

CITY OF BOULDER
DESIGN AND CONSTRUCTION STANDARDS

CHAPTER 4
GENERAL UTILITIES DESIGN

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4.01 General

(A) Intent

The General Utilities Design Standards are intended to provide for an integrated public utilities system for all public utilities, including water, wastewater, storm drainage, gas, electric and telecommunications systems.

(B) Utilities Master Plans

All improvements proposed to the City's public utilities system shall conform with the goals, policies, and standards adopted in the Water Distribution, Wastewater Collection, Storm Water Collection and Major Drainageway Master Plans.

(C) Reference Standards

Where not specified in these Standards or the B.R.C. 1981, to protect the public health, safety, and welfare, the Director of Public Works will specify the standards to be applied to the design and construction of public utilities improvements and may refer to one or more of the references listed in the References Section of these Standards.

4.02 Utility Connection Plan

(A) Required

The Director of Public Works may require the preparation of a Utility Connection Plan in order to assess the feasibility of providing utility service to any project or development and identify impacts of any development application on the existing and planned public utility systems. A Utility Connection Plan may be prepared in lieu of a Utility Plan for projects or developments that meet all of the standards below:

- (1) City utilities required to serve the site are located directly adjacent to the subject property.
- (2) No extension, enlargement, or improvement of public mains is required to serve the site.
- (3) No change in use is proposed which may alter the utility needs of the site.

(B) Plan Requirements

The Utility Connection Plan shall include the following project or development information:

- (1) Title Block: Include the label "Utility Connection Plan" and name of project or development application, and the original preparation date and dates of any revisions.
- (2) Site Location Data: Include vicinity map and north arrow,
- (3) Drawing Scale: The drawing scale shall be between 1 inch equals 20 feet and 1 inch equals 100 feet, placed on the minimum number of plan sheets possible.
- (5) Property and Street Information: Include the location of existing and proposed lot lines, block and lot numbers, and street names.
- (6) Construction Note: Include the statement that "Utilities shall comply with the City of Boulder Design and Construction Standards."
- (7) Existing and Proposed Utilities: Include the location, type and size of all existing and proposed utilities mains and service lines. Utilities to be identified include without limitation: water, wastewater, storm drainage, flood control, gas, electric, telecommunications,

drainageways, and irrigation ditches within and adjacent to the project or development site. Include and assign identification numbers to all existing and proposed manholes, inlets, fire hydrants, meter settings and pits, and provide “direction of flow” arrows on gravity pipelines.

- (8) Easements and Rights-of-Way: Include the location, dimensions, and dedication type of all existing and proposed easements and rights-of-way for all utilities improvements. If available, reference existing easements to appropriate recorded film and reception numbers.
- (9) Structures and Trees: Include the location and dimensions of all existing and proposed structures, including without limitation buildings and fences, trees 1½inch caliper or greater, and major landscape features.
- (10) Floodplain: Delineate any 100-year floodplain boundaries that impact the project or development site and identify the floodplain designation, base flood elevations and floodplain mapping source used to determine the floodplain.
- (11) Storm Water Plan Combination: The Director may approve a combined “Utility Connection and Storm Water Plan,” reflecting storm water design information, prepared in compliance with the requirements outlined in Chapter 7, “Storm Water Design,” of these Standards.
- (12) Applications for Annexation or Out-of-City Utility Service for a single family residential dwelling may provide the required information on a scaled Improvement Location Certificate or Improvement Survey Plat.

4.03 Utility Plan

(A) Required

The Director may require an applicant to submit a Utility Plan as a condition of any development application in order to adequately assess the availability of utility service and impacts of any development application on the existing and planned public utility systems. The Utility Plan shall provide an overview of the proposed project or development application and identify whether the proposal is:

- (1) Eligible for utility service and has access to available public utility systems.
- (2) Consistent with current Utilities Master Plans and meets the minimum design standards for system layout, and compatibility with and perpetuation of the existing utility systems.
- (3) Located within any mapped 100-year floodplain.

(B) Plan Requirements

The Utility Plan shall include the following project or development information:

- (1) Title Block: Include the label “ Utility Plan” and name of project or development application, and the original preparation date and dates of any revisions.
- (2) Site Location Data: Include vicinity map, north arrow, relationship of the property to range, township, and section lines.
- (3) Survey Information: Include the elevation and location of City-recognized benchmarks with reference to local, USGS and NGVD data.
- (4) Drawing Scale: The drawing scale shall be between 1 inch equals 20 feet and 1 inch equals 100 feet, placed on the minimum number of plan sheets possible.
- (5) Property and Street Information: Include the location of existing and proposed lot lines, block and lot numbers, and street names.

- (6) Construction Note: Include the statement that “Utilities shall comply with the City of Boulder Design and Construction Standards.”
- (7) Existing and Proposed Utilities: Include the location, type and size of all existing and proposed utilities mains and service lines. Utilities to be identified include without limitation: water, wastewater, storm drainage, flood control, gas, electric, telecommunications, drainageways, and irrigation ditches within and adjacent to the project or development site. The locations of existing underground utility mains and service lines, and the invert and surface grade elevations of all manholes, inlets and culverts, shall be field verified to the Director’s satisfaction (by “pothole” excavations, if necessary) and accurately delineated and dimensioned. Include and assign identification numbers to all existing and proposed manholes, inlets, fire hydrants, valves, pipe lengths, meter settings and pits, and provide “direction of flow” arrows on gravity pipelines. Proposed invert and surface grade elevations shall be provided for all proposed manholes, inlets and culverts.
- (8) Site Topography: Include existing and proposed contour lines showing at least 2-foot contour intervals, and reflecting spot elevations at various locations, “cut and fill” areas, and surface drainage systems.
- (9) Easements and Rights-of-Way: Include the location, dimensions, and dedication type of all existing and proposed easements and rights-of-way for all utilities improvements. If available, reference existing easements to appropriate recorded film and reception numbers.
- (10) Structures and Trees: Include the location and dimensions of all existing and proposed structures, including without limitation buildings and fences, trees 2 inch caliper or greater, and major landscape features.
- (11) Maintenance Access: Include the location and dimensions for existing and proposed “all-weather” maintenance access drives for 14-ton maintenance equipment to reach manholes and inlets not located in existing or proposed streets.
- (12) Floodplain: Delineate any 100-year floodplain boundaries that impact the project or development site and identify the floodplain designation, base flood elevations and floodplain mapping source used to determine the floodplain.
- (13) Storm Water Plan Combination: The Director may approve a combined “ Utility and Storm Water Plan,” reflecting storm water design information, prepared in compliance with the requirements outlined in Chapter 7, “Storm Water Design,” of these Standards.

(C) Utility Plan Approvals

- (1) The utility plan shall reflect proposed utility infrastructure and utility service to development applications, and may serve as the basis for approving site review and preliminary subdivision proposals.
- (2) A final version of the utility plan shall be included in all Construction Plans proposing the construction of utility infrastructure to reflect overall system layout and design configurations.
- (3) The utility plan may serve as the Construction Plan under the following conditions:
 - (a) The proposed utility improvements include only private service line (water, wastewater, or storm sewer) or fire line connections to individual properties.
 - (b) The proposed utility improvements include only water main extensions or fire hydrant runs on individual properties.
 - (c) Standard construction notes are included on the Utility Plan, and no other

Construction Plans for other public improvements are required.

- (4) The Director may waive the requirement that the Utility Plan be prepared by an Engineer for development applications that include only private utility (water, wastewater and storm drainage) service lines or fire lines to individual properties.

4.04 Utilities Easements

(A) General

- (1) All City-operated public utilities, including without limitation, water, wastewater and storm drainage systems, shall be located within public rights-of-way or public utility easements.
- (2) Public utility easements shall be at least 25 feet wide. Wider easements may be required where the depth of a utility, or number of utilities occupying the easement, requires additional width to satisfy standards for utility separations, trenching excavations, or adequate maintenance access.
- (3) Public utility easements shall provide a minimum parallel separation of 6 feet between the edge of any utility line and the easement boundary.
- (4) Public utility easements are to be placed longitudinally along one side of any property line in a manner that no portion of any easement falls on both sides of a parallel property line.
- (5) Trees proposed to be planted in public utility easements shall be located at least 10 feet away from existing or future utilities.
- (6) Structures and landscaping proposed in public utility easements shall comply with the standards as set forth in Chapter 8-5, "Work in the Public Right-of-Way and Public Easements," and Chapter 8-6, "Public Right-of-Way and Easement Encroachments, Revocable Permits, Leases, and Vacations," B.R.C. 1981.
- (7) The Director may allow water service taps from water mains in easements only if free and unobstructed access is permanently guaranteed for all-weather water meter reading and maintenance. Proposals will be reviewed on a case-by-case basis, and are subject to prior approval by the Director.

(B) Easements Crossing Single-Family Residential Lots

Public utility easements crossing single-family residential lots may be allowed only for the following:

- (1) Completing required water system looping in cul-de-sac type applications where water mains would otherwise dead-end, and for the installation of fire hydrants.
- (2) Continuing a wastewater main that would otherwise dead-end in cul-de-sac type applications.
- (3) Conveying storm water drainage and overflows from back-draining cul-de-sac or street sump type applications.

4.05 Pipe Strength

All utility pipe shall be of adequate strength to support the trench and AASHTO HS-20 highway loadings.

4.06 Separation of Utilities

(A) Parallel (Horizontal) Separation

Parallel separations between utility mains and services to provide for adequate trench excavations and maintenance operations shall be as follows. All distances are measured from outside of pipe to outside of pipe:

Table 4-1: Utility Separation Requirements

	Water	Sewer	Storm	Electric, Telecommunications, and/or Gas
Water		10-ft	5-ft	5-ft
Sewer	10-ft		10-ft	10-ft
Storm	5-ft	10-ft		5-ft
Electric, Telecommunications, and/or Gas	5-ft	10-ft	5-ft	

(B) Pipe Crossings (Vertical) Separation

- (1) The minimum vertical separation between water and wastewater line crossings, as measured outside of pipe to outside of pipe, shall be 18 inches. The water line shall be constructed above the wastewater line.
- (2) The minimum vertical separation between water and storm drainage line crossings shall be 18 inches, measured from outside of pipe to outside of pipe.
- (3) The minimum vertical separation between wastewater and storm drainage line crossings, as measured outside of pipe to outside of pipe, shall be 6 inches, including the following:
 - (a) If the storm drainage line is constructed below the wastewater line, pressure-class pipe will be required for both utility lines to prevent possible wastewater contamination of storm drainage.
 - (b) If the vertical separation between the wastewater and storm drainage line is less than 18 inches, structural support will be required, subject to the Director's approval.
- (4) The minimum vertical separation between City public utilities and all gas, electric, and telecommunications utilities shall be 6 inches.

(C) Drainageway and Irrigation Ditch Crossings

Utility crossings of natural and improved drainageways and irrigation ditches listed in Table 4-1, "Local Drainageways and Irrigation Ditches," and shall meet the following conditions:

- (1) Water Main Crossings: The water main shall be placed at least 4.5 feet below the invert of the drainageway or irrigation ditch, and shall be placed in a steel sleeve in conformance with the applicable standard drawings in Chapter 11, "Technical Drawings," of these Standards.
- (2) Wastewater Main Crossings:

- (a) The wastewater main shall be placed at least 3 feet below the invert of an open drainageway or irrigation ditch or at least 18 inches below the invert of a drainageway or irrigation ditch culvert, and shall be placed in a steel sleeve in conformance with the applicable standard drawings in Chapter 11, “Technical Drawings,” of these Standards.
 - (b) In open drainageway or irrigation ditch crossings, the Director may allow the wastewater main to be encased in concrete instead of placement in a steel sleeve, and the concrete encasement shall conform with the applicable standard drawings in Chapter 11, “Technical Drawings,” of these Standards.
 - (c) When a drop manhole is used to obtain the required vertical separation for a drainageway or irrigation ditch crossing, the drop manhole shall be located at least 20 feet from the end of a steel sleeve.
- (3) Storm Drainage Main Crossings: When a storm drainage line is required to cross an irrigation ditch, it shall comply with the conditions prescribed in subsection (C)(2).
- (4) Other Utility Line Crossings
- (a) Other utility lines, including without limitation, gas, electric, and telecommunications lines, shall be placed at least 30 inches below the invert of a drainageway or irrigation ditch.
 - (b) Other utility lines shall be placed in a Schedule-40 steel casing, extending horizontally at least 10 feet beyond each side of the drainageway or irrigation ditch, measured from top of bank to top of bank.

Table 4-2: Local Drainageways and Irrigation Ditches

Anderson Ditch	Elmer’s Two Mile Creek	Skunk Canyon Creek
Bear Canyon Creek	Farmer’s Ditch	South Boulder Creek
Bluebell Creek	Fourmile Canyon Creek	Sunshine Creek
Boulder Creek	Goose Creek	Two Mile Canyon Creek
Boulder and Whiterock Ditch	Gregory Creek	Viele Channel
Boulder and Left Hand Ditch	Howard Ditch	Wellman Canal
Dry Creek	King’s Gulch	Wonderland Creek
Dry Creek #2	New Anderson Ditch	
Dry Creek #2 Ditch	North Boulder Farmer’s Ditch	

(D) Special Conditions for the Separation of Utilities

If the required horizontal or vertical separation of utilities cannot be obtained as required in this section, the Director may apply special conditions to the design of utilities separations, to ensure the safety, protection and integrity of the utility system, as follows:

- (1) Parallel Separation
 - (a) If 10 feet of parallel separation between water and wastewater lines cannot be obtained, the wastewater line may be laid closer to the water line, provided the

following conditions exist:

- (i) The wastewater line is constructed of pressure-class pipe, in conformance with these Standards, until the required horizontal separation is obtained, and
 - (ii) The water line is located at least 18 inches above the wastewater line, as measured from the top of the wastewater pipe to bottom of the water pipe.
- (b) If 5 feet of parallel separation between water and storm drainage lines cannot be obtained, the storm drainage line may be laid closer to the water line, provided the storm drainage line is constructed of pressure class pipe, until the required horizontal separation is obtained. The storm drainage line does not need to be pressure tested.

(2) Crossings Separation

- (a) If 18 inches of vertical separation between either water and wastewater line crossings, or water and storm drainage line crossings, cannot be obtained, the wastewater or storm drainage line shall be constructed of pressure-class pipe, in conformance with these Standards, for at least 10 feet beyond each side of the water line crossing. This distance shall be measured along the wastewater or storm drainage line from the center of the water line. The storm drainage line does not need to be pressure tested.
- (b) If the water line cannot be constructed above the wastewater line at water and wastewater line crossings, the wastewater line shall be constructed of pressure-class pipe, in conformance with these Standards, for at least 10 feet beyond each side of the water line crossing. This distance shall be measured along the wastewater line from the center of the water line.
- (c) If either 18 inches of vertical separation between water and wastewater line crossings, and water and storm drainage line crossings, or 6 inches of vertical separation between wastewater and storm drainage line crossings cannot be obtained, special structural support shall be required to prevent settlement and potential pipe damage at the crossing. Structural support design shall be subject to the Director's approval.

(3) Pressure Class Pipe for Crossings: When pressure-class pipe is required to satisfy the requirements prescribed in this section, the following will apply:

- (a) Pipe materials and quality shall be suitable for water main construction in accordance with specifications prescribed in these Standards.
- (b) Individual pipe sections shall be at least 18 feet long and placed at the crossing so that the ends are located 9 feet beyond each side of the water line crossing.
- (c) The inside diameter of the pressure class crossing pipe shall be of equal size or nearest diameter larger than the non-pressure-class wastewater or storm drainage pipe inside diameter for the length until the required separation between utilities is obtained. Pressure class pipe installations shall include watertight transition couplings.
- (c) Both the water and wastewater lines shall be pressure tested.

4.07 Undergrounding of Utilities

New, replacement, or relocated electrical utilities and telecommunication and cable television systems shall be installed underground as set forth in Section 9-5-9, "Public Improvements," B.R.C. 1981.