

**2.9. WATER SYSTEM DESIGN**

All culinary water mains and appurtenances shall be designed to provide for adequate future service for all contiguous areas which may, within a reasonable period of time, be tributary thereto.

2.9.1. DESIGN FLOW AND PRESSURES

- A. Water mains shall be designed to provide a minimum residual pressure of 20 psi under peak day demand conditions, including designed fire flow.
- B. A minimum of 40 psi residual pressure must be maintained under peak instantaneous conditions without fire flow.
- C. Commercial or industrial areas may require special investigation to determine fire flow requirements.
- D. Existing and future static pressure and flow information used in the design must be obtained from or approved by the City Engineer.

2.9.2. FLOW DESIGN CRITERIA

- A. Use the following flow design criteria:

	Peak Instant	Peak Day	Avg Annual	Storage Requirement
Indoor Use	$Q \text{ (gpm)} = 10.8 * \text{ERU}^{0.64}$	0.56 gpm per ERU	0.45 AF per ERU	400 gallons per ERU
Irrigation Use	9.8 gpm per irrigated acre	4.9 gpm per irrigated acre	3.26 AF per irrigated acre	4,964 gallons per irrigated acre

- B. Minimum fire flow is 1,000 gpm for 2 hours for residential areas with dwellings no larger than 3,600 sq. ft per floor.
- C. Fire flow for areas with larger residences and commercial residences should be as per International Building Code.
- D. Water usage form (Form 7042) included in Appendix E shall be submitted with preliminary plan on subdivisions and with any application for site development.

2.9.3. HYDRAULIC ANALYSIS

- A. A computer network model shall be required for all system expansions in accordance with State of Utah rules.
- B. The model must show that the new expansion will not detrimentally impact other areas in the system.

#### 2.9.4. MINIMUM SIZE AND DEPTH

- A. The minimum depth of cover for water mains shall be 3 feet below the final grade of the street.
- B. Where final grades have not been established, mains shall be installed at least 4 feet deep or greater to insure three feet of cover below the future grade based on the best information available.
- C. The minimum size of a water main shall be not less than 4 inches in diameter.
- D. The minimum size of a water main , with connecting hydrants, shall be not less than 8 inches in diameter.
- E. Hydrant barrels and laterals to hydrants may be 6-inches in diameter.
- F. Size of mains must be verified to be sufficient through an engineering analysis to meet the prescribed design flows and pressures.

#### 2.9.5. VALVES

- A. Valves shall be spaced and system must be looped such that:
  - 1. No more than 2 fire hydrants will be isolated at any time.
  - 2. No more than 30 services are isolated at any time.
  - 3. A maximum of five valves will be required to isolate any location.
- B. Install valves within 20 feet of the end of all temporary dead end lines.
- C. Transmission mains may space valves at intervals of 2,500 feet when outside of a pressure zone
- D. Gate valves shall be used on 12-inch pipe and smaller.
- E. Gate valves or butterfly valves may be used on larger pipe.
- F. All distribution mains connecting to larger supply mains shall be valved near the connection.
- G. A valve near the main shall be located on all services and hydrant laterals greater than 2-inch in size.
- H. Valves shall generally be located in clusters near a tee or cross.

#### 2.9.6. DEADENDS

- A. Dead-end mains shall be avoided wherever possible, and if installed, shall not exceed 600 feet.

- B. Hydrants shall be located at the end of dead-end mains for flushing purposes as well as for fire protection.
- C. Dead ends may have a 2-inch flush valve installed in lieu of a fire hydrant, if approved by the City on a case by case basis.

2.9.7. SERVICE CONNECTIONS

- A. Pressure reducing devices shall be installed by the owner on all water connections to buildings.
- B. Each service meter shall have a separate tap to the main.
- C. Service line shall be located in a perpendicular alignment to the street.
- D. Each building shall have a separate line and meter.
- E. Service line size shall match the meter size. Beyond the meter, the line may be increased only one size.
- F. Services shall be sized as follows:

SERVICE LINE SIZE	MAXIMUM UNITS SERVED
3/4"	1
1"	5
1.5"	12
2"	20

2.9.8. FIRE HYDRANT SPACING AND LOCATION

- A. Generally locate on the same sides of streets throughout a subdivision.
- B. Fire hydrants are preferred near intersections.
- C. In residential areas, fire hydrant spacing shall be no greater than 500 feet, and no house shall be greater than 250 feet from a hydrant via a street access to the property being served.
- D. In industrial, business, or commercial areas, fire hydrant spacing shall not be greater than 350 feet, nor shall any building be greater than 175 feet from a hydrant via public access to the property being served.
- E. Generally, hydrants shall be located in line with extensions of the property line when located mid-block.
- F. Hydrants shall be placed in the park strip or, if there is no park strip, behind the sidewalk in such a manner that no part of hydrant encroaches on the walkway, and at such a height that lowest water outlet is not less than 18 inches nor more than 30 inches from the final ground elevation.

- G. All fire hydrants shall be installed on dedicated easements or public rights-of-way, and will be owned and maintained by the City.
- H. Hydrants shall have at least 5 feet clearance on sides and front and 3 feet on rear.

#### 2.9.9. CULINARY WATER PIPELINES

- A. Located within a dedicated right-of-way, waterline easement or equivalent. Waterline easements shall provide at least 20 feet of unobstructed width.
- B. Install in straight segments between bends unless approved by the City.
- C. Approved Pipe Materials:
  - 1. Solid Wall PVC, AWWA C-900
  - 2. Ductile Iron, Class 200, cement mortar lined, must be bagged to prevent corrosion.
  - 3. Solid wall HDPE, submit calculations for wall thickness.
  - 4. Steel, cement mortar lined and coated, submit calculations for wall thickness, must submit plan for cathodic protection.

#### 2.9.10. NETWORK HYDRAULIC ANALYSIS

- A. Required when:
  - 1. The project is a major subdivision with an internally looped system.
  - 2. The project is located in the higher elevations of a low static pressure zone.
  - 3. A high fire flow demand is required (greater than 1500 gallons per minute).
  - 4. There will be extensive irrigation.
  - 5. The new water plans will complete a loop on the current system.
  - 6. As otherwise required by the City Engineer.
- B. The consulting engineer should request the source hydraulic grade line (HGL) from the public works department prior to the initial design where a network hydraulic analysis is required.
- C. Engineer must submit Water usage form (Form 7042) when requesting the HGL.

#### 2.9.11. SECONDARY (IRRIGATION) WATER SYSTEM

- A. Designed in accordance with all culinary water system requirements with the following exceptions:

*Ivins City Standard Specifications for Design and Construction*  
Part 2 Engineering and Design Standards

1. Design pressures should be 10 psi higher than the culinary water system in the same pressure zone unless otherwise approved.
2. The pipe material shall be colored purple, or a discrete color different from the culinary water main.
3. There shall be no cross connection between secondary and culinary water systems.
4. Shall be installed at a minimum depth of 30 inches and generally installed above the culinary water line.