

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 1 – Main Extensions

- 1.01 Extensions Defined. Distribution system extensions, to include the total existing or future service areas, are referred to as “Main Extensions.” “Main Extensions” shall further be defined as “City Mains” and “Private Mains.”
- a. City Mains. Main extensions as designated by the City Engineer to be located within public rights-of-way and/or easements as determined by the City Engineer. These mains and appurtenances shall be owned and maintained by the City of Cripple Creek.
 - b. Private Mains. Private Mains are main extensions designated by the City Engineer to be located outside of public rights-of-way and /or easements. These mains shall be owned and maintained by an individual, property owner(s), corporations, home owners association or partnership. Private Mains shall be limited to mains required for fire protection unless determined otherwise by the City Engineer. See Section [203] of these Specifications.
 - c. Standard Specifications to Apply. These Standard Specifications shall apply uniformly to both “City Main” and “Private Main” extensions, subject only to specific appurtenance and procedural variations.
- 1.02 Responsibility for Main Extensions. All water main extensions within the City of Cripple Creek and Teller County, to include the total existing and future service areas, shall be made at the expense of the developer or owner. Extensions shall be made from the nearest adequate source, as determined by the City Engineer, to a point of the property line, farthest from the existing distribution main, on the frontage of the applicants property. The City Engineer shall determine the size of main, location and required appurtenances, and the City Engineer’s determination of size, location, appurtenances and point(s) of extension of water mains shall be final. See Sections [3.03] and [7.02] of these Specifications.
- 1.03 Surface Restoration. The Owner/Developer shall be responsible to restore the surface to original or better condition and to provide landscaping, grading and drainage controls adequate to prevent erosions caused by surface run-off. Landscaping and restoration construction shall be designed in such a manner that minimum future maintenance will be required. A landscaping and restoration design plan shall be submitted with the final water main extension plan for approval and will be subject to the same guarantee as described in Section [2.13] of these Specifications.
- 1.04 Application Procedure.
- a. The process is initiated by submitting a letter to the City of Cripple Creek, Attn: City Engineer, 337 E. Bennett Avenue, Cripple Creek, Colorado 80813, identifying the proposed expansion and requesting a meeting to discuss.
 - b. After meeting with the City Engineer, the applicant shall submit an initial proposal containing a description and scaled drawings of the proposed water system expansion. As a minimum the proposal should contain the following:

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

1. A master plan depicting the area to be developed.
 2. A depiction of adjoining proposed current or future developments by the applicant.
 3. A general description of the number and linear feet of mains and service lines to be added.
 4. A projection of the additional customers to be served to include the size, number, location, and current and planned zoning.
 5. A schedule containing “no earlier than” and “no later than” start and completion dates and a list of major milestones.
 6. A projected budget for the expansion with details on project funding to include sources of funding and terms of funding.
- c. After reviewing the initial submittal, the City Engineer will identify requirements for:
1. Points of connection to existing facilities.
 2. Size of mains to be installed.
 3. General alignment of mains to be installed.
 4. Special features such as storage tanks, water quality sampling points, pressure regulating valves, back-flow prevention valves, blow-offs, relief valves, booster pumps, etc.
 5. Acceptable materials.
 6. Warranty and bonding requirements.
 7. Schedule limitations.
 8. Restoration requirements.
- 1.05 Upon receipt of the information contained in Section 1.5.3, the applicant shall then prepare a final proposal. The plans contained in the final proposal must be prepared by a Professional Engineer registered in the State of Colorado and approved in writing by the Owner and/or Developer. The final submittal shall contain all of the following items:
- a. Plan and profile drawings.
 - b. A Restoration Plan to include a proposed restoration schedule.
 - c. Water Main Extension Plan Statement.
 - d. Recorded Subdivision Plat.
 - e. Storm Drain and Street Plan.
 - f. Wastewater Plan.
 - g. Traffic control plan.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- 1.06 The City Engineer shall check all submittals for conformance with these Standard Specifications and other applicable rules and regulations and either concur with the submittal or return it to the applicant with recommended corrections. Any revisions, amendments or additions made to the original submitted information once the water main extension design is initiated, shall be applied to the original submitted information by the applicant's Engineer and signed by same.
- 1.07 Upon receipt of the applicant's final proposal, the City Engineer shall forward the proposal with a positive or negative endorsement to City Council for review and approval.
- 1.08 Plan and Profile Sheets.
- a. Plan and profile drawings shall be provided for all water main extensions. Preparation of drawings shall be at the expense of the Owner and/or Developer and shall bear the name and registration number of a Registered Professional Engineer in the State of Colorado.
 - b. Plan and profile sheets shall be made from actual field surveys referenced to land corners or other official survey control points. They shall be of sufficient accuracy to identify and locate new underground facilities for maintenance, tapping and control.
 - c. Drawings must be of suitable scale to show all necessary information and show sufficient adjacent area to provide the spatial relationship between new and existing facilities. The preferred scale for plan and profile drawings is 1" = 50' horizontal and 1" = 5' vertical but may be adjusted to fit the circumstances of the particular application. Larger scales shall be used on detail drawings when necessary to adequately show specific details of mains, connections and other installations.
 - d. Additional specifications added to plan and profile drawings shall be in addition to, and shall supersede these Specifications.
 - e. Plan and profile sheets shall be neat, orderly and legible and shall contain:
 1. The proposed alignment and size of the water lines to include the location of all proposed facilities such as valves, hydrants, fitting, etc.
 2. Private service taps to include location and size.
 3. A recorded plat showing location and dimensions of dedicated street, alleys, right-of way and easements to include the recorded book and page numbers, or any other data which could conflict with or require deviations in the design of the water main.
 4. Legal descriptions containing lots and blocks.
 5. All existing and proposed curb and gutter.
 6. Sidewalk and curb locations with respect to property lines.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

7. All existing or proposed utilities which may conflict with, cross or parallel water main installations to include size, type and horizontal and vertical locations.
 8. All existing or proposed obstructions such as vaults, catch basins, traffic islands, etc.
 9. Horizontal and vertical location of all existing and proposed utilities and structures which may conflict.
 10. Curve data.
 11. USGS elevations and bench marks with a location and description.
 12. Manhole invert and rim elevations.
 13. Original and proposed ground line.
 14. Control line with stations.
 15. See Standard Drawings No. 2 and 3 for additional details.
- 1.09 Conflicts Between Plans and Specifications. When a conflict occurs between or within standards, specifications and drawings, an interpretation shall be made by the City Engineer, pursuant to Section [1.05] of these Specifications.
- a. Addenda and modifications to the drawings and specifications take precedence over the original documents.
 - b. Should there be a conflict within the Specifications or on the drawings, the City Engineer shall decide which stipulation will provide the best installation and his/her decision shall be final.
 - c. In the drawings, calculated dimensions shall take precedence over scaled dimensions and noted material over graphic indication.
- 1.10 Construction Procedure. Following final approval of the plan(s), the applicant may proceed with construction. It shall be the Developer's responsibility to notify the City Engineer a minimum of five (5) working days prior to his/her intent to begin construction. It shall also be the Developer's responsibility to see that the area of construction is free of debris, material, equipment or any other obstacles, which may obstruct the placement of stakes or access to reference points. In addition to all construction requirements contained in other portions of these Specifications, the applicant and his/her Contractor shall observe the following:
- a. Construction shall commence within six months of the approval date shown on the plans or the plans must be resubmitted for review and approval. If construction on the main installation is halted for more than six months, plans must be resubmitted for review and approval.
 - b. The applicant shall secure and pay for all licenses and permits required for the system extension.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- c. All materials needed to complete the work shall be on hand so that the project may proceed without delay.
 - d. Adequate provisions for notification of customers who may suffer outages must be developed. Outages shall be kept to a minimum in compliance with Section [5.24.d] of these Specifications.
 - e. Mains shall not be installed unless they can be extended from an approved permanent water source, which can supply sufficient water for chlorinating and flushing.
 - f. Mains shall be chlorinated in accordance with Section [5.26] of these Specifications.
 - g. The Contractor shall be responsible for arranging for or making all taps from main extensions on both public and private water mains. Mains shall only be tapped for service lines after having been installed, chlorinated, tested and flushed to the satisfaction of the Inspector. No tapping of dry mains shall be allowed. See Section [5.24.b] of these Specifications.
- 1.11 Surveying. Line and grade for all water mains and appurtenances shall be established by a Professional Engineer or by a Land Surveyor, licensed to practice in the State of Colorado or his/her authorized representative. All work shall be done in a professional manner. Correct alignment and grade of the water mains shall be the responsibility of the owner or developer's Engineer. Approval of the staked alignment and elevations by the Inspector does not relieve the Engineer in any manner from the responsibility for field errors. Sufficient line shall be staked to ensure continual work progress. Under no circumstances shall pipe be installed without line and grade stakes set by the Engineer or Surveyor and approved by the Inspector.
- a. Exception – If a main less than 12-inch diameter is to be extended in an existing street and if the Engineer who prepared the plans can provide evidence that the finish grade of the street is to remain unchanged, no grade stakes need be set. The main shall be installed with a minimum of 7 feet and a maximum of 8 feet of cover.
 - b. Placing Survey Lines.
 - 1. Hubs and stakes shall be set on an offset line to mark the location of the centerline of the water main. Centerline hubs and stakes may be used in addition to, but not in place of, offset hubs and stakes. Normal practice is to set offset hubs and stakes 5 feet to 10 feet off the centerline of the water main.
 - 2. Survey points shall be set a maximum distance of 50 feet apart. All valves, crosses, tees, horizontal and vertical bends and hydrants shall be staked for location and grade. Points of curvature and points of tangency of curves, as well as points on the curve, shall be staked. All stakes shall be flagged to increase their visibility.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3. Fire hydrants shall be set so that the elevation of the center of the traffic flange is four inches above the finish grade of the ground or top of the curb and/or sidewalk. See Section [5.17] and Standard Drawings No. [4 and 5].
 4. Notice of and preparation for staking for line and grade for water mains shall be provided by the Developer.
- 1.12 Inspection. New installation or replacement of any existing facilities in the water distribution system shall be inspected and approved by the City Engineer or his representative.
- a. The Inspector shall ensure that the provisions of the Standard Specifications are carefully complied with, especially with regard to the quality of workmanship and material. Problems, which may require sound field judgment, in lieu of strict interpretation of the Standard Specifications, shall be resolved by the Contractor to the satisfaction of the Inspector.
 - b. All work shall be performed in accordance with accepted workmanship practices and these Standard Specifications. Any work not accepted by the Inspector shall be redone until compliance with these Standard Specifications is achieved.
 - c. All appropriate permits and approved water main extension plans shall be kept on the job site and shall be checked by the Inspector before starting construction.
 - d. The Inspector shall not supervise nor set out work or give line and grade stakes. A responsible representative for the Contractor, designated by the contractor, shall be at the project site at all times that construction is in progress. The Inspector shall discuss the work with the Representative or his/her supervisors only. Any directions given to the workmen will be given them by the Representative. If at any time during construction it is found that no Representative for the Contractor is at the project site, then such a situation shall be cause for the Inspector to stop work until a Representative is present at the project.
 - e. All materials used shall be subject to the inspection and approval of the Inspector at all times. The Inspector has the right to perform any testing deemed necessary to insure compliance of the material with these Specifications. No material shall be used before being inspected and approved by the Inspector. Failure or neglect on the part of the Inspector to condemn or reject inferior material, or work, shall not be construed to imply their acceptance should their inferiority become evident at any time prior to completion of a one year warranty period. See Section [2.13] of the Specifications. Materials rejected by the Inspector shall be immediately removed from the job site.
- 1.13 Overtime.
- a. Overtime work is defined as work performed on Saturdays, Sundays, City of Cripple Creek Holidays or on weekdays before 8:00AM or after 4:00 PM. All overtime work performed shall be subject to charges for inspection by the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- b. All overtime inspection work performed as a result of work being carried on by the Contractor will be charged to the Contractor at one and one-half times the normal rate for Inspectors, with double time charged on Sundays and holidays, plus straight time for equipment. The equipment usually being defined as the Inspector's vehicles.
 - c. All overtime worked by Inspectors shall be authorized in writing by the Contractor on forms available from the Inspector. All overtime work must be approved by the Inspector at least five working days in advance of the proposed work. Overtime work may be denied by the Inspector if it conflicts with other City activities or events.
- 1.14 Performance Agreement and Bill of Sale. The Developer shall furnish to the City Engineer a guarantee for the satisfactory repair or replacement where required, or the cost thereof, of all work, material, service and equipment which becomes defective as a result of faulty materials, faulty installation, or improper handling of material and equipment installed by the Contractor. Such guarantee shall be for a period of one (1) year from the date of acceptance of all work performed. This date shall be the approval date as recorded on the Performance Agreement and Bill of Sale form.
- a. The Performance Agreement and bill of Sale form shall be provided to the Developer by the City Engineer. The Developer shall complete the form and return it to the City Engineer for final approval.
 - b. A copy of the final approved form will be sent to the Developer.
 - c. Special Conditions. When applying for a main extension, special conditions that involve another agency, such as crossing a railroad or highway, may exist. All conditions of the other agency must be satisfied. All designs, drawings and calculations submitted to another agency shall also be submitted to the City Engineer for approval. Should a conflict in the plans and specifications occur between the City Engineer and the other agency, the more stringent plans and specifications yielding a higher quality product shall prevail.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

CITY MAIN EXTENSIONS

Water Main Extension Plan Statement

The undersigned Owner/Developer agrees that the installation of these proposed water facilities will be made in accordance with City of Cripple Creek specifications and shall provide a minimum of 7 feet and a maximum of 8 feet of cover over the water main(s). Any changes required to meet the above stipulations shall be at the expense of the Owner/Developer. Cover in excess of 8 feet shall be supported by plan and profile drawings approved by the City Engineer.

Signed _____ Date _____
Owner/Developer

DBA _____

Address _____

All hydrants shall be installed according to the City Engineer's Specifications.

Water Installation Corrosion Control Requirements

None required
Required, described as follows:

Water Main Extension Plan Approval

Signed _____ Date _____
City of Cripple Creek
City Engineer

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

PRIVATE MAIN EXTENSIONS

Water Main Extension Plan Statement

The undersigned Owner/Developer agrees that the installation of these proposed water facilities will be made in accordance with City of Cripple Creek specifications and shall provide a minimum of 7 feet and a maximum of 8 feet of cover over the water main(s). Any changes required to meet the above stipulations shall be at the expense of the Owner/Developer. Cover in excess of 8 feet shall be supported by plan and profile drawings approved by the City Engineer.

Signed _____ Date _____
Owner/Developer

DBA _____

Address _____

All hydrants shall be installed according to the City Engineer's Specifications.

Water Installation Corrosion Control Requirements

None required
Required, described as follows:

Water Main Extension Plan Approval

Signed _____ Date _____
City of Cripple Creek City Engineer

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 2 – Distribution System Design and Layout

- 2.01 General. The purpose of the chapter is to provide information for the standardized design and layout of the City of Cripple Creek’s water distribution system.
- 2.02 Quality of the Distribution System. These Standard Specifications are designed to ensure that only proven high quality materials are installed using first class workmanship. Determination of the best materials and constructions methods are based upon lowest life cycle costs, not upon lower initial costs. Sizing and layout of the system are parts of the total consideration of design, operation and maintenance of a water supply system that yields optimum quality service at the lowest total cost to the customer.
- 2.03 Sizing of Distribution Mains. All mains shall be sized large enough to provide for domestic, irrigation, and fire protection flows to the area requesting service and shall meet the following requirements:
- a. Mains shall be sized to provide service for projected future needs. See Section [2.03] of these Specifications.
 - b. In business and industrial areas, sizes may be increased in adherence to the recommendations of the Insurance Services Organization to provide adequate fire flows.
 - c. Planned Building Groups may be treated the same as Industrial and Business areas because of the high fire risk. These areas generally require “Private Mains.” See Sections [2.01 and 2.04] of these Specifications.
- 2.04 Fire Protection.
- a. Fire Hydrants. The number and location of fire hydrants in a given area is determined by the City Engineer. Normal practice is to install fire hydrants on the corners of street intersections. If fire hydrants are to be installed at locations other than street intersections, they shall be located on lines, which are established by extending property lot sidelines into the streets. Any other proposed location must be approved by the City Engineer. See Standard Drawing No. [4].
 - b. Fire hydrant branch lines shall be set at right angles to street mains. The hydrant shall be set at the end of the branch line and shall face the branch line. No horizontal or vertical bends or offsets shall be used in installing fire hydrant branch lines unless approved by the City Engineer. Under no circumstances shall any size or manner of tap be made on a fire hydrant branch line between the hydrant and hydrant valve.
- 2.05 Private Mains. When required in business, industrial and building group areas where increased fire protection is necessary, private fire mains and hydrants may be needed. Location of these facilities to be determined and approved by the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- a. Private mains shall be treated as large service lines. Domestic service, irrigation and/or fire sprinkler lines may be extended to buildings provided all service line and meter installation requirements are complied with.
 - b. Private Mains shall be constructed of the same quality, material and workmanship as City Mains and shall meet the requirements of these Standard Specifications and all other applicable rules, regulations and Building Code requirements.
 - c. A gate valve and a backflow prevention device will be installed at the point of connection with the City Main and at the property line.
 - d. All private main extensions shall be limited to single platted lots. Extensions will not be allowed to cross lot lines for the purpose of serving two or more platted lots and building complexes. Responsibility for a private main must remain with one property owner. See Sections [2.01 and 2.04] of these Specifications.
 - e. Private main extensions, to include fire hydrants, shall be installed in accordance with these Specifications and shall be inspected by the City Engineer or his representative. See Section [2.12] of these Specifications.
- 2.06 Distribution Regulation Installations. Regulating installations are required to control pressure, provide pressure relief and separate pump and gravity zones throughout the water distribution system. When main extension plans are submitted for review, the need for regulating installations will be determined by the City Engineer, based on existing and proposed pressure zones, booster pump areas and the existing distribution system piping.
- a. Presently, regulating installations shall be categorized as follows:
 1. Pressure Regulating Station
 2. Pressure Relief Station
 3. Check Valve Station
 - b. All regulation installations will be designed by the Applicant and installed by the Owner/Developer subject to City Engineer review and approval.
 - c. All required piping, regulators, fittings, valves, etc.; to be installed within the confines of a station shall be furnished by the Owner/Developer. Upon completion and acceptance of the station, the station shall become the property of the City.
 - d. All required concrete pits, concrete, reinforcing steel, manhole assemblies, and the total installation shall be provided by the Owner/Developer in accordance with Standard Drawings No.[24 through 28]. Any proposed deviations or changes from these drawing will require engineering plans and specifications, to be provided by the Owner/Developer, and approved by the City Engineer. See Section [5.20] of these Specifications.
 - e. Responsibility and requirements for the installation of regulating stations to be incorporated will be specified on the plan and profile drawings.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- 2.07 Pumping Facilities. Booster pumping facilities may be allowed on mains supplying water from the City distribution system only where specifically authorized by the City Engineer. The City Engineer will prohibit the installation of pumping facilities where, in his opinion, such installations would be injurious to the operation, or future operation, of the City's distribution system. All proposed booster-pumping facilities shall be considered as a special feature and will be evaluated individually on a case-by-case basis. This may include pressure testing of the total installation when determined necessary by the City Engineer.
- 2.08 Storage Facilities. Water storage reservoirs are required throughout the distribution system to maintain adequate supply during peak demand periods. Storage reservoirs may also be required adjacent to and on the suction side of pumping facilities. The size, location and type of storage reservoirs shall be determined by the City Engineer. All proposed storage facilities shall be considered a special feature and will be evaluated individually on a case-by-case basis.
- 2.09 Layout of the Distribution System.
- a. Width Requirements for City Installations. All City mains shall be installed in dedicated public streets of 50 feet minimum width. When the City Engineer determines it is not possible or feasible for an installation to be made in a dedicated street, the installation shall be made in a right-of-way or easement. The conditions under which such an exception will be allowed will be determined for each individual case. Only rights-of-way and easements, which conform to the requirements of these specifications, will be accepted. The minimum acceptable width is a twenty feet (20') exclusive or a forty feet (40') non-exclusive right-of-way or easement. If, at the determination of the City Engineer, it is not feasible to meet the above requirements, streets, alleys, right-of-way or easements of other widths may be evaluated on a case-by case basis.
 - b. Dedicated Streets. Pipe alignment shall be parallel to property lines. Normal practice is to lay the pipe on the south or west side, 10 feet from the centerline of the street. Except as stated above, pipe alignment shall be between the limits of the curb and gutter within an established roadway. Minimum clearance for the edge of the gutter pan shall be 4 feet in all cases. See Standard Drawing No. 1.
 - c. Fire Hydrants. All fire hydrants will be installed within dedicated streets or in the right-of-way or easements as defined above. Fire hydrants shall be installed only at location designated by the City Engineer as specified in Section 2.4. See Standard Drawing No. 4 for additional details.
 - d. Line Valves. Line valves are required at street intersections. In certain situations, at the discretion of the City Engineer, one or more line valves may be required between intersections. Street intersections carrying heavy traffic, or containing major water distribution mains in both directions will require four valves, one in each direction. All tee intersections of distribution mains, with the exception of hydrant tees, will require three line valves. Where necessary, the Inspector mayll

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- require the installation of additional line valves in order to avoid exposing existing customers to high chlorine residual during disinfection of pipelines. See Standard Drawing No. 7.
- e. Connections to Mains for Fire Sprinkler Lines. Sprinkler heads found in hotels, motels, public assembly places, warehouses, etc. are supplied by a fire line. The fire line shall be sized by the persons responsible for the structure it protects. The City Engineer will not size fire lines.
 - f. Clearance and Encasement Design for Sanitary and Storm Sewer Crossing. Normal design and construction practice shall provide for at least 18 inches separation between the crown of a sewer pipe and the bottom of the water main where the water main is laid over or above a building sewer (service line), sanitary sewer or storm sewer. Where a sewer (building sewer, sanitary sewer or storm sewer) passes over or is less than 18 inches under a water main, one of the following design and construction procedures shall be followed:
 - 1. One length of pipe at least 18 feet long shall be constructed in the sewer and centered over or under the water main. Joints between the sewer pipe and the special pipe should be encased in a concrete collar at least six inches thick and extending at least six inches either side of the joint. This shall be in addition to the use of a premanufactured adapter coupling such as a Mission, Fernco or Caulder coupling with stainless steel tightening bands.
 - 2. Reinforced concrete encasement shall be installed around the sewer pipe. The encasement shall be in accordance with Standard Drawing Nos. [18, 19 and 20]. In general, the encasement shall be a minimum of 12 inches thick and extend a distance of 10 feet either side of the center of the water main. Where the water main passes beneath a storm sewer pipe or an open drainage channel, the water main shall be encased in reinforced concrete in accordance with Standard Drawing Nos. [18 or 19.]
 - 3. Where water mains pass under sewers (building sewer, sanitary sewer or storm sewer), in addition to one of the two items above, the following shall be accomplished to prevent cross-contamination:
 - 4. A vertical separation of at least 18 inches between the invert of the sewer and the top or crown of the water main.
 - 5. Adequate structural support for the sewer pipe to prevent excessive deflection of joints and settling on and breaking the water main. Such structural support shall be in accordance with Standard Drawing No. [20] or approved modifications thereto.
 - g. Parallel Installations. Parallel installations of water mains with sanitary sewer, storm sewer or sewer manholes shall provide for a 10-foot horizontal separation. Where special conditions exist which prohibit a horizontal separation of 10 feet, a water main may be laid closer to a storm or sanitary sewer provided that:

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

1. It is constructed in a separate trench with undisturbed soil material between the water main and the sewer main.
2. The elevation of the crown of the sewer is at least 18 inches below the bottom of the water main pipe. Such separation shall be undisturbed or compacted soil material.
3. Where a minimum of 18-inch vertical separation cannot be obtained, the sewer shall be constructed of materials and with joints that are equivalent to water main standards of construction.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 3 – Materials

- 3.01 Materials and Testing. Detailed technical specifications for purchase or approval of materials are included in this chapter. All materials shall conform to these Specifications and to all limitations on acceptable makes and styles.
- a. All materials furnished shall be new and undamaged. Everything necessary to complete all installations in accordance with these Standard Specifications shall be furnished and installed whether shown on approved drawing or not; and all installations shall be completed as fully operable, functioning components of the City's water distribution system.
 - b. Acceptance of materials, or the waiving of inspection thereof, shall in no way relieve the applicant of the responsibility for furnishing materials meeting the requirements of these Specifications.
 - c. New water industry products or materials will be tested, if it is the opinion of the City Engineer that the product or material is of appropriate quality and durability. The City Engineer will establish the criteria for testing or evaluating the product and reserves the right to accept or reject any product or material regardless of the test results.
- 3.02 Size of Mains. The size of mains shall be in accordance with Section 2.03 of these Specifications.
- 3.03 Pipe Pressure Classes. The following minimum AWWA pressure classes for acceptable types of pipe are required:
- a. Ductile Iron Pipe (DIP) Class 51
 - b. All pipe shall conform to the following:
 - c. General. All ductile iron pipe shall be manufactured in accordance with AWWA Standard C151 and ANSI A21.51 "Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids," with the following additional requirements or exceptions:
 - a. Size of Pipe. This specification shall cover ductile iron pipe in 4-inch, 6-inch, 8-inch, 10-inch, 12-inch, 16-inch and 20-inch nominal diameters.
- 3/13/31 I-4-1
- b. Joint Type. "Push-on single gasket" type conforming with applicable requirements of AWWA Standard C111 and ANSI A21.11, "Rubber-Gasket Joints for Ductile-Iron and Cast-Iron Pressure Pipe and Fittings."

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- c. Class and Type. Pipe furnished under this specification shall conform to the following thickness classes as a minimum:

4" – 20" Diameter: Class 51

- d. Pipe Length. Pipe furnished under this specification shall have normal laying lengths of either 18 feet or 20 feet. Random lengths are not acceptable.
- e. Material Strength. Iron used in the manufacture of pipe furnished under this specification shall have 60/42/10 physicals.
- f. Cement Mortar Lining. Pipe furnished under this specification shall have standard thickness cement mortar linings in accordance with AWWA Standard C104 and ANSI A21.4, "Cement-Mortar Lining For Ductile-Iron Pipe and Fittings for Water."

- 4.04 Pipe Fittings. All ductile iron fittings used in the City of Cripple Creek water distribution system shall meet the latest AWWA Standard C110 and ANSI A21.10 or AWWA Standard C153 and ANSI A21.53.

All fittings shall be furnished with mechanical joint ends and shall conform to the following:

- a. General. All ductile iron fittings shall be manufactured in accordance with the following AWWA Standards: C104, "Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water"; C110, "Ductile Iron and Gray Iron Fittings, 3-Inch Through 48-Inch for Water and Other Liquids"; C111, "Rubber-Gasket Joints for Ductile-Iron and Cast-Iron Pressure Pipe and Fittings"; C153, "Ductile-Iron Compact Fittings, 3-Inch Through 16-Inch for Water and Other Liquids"; with the following additional requirements or exceptions.
- b. Cement Mortar Lining. All sizes of ductile iron fittings shall be furnished with a cement-mortar lining of standard thickness as defined in referenced specifications and given a seal coat of bituminous material.
- c. Type of Joint. All fittings shall be furnished with mechanical joint ends conforming to referenced specifications.

3/13/91

I-4-2

- d. Thickness Class. All fittings shall be 350 psi pressure rating and shall conform to the dimensions and weights shown in the tables of referenced specifications.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

e. Material. All fittings shall be made from ductile iron.

4.05 Steel Pipe and Fittings. Steel pipe and fittings, when required, shall conform to the following:

a. General. All steel pipe, fittings and specials shall be fabricated in accordance with AWWA Standard C200, "Steel Water Pipe 6-Inches and Larger," AWWA M-11 Steel Pipe Manual and the requirements on the drawings.

Complete shop drawings shall be submitted to the City Engineer for approval prior to any fabrication.

b. Material. All material used shall be acceptable under the "Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality," ASTM Designation A283, Grade C or D.

Steel pipe, fittings, and specials shall be fabricated to the sizes, dimension, and shapes as indicated on the drawings. Specified pipe shall be the nominal outside diameter of the pipe. All pipe shall have a wall thickness of at least 1/4 inch.

All flanges shall be forged steel slip-on hub type fabricated in accordance with AWWA Standard C207, Minimum Class E.

All fittings shall be fabricated from tested pipe and dye checked in accordance with AWWA Standard C208

Built-up ends and harness lugs shall be a part of the fabrication as indicated on the drawings.

c. Protective Coating. All steel pipe, fittings, and specials shall be prepared, primed, lined, coated, painted or wrapped as hereinafter specified.

(1) Exterior Surfaces in Interior Locations. Exterior surfaces of all pipe, fittings, specials, flanges and accessories exposed in interior locations shall be thoroughly cleaned by sandblasting and given a prime coat of primer in accordance with AWWA Standard C203.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

(2) Exterior Surface Underground. Exterior surfaces of all pipe, fittings, and specials which are to be installed underground shall be cleaned by sandblasting, primed and coated with coal tar enamel, fibrous glass mat and wrapped with Kraft paper. Coal tar coating and wrapping shall be held back 12 inches from ends to be mechanically coupled. Uncoated areas shall be primed with coal tar primer. All coating and wrapping shall be in accordance with AWWA Standard C203.

(3) Interior Surfaces. The interior of all steel pipe fittings and specials shall be cleaned and then lined with cement mortar in accordance with AWWA C205, or lined with coal tar epoxy according to AWWA Standard C210.

4.06 Gate Valves. Gate valves shall be the same size as the main. Valves shall open to the left (counterclockwise). Gate valves shall conform to the following:

- a. General. All valves shall be manufactured in accordance with AWWA Standard C509 with the following additional requirements or exceptions.
- b. Valve Description. Valves shall be resilient wedge, cast iron body, fully bronze-mounted, with non-rising stem, resilient seat and epoxy lined.
- c. Service. All valves shall be suitable for frequent operation as well as service involving long periods of inactivity. The operating pressure for all sizes shall be 200 psi with testing pressure of 400 psi.
- d. Valve Stems. Valve stems shall be threaded so that the valve can be opened by turning to the left (counterclockwise). The stem shall be non-rising and be sealed with "0" ring packing. All valves shall be equipped with a 2-inch square wrench nut.
- e. Extension Stems. Provide wherever operating nuts are 5 feet below grade. The stems shall consist of solid steel shafting with O.D. not less than O.D. of valve stem or galvanized steel pipe with I.D. not less than O.D. of valve stem. Connect to valve by flexible socket coupling.
- f. Types of End Connections. All valves shall have a mechanical joint end with gasket, gland and fasteners conforming to the ANSI A21.11 (AWWA Standard C111, "Rubber-Gasket Joints for Ductile-Iron and Cast-Iron Pressure Pipe and Fittings"). Plain rubber gaskets shall be used except that in certain conditions, the City Engineer may require the use of special rubber gaskets.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/03

I-4-4

- g. Manufacturer. Because of the problems associated with stocking repair parts for all make of valves, only the following makes are acceptable for use in the City Engineer's distribution system:

Mueller
M&H
Clow
Waterous

4.07 Valve Boxes. All buried valves shall be provided with a 6-inch cast iron valve box, slip type. The valve box shall be of a design, which will not transmit shock or stress to the valve and shall have enough extension capability to be raised to final street grade. Valve boxes shall conform to the following:

- a. General. The manufacturer of valve box components shall be experienced in their design and construction, shall be regularly engaged in their manufacture and shall have produced valve boxes, which have given successful service for a period of at least five (5) years.

- b. Materials. Valve box parts shall be made of gray cast iron.

Use of an aluminum alloy as a casting material is not acceptable

- c. Approved Patterns. Valve Boxes shall be the three-piece adjustable slip type and only the following pattern acceptable:

Tyler Slip Type 6-Inch Cast Iron Valve Box Assembly Series 6855 or equal.

- d. Coating. Box, cover and base coated by dipping in asphalt varnish.

- e. Cover. Deep socket type with the word "WATER" cast in tope for water applications.

4.08 Fire Hydrants. Within the City of Cripple Creek distribution system where maintenance, repair, replacement, and parts stocking is the responsibility of the City, only one (1) hydrant as listed is acceptable.

- a. General. All fire hydrants shall be designed and manufactured in strict compliance with AWWA Standard C502, "AWWA Standard for Dry-Barrel Fire Hydrants". All references made in this specification are to the above standard unless otherwise noted.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-4-5

b. Acceptable Brand and Service Limitations:

Static Pressure
Less than 200 psi

Mueller Super Centurion 200

c. Size of Hydrant. Hydrants shall have a main valve opening size of 5-1/4 inches and shall be ordered for a 7-foot 6-inch bury unless otherwise approved by the City Engineer.

Hydrant bury will be measured from the bottom of the hydrant lateral pipe to finish grade line.

d. Type of Hydrant. All hydrants shall be the traffic model type. Hydrants shall be the three-way type with one (1) pumper nozzle and two (2) hose nozzles all located on the same horizontal plane.

e. Inlet Connection. Hydrant base shall be provided with a mechanical joint inlet to accommodate 6-inch diameter ductile iron pipe, all in accordance with ANSI A21.11 (AWWA Standard C111, "Rubber Gasket Joints for Ductile-Iron and Cast Iron Pressure Pipe and Fittings"). Incorporated into the base shall be two (2) lugs from rodding or strapping of pipe.

f. Main Valve Assembly. The main valve of the hydrant shall be 5-1/4 inch diameter compression type, which closes with the water pressure.

Gasket for valve shall be a replaceable type fabricated of a resilient material, with a threaded bottom plate or nut, complete with seal to prevent leakage of the hydrant shaft.

The valve assembly shall include one or more drain valves, which will work automatically with the main valve and drain the barrel when the main valve is in the closed position.

All parts of the main valve assembly shall be so designed that removal of assembly from the barrel is accomplished without excavation in accordance with Part III of these specifications.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- g. Operating Shaft Nut. The operating nut shall have a pentagon cross-section. See Standard Drawing No. 6. Bushings in the bonnet shall be so constructed that it will prevent the operating nut from traveling during opening or closing operation;

3/13/91

I-4-6

also the bushing shall house a gasket or seal to prevent moisture or foreign material from entering the lubricant reservoir.

The hydrant shall open by turning the operating nut to the left in a counter-clockwise direction and shall have an arrow on top of the bonnet to designate the direction of opening.

- h. Pumper Nozzle and Cap. The pumper nozzle shall be 4-1/2 inch nominal diameter with four threads per inch (National Standard). Threads shall be right-hand. See Standard Drawing No. 6.

Nozzle cap shall be furnished with a synthetic rubber gasket installed in a retaining groove and the dimensions and shape of the nozzle cap nut shall be the same as the operating shaft nut.

Nozzle caps shall be furnished with a security chains with one end of each securely attached to the upper barrel section of the hydrant.

All nozzle caps shall be removed by turning counter-clockwise.

- i. Hose Nozzles and Caps. The two hose nozzles shall be 2-1/2 inch nominal diameter with seven and one-half threads per inch (National Standard). Threads shall be right-hand. See Standard Drawing No. 6. Each hose nozzle shall include a nozzle cap with nut, security chain and shall be removed by turning counterclockwise.
- j. Color. The upper exposed section of the hydrant above ground shall be painted Rustoleum 1210 – Fire Hydrant Red of equal. The buried portion of the hydrant shall be given a bituminous coating in accordance with Section 684 of AWWA Standard C106.

- 4.09 Corrosion Protection Systems. The testing of the corrosiveness of the soil, which a water main passes through, may be required by the City Engineer. If so required, the testing shall be accomplished by the Applicant. The need for protection will be determined by the City Engineer based on the information submitted by the Applicant and/or other information available to the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- a. Polyethylene Encasement Material. If determined by the City Engineer as a requirement, the pipe, fittings, rods, and appurtenances shall be wrapped in polyethylene in accordance with Section 5.25 and Sheet p of the Standard Drawings. Polyethylene Material shall conform to the following:

3/13/03

I-4-7

- (1) General. A polyethylene encasement material shall be manufactured in accordance with AWWA Standard C105, "Polyethylene Encasement For Gray and Ductile Cast-iron Piping For Water And Other Liquids," with the following additional requirements or exceptions.
- (2) Materials. The raw material used to manufacture polyethylene film shall be Type 1, Class A, Grade E-1, in accordance with A.S.T.M. Standard Designation D-1248.

Tensile Strength	1200 psi minimum
Elongation	300% minimum
Dielectric Strength	800 V/Mil Thickness minimum
Thickness	0.008" (8 mils) minimum Nominal with minus tolerance not exceeding 10% of nominal
Melt Index	0.4 maximum

- 4.10 Concrete Thrust Blocks, Anchors and Structures. Concrete thrust blocks and anchors shall be sized for the internal pipe pressure and soil bearing capacity. Standard sizes and shapes of thrust block and anchors are shown on Sheets 12 and 17 of the Standard Drawings.

Thrust reaction blocking shall be concrete of a mix not leaner than 1 part cement to 2-1/2 parts sand and 5 parts stone, and having a compressive strength of not less than 3000 psi after 28 days. See Section 5.19 of these specifications. The concrete and any required reinforcement shall meet the following criteria:

- a. Materials.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Cement. All cement used shall be Portland Cement acceptable under the “Standard Specifications and tests for Portland Cement,” ASTM Designation C150 of the American Society for Testing and Materials. Cement used shall be Type II.

Aggregates. All the fine and coarse aggregates shall meet soundness requirements, deleterious substance limits and grading limits as set forth in the latest edition of “Standard Specifications for Concrete Aggregates” ASTM Designation C33. The limits for deleterious substances and physical property requirements of the coarse aggregates shall be selected for the applicable class designation from those listed under severe weathering regions, Table 3 ASTM Designation C33. The maximum

3/13/91

I-4-8

size aggregate that is practical for the structure design and placing conditions shall be used in the concrete.

Water. The water used in all concrete shall be free from objectionable quantities of silt, organic matter, alkali, salts, and other impurities.

Admixtures. An air-entraining agent shall be used in all concrete. The agent used shall conform to “Standard Specification for Air-Entraining Admixtures for Concrete,” ASTM Designation C260. The amount of air-entraining agent used shall be such as will affect the entrainment of $5\% \pm 1\%$ of volume of the concrete.

A water-reducing admixture (WRA) may be used unless otherwise noted by the City Engineer. The admixture shall conform to ASTM Designation C494 for Type A or Type D chemical admixture, shall contain no calcium Chloride, and shall be compatible with the cement being used.

The Contractor shall be responsible for any difficulties arising or damages occurring as a result of the selection and use of any admixture such as a delay or difficulty in concrete placing or damage to concrete during form removal.

- b. Concrete Quality. All Concrete shall have a minimum 28-day compressive strength of 3,000 psi and a maximum slump of 4 inches.
- c. Testing. When determined necessary by the City Engineer, field control tests consisting of aggregate gradation tests, slump tests, air content tests, and making compression test cylinders, shall be performed by qualified personnel in the presence of the Inspector.
- d. Concrete Reinforcement. Reinforcements shall be accurately formed and shall be free from loose rust, scale and contaminants, which reduce bond. Unless otherwise

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

shown on the drawings or specified herein, all requirements shall conform to the latest ACI Standard 318 and the Uniform Building Codes.

Reinforcements shall be accurately positioned on supports, spacers, hangers, or other reinforcements and shall be secured in place with wire ties or suitable clips.

- e. Reinforcement Material. All deformed reinforcing bars shall conform to ASTM Standard A615, minimum Grade 40.

- 4.11 Casing Pipe. Installation of mains through rights-of-way or easements of others, such as highways, railroads, etc., may require casing pipes for bores. The type of casing material and its properties will be specified by the agency granting permission to cross.

3/13/91

I-4-9

cross. Such crossing shall be subject to approval by the City Engineer to avoid conflicts in requirements or standards between the City Engineer and the persons or agency granting permission to cross. See Section 5.23 of these Specifications.

- 4.12 Responsibility for Materials.

- a. Material Furnished by Contractor. The Contractor shall be responsible for all material furnished by him/her and shall replace at his/her own expense all such material found defective or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all material and labor required for the replacement of installed material discovered defective prior to final acceptance of the work.

- b. Responsibility for Safe Storage. The Contractor shall be responsible for the safe storage of material furnished by or to him/her, and accepted by him/her and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings, and other accessories shall be kept free from dirt and foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

- 4.13 Handling of Materials.

- a. Hauling of Materials. All materials furnished by the Contractor or to the Contractor shall be delivered and distributed at the job site by the Contractor.

All pipe, valves, fittings, hydrants and accessories shall be loaded and unloaded by lifting so as to avoid shock or damage. Under no circumstances shall materials be dropped. Pipe shall not be skidded or rolled against pipe already unloaded.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- b. Unloading at the Site of Work. When distributing the material at the site of work, each piece shall be unloaded opposite or near the place where it is to be installed in the trench.
- c. Care of Coatings and Linings. All materials shall be so handled that the coating and lining will not be damaged. If, however, any part of the coating or lining is damaged, the replacement or repair of the damaged material shall be done to the satisfaction of the City Engineer. All material handling equipment and material handling methods shall be approved by the City Engineer.

3/13/91

I-4-9

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 5 – Pipe Installation

- 5.01 Approval by the City Engineer. Throughout these Specifications many handling and installation procedures, tools, equipment, and materials will require approval by the City Engineer. Approval by the City Engineer shall in no manner render the City Engineer liable for any injuries suffered or equipment damaged. Approval by the City Engineer is used solely as a means to insure quality control and safety.

Safety of workers shall be provided as required by the Occupational Safety and Health Act (OSHA). The Contractor is solely responsible for job safety.

- 5.02 Handling of Materials. Pipe and fittings shall be loaded and unloaded by lifting so as to avoid shock or damage. Under no circumstances shall such material be dropped. If, however, any part of the coating or lining is damaged, the replacement or repair of the damaged pipe shall be done to the satisfaction of the City Engineer. Any pipe or fittings that are not acceptable to the City Engineer shall be removed from the job site immediately. All pipe handling equipment and pipe handling methods shall be approved by the City Engineer in conjunction with the methods and equipment recommended by the manufacturer.
- 5.03 Inspection and Preparation of Pipe and Fittings. Before placing pipe in the trench, each pipe or fitting shall be thoroughly cleaned of all foreign material, kept clean at all times thereafter, and carefully examined for cracks and other defects before installation. Bell ends and spigot ends are to be examined with particular care. Defective pipe or fitting shall be laid aside for inspection by the City Engineer Inspector who will prescribe corrective repairs or rejection.

All lumps, blisters and excess coating shall be removed from the bell-and-spigot end of each pipe and fitting, and the outside of the spigot and the inside of the bell shall be wire brushed and wiped clean, dry and free from oil and grease before the pipe or fitting is installed. Dirt and any other material must be removed from the barrel of the pipe before installation.

- 5.04 Cutting and Fitting of Pipe. Pipe shall be cut, whenever necessary, to conform to location of fittings, line or grade. All cuts shall be straight and true, and in a workmanlike manner so as to leave a smooth end without damaging the pipe or its cement lining. All burrs shall be removed from the ends of cut pipe, and the end lightly rasped or filed. All tools used in cutting pipe shall be approved by the City Engineer. See Standard Drawing No. 16.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-5-1

- 5.05 Pipe Joint Lubrication. Joint lubricant shall be supplied by the pipe manufacturer, and approved by the City Engineer. Joint lubricants shall be non-toxic, and water-soluble.
- 5.06 Pipe Alignment and Grade. In laying pipe, the intent is to lay to a set line and grade within a tolerance of 3 inches plus or minus. On slopes of zero grade, the intent is to lay to grade. Fittings, valves and hydrants shall be installed at staked locations and elevations; spigots centered in bells; and all valve and hydrants stems plumb.

In new developments, street right-of-way and/or property line and lot corner points must be set and in visible evidence before water installations can proceed. In existing areas sufficient right-of-way, property or easement delineations must be recovered or established before water installation can proceed. Offset stakes for alignment and grade shall be set by the Contractor's, Owner's or Developer's engineer. Any replacement of stakes shall be at the expense of the Contractor, Owner or Developer.

When laying pipe on curves, the intent is to lay to the staked alignment. The pipe shall be kept in alignment by placing all deflecting joints or bends on the curve. Short lengths shall be used as necessary to accomplish the curvature without exceeding individual deflections specified by the City Engineer. See Standard Drawing No. 15. Bends shall be used whenever individual deflections exceed those specified by the City Engineer.

For pipes with an internal diameter of 10 inches or less, the depth of fill over the pipe measured from the proposed finish grade over the pipeline to the top of the pipe shall be a minimum of 7 feet and maximum of 8 feet unless otherwise specified. All pipes with an internal diameter of 12 inches or more shall be installed to the depth shown on the required plan and profile drawings.

If difficulties arise when crossing an interference and where specifically approved by the City Engineer or its Inspector, deviations from the above minimum and maximum depths of cover may be permitted. See Standard drawing No. 19.

Any changes in alignment and grade must be authorized by the Inspector and shall be accomplished by the installation of additional fittings. "Breaking" of joints is permitted only when installing pipe on horizontal or vertical curves.

Pipe shall be laid with the bell ends facing in the direction of laying, unless directed otherwise by the City Engineer. Where pipe is to be installed on a grade of ten percent (10%) or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe up grade.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-5-2

- 5.07 Deviation From Alignment and Grade Occasioned by Other Structures. Whenever obstructions not shown on the plans interfere to such an extent that alteration in the plans is required, the City Engineer shall have the authority to determine the best method of correction. The City Engineer may order a deviation from the line and grade of the structures and/or removal, relocation and reconstruction of the obstructions. See Standard Drawing No. 19.
- 5.08 Temporary Bulkheads. Whenever the pipe is left unattended, temporary plugs shall be installed at all openings. Temporary plugs shall be of such design as to prevent water, debris, children and animals from entering the pipe. All temporary plugs shall be provided by the Contractor and approved by the Inspector.
- 5.09 Frost. No pipe or appurtenant structure shall be installed upon a foundation into which frost has penetrated, or at any time when the Inspector deems there is danger of ice formation or frost penetration at the bottom of the excavation. No pipe or appurtenant structure shall be installed unless backfilling can be completed before the formation of ice and frost.
- 5.10 Excavation, Bedding and Backfill. See Part III of these Specifications for all earthwork.
- 5.11 Lowering of Material Into the Trench. Proper implements, tools and facilities satisfactory to the City Engineer shall be provided and used by the Contractor for the safe and convenient performance of the work. All pipe, fittings, valves and hydrants shall be carefully lowered into the trench piece by piece by means of a derrick, ropes, or other suitable tools or equipment, in such a manner as to prevent damage to water main materials and their protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.
- If damage occurs to any pipe, fitting, valve, hydrants or water main accessories in handling, the damage shall be immediately brought to the attention of the Inspector. The Inspector shall prescribe corrective repairs or rejection of the damaged items.
- 5.12 Laying of Pipe. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Inspector may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

As each length of pipe is placed in the trench, the spigot end shall be centered in the bell and the pipe forced home with a slow steady pressure without jerky or jolting movements and brought to correct line and grade. The pipe shall be secured in place

3/13/91

I-5-3

with approved backfill material tamped under it except at the bells. Precautions shall be taken to prevent dirt from entering the joint space. No wooden blocking shall be let at any pint under the pipeline.

No pipe shall be laid when, in the opinion of the City Engineer, trench conditions are unsuitable.

5.13 Ductile Iron Pipe. There is only one minimal dimension of the spigot outside diameter and the bell inside diameter for each size of push-on joint pipe. In some existing older pipelines, caulked-joint bell and spigot pipe may have been installed. Similar dimensions of the caulked-joint pipe may vary with the class of pipe for each size. Therefore, when connecting to an existing caulked-joint line, care should be exercised to ensure that the outside diameter of the existing line is the same as the outside diameter of the push-on joint or mechanical joint pipe being installed, otherwise a special adapter to join the two lines may be necessary.

a. Push-On-Joint. Immediately before joining two lengths of ductile iron pipe, the inside of the bell, and the outside of the spigot end, and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating and other foreign matter. The rubber shall be flexed inward and inserted in the gasket recess of the bell socket. Since different manufactured brands of pipe require different types of gaskets, the Contractor shall exercise cautions to ensure that the correct type of gasket is used.

A thin film of approved gasket lubricant shall be applied to either the inside face of the gasket, or the spigot end of the pipe, or both.

The spigot end of the pipe shall be placed in the bell end with care to prevent the joint from contacting the ground. Pipe furnished without a depth mark on the spigot end shall be marked before assembly to assure insertion to full depth of the joint. The pipe shall be kept in straight alignment and the joint shall be completed by pushing the pipe home with a slow, steady pressure without jerky or jolting movements by using a forked tool or jack-type tool or other device approved by the City Engineer. If pipe is pushed home with a backhoe bucket, wooden shield must be place between the backhoe bucket and the end of the pipe. The spigot end of field cut pipe lengths shall be filed, or ground to resemble the spigot end of such pipe as manufactured.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Upon completion of joining push-on joint pipe, an inspection shall be made to assure that the gasket is correctly aligned in the gasket recess of the bell socket and not twisted or turned.

3/13/91

I-5-4

Whenever it is necessary to deflect push-on joint pipe, the amount of deflection shall not exceed the maximum deflections specified by the City Engineer. See Standard Drawing No. 15.

- b. Mechanical Joint Pipe. Before joining mechanical joint cast or ductile iron fittings to cast iron or ductile iron pipe, the outside of the spigot, the inside of the bell and the rubber gasket shall be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter.

Normal practice is to lubricate the joint with a soap solution; however, in cold weather the joint may be assembled dry if approved by the Inspector. Extreme care should be exercised in making dry joints.

The cast iron gland shall be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket, or bell end. The rubber gasket shall be placed on the spigot end with the thick edge toward the gland.

The pipe shall be pushed in until the spigot end fully penetrates the bell. The gasket shall then be pressed into place within the bell evenly around the entire joint. The cast iron gland shall be moved along the pipe into position for bolting; the bolts inserted and the nuts screwed finger tight, then tightened with a torque-limiting wrench. Toques for the various sizes of bolt shall be as follows:

<u>Bolt Size</u>	<u>Ft. Lbs.</u>
5/8 inch	45-60
3/4 inch	75-90
1 inch	85-100
1-1/4 inch	105-120

Nuts spaced 180 degrees apart shall be tightened alternately in order to produce equal pressure on all parts of the gland.

Whenever it is necessary to deflect mechanical joint pipe, the amount of deflection shall not exceed the maximum deflections specified by the City Engineer. See Standard Drawing No. 15.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- 5.14 Installation of Valves. Valves shall be handled in such a manner as to prevent any injury or damage. All joints shall be thoroughly cleaned before installation.

Valves shall be located at the pints on the main as indicated on Standard Drawing No. 7, unless specified otherwise by the City Engineer.

3/13/91

I-5-5

Valves shall be set and joined to the pipe in the manner previously specified for cleaning, laying and joining push-on and mechanical joint pipe. Valves shall be set in such a manner that the valve stems are plumb. Valves will be blocked using only precast concrete blocks. No wood blocking will be allowed.

Valves shall be operated prior to installation to ensure good operating condition.

Where necessary, the Inspector shall require the installation of additional valves not shown on the plans. See Section 3.08 of these Specifications.

- 5.15 Valve Boxes.

- a. Installation. A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve, and shall be centered and plumb over the operating nut of the valve, with the box cover set to the required elevation. It will be the responsibility of the Developer to insure that valve boxes are plumb and raised to the proper elevation.

Paving of any street requires that all existing valve boxes be located and prepared for final raising to the finish street surface as shown on Standard Drawing No. 8.

- b. Inspections. Prior to paving, a final inspection is required and can be arranged by contacting the City Engineer. Inspections should be requested twenty-four (24) hours in advance of need.

- 5.16 Installation of Fittings. All fittings in the City Water Distribution system shall be mechanical joint in compliance with the material specification. Fittings shall be set and joined in the manner described in Section 5.13.b of these Specifications.

The use of “wyes” in main extensions or private pipe extensions is strictly prohibited except in special installation as directed by the City Engineer.

- 5.17 Fire Hydrants.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- a. Installation. All hydrants shall be staked for location and grade. Final location and grade shall be in accordance with the approved drawings. Offset stakes not further than 12 feet from the fire hydrant are acceptable. All hydrants shall stand plumb and be installed as indicated on Standard Drawing No. 5.

Each hydrant shall be connected to the main by a 6-inch branch line. An independent 6-inch gate valve shall be installed on each fire hydrant branch.

No service line connections shall be installed between the fire hydrant and the fire hydrant control valve.

3/13/91

I-5-6

- b. Anchorage. The bowl of each hydrant shall be well braced against the unexcavated earth at the end of the trench with a concrete thrust block. The bottom of the hydrant bowl and the hydrant valve shall be supported with eighteen by eighteen by four-inch (18"x18"x4") pre-cast concrete blocking slabs. The hydrant shall be tied to the hydrant valve and the hydrant valve tied to the tee with anchor pipe or with two, 3/4-inch all thread galvanized rods as shown on Standard Drawing No. 5.

Whenever a fire hydrant is installed at the termination point of a main extension (such as in a cul-de-sac), then tie rods and concrete reverse anchors will be required for both the fire hydrant valve (which in this case is also a line valve on the main) and the fire hydrant lateral or branch line connected to the fire hydrant. See Standard Drawing No. 5. Additional concrete anchors may be required at the direction of the Inspector.

If bends are needed to bring a hydrant to a desired horizontal or vertical position, special concrete reverse anchors, and/or anchor pipe or all thread tie back rods, or a combination of all these along with a riser may be required. In any case, a riser no longer than 2 feet will be acceptable and it will be the Contractor's responsibility to set the safety flange at the proper grade.

- c. Drainage. Whenever a hydrant is set, drainage shall be provided at the base of the hydrant by placing rock from the bottom of the trench, to at least 12 inches above the barrel flange of the hydrant, and to a distance of 12 inches around the elbows. The minimum distance from the bottom of the trench to the bottom of the hydrant elbows shall be 6 inches. the minimum of rock placed shall be 1/3 cubic yard. The rock shall be well-graded gravel, cobble, or crushed rock, free of dirt.
- d. Hydrant Protection in Corrosive Soils. In areas where soil resistivity requires corrosion protection, all ductile iron branch lines and hydrants shall be protected. All pipe, rods and fittings, from finished ground level on the hydrant barrel up to and including the tee, shall be encased in polyethylene wrap. The type of polyethylene and manner in which it is to be installed shall conform to Section 5.25

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

of these Specifications. Bedding material shall be as specified in Part III of these Specifications.

- 5.18 Dead Ends and Blow Offs. All dead ends on new mains shall be closed with cast iron plugs or caps; such dead ends shall be equipped with suitable concrete anchors and blow off facilities.

The Contractor shall furnish, install or remove temporary blow offs at locations shown on the drawings or designated by the City Engineer. See Standard Drawing No. 21.

3/13/91

I-5-7

The Contractor shall install permanent blow offs where indicated on the drawings. A permanent blow off is defined as one which will be left in place at the completion of all proposed installations. Refer to Standard Drawing No. 21.

- 5.19 Thrust Blocks and Anchors.

- a. Installation. Thrust blocks and/or anchors shall be constructed at all bends, tees, plugs and fittings which require reaction support due to unbalanced line thrust. Care shall be taken not to block outlets or to cover bolts, nuts, clamps or other fittings or to make them inaccessible. The Standard Drawings Sheets 12 and 17, show size and shape of thrust blocks and anchors. Bearing surface areas are minimum areas to bear against the undisturbed trench wall. If in the opinion of the City Engineer, the soil bearing capacity is not sufficient to provide adequate restraint based on minimum bearing areas shown on the Standard Drawings, then the minimum bearing area shall be increased to a size that will ensure adequate restraint. When it is impossible, through over excavation or other cause, to pour a thrust block or anchor against undisturbed earth, harness rods shall be required to anchor the fittings to the main.

Thrust blocks will be required on large taps regardless of whether a tapping sleeve or tapping saddle is used. Refer to Standard Drawing No. 13 for tap and main size combinations requiring thrust block installation.

All debris, water or ice shall be removed from the place to be occupied by the concrete. Concrete shall not be placed on frozen Subgrade. Concrete shall be placed in the presence of the Inspector unless inspection has been waived prior to the placement.

- b. Form Work for Thrust Blocks and Anchors. All forming for concrete thrust blocks and anchors will be done by bulkheading around the shape of the thrust block or

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

anchor with burlap or reinforced paper sacks filled with sand or earth. Sacks shall be of a size easily handled when full, and shall be left in place in the trench. Wood forms may be used in some cases; however, all wood will be removed before backfilling.

No horizontal struts or braces required for trench shoring shall remain in the concrete thrust blocks. Prior to placing concrete, the forms and ditch bank shall be inspected and approved by the Inspector.

- c. Concrete and Curing Time. Thrust blocks shall be concrete of a mix not leaner than 1 part cement to 2-12 parts sand and 5 parts stone, and having a compressive strength of not less than 3,000 psi after 28 days.

3/13/61

I-5-8

Minimum curing time for concrete thrust blocks regardless of additives shall be thirty-six (36) hours for anchors containing 2 cubic yards or less, forty-eight (48) hours for anchors containing more than 2 cubic yards but less than 6 cubic yards, and seventy-two (72) hours for anchors containing more than 6 cubic yards but less than 12 cubic yards. Anchors containing more than 12 cubic yards will be cured as directed by the City Engineer Inspector. Curing time for anchors having flanged rods or other accessories embedded in them for the purpose of tying pipe and/or fittings directly to the anchor will require approximately twenty-five percent (25%) additional curing time.

No water main will be charged or pressurized without the approval of the Inspector. All thrust blocks and anchors must meet the minimum curing time unless, under certain circumstances, the Inspector may elect to shorten or extend the time of curing.

- d. Compaction of Fill Over Thrust Blocks and Anchors. Backfill may be placed over thrust blocks and anchors once the surface has set sufficiently to resist the weight of the backfill. However, no tamping or compacting shall be allowed above the thrust block or anchor for a minimum of thirty-six (36) hours after placement or as directed by the Inspector.

5.20 Vaults. Vaults may be precast or poured-in-place and shall be constructed in accordance with these Standard Specifications. Precast vaults shall be so designed that all joints and corners are waterproof. Precast and poured-in-place vaults shall be made waterproof after construction by use of sealants, epoxies or other approved methods. All dimensions, locations and elevations shall be coordinated by the Developer and Contractor and meet the requirements of the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Concrete footers shall be required as indicated on the drawings.

All vaults shall be constructed to meet H.S. 2-44 traffic loading conditions and 300 PSF surcharge load.

All manhole rings and covers, ladder rungs, pipe arches, sleeves, etc., shall conform to the drawings. See Standard Drawing No. 28.

- 5.21 Harness Rods. Harness rods and lugs shall be sued at all bends and fittings where thrust blocks cannot be sued due to existing field conditions or where harness rods and lugs are specifically required by these Specifications, installation plans, or the Inspector. See Standard Drawings No. 23 and 29.
- 5.22 Bridging and Encasement of Pipe. Under certain conditions when the water main is to be installed over or under an existing or proposed utility or structure, the City Engineer may require bridging or encasement of the pipe.

3/13/91

I-5-9

If, in the opinion of the City Engineer, there exists the possibility of settlement of the pipe being installed over an existing utility or structure, then bridging of the pipe shall become necessary. This condition shall also apply to other underground utilities or structures being installed over existing water mains. The City Engineer shall determine the size and location of the concrete bridging. See Standard Drawing No. 20.

Under certain conditions, the City Engineer may require the complete encasement of water mains with concrete. The City Engineer shall determine the size, length and location of these encasements. See Standard Drawing No. 18.

- 5.23 Encasement or Sleeve Pipe. Wherever it is necessary to provide an encasement or sleeve for the water main, the water main shall not be inserted into the encasement or sleeve pipe without providing insulating skids for each joint of the water main. Insulating skids shall be of a type such as the "P.S.I. Model A12 Steel Casing Insulators" or equivalent. In addition, no encasement or sleeve pipe shall be installed without protecting the ends of the pipe with adequate open joint masonry, which will deter dirt and debris from entering, but at the same time will allow water to escape from the encasement of sleeve pipe. Encasement pipes shall be protected both inside and out with corrosion resistant materials having a bituminous base. Encasement or sleeve pipe, size, length, type and sidewall thickness will be determined by the City Engineer. See Section 2.14 of these Specifications.
- 5.24 Connections to the City's System.
- a. Connections. Connections to the City system shall be in a neat and workmanlike manner. An Inspector shall be present at all times during the construction of the

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- connection. The connection is subject to approval by the City Engineer. Under no circumstances shall a non-disinfected main, which cannot be isolate, be connected to an existing distribution main in service.
- b. Tapping Existing Mains. The Contractor shall be responsible for making or arranging for all taps for main extensions. Permits for service tapes shall only be issued to a master plumber unless otherwise approved by the City Engineer. The Contractor shall notify the City Engineer a minimum of twenty-four (24) hours prior to tapping. Once the tap is complete, the Contractor shall be responsible for protection of the tapping sleeve or saddle and the tapping valve against freezing or other damage. The Contractor shall also be responsible for all backfill, compaction, paving, curb and gutter, etc. See Standard Drawing No. 22.
- c. Operation of Valves. In connecting to the City Engineer's system, it may be necessary to operate existing valves.

Valves on the City Engineer's system that must be operated to make a connection shall be operated by City Engineer personnel only. The Contractor shall give the

3/13/91

I-5-10

Inspector forty-eight (48) hours' notice to arrange for operating valves. Both the Contractor and the Inspector shall be present when the valves are operated.

- d. Interruption of Service. Installation of a connection that will require closing existing valves may cause an interruption of water service to existing City Engineer customers. Affected customers must be notified twenty-four (24) hours in advance.

The City Engineer Inspector will arrange for all notification to both residential customers and the fire City Engineer; however, the Contractor will be responsible to furnish the Inspector all necessary information as to the date and time the interruption will begin and the total time required to complete the installation.

A normal interruption shall be a maximum of two hours. If the interruption will be greater than two hours, the work shall be done in a manner to minimize the inconvenience to customers, such as working at night in a continuous operation until service is restored. A connection which will require an interruption longer than two hours shall be subject to review by the City Engineer as to the appropriate timing of the connection.

If, in the process of installing a connection, there exists an industry or building in the area that cannot be out of water, such as a hospital or other special customer, appropriate means shall be taken to provide and convey water. The water and means of conveyance shall be approved by the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

5.25 Corrosion Protection Systems.

- a. Dissimilar Materials. Insulation shall be installed as required by the City Engineer. Particular care shall be taken to insulate between dissimilar materials.
- b. Insulating Joints. Whenever it is necessary to join pipe of dissimilar metal, or when designated by the City Engineer, a method of insulating against the passage of electrical current shall be provided. Special care shall be exercised during the installation of these joints to prevent electrical conductivity across the joints. See Section 4.09 of these Specifications and Standard Drawing No. 10.
- c. Polyethylene Encasement Material. Whenever designated by the City Engineer, the metallic pipe and all appurtenances shall be wrapped in polyethylene. The polyethylene encasement shall prevent contact between the pipe and bedding material, but is not intended to be a completely airtight and watertight enclosure.

Prolonged exposure to sunlight will eventually deteriorate polyethylene film. Exposure to sunlight shall be kept at a minimum.

3/13/03

I-5-11

The polyethylene shall have a minimum wall thickness of eight (8) mils and conform to the specification set forth in this part.

A 2-inch wide, ten-mil thickness polyethylene pressure-sensitive tape shall be used to close seams, secure to pipe or hold overlaps.

Polyethylene pipe wrap material shall be applied to line pipe in the manner shown on Sheet 9 of the Standard Drawing.

Damage to polyethylene wrapped pipe in the trench prior to and during backfill shall be repaired to the satisfaction of the City Engineer.

Before the Contractor taps a water main, the trench, pipe and polyethylene wrapping shall be in a state of readiness. The Contractor digging the trench shall repair or replace any damaged polyethylene prior to tapping.

- d. Insulating from Concrete. Areas of metal pipe and appurtenances which are to be in contact with concrete thrust blocks, anchors or encasement may be required by the City Engineer to be protected against corrosion prior to installing concrete. The following types of protection systems are acceptable:

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (1) Application of cold-applied mastic coating with high electrical resistivity, similar to Roskote Mastic A-51, manufactured by Royston Laboratories.
- (2) Application of a cold-applied primer and corrosion resistant pipe wrap, similar to the primer and pipe tape manufactured by the Protecto Wrap Company.

Other proposed protection systems may be accepted following review and approval of the City Engineer.

5.26 Disinfection. The following procedure shall apply to all main extensions within the City of Cripple Creek’s Water Service Area. Pipe extensions shall be chlorinated in accordance with AWWA C651, “Disinfecting Water Mains.” The Contractor shall provide material for disinfection of all water mains.

Calcium hypochlorite granules with a minimum of 65 percent available chlorine or 5-g calcium hypochlorite tablets shall be used for disinfection. Application rates shall comply with AWWA C651.

The following table denotes the amount of calcium hypochlorite granules to be placed at the beginning and end of the main and at 500-foot intervals to obtain disinfection.

3/13/91	I-5-12	<u>Calcium Hypochlorite Granules (oz.)</u>
<u>Pipe Size</u>		
4”		0.5
6”		1.0
8”		2.0
12”		4.0

The following table denotes the number of 5-g calcium hypochlorite tablets required per 20-foot joint for dose of 25 mg/l.

<u>Pipe Size</u>	<u>No. of Tablets</u>
4”	1
6”	1
8”	2
10”	3
12”	4

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

After the calcium hypochlorite has been placed in the pipeline by the Contractor, disinfection must be completed within ten (10) calendar days.

After the pipe is filled with water and chlorine, and unless approved otherwise by the City Engineer, the chlorinated water shall be held in contact with the pipe for twenty-four (24) hours. At the end of the twenty-four (24) hour period, the water in the pipeline shall be tested by the City Engineer to ensure a residual chlorine content of not less than ten (10) mg/l.

The pipeline shall then be thoroughly flushed to remove the heavily chlorinated water. Care shall be taken in flushing the pipeline to prevent property damage and danger to the public.

Samples of water will be collected for bacteriological examination and residual chlorine content testing before the pipe is put into service. Testing of residual chlorine and sampling will be done by the City Engineer.

No main, which has been disinfected and flushed, shall stand stagnant for more than fifteen (15) days without being reflushed

5.27 Pressure Testing. All mains and appurtenances shall be subject to pressure testing performed by the Contractor. All mains shall be subjected to a test pressure of 1.5 times the static pressure at the lowest point in the portion of the system being constructed. The test pressure shall be placed on the pipeline and the line isolated

3/13/91

I-5-13

from other water sources. After a two (2) hour period, water shall be added to the line to return the pressure to the specified test pressure. The quantity of water required to return the pressure to the specified level will be measured.

The maximum allowable leakage at the specified test pressure shall not exceed ten (10) gallons per day per inch of pipe diameter (inside diameter) per mile of pipe.

ALLOWABLE LEAKAGE

<u>Pipe Diameter</u>	<u>Allowable leakage in 2 hours per 1000 feet of pipe, Gallons</u>
6"	0.95
8"	1.26
10"	1.58
12"	1.89

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

5.28 Acceptance and Release for Taps. A new main shall be accepted by the City Engineer and release for taps when the following conditions have been met:

- a. The main and all appurtenances have been installed to the satisfaction of the Inspector and all pertinent notes and measurements have been made.
- b. Disinfection has been completed and the main has been flushed, charged and received a passing bacteriological test.
- c. Pressure testing has been completed satisfactorily.
- d. All tapping methods have been approved by the City Engineer.

5.29 Acceptance of Mains and Service Lines Including Curb Stops.

- a. Preliminary Acceptance. Preliminary acceptance of mains will be granted by the City following the Developer's completion of all curbs, gutters, grading and paving, plus all curb stop and street valve boxes being set at proper grade.
- b. Final Acceptance. Approximately one year following the preliminary acceptance, the City Engineer will reinspect the curb stop and street valve boxes for centering, plump and grade. The Contractor and Developer will be notified of any defects in materials and workmanship and these defects must be promptly corrected in accordance with these Specifications. Corrections must be made immediately. If no defects are found or corrections are made as required by the Inspector, a letter of acceptance will be issued, following receipt of proper documents giving clear title to all mains and appurtenances. Service lines beyond the corporation stop on the

main are the property of the Developer and/or Owner. Preliminary and final acceptance can be granted in phases of development after all the conditions of current specifications have been met.

The Developer shall be responsible for repairing any deficiencies in the workmanship for a period of one year after preliminary acceptance. This shall include but not necessarily be limited to removal and replacement of surfacing materials (pavement, curb and gutter, sidewalk) which are damaged due to soil settlement.

- c. Repair and Maintenance Prior to Final Acceptance. Repair and maintenance of mains and services prior to final acceptance by the City Engineer will be the sole responsibility of the Developer and/or Contractor. Repair and maintenance will be accomplished to the current specifications of the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- d. Meters. Meters will be maintained by the City Engineer from the time of installation.

3/13/91

I-5-15

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 6 – Service Lines

6.01 All New Service Lines and, Where applicable, Service Line Replacements.

- a. Require water plans (see Chapter 2) must be approved by the City Engineer and all water connection and tapping charges due must be paid before water taps will be made. All replacement water taps are subject to the water tap fee unless otherwise approved by the City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- b. Tapping permits must be applied for at the City Engineer Office located at 337 E. Bennett Street, Cripple Creek, Colorado 80813, telephone (719) 689-2502 and paid for at least 24 hours prior to tapping.
- c. All service taps on water mains within the water distribution system shall be accomplished by the Contractor, who shall notify the City Engineer a minimum of 48 hours prior to tapping.
- d. No water taps shall be made unless property corners are clearly marked so measurements of taps and curb boxes can be made at the time of tapping.
- e. Excavation of the tapping hole is the responsibility of the Contractor and shall be done in accordance with Drawing No. 31.
- f. Minimum size tap for a water service is 3/4 inch. The Contractor shall be responsible for furnishing all necessary materials. For service line sizes in excess of 2 inches, the corporation shall be a tapping valve and the curb stop shall be a gate valve.
- g. Cribbing, sheeting or sloping of the banks of tapping holes is the responsibility of the Contractor and will be in accordance with the rules and regulations of the State of Colorado, City Engineer of Labor and Employment, 200 West 19th Street, Denver, Colorado 80203, and OSHA as applicable.
- h. Barricading of tapping holes is the responsibility of the Contractor and shall be in accordance with construction, installation and repair of right-of-way openings for subsurface utilities for work within the City of Cripple Creek or other applicable regulatory agency.

3/13/91

I-6-1

- i. Backfilling and compaction of tapping holes shall meet the specifications of the governing body in whose jurisdiction work is being done; i.e., City of Cripple Creek, Teller County or State of Colorado.
- j. Replacement of Existing Corporations Stops: Where an existing corporation stop is to be replaced with a new corporation stop of equal or larger size, the Owner of the property shall be responsible, at his/her expense, to have the old corporation stop excavated and shall contact the City Engineer which will shut off the old corporation at no expense to the Owner. Backfill, compaction and replacing of the

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- corporation stop following shut off by the City Engineer are the responsibility of the property Owner at his/her expense.
- k. **Abandoning Existing Taps:** Where an existing water tap is to be abandoned, the Owner of the property shall be responsible, at his/her expense, to have the corporations stop excavated and then contact the City Engineer, which will shut off the corporation at no expense to the Owner. Backfill and compaction will be the responsibility of the property Owner at his/her expense.
 - l. **Multiple Service Taps:** No service line within the City Engineer's water service area will serve more than one customer. Each house, building or business shall have an individual tap and service line from the water main to the house, building or business, and an individual meter.

6.02 Water Service Line Excavations for All New and Replacement Service Lines.

- a. Excavation, safety and backfilling to include proper compaction of water service line ditches are the responsibility of the Contractor all in accordance with the specifications of the governing body in whose jurisdiction the work is being done; i.e., City of Cripple Creek, Teller County of State of Colorado.
- b. Water Service line ditches must enter the lot as near ninety degrees (90°) to the street line as is practical and not at an extreme angle unless otherwise approved.
- c. **Water Service Line Ditches and Separation of Water Service and Building Sewer:** Except as permitted below, the water service line and the building drain or building sewer shall be not less than 10 feet apart horizontally and shall be separated by undisturbed or compacted earth. The water service line may be placed in the same trench with the building drain or building sewer provided approval is given by the Building City Engineer and the following conditions are met:
 - (1) The bottom of the water service line at all points shall be at least 18 inches above the top of the sewer line at its highest point.

3/13/91

I-6-2

- (2) The water service line shall be placed on a solid shelf excavated at one side of the common trench.
- (3) No joints in the water service line shall be permitted between the corporation stop and the curb stop without prior approval of the City Engineer. Such approval shall be requested by the Contractor in writing prior to starting construction.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (4) The materials and joints of sewer and water service lines shall be installed in such a manner and shall possess the necessary strength and durability to prevent the escape of solids, liquids and gases from under all know adverse conditions such as corrosion, strains due to temperature changes, settlement, vibrations and superimposed loads.

6.03 Service Line Installation and Material for All New and Replacement Service Lines.

- a. An expansion loop as shown in Drawing No. 31 (3/4-inch through 2-inch only) must be left in the service line where it is connected to the corporation stop at the water main to allow for expansion and contraction. Existing water services or taps which are not 3/4-inch or larger and do not consist of copper or that will not meet the specification referred to in this section will not be permitted. If the existing tap has been deleted from the water system at the time of demolition, under no circumstances will the City Engineer allow a service to be reconnected. It would constitute a new tap and service.

- b. Water service lines shall be a minimum of 3/4 inch in diameter.

- c. Water service line material between the corporation and the curb shall be as follows:

Copper Tubing: Type K

Conformance: ASTM B-88

- d. Water service line joints

- (1) Copper tubing shall have flared fittings. Ford Meter Box Company, Catalog No. C22 or equal.

- (2) No sweat or welded joints shall be allowed underground.

3/13/91

I-6-3

- (3) Dissimilar type of material – copper tubing to galvanized iron

(a) Iron pipe O.D. x copper tube size O.D.

(b) Insulating coupling

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (c) Romac Industries, Inc., Style 702 compression coupling
 - (d) Rockwell/Smith Blair adapter gasket for steel pipe to copper tubing
 - (e) Equivalent product of other manufacturers
- e. All water service lines shall have a minimum cover of 7 feet except at the expansion loop and will be determined by the street cut and/or by the finished grade of the property.
- f. Water service lines from the corporation to the curb stop shall have a maximum cover of 8 feet unless otherwise approved.
- g. Where a 1-1/2-inch or larger water service line crosses another utility or any underground structure, the water service line shall preferably pass over the other utility or structure, but in no instance shall there be less than 6 inches clearance between the water service and the other utility or structure. The space between the water service line and the utility or structure shall be backfilled with sand when the clearance is less than 12 inches.

Where any water service line passes under a sewer main, the sewer main shall be constructed of cast iron for 6 feet each side of the water service or the sewer main and the water service line shall be encased in concrete for 6 feet each side of the water service line.

- h. Tapping saddle: A tapping saddle shall be used on all service line connections to the water distribution system. Tapping saddles shall have the following characteristics:
- (1) Double strap
 - (2) Brass body
 - (3) Stainless steel straps
 - (4) AWWA tapered thread pattern (cc)
 - (5) Acceptable manufactures: Ford Meter Box Company, Style 202; Mueller CO., Catalog No. H-10525 for 3/4", same series for larger sizes.
- i. Corporation stop
- (1) Conform to AWA C800
 - (2) AWWA tapered thread pattern inlet (cc)
 - (3) Flared copper tubing outlet

3/13/91

I-6-4

- (4) Same size inlet and outlet

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

(5) Acceptable manufacturers: Ford Meter Box Company, Type F600; Mueller Co., Catalog No. H-1500 for 3/4", same series for larger sizes

- j. New service lines on single-family units will be installed to enter the property 10 feet inside the front property line farthest from the garage and/or driveway unless otherwise approved by the City Engineer.
- k. Length of the service line from the corporation to the house or other building will be limited as follows:

<u>Size</u>	<u>Maximum Length</u>
3/4"	75 Feet
1"	100 Feet
1 1/4"-1 1/2"	150 Feet

Authorized lengths of service lines 2 inches and larger will be determined by the City Engineer on an individual case basis.

6.04 Curb Stop and Curb Box for All New and Replacement Service Lines.

- a. All service lines, regardless of size, must have a curb stop and curb box installed in accordance with Drawing no. 32. The curb box shall be centered over the curb stop and shall be plumb. The following location will be accepted by the City Engineer:

All curb stop boxes will be installed 6 inches from the public right-of-way line unless designated otherwise by the City Engineer.

- b. The curb stop supplied by the Contractor shall be installed in accordance with Part I, Section 5.14 of these Specifications.
- c. The responsibility of the Contractor for the curb box ends only when sidewalks, curbs, driveways, etc. have been installed and all backfilling and compaction has been completed. They are subject to review for alignment at the end of the one-year warranty period.
- d. Curb stops: All curb stops shall be provided with drain features. They shall be Mueller Co. Model H-15214 or equal.
- e. Curb boxes: Tyler series or equal. Enlarged bases required for 1-1/2-inch and 2-inch curb stops.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-6-5

6.05 Water Meters – General

- a. All water supplied by the City Engineer to a newly developed property must be metered. The only exceptions are fire lines.
- b. All water meters are owned, supplied, installed and maintained by the City Engineer except that water meters 1-1/2-inch and larger will be furnished and installed by the Contractor. The City Engineer will provide the initial meter for sizes under 1-1/2-inch. If replacement is necessary due to freezing or other problems, the replacement meter will be at owner's expense. The replacement meter will become the property of the City Engineer.
- c. Acceptable locations for 5/8-inch through 3/4-inch and 1-inch water meters shall be limited to outside water meter pits, basement, utility room or utility closets unless otherwise approved. Locations for 1-1/2-inch or larger water meters shall be approved by the City Engineer prior to installation of the water meter loop.
- d. Water meter locations selected shall provide adequate protection against freezing.

6.06 Inside Water Meter Installations Only

- a. Inside residential water meter locations must be in the basement or other lowest level of the residence. When installed in a crawl space with an earth floor, a rock-filled sump, 1-1/2' deep, 1-1/2' in diameter shall be installed beneath the meter location. Where plastic pipe is used for inside installations, plastic will not be used within 3 feet of the meter loop.
- b. Inside 5/8-inch through 3/4-inch and 1-inch water meter locations shall be such that the water meter is unobstructed on one side; i.e., easily accessible for reading or servicing, with a minimum of 8 inches clearance around the remainder of the meter with a minimum of 3 feet of clearance above the meter. Meter locations shall not require stooping or crawling to gain access to the meter. Approval prior to construction for crawl space installation may be granted by the City Engineer.
- c. Inside 5/8-inch through 3/4-inch and 1-inch water meter loop installations shall include an inlet and outlet valve as shown on Drawing Nos. 33,34 and 35. Inlet and outlet valves shall be full opening water way, handwheel operated, compression valves which shall be installed to close in the direction of the flow.
- d. Inside 1-1/2-inch and larger. Plans for inside water meter loop (to include support) installations for 1-1/2-inch and larger water meters shall be submitted to the City Engineer for approval prior to installation of the meter loop and should be similar in design to the meter loop piping and support shown on Drawing No. 36 except

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-6-6

that the bypass piping may also be extended under or over the meter and that adequate meter loop support may require a different design.

- e. Water main installations shall incorporate necessary backflow prevention devices as specified herein.

6.07 Water Meter Pit Installations Only

- a. Pit installation of meters 5/8-inch through 1-inch are not normally acceptable within the City Engineer's service area. Any deviations from this policy must be approved in advance by the City Engineer on an individual case basis. Following approval, the following specifications will apply:

The locations of the meter pit for 5/8-inch through 1-inch water meters will be one foot (1') inside of the curb stop. If a problem arises on eth location, the location will be determined by the City Engineer.

- b. The only pit acceptable to the City Engineer for 5/8-inch and 3/4-inch meter is a fiber or corrugated steel pipe (CSP) pit, 20 inches inside diameter by approximately 60 inches in height, with a frost-proof cover. See Drawing No. 37 and the accompanying general notes. For 1-inch meters, the only acceptable pit material is a fiber or corrugated steel pipe (CSP) pit, 24 inches in diameter, 60 inches in height, with a frost-proof cover. See Drawing No. 37 and accompanying general notes. Regulators or sprinkling system devises are not acceptable in either the 20-inch or the 24-inch pit.
- c. The meter loop in the pit (5/8-inch through 1-inch water meters) must be with a copper setter with an inlet valve only, such as FORD Series V-82 or Mueller Series H-14062.

The copper setter will be installed so that the loop is 17 inches below the top of the meter pit lid. See Drawing No. 37 and accompanying general notes.

- d. The location of the meter pit for 1-1/2-inch or larger water meters can vary from that of the small meter pit, but must meet the approval of the City Engineer.
- e. Meter pits for water meters 1-1/2-inch or larger must be enough to accommodate meter, meter bypass, all valves and piping. See Drawing Nos. 38-42 and accompanying general notes.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

All pits housing a meter 1-1/2-inch or larger will have a 12-inch wide metal ladder installed in the pit. Wooden ladders will not be accepted.

3/13/91

I-6-7

- f. Meter pits must have an approved ring and cover of sufficient size (25-1/2 inches minimum) opening for installation and removal of the meter.
- g. Meter loop (1-1/2-inch and 2-inch) must set on the floor of pit, not on a riser. See Drawing Nos. 38, 39, 41 and 42 and accompanying general notes for depth requirements.
- h. Water meter loops 1-1/2-inch and larger must have both inlet and outlet valves.
- i. Water meters 1-1/2-inch and larger may be required to have a bypass around the meter of sufficient size to supply the property while the meter is being serviced. This requirement shall be at the discretion and direction of the City Engineer. Contact the City Engineer prior to construction of meter loops of this size. See Drawing Nos. 36 and 39 and accompanying general notes.
- j. When a by-pass is allowed with a meter installation, the pressure regulator valve shall not be bypassed.

6.08 Combined Domestic and Fire Line Water Meters

- a. Only meters approved by the National Board of Fire Underwriters shall be installed in water lines providing both domestic and fire demands. Requests to install a meter in a water line providing both domestic and fire demands should be made to the City Engineer a minimum of 90 days in advance of construction.
- b. Unless otherwise approved by the City Engineer, a combined domestic and fire line meter must be installed in a pit large enough to accommodate the meter, meter bypass and all valves and piping, all in accordance with Drawing Nos. 39, 40, 41 and 42 and accompanying general notes.
- c. The location of the meter pit must be approved by the City Engineer in advance of construction.
- d. Meter pits must have an approved ring and cover of sufficient size (25-1/2 inches minimum) opening for installation and removal of the meter.
- e. The meter loop (3-inch through 6-inch) must set on the floor of pit, not the riser. The maximum depth of the meter pit (inside dimension) shall be 8 feet. The

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

minimum depth of the meter pit (inside dimension) shall be 7 feet. See Drawing No. 41 and accompanying general notes. For meter loops 8-inch through 10-inch, refer to Drawing No. 40.

- f. Water meter loops for combined domestic and fire line water meters must have both inlet and outlet valves.

3/13/91

I-6-8

- g. Water meters must have a bypass around the meter of sufficient size to supply the property while the meter is being serviced. See Drawing Nos. 36 and 39.

6.09 Remote Readers

- a. Inside 5/8-inch through 3/4-inch water meter installations shall include the installation by the Contractor of the two wire interconnecting cable between the meter and the remote reader as shown on Drawing Nos. 34 and 35.
- b. The remote reader two wire interconnecting cable shall not exceed 40 feet in length. The cable used shall be two conductor No. 22-220V stranded with plastic jacket (equivalent to Alpha 1172, Birnbach 156 or 6348 Columbia cable) and shall be installed along the approximate center of studs and joists using No. 1 insulated staples leaving a 2-inch stress loop within the wall and shall be extended through the exterior wall at a distance approximately 5 feet above the ground. The cable cannot be spliced and a minimum of 12 inches of extra cable must be left at the meter loop and at the proposed remote reader location for connection of same by the City Engineer personnel. The installed wire shall be tested for electrical continuity at the time of installation. If the cable is to be installed in concrete or masonry walls, electrical conduit must be installed in advance of the cable installation.

6.10 Water Regulators

- a. A water regulator designed for 250 psi shall be installed in all domestic service lines and on the inlet side of the meter. If a pressure greater than 55 psi is required for outside sillcocks or sprinkling systems, then a double regulator will be required. Under no circumstances will the pressure exceed 100 psi at the inlet side of the meter. See Drawing Nos. 33,34,35,36,39 and 42.
- b. A water regulator for service lines incorporating a 1-1/2-inch or larger meter, where a bypass is required, shall be installed so that the water passing through the bypass is also regulated into the building.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- c. Water regulators may be located either inside the building or outside the building in a pit (1-1/2-inch service or larger only), at the builder's discretion, subject to the City Engineer's approval.

6.11 Inspection of Services for All New and Replacement Service Lines

- a. Water service lines shall be inspected by the City Engineer and the inspection shall include an inspection of the service line from the corporation to the curb stop and an inspection of the meter installation to include all of those items contained within Sections 6.01 through 6.10 of these Specifications.

3/13/91

I-6-9

- b. The City Engineer shall inspect the service line from the curb stop to the building when it passes beneath curbs, gutters, sidewalks and driveway slabs. The trench backfill compaction shall meet the requirements of these Specifications.

6.12 Repair and Replacement of Existing Service Lines

- a. Responsibility. The property Owner is responsible for the repair and maintenance of the water service line from the corporation stop to the house or other building.
- b. Leaks occurring on a water service line between the corporation stop and the house or building shall be repaired as necessary to include backfilling and restoration of property at the property owner's expense. However, the City Engineer will, if requested to do so, shut off the water service line at the curb stop. To preclude unnecessary waste of water, if repairs are not initiated within a reasonable period of time, the City Engineer may, at its discretion, shut off the water service until repairs have been effected.
- c. The property owner is responsible for all damages that may occur to other property, real or person, including property of the City Engineer, that were caused by failure to repair and maintain the water service line, or from leaks occurring on a water service line or from bursting or other failure of the water line.
- d. Leaks occurring between the curb stop and the corporation shall be repaired by the property Owner at no expense to the City Engineer. Appropriate street restoration is required.
- e. When a doubt exists concerning the location of a leak, the City Engineer will determine the general location of the leak. This will be done by turning off the service at the curb stop. When this action causes the leak to stop flowing, the homeowner or property Owner will be responsible for repair of the line at a location between the curb stop and the structure served. When the leak continues to flow after turn off, the property Owner will be responsible for repair of the line at a

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

location between the curb stop and the main. Upon excavation of the corporation stop by the property Owner, the City Engineer will turn off water at the corporation stop to facilitate repair.

6.13 Service Line – General Notes

- a. All work on fabrication and installation of meter boxes shall conform to the following codes, latest edition:

3/13/91

I-6-10

Uniform Building Code
Building code for Reinforced Concrete (ACI)
American Welding Society Specifications

All material or components considered defective by the City Engineer shall be rejected and immediately removed from the site at no expense to the City Engineer.

The Contractor shall verify and coordinate the dimensions of all openings, meters, inserts, etc., with the City Engineer and manufacturer.

- b. Concrete: All concrete shall be Type II cement with 6% air entrainment and shall develop a minimum compressive strength of 3000 psi at 28 days.

No Concrete shall be placed on frozen ground.

Soil shall be firm and capable of withstanding bearing pressures of 2500 psf DL + LL.

Concrete placed during cold weather shall be protected from freezing for a minimum of seven days.

Shoring shall be provided for slabs and walls until concrete has developed sufficient strength to withstand all imposed loads.

All surfaces shall be sprayed with a combination non-staining cure and seal compound.

All reinforcing shall conform to ASTM A615, Grade 60.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

All exterior concrete surfaces shall receive two applications of asphalt waterproofing.

- c. Shop drawings and specifications shall be submitted in triplicate to the City Engineer for all concrete reinforcements (cast-in-place), anchor plates, and prefabricated boxes (bituminous fiber and waterproof).
- d. Welded steel anchor plates shall be made of A6 steel with E60 Electrode and shall be welded by a certified welder and shall have two coats of red lead oxide paint. All surfaces damaged during welding and installation shall be repaired and painted to the satisfaction of the City Engineer.
- e. Grouting of concrete walls around pipes and footings as shown on drawings shall be done with non-shrink Embeco grout.

3/13/91

I-6-11

- f. In the event that ground water or other unstable and unusual conditions are encountered, the Contractor shall notify the City Engineer immediately for inspection and recommendations for drains, gravel fill, additional reinforcing, etc. Approved rubber water stops shall be used in all concrete joints for conditions where subsurface water is encountered.
- g. Prior to construction, the Contractor shall obtain meter size and dimensions from the City Engineer. Regulators may be located in the meter Pit or in the building on the property side of the meter, unless the pressure exceeds 100 psi, then the regulator shall be installed on the inlet side of the meter.
- h. The Contractor, at his/her option, may use 22 gauge galvanized corrugated metal forming for cast-in-place concrete roof slabs. Brief specifications shall be submitted to the City Engineer for approval and verification of structural capacity.
- i. A complete set of "as-built" plans consisting of all water mains and service lines will be furnished to the City Engineer by the Contractor within thirty (30) calendar days after completion of each phase of development, and a separate complete set showing all phases of the development will be furnished within ninety (90) calendar days after completions of all phases of the development.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-6-12

WATER SYSTEM STANDARD SPECIFICATIONS

Chapter 7 – Water Service Quality Control Regulations

- 7.01 General. This document is adopted by the City of Cripple Creek to promote and sustain the high quality of drinking water furnished to the City's water customers; to protect the public potable water supply system of the City of Cripple Creek from the possibility of contamination or pollution by backflow, backsiphonage or backpressure; to promote the elimination or control of existing cross connections, actual or potential; and to provide for the maintenance of a continuing program or cross connection control.
- a. The authority to implement and maintain this program or cross connection control is contained in the following legislative actions:
- (1) Colorado City Engineer of Health Law C.R.S. 1973 Title 25-1-114.
 - (2) Colorado Primary Drinking Water Regulations Section 11.1.2 (Hazardous Cross Connection).
 - (3) Cross Connection Control, Colorado City Engineer of Health, 1983
 - (4) Occupational Safety and Health Administration Federal Register #202 Part 2, Page 22234, Subpart J.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (5) U.S. Environmental Protection Agency, Cross Connection Control Manual (1973) E.P.A. – 43070-73-002 Section 3.
 - (6) Uniform Plumbing Code of the International Plumbing and Mechanical Officials, Chapter 10, Sections 1001, 1002, 1003.
 - (7) City of Cripple Creek Resolution No. 1991-7.
- b. Reference manuals adopted for guidelines on cross connection control:
- (1) Manual of Cross Connection Control, Foundation for Cross Connection Control and Hydraulic Research, University of California.
 - (2) Cross Connection Control, Colorado City Engineer of Health.
 - (3) Cross Connection Control Committee, Pacific Northwest Section AWWA Manual of Accepted Procedures and Practices.
- 3/13/91
- I-7-1
- (4) Recommended Practice for Backflow Prevention and Cross Connection Control AWWA Manual M-14.
 - (5) Definitions of terms used in this regulation are those contained in “Manual of Cross Connection Control,” Foundation for Cross Connection Control and Hydraulic Research, University of California.
- c. General Requirements
- (1) Building plans submitted to the Building City Engineer will be reviewed by the Public Works City Engineer and approved prior to issuance of a building permit. Building plans must show:
 - (a) Water service size and location.
 - (b) Meter location and size.
 - (c) Backflow prevention device size, type and location.
 - (d) Fire sprinkling system(s) service line, size and type of backflow prevention device.
 - (2) Backflow prevention devices are to be installed in an accessible location to facilitate maintenance, testing and repair. Drawing Nos. 31 through 49 show various installations.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (3) All backflow devices shall be installed immediately downstream of the water meter.
- (4) Before installing the backflow prevention device, pipelines should be thoroughly flushed to remove foreign material.
- (5) In no case will it be permissible to have connections or tees between the meter and service line backflow prevention device.
- (6) In no case will it be permissible to connect the relief valve discharge on reduced pressure devices into a sump, sewer, drainage ditch, etc.
- (7) Backflow prevention valves are not to be used for the inlet or outlet valve of the water meter. Backflow preventer test cocks should never be used as supply connections and should be plugged except when being tested.

3/13/91

I-7-2

- (8) In order to ensure that backflow prevention devices continue to operate satisfactorily, it will be necessary that they be tested at the time of installation and on an annual basis thereafter. Such tests will be conducted in accordance with AWWA performance standards and field test procedures as prescribed by the manufacturer. The City of Cripple Creek shall provide appropriate forms.
- (9) The City of Cripple Creek Public Works City Engineer will inspect all installations at no cost to the Owner.
- (10) All costs for design, installation, maintenance, repair and testing are to be borne by the customer.
- (11) No grandfather clause exists. All laws and regulations apply to new as well as existing structures.
- (12) All glycol or antifreeze systems shall have an approved Reduced Pressure Zone device for containment.
- (13) Dry fire systems shall have an approved Double Check Valve installed upstream of the air pressure valve.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (14) Single-family residences with a fire sprinkler system and domestic water system combined shall have a double check valve.
- (15) Underground fire sprinkler systems not having a fire hydrant attached shall be inspected from the city main to the riser flange including the backflow device by the City Engineer. This inspection shall include, but not be limited to, all anchors, supports, materials and appurtenances from the water main through the backflow prevention device.
- (16) All underground fire sprinkler systems, shall conform to the following sections of the National Fire Protection Association pamphlets number 13 and 24: pamphlet number 13, sections 1-11.2 hydrostatic testing, and sections 1-1.2.2 allowable leakage. Pamphlet number 24, private fire service mains and their appurtenances sections 8.4, 8.5, 8.7 and 8.8.

d. Standards for Backflow Prevention Devices

- (1) Any backflow prevention device required herein shall be of a model and size approved by the City of Cripple Creek. The term “APPROVED BACKFLOW PREVENTION DEVICE” shall mean a device that has been manufactured in full conformance with the standards established by the American Water Works Association (AWWA) entitled:

3/13/91

I-7-3

AWWA C506 Standards for Reduced Pressure Principle and Device, or current edition, and have met completely the laboratory and field performance specifications of the Foundation for Cross Connection Control and Hydraulic Research (FCCC & HR) of the University of Southern California established by:

Specifications of Backflow Prevention Devices, 7th Edition, August 1985; Revised, or the most current issue.

AWWA and FCCC & HR Standards and Specifications have been adopted by the City of Cripple Creek. Final approval shall be evidenced by a “Certificate of Approval” issued by an approved testing laboratory certifying full compliance with said AWWA Standards and FCCC & HR Specifications. The following testing laboratory is qualified to test and certify backflow prevention devices:

Foundation for Cross Connection and Hydraulic Research University of
Southern California
OHE 430 D – University Park – MC 1453

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

Los Angeles, California 90089-1453

- (2) Only “Approved Backflow Prevention Devices” shall be used. See pages I-7-10 through I-7-14 for approved backflow prevention devices. See pages I-7-7 through I-7-9 for selection criteria.
- (3) Backflow preventers currently installed, which are not approved, shall be replaced with an approved device within three (3) years of adoption of this regulation unless the backflow preventer fails an annual operational test. If the device fails any such test, it shall be replaced immediately with an approved device.
- (4) Backflow devices used on fire lines shall have O.S. & Y. valves and be listed by the National Fire Protection Association.

e. Installation

- (1) Backflow prevention devices shall be installed in accordance with Drawing Nos. 31 through 39.
- (2) Backflow prevention device installations shall be inspected and approved for use by the City of Cripple Creek. Inspections can be scheduled by calling (719) 689-2502 at least 48 hours in advance of the desired inspection time.

3/13/91

I-7-4

- (3) All backflow devices shall be installed in the horizontal position. Variance by review only on retrofit fire systems.
- (4) A pressure vacuum breaker shall only be used where the device is never subjected to backpressure and installed a minimum of 12 inches above the highest piping of outlet downstream of the device in a manner to preclude backpressure.
- (5) An atmospheric vacuum breaker shall be used only where the device is:
 - (a) never subjected to continuous pressure, and
 - (b) installed on the discharge side of the last control valve and above the point of usage, and
 - (c) installed with the air inlet in a level position and a minimum of 6 inches above the highest piping on outlet it is protecting.
- (6) The single check valve is not considered to be a backflow prevention device.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (7) Double check valve assemblies may be installed in below grade vaults when these vaults are properly constructed in accordance with Drawing Nos. 31 through 38.
- (8) Reduced pressure backflow preventers will be installed above ground. The unit should be placed at least 12 inches above the finish grade to allow clearance for the repair work. A concrete slab at finish grade is recommended. Proper drainage should be provide for the relief valve and may be piped away from the location, provided it is readily visible from above grade and 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 problem in this area. Precautions should be taken to protect above ground installations.
- (9) Reduced pressure zone backflow preventer may be installed in a basement provided with an adequate drain with an effective opening of twice the diameter of the device.

f. Testing and Maintenance

- (1) It will be the duty of the customer/user at any premises where the backflow prevention devices are installed to have certified inspections and operational tests made of the devices at least once per year. In those specific instances where the City of Cripple Creek deems the hazard to be great enough, it will require certified inspections at more frequent intervals.

3/13/91

I-7-6

These inspections and tests shall be at the expense of the water user and shall be performed by water utility personnel or by a certified technician approved by the City of Cripple Creek, the Colorado City Engineer of Health, or the Water Distribution and Wastewater Collection Systems Certification Council.

- (2) The customer shall notify the City of Cripple Creek 48 hours in advance of when the tests are to be performed so that the City's representative may witness the tests if so desired. The devices shall be repaired, overhauled or replaced at the expense of the customer/user whenever the device(s) are found to be defective. Records of all such tests, repairs and overhauls shall be kept, with a copy sent to the City's Public Works City Engineer.

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

- (3) The customer may request a private certified tester to perform the annual test and furnish the City with a copy of the test, pursuant to the aforementioned stipulation.
- (4) Existing devices shall be sealed by the technician performing the test at the completion of the test.
- (5) All testing gauges shall be checked for accuracy and be kept in good operating condition.
- (6) The City of Cripple Creek retains the right to test or otherwise check the installation and operation of any containment device.
- (7) The customer may request that the City perform the test for a fee as indicated on the following schedule. The City of Cripple Creek will not perform any repairs; this must be accomplished by certified personnel from the private sector.

All backflow prevention devices 3/4" – 2"	\$20.00
Reduced pressure assemblies 2" – 10"	\$25.00
Double check assemblies	\$30.00

g. Right of Entry

The City of Cripple Creek water utility representative(s) assigned to inspect premises relative to possible hazards shall carry proper credentials of his/her office, upon exhibit of which he or she shall have the right of entry during usual business hours to inspect any and all buildings and premises for cross connections in the performance of his or her duties.

3/13/91

I-7-6

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

This right of entry shall be a condition of water service in order to provide assurance that the continuation of service to the premises will not constitute a menace to health, safety and welfare of the people throughout the City of Cripple Creek’s potable water distribution system. Where building security is required, the backflow device should be located in an area not subject to security.

h. **Violations**

- (1) Failure of the customer to cooperate in the installation, maintenance, testing or inspection of backflow prevention devices required by this regulation shall be grounds for the discontinuance of water service to the premises or the requirement for an air-gap separation from the public potable water system.
- (2) Service of water to any premises may be discontinued by the City of Cripple Creek after written notification if unprotected cross connections exist on the premises, or if any defect is found in an installed backflow prevention device, or if a backflow prevention device has been removed or bypassed. Service shall not be restored until such conditions or defects are corrected.
- (3) Discontinuance of service may be summary, immediate and without written notice whenever, in the judgment of the City of Cripple Creek’s City Engineer of the Public Works City Engineer, such action is necessary to protect the purity of the public potable water supply or the safety of the water system.

7.02 Cross Connection Control & Backflow Prevention – Criteria List

a. Abbreviations

- A/G – Air Gap Separation
- R/P – Reduced Pressure Zone Device
- D/C – Double Check Valve Assembly
- P.T.V.B. – Pressure Type Vacuum Breaker

<u>Type of Establishment</u>	<u>Device Required</u>
Apartments and condominium	R/P
Auxiliary water systems	R/P
Belted meter installations	R/P
Buildings – 4 stories or more	R/P
Car Wash	R/P

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-7-7

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

<u>Type of Establishment</u>	<u>Device Required</u>
Child day care	R/P
Fire Line (tonic chemicals added)	R/P
Fire Line (no chemicals)	D/C
Food processing/packing plant	R/P
Greenhouse	R/P
Hospital, dental or medical facility	R/P
Irrigation System	R/P – P.T.VB
Kennels – dog/cat	R/P
Laboratory – chemical or medical	R/P
Lease space (shopping centers, warehouse. main water supply)	R/P
Manufacturing/Processing Plant	R/P
Mobile equipment (landscape, lawn, tree spraying, water hauling)	A/G variance by review only
Morgue, mortuary, or autopsy facility	R/P
Nursing home/retirement home	R/P
Pet shops	R/P
Photo developing lab	R/P
Planned Unit Development	R/P
Plating facilities	R/P
Printing shop	R/P
Private well supply	A/G
Recirculated water	R/P
Reflecting ponds, swimming pools, fountains open ponds, etc	R/P
Schools – Colleges w/Lab	R/P
Sewage treatment plant	R/P
Solar System	R/P by review

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

	Steam generating plant	R/P
3/13/91	I-7-8	
	<u>Type of Establishment</u>	<u>Device Required</u>
	Stock Yard	R/P
	Transportation	R/P
	Veterinary	R/P

NOTE: Other types of establishments may require protection via air gaps or backflow prevention devices depending on the equipment and/or plumbing arrangements utilized therein. These shall be considered individually, at the discretion of the City of Cripple Creek. All of the establishments listed below will require review by the City and a determination made as to the need for a backflow prevention device.

Apartments and condominiums – single and multi-structures – four units or more, three stories or less

Barbershop or college

Beauty shop or college

Buildings – three stories or less

Cafeteria, restaurant, coffee shop, etc. (any food handling establishment)

City Engineer Store

Hotels and motels – single structures and multi-structures, three stories or less

Laundromat

Office or Warehouse

PART I

WATER SYSTEM STANDARD SPECIFICATIONS

3/13/91

I-7-9