

CULINARY WATER SYSTEMS

- I. Water system size determination
 - A. The minimum water line size is 8 inch for distribution lines in a residential subdivision.
 1. Subdivisions that have a school or church will be required to install 10 inch, 12 inch, or larger line, looped systems.
 2. All subdivision water lines shall be subject to the City Engineer's size requirements. The lines may be increased in size to accommodate future development or to provide adequate fire flow protection. The size of the line is a function of the location of the system within the specific pressure zone and the approved master plan.
 - B. The minimum line size for dead-end systems (including cul-de-sacs over 500 feet in length) shall be 8 inch.
 - C. The water line sizes shall be determined by the City Engineer, after consultation with the Fire Marshall, using the following requirements:
 1. A minimum fire flow of 1,000 gpm for residential units, without brush or near standing trees.
 2. A minimum fire flow of 1,500 gpm for residential units with brush and/or standing trees nearby.
 - a. The City Fire Marshall will make the determination of brush requirements.
 3. A minimum fire flow of 2,200 gpm for a typical church building. Subdivision developments that may include a school or church will be required to provide the additional fire flow line size.
 4. A minimum of 3,000 gpm for commercial development.
 - a. The fire flow may be reduced to 1,500 gpm if approved by the City Fire Marshall.
 - b. The fire flow may be increased as determined by the City Fire Marshall.
 5. The culinary demand of .33 to 1.0 gpm per unit shall be added to the fire flow amount, allowing 8 fixture units to 27 fixture units.
 6. The outdoor demand of .66 to 2.0 gpm from the culinary system shall be added to the fire flow and indoor culinary use.
 - a. The outdoor demand will not be used in areas serviced by a secondary water system AND the secondary water system is installed at the site in question.
 7. A minimum of 50 psi is expected in all parts of the system.
 8. 100 psi is the anticipated maximum operating pressure. Pressures exceeding 100 psi must be approved by the City Engineer.
 9. The flow velocity through a pipe during a fire flow must not exceed 10 ft/sec. Flow velocity must be verified by the Layton City water model.
 10. The impact of the proposed system on the existing system will be reviewed by the City Engineer.
 - a. The developer may be required to add additional lines off site in order to provide adequate water supplies and pressures.

11. The areas that will be supplied through the proposed development will be considered and the method of service to those areas determined. An increased line size may be required for future development, as indicated by the master plan.
12. The system storage requirements will be considered for each development.

II. Waterline placement

- A. The waterline shall be placed 4.0 feet north and east of the street centerline.
- B. The waterline shall be placed along the curve of a street to conform to the 4-foot alignment. The use of bends may be required if the centerline radius is shorter than the allowed radius of the pipeline.
- C. The waterline shall be installed with a minimum of 48 inches and a maximum of 72 inches of cover over top of the pipe unless prior approval is obtained from the City Engineer.
- D. If the waterline needs to be "looped" to pass another line or structure, the minimum clearance between the two utilities shall be 12 inches except for sanitary sewer lines which require 18 inches minimum clearance.
- E. The waterlines will not be installed at side lot or rear lot property lines. All lines will be installed within street right-of-ways.
- F. Water lines shall be extended to the boundary of the development.
- G. The minimum centerline radius of the waterline shall be as follows:
 1. 6" through 12" - 205'
 2. 14" and 16" - 260'

III. Fire hydrant requirements

- A. Fire hydrants shall be installed at 500-foot intervals in residential areas.
- B. Fire hydrants in commercial and industrial areas shall be installed in accordance with table C105.1 in Appendix C of the International Fire Code. The City Engineer and City Fire Marshall will determine any variations to the required number and location of fire hydrants.
- C. Bends are not allowed on the water line connection of a public fire hydrant to the water main.
- D. Fire or flushing hydrants shall be installed at the end of all lines.
 1. Fire Hydrants placed at the end of cul-de-sacs or on dead end streets shall not be considered as a "fire protection" fire hydrant but simply as a hydrant for use by the water department to flush the system lines.
 2. 2" flushing hydrants may be placed at temporary dead end streets as approved by the City Engineer.
- E. Fire hydrants shall be placed in the planter / park strip area 12 to 18 inches behind the curb with the auxiliary valve located on the mainline tee in the street. The hydrant breakaway flange shall be flush with the sidewalk.
- F. Fire hydrants shall be placed 12"-18" behind the sidewalk in areas where no planter / park strip is provided. The auxiliary valve shall be located on the mainline tee in the street. The hydrant breakaway flange shall be flush with the sidewalk.
- G. Where asphalt widths exceed 54 feet, fire hydrant spacing shall be independent

from one side of the street to the other side of the street. A fire hydrant on one side of the wide street will not be included in fire hydrant spacing on the other side of the street.

- H. The City Fire Marshall may require additional fire hydrants.
- I. Fire hydrants shall be installed at the entrance to all cul-de-sacs. Fire hydrants must be placed at the beginning of a curb radius or at the end of a curb radius.
 - 1. If two cul-de-sacs or a cul-de-sac and a through street back onto each other AND if the centerline to centerline distance of the two streets does not exceed 260 feet AND if the length of the cul-de-sac(s) does not exceed 350 feet, the fire hydrant may be installed on a common property line of the lots backing onto each other at the main street.

IV. Isolation valve placement

- A. Isolation valves shall be placed at the entrance to all cul-de-sacs.
- B. Isolation valves shall be placed at intervals not to exceed 800 feet.
- C. Isolation valves shall be placed at all intersections on at least two branches of a "T" intersection and three branches of a 4-way intersection. These valves shall be installed in the intersections, at the extension of property lines.
 - 1. An additional valve will be required if the sum of the pipelines on the third or fourth branch exceeds 1,000 feet.
 - 2. An additional valve will be required if the pipeline(s) beyond the branch may continue in service when the adjacent valves are shutdown.
- D. Isolation valves shall be installed near fire hydrants, points of curve, points of tangent, or common property lines.
- E. Isolation valves for private fire lines and other private service lines larger than 3 inch shall be installed at the mainline connection.
- F. Isolation valves shall be installed within 10 feet of the upstream and downstream ends of an augured or trenched casing

V. Water service connections

Pipe and pipe fittings installed after January 4, 2014 shall be "lead free" in accordance with Section 1417 of the Federal Safe Drinking Water Act. They shall be certified as meeting ANSI/NSF 372 or Annex G of ANSI/NSF 61.

- A. All residential building lots shall have a 3/4-inch culinary water lateral installed unless a fire sprinkling system is required. Plans must note the size of the lateral to be installed.
 - 1. The complete service connection includes the corporation stop and service saddle for PVC or direct tap for ductile iron, 3/4 inch type "K" copper or HDPE CTS-OD SDR-9 poly tubing, a cast iron meter yoke, angle stop, backflow angle valve, stainless steel stiffener inserts at all poly pipe connections, 21 inch X 36 inch concrete or approved PVC meter box, cast iron frame and cover.
- B. Residential lines may be increased to 1-inch copper or HDPE CTS-OD SDR-9 poly if the developer requests the increase.
 - 1. A note will be added to the dedication plat indicating the increased line size.

2. The complete service connection includes the corporation stop and service saddle for PVC or direct tap for ductile iron, 1 inch type "K" copper or HDPE CTS-OD SDR-9 poly tubing, a cast iron meter yoke, angle stop, backflow angle valve, stainless steel stiffener inserts at all poly pipe connections, 21 inch X 36 inch meter box, cast iron frame and cover.
- C. The water meter shall be installed at the center of the building lot.
- D. The tubing shall extend to the outside edge of the public utility easement, which is:
1. Typically 8 feet past the sidewalk where a park strip is provided.
 2. Typically 11 feet past the sidewalk where the sidewalk abuts the curb & gutter.
- E. All residential meters shall be placed between the curb & gutter and sidewalk if a park strip is provided.
- F. All residential meters shall be placed 18"-24" behind the sidewalk where it abuts the curb.
- G. Residents with interior fire sprinkler systems typically are required to install a 2 service line and a 1.5-inch meter with backflow prevention unless approved by the Fire Marshall.
1. A note must be added to the dedication plat indicating the lateral and meter size, and the lots that will be serviced with a fire suppression system.
 2. All residential 2-inch meters shall be installed in a 4-foot manhole section.
- H. Multi-family units and private residential subdivisions
1. Multi-family and private residential subdivisions will require a master meter with a backflow assembly in a separate vault for meters larger than 2-inches.
 - a. The backflow assembly shall be installed in a separate manhole/vault after the master meter vault. Adequate access and 12 inches of clearance on all sides of an APWWA approved backflow assembly is required. The backflow assembly and vault are private. The level of protection of the backflow assembly is determined by the type of development being proposed.
 2. Meter size required will be based on submitted fixture units. The meter shall be sized by determining the maximum fixture count as established in the International Plumbing Code and as follows:

a.	Bathtub / shower	1.4 units
b.	Lavatory	0.7 unit
c.	Dishwasher / sink	1.4 units
d.	Flush tank toilet	2.2 units
e.	Clothes washer	1.4 units
 3. The maximum flow allowed by meter size and the acceptable service sizes are shown in the table below:

Meter Size (inches)	Continuous Flow (gpm)	Acceptable Service Size (inches)
5/8	15	3/4
3/4	20	3/4
1	30	1 or 1-1/2
1-1/2	75	1-1/2 or 2
2	250	2 or 3
3	500	3 or 4
4	1000	4 or 6
6	1600	6
8	2800	8

4. The meter size shall be increased to accommodate outdoor watering.
5. A separate fire line is typically required.
6. A water service line may be connected to a fire hydrant line system where a loop system exists or is proposed and the following items are considered:
 - a. The fire hydrant system must have two separate connections to the city main to create the loop system.
 - b. Meters will be required at each connection.
 - c. The minimum combined system line size shall be 8 inch.
 - d. The dedication plat and CCR's for the development shall specify waterline responsibility and ownership.
- I. Commercial connections shall be sized according to the peak domestic fixture count and outdoor use as determined by the City Engineer.
- J. Commercial meters shall be installed near the right-of-way, at a location acceptable to the City Engineer. See "Commercial Site Development Checklist" for commercial development water standards.

VI. Pipeline materials, construction, and testing

A. Materials

1. All waterlines, between 3 inches and 12 inches in diameter shall be class 51 ductile iron pipe or C-900 DR14 PVC pipe. All waterlines larger than 12 inches in diameter shall be class 51 ductile iron pipe.
2. All gate valves shall be non-rising stem, resilient seat valves, ductile iron bodies. All valve body assembly bolts shall be stainless steel. All valves 12 inches and larger shall be butterfly valves.
3. All private fire lines for hydrants and/or suppression systems must be class 51 ductile iron pipe or C-900 DR14 PVC pipe in the public right of way. Material used for underground piping in the private areas must meet NFPA25 fire code requirements.
4. All fire hydrants shall be minimum 48 inch bury, 6-inch barrel, 4 1/2 steamer and 2 - 2 1/2 nozzle hydrants.
 - a. Clow
 - b. Mueller
5. "MEGA-LUG" joint restraints or pre-approved acceptable equal shall be used on all pipeline loop construction. All joint restraints shall use T-bolts

and nuts coated with Fluoropolymer Star-Blue corrosion preventer or pre-approved acceptable equal.

6. "MEGA-LUG" joint restraints or pre-approved acceptable equal shall be used on all waterline connections and fittings where C-900 DR PVC pipe is installed. All joint restrains shall use T-bolts and nuts coated with Fluoropolymer Star-Blue corrosion preventer or pre-approved acceptable equal.
7. Where flange kits or bolt packs are installed, all flange kits or bolt packs shall use bolts and nuts coated with Xylan 1424 series fastener class coating for corrosion prevention or pre-approved acceptable equal.
8. All waterlines shall have a minimum 12 ga. insulated tracing wire installed with the pipe. The tracing wire shall be installed under the haunches of the pipe prior to backfilling.
 - a. Tracing wires shall terminate inside of all valve boxes, meter boxes, and at all fire hydrants using SnakePit tracer box style CD14*TP with blue locking cover. At service saddles and tapping sleeves, the tracing wire shall not be allowed to be placed between the saddle and the pipe. A grounding rod shall be installed at all tracer system terminal points.
 - b. Tracing wire shall be copper wire with blue insulation rated for direct burial. All wire connectors shall be 3M DBR direct bury splice or pre-approved acceptable equal and shall be watertight to provide electrical continuity.
 - c. All tracing wire shall be tested for continuity in the presence of the Public Works Inspector prior to asphalt placement. Any tracing wire found not to be continuous after testing shall be repaired or replaced by the contractor prior to asphalt placement.
9. Direct tapping of C-900 DR14 PVC pipe is not permitted.
 - a. Service taps up to 2" in size shall be made through the use of service saddles. All service saddles shall be Romac style 202NS or pre-approved acceptable equal.
 - b. For taps larger than 2", tapping sleeves shall be used. The sleeve shall be designed for use on C-900 DR14 PVC pipe. Taps are allowed up to size-on-size.

B. Construction

1. All waterlines shall be capped or plugged at the end of each day's construction and at all other times the line is not under direct observation by the contractor.
2. The waterline pipe shall be bedded in gravel where the sub-grade material is wet and/or the material is unstable.
3. All fittings shall have an appropriate thrust block installed.
4. At the connection point to the main, there is a minimum separation of 15 feet for lines 6 inches and greater; 4 feet for smaller building laterals; and 18-inches for ¾ inch pipe.

C. Testing - All tests shall be witnessed by the Public Works Inspector

1. The line shall be tested for leakage by raising the internal pipe pressure to

at least 200 psi. This pressure shall be maintained for a period of at least 2 hours without dropping.

2. The line shall be disinfected for a period of at least 24 hours. The line shall pass a microbiologic test with no coliform present and no bacteria colonies present.
3. All fire hydrants shall be operated from full open to full closure to assure proper operations. The flow shall be controlled by the auxiliary valve.
4. All valves shall be operated full open to full close. Then shall be left in the full open position.

VII. Special requirements

- A. If a development crosses a pressure zone boundary, the developer may be required to construct a pressure reducing valve station as determined by the Culinary Water Master Plan.
- B. If a development is located in an area not currently being served by the City culinary system, the developer may be required to construct storage facilities, pumping facilities and transmission lines.
- C. Services to be abandoned shall be disconnected at the main.
- D. Water mains to be abandoned shall be disconnected at the tee.
- E. Developments may be required to install sampling stations for water quality monitoring and sampling as determined by the City Engineer.
- F. Prior to final approval of any subdivision or development requiring water service from the City, the Developer shall dedicate to the City a sufficient number of water shares or rights, to provide a minimum of 3 acre-feet of water per acre of land proposed for development.
- G. All developments must submit an electronic PDF file and paper copy of the construction plans on 11" x 17" sheets at final approval for submittal to the Utah Division of Drinking Water.
- H. A "water/sewer crossing table" must be submitted to Layton City at final approval for submittal to the Utah Division of Drinking Water. The table must include information for all locations where the culinary water main crosses the sanitary sewer main. The table must include the development name, sheet number showing the crossing, road name where the crossing is located, station of the crossing, whether the water line will cross over or under the sanitary sewer, and the clearance between the water line and the sanitary sewer. An example table is shown below:

Development Name
Layton City – PWS 06018
Water/Sewer Crossings

Sheet	Road	Crossing Station	Crossing	Clearance
PP-01	Layton Street	1+50	Over 8" sanitary sewer	60"
PP-02	Main Street	5+00	Over 8" sanitary sewer	24"

I. Steel Casing Construction

1. ASTM A53, Grade B steel pipe for jacking operations, minimum wall thickness of 0.375 inch, minimum yield strength of 42,000 psi. Use a casing with a diameter equal to the outside bell diameter of the pipe plus a minimum 4 inches.
2. Fillet weld joints continuous around casing and reinforce joints to withstand jacking operations.
3. Use casing spacers CCI Pipeline Systems Model CSP or CSC or acceptable equal to center pipe within casing. Minimum of three spacers per length of pipe.
4. Install neoprene rubber end seal with stainless steel bands CCI Pipeline Systems Model ESC or ESW as applicable or acceptable equal at each end of casing.

The ownership and maintenance of these improvements will become the City's upon completion of the work and acceptance by the City. Private ownership of these types of improvements is allowed only as determined by the construction Staff.