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## **CHAPTER 3 – WATER DISTRIBUTION AND TRANSMISSION SYSTEMS**

### **3.1 GENERAL**

The City of Rio Rancho’s Water Utility Department has dual functions. It supplies potable water for industrial, commercial, and domestic use and supplies water for fire protection. This document in conjunction with the City of Rio Rancho’s Standard Drawings provides guidance and minimum basic design criteria and standards, as set forth by the Department of Public Infrastructure, for providing and maintaining the public water utility distribution system of the City of Rio Rancho. It is intended for use in the planning and design processes. Where not specified in these standards, the City Engineer or designee will specify the standards to be applied to the design and construction of public water utility improvements in order to protect the public health, safety, and welfare of all water users served by the City of Rio Rancho.

### **3.2 GOVERNING REGULATIONS**

Ordinances, policies, and planning documents related to the design and operation of water systems include the following:

- A. City of Rio Rancho Code of Ordinances Title V: Public Works, Chapter 51, Water and Wastewater Rules and Rates
- B. Water System Comprehensive Planning Model for the City of Rio Rancho
- C. Guidelines of Water Supply Systems and Treatment Works in New Mexico, Environmental Improvement Division

### **3.3 LINE SIZING AND DEMAND REQUIREMENTS**

- A. **General Requirements:** The following general requirements must be followed when commencing a water system design.
  - 1. The sizing and routing of Master Plan lines must be coordinated with the “Water System Comprehensive Planning Model” for the City of Rio Rancho and approved by the Department of Public Infrastructure. Specific requirements for providing water service to any parcel or development will be defined in a water (and sewer)

availability statement/recommendation from the Department of Public Infrastructure.

The procedure for obtaining the availability statement is outlined in Chapter 2.

2. Pressure zone boundaries must be considered in the design of all systems.

**B. Domestic Demand:** Water infrastructure for all proposed commercial, industrial, and residential developments shall, at a minimum, be sized to provide Peak Day Water Demand flows plus fire flow protection. The fire flow requirement shall apply to both private sprinkler systems and public fire hydrants. The average day water demand for residences within the Rio Rancho water utility is estimated at 300 gallons/day per residence. Using a peaking factor of 2.167, peak day water demands are calculated at 650 gallons/day per residence. Water demand estimations for non-residential applications are listed in Table 3.1. These average day demands are derived from the land-use sewer design flows. These values assume that water usage is approximately 133% of the estimated average sanitary sewer design flows. Although the list is not all-inclusive, it does serve to establish a general base line for system evaluation and analysis. It should be noted that in all non-residential development projects, specific water demand determinations should be calculated and provided to the City Engineer or designee during the design and approval process. If a proposed development does not fit within the categories listed above, consult with City Engineer or designee for determination of the appropriate water demand. The City Engineer or designee may adjust average day demands based on the specific design of the development.

**Table 3.1: Average Day Water Demands for Non-Residential Applications**

Development Type/Land Use	Average Day Demand	Units
Light Commercial	1,750	gal / ac-day
Heavy Commercial	8,500	gal / ac-day
Light Institutional	325	gal / ac-day
Heavy Institutional	2,550	gal / ac-day
Light Industrial	640	gal / ac-day
Medium Industrial	2,400	gal / ac-day
Heavy Industrial	13,230	gal / ac-day

- C. Friction Factor:** For line sizing and design purposes the Hazen-Williams formula should be used. A friction coefficient, “C” factor, of 120 should be used for all new DI water main design calculations. A friction coefficient, “C” factor, of 130 should be used for all new PVC water main design calculations.
  
- D. Peaking Factors:** Peak day and peak hour demands are important in the sizing of various parts of the water system. Peak day use is used to ensure that water production facilities are adequately sized to match peak day use and is also used to size storage facilities. Peak hour use is the maximum amount of water used in any single hour of a day and is used in sizing storage facilities and transmission/distribution lines. Table 3.2 shows the water demand peaking factors that are to be used to determine the peak hour and peak day water demands for residential and non-residential development types.

**Table 3.2: Water Demand Peaking Factors**

Development Type/Land Use	Peak Hour	Peak Day
Residential Development	3.5	2.167
Non-Residential Development	2.5	1.5

- E. Water Demand Calculation Example:** For clarification, the following example illustrates typical calculations performed to determine the design demands and quantities involved in a hypothetical system design.

**EXAMPLE:** Hypothetical Water Demand/Flow Evaluation

**ASSUME:** 100 Dwelling Unit Residential Subdivision Development

**CRITERIA:** Average day demand = 300 gallons/day/residence

Average demand for subdivision = 300 gallons/day x 100 = 30,000 gpd =  
30,000 gpd/1440 mpd = 20.8 gpm

Peak demand for subdivision = 30,000 gpd x 2.167 = 65,010 gpd =  
65,010 gpd/1440 mpd = 45.1 gpm

Maximum hour demand = 30,000 gpd x 3.5 = 105,000 gpd =  
105,000 gpd/1440 mpd = 72.9 gpm

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### **3.4 GENERAL WATER MAIN DESIGN CRITERIA**

- A. General:** All issues and elements presented in this section are typically included and must be addressed in all water distribution infrastructure projects.
  
- B. Jurisdictional Agency Approvals:** One very critical task in the early stages of the project is the development of an agency approval list. These approvals and/or close coordination required by these agencies will impact the successful and timely completion of the project. All appropriate department levels affected within the City, County, State, and Federal agencies need to be contacted for their individual requirements.
  
- C. Environmental and Cultural Regulatory Requirements:** This section is not intended to be all encompassing, rather provide an overview of the environmental and cultural requirements and the typical agency involvement. A thorough consideration of the environmental and cultural impact of the project at its specific location shall be evaluated to identify the various requirements. Private developers shall be responsible for regulatory compliance and for obtaining the required permits for their projects.

In specific areas where a project impacts Water of the United States, a Clean Water Act, Section 404 Permit shall be required from the U.S. Army Corps of Engineers.

Compliance is required with the U.S. EPA under the Stormwater National Pollutant Discharge Elimination System (NPDES) general permit for stormwater discharges from construction sites. Coverage under the general permit is required for all operators of construction sites that disturb one (1) or more acres of soil through grading, trenching, or excavation.

Projects shall not adversely impact threatened or endangered species or their habitat and shall comply with the Federal Endangered Species Act. To address any biological requirements, an assessment report of the project may be required by the U.S. Fish and Wildlife Service and the New Mexico Fish and Game Department.

Projects shall not adversely impact historic or prehistoric properties. Projects shall comply with the National Historic Preservation Act and the State Historic Preservation Act.

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- D. Community Notification and Public Involvement:** The City is committed to early citizen notification and involvement. Identifying neighborhood concerns is a priority and good communication is required throughout the public involvement phase of all projects.
- E. Alignment and Easement Requirements:** The following alignment and easement requirements shall be followed for water line designs.
1. Water lines are to be located within the public right-of-way and aligned in accordance with the “Typical Plan View for Streets” drawings in Appendix C. Water lines shall be located so they can be maintained without disturbing any sidewalk, curb, gutter, structure, or any other utility.
  2. If it is not possible to utilize designated public right-of-way or align in accordance with the Utility Locations, alternate alignments will be considered by the City Engineer or designee.
  3. If not in a public right-of-way, the water line must be located in a permanent easement. A permanent easement must be granted and dedicated to the City of Rio Rancho for the exclusive use of water and sanitary sewer, unless shared use with other utilities is coordinated and approved in advance by the Department of Public Infrastructure. A minimum easement width of 20 feet (or more) is required for a single utility and 25 feet (or more) for water and sewer both within the same easement.
  4. Water and sewer easements shall be free of all obstructions and shall at all times be accessible to City service equipment. No buildings, sport courts, walls, fences, shade structures, nor permanent structures of any kind shall be constructed upon, over, or under and water line easements. Since water mains can be damaged by tree roots, trees shall not be planted within 10 feet of the centerline of the water main. No landscaping shall be placed and/or planted within the easement that would render the easement inaccessible by equipment. The Department of Public Infrastructure has the right to have any obstruction removed without notice to the property owner and all cost associated with the removal shall be the property owner’s responsibility. The maintenance of all landscaping in water line easements is the responsibility of the property owner.

**F. Acceptable Pipe Materials:** The type of pipe to be installed shall comply these standards, meet NMAPWA specification, and shall be based upon applicable design flows, pressures, site conditions, corrosion protection, and maintenance requirements. Water lines shall be either polyvinyl chloride pipe (PVC) or ductile iron pipe (DIP). High density polyethylene pipe (HDPE) is discussed in a subsequent section of these standards.

**G. Radius of Curvature:** The minimum radii of water line curvature are shown in Table 3.3.

**Table 3.3: Minimum Radius of Curvature**

Pipe Type	Pipe Diameter (in.)	Joint Length (ft.)	Minimum Radius (ft.)
DIP	4 - 12	20	300
PVC	8	20	250
PVC	10	20	310
PVC	12	20	370

**H. Water Main Extensions:** The City’s policy on water main extensions is contained in the City of Rio Rancho Code of Ordinance Title V: Public Works, Chapter 51 Water and Wastewater Rules and Rates, Section 51.24 Main Extension Policy, Including Subdivisions.

**I. Hydraulic Requirements:** The Department of Public Infrastructure may require a hydraulic modeling analysis be conducted. This requirement may be in addition to the analysis that was part of the availability statement submittal. This analysis will identify any new requirements or connection alternatives and will help determine the appropriate size of the infrastructure.

**J. Thrust Restraint:** Joint restraint shall be used at all valves and fittings or where joint restraint devices are specified by the approved construction plans. Restrained joint calculations shall be prepared and submitted when necessary. Typical restrained joint length requirement tables are shown on Standard Drawings W-19 and W-20 in Appendix C.

**K. Corrosion Protection:** Corrosion protection will be required for all water system improvements where corrosive soil conditions are encountered.

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- L. Separation from Sanitary Sewer Mains:** To minimize the potential for cross contamination, water mains shall have at least 10 feet horizontal separation from any existing or proposed sewer line or water reuse line. In situations where it is not feasible to maintain a 10-foot separation the design engineer may propose a reduced distance. Such reductions may only be approved and granted by the City Engineer or designee and may be allowed provided the water main is laid in a separate trench or an undisturbed earth shelf located on one side of the sewer line at an elevation so that the bottom of the water main is at least 18 inches above the top of the sewer line.

Water mains crossing sewer lines shall be laid to provide a minimum separation of 18 inches between the outside of the water main and outside of the sewer line. This separation shall be maintained where the water main is either above or below the sewer line. The crossing shall be arranged so that the water main joints will be equidistant and as far as possible from the sewer line.

Where it is impracticable to obtain proper horizontal and vertical separation, the sewer line shall be designed and constructed equal to the water main and shall be pressure tested to assure watertightness. Encasement of the water line may also be required by the City Engineer or designee.

Water mains shall not pass through or come in contact with any part of a sewer manhole.

- M. Separation from Storm Drains and Culverts:** Water mains shall maintain six (6) feet horizontal and two feet vertical separation from storm drains and culverts. Water mains crossing less than two (2) feet below a storm drain or culvert shall require additional protection such as the use of a pipe casing. Whenever possible the water line should be placed below the storm sewer.
- N. Separation from Other Utilities:** Water mains shall maintain a minimum ten (10) feet horizontal separation and one (1) foot vertical separation to any underground dry utility, all measurements outside to outside.

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- O. Cross Connections and Backflow Prevention:** No physical connection shall be made between potable and non-potable sources. Any connection is considered a cross connection. Refer to the City of Rio Rancho’s Building Code for specific provisions regarding cross connections and backflow prevention. Backflow preventers shall be installed in accordance to Standard Drawings W-1 and W-2 in Appendix C.
  
  - P. Start-Up and Commissioning Period:** The construction project is functional only after demonstrating the completion of pressure testing, bacteriological testing, and final inspections in accordance with AWWA, etc. Then, an acceptable flushing schedule and chlorine residual monitoring plan must be prepared to maintain and demonstrate an acceptable level of turnover during the early period of new project commissioning. Once this body of work has been completed, start-up and demonstration period is ready to begin. The start-up details and duration of commissioning shall be identified 30 days prior and listed in the project scope of work.

### **3.5 WATER SERVICES**

- A. General:** The following general requirements pertain to water services. All requirements and standards are as set forth in the City of Rio Rancho Code of Ordinance Title V: Public Works, Chapter 51 Water and Wastewater Rules and Rates, Section 51.08 Service Connections and the City of Rio Rancho’s Standard Drawings.
  
- B. Standards:** Water services are water system extensions that are tapped onto the distribution system to provide water to consumers. Water services are subject to the requirements set forth and described in these standards and as shown in the Standard Detail Drawings.
  
- C. Point of Service:** The Department of Public Infrastructure shall determine the point of service to any premises. The Department of Public Infrastructure shall be called upon for exact information regarding the service line location.
  
- D. Water Service Connections:** Water service connections shall adhere to the City’s policy as described in the City of Rio Rancho Code of Ordinance Title V: Public Works, Chapter 51 Water and Wastewater Rules and Rates, Section 51.08.B Water Service Connections.

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- E. Water Service Laterals:** All water service laterals should be installed in accordance with the Standard Detail Drawings in Appendix C.
  
  - F. Backflow Prevention:** Backflow preventers shall be required in the construction of all new commercial, industrial, and public authority services where water is used in any process which, in the opinion of the Department of Public Infrastructure, could constitute a cross connection or health hazard. Backflow preventers shall be installed in accordance to Standard Drawings W-1 and W-2 in Appendix C.

### **3.6 DISTRIBUTION MAINS – DESIGN CRITERIA**

- A. General:** Distribution mains are typically 8 inches through 12 inches in diameter. Project designs shall make every effort to loop water mains throughout the development.
  
- B. Installation:** Construction of water-related public improvements shall be in compliance with these standards and the Standard Drawings located in Appendix C.
  
- C. Pipe Sizing:** The design engineer shall size all distribution system pipes and appurtenances in accordance with the provisions of this manual and applicable ordinances. Distribution mains shall be a minimum of 8-inches in diameter.

The following is a generalized pipe size guideline that is subject to refinement in the design analysis. Distribution mains shall be sized such that:

1. Velocity does not exceed three (3) fps for peak day flow or ten (10) fps for fire flow and average day, or headloss does not exceed 10 feet/1000 feet (whichever is limiting).
2. Under normal operating conditions, the range of system pressures is between 30 psi and 125 psi.
3. Pressure and flow capacity data for both existing and future conditions in the City’s major water distribution system is to be obtained from the Department of Public Infrastructure for use in the design and analysis of all proposed system improvements.

- D. Location/Alignment:** A six (6) foot minimum horizontal and one (1) foot minimum vertical exterior surface separation from any parallel underground dry utility is required. In all major streets and other active utility corridors, a utility conflict review is required.
  
- E. Distribution Main Cover:** Distribution mains shall adhere to the minimum cover requirements shown in Table 3.4 and Standard Drawing W-7 in Appendix C, unless otherwise noted in plans or required by the City:

**Table 3.4: Minimum Cover Requirements**

Condition	Depth of Bury (ft)
Paved Street (top of pavement)	4
Unpaved and Maintained Street	5
Unpaved and Un-maintained Street	6

- F. Taps:** It is desirable that all taps approved onto a main shall be installed under “wet tap” conditions, using a tapping tee and valve, which allows the distribution main to remain in service at all times.
  
- G. Valves:** Valves on mains 12-inch and smaller shall be gate valves and shall be the same size as the main lines. Gate valves shall be iron-bodied, resilient seat or epoxy coated double disc, with non-rising stem conforming to AWWA C500 or C509. Valves shall open counterclockwise and shall be rated for a design working pressure of 200 psi. Double disc type valves shall be bronze mounted with parallel seats. All buried valves shall have one 2-inch square operating nut. Mechanical or push-on joints appropriate for buried installations shall be provided.
  1. Table 3.5 shows the maximum spacing for valves on distribution mains.

**Table 3.5: Valve Spacing**

Type of Development/Land Use	Maximum Valve Spacing (ft)
Residential	750
Commercial and Industrial Development	500

2. Extension stems with a 2-inch square operating nut and a support for the upper end of the extension shall be provided for all valves installed more than 4 feet deep. The operating nut shall be located within 4 feet of the finished grade. Extension stems shall be mechanically connected to the operating nut. Extension stems shall be fabricated from solid steel shafting not smaller in diameter than the stem of the valve or from galvanized steel pipe having an ID not smaller than the OD of the valve stem. Extension stems shall be connected to the valve by a flexible socket type coupling. All connections shall be pinned, keyed, or socket type. Pipe couplings will not be acceptable. Each extension stem for a buried valve shall extend within 6 inches of the ground surface, shall be provided with spacers that will center the stem in the valve box, and shall be equipped with a wrench nut.
3. A valve shall be located on each side of a canal, arroyo, railroad and freeway crossing.
4. Avoid valve locations in curbs, sidewalks, driveways, multi-use paths, on-street bike lanes, and valley gutters.
5. Isolation valves for fire hydrant assemblies shall follow the Standard Drawing W-3 in Appendix C.
6. Valves shall be located at the point of curvature (PC) of the curb return at street intersections and should be aligned with extensions of property lines or right-of-way lines where possible.
7. Valve boxes and covers shall be provided for all buried distribution system line valves in accordance with Standard Drawing W-4 in Appendix C. Valve boxes shall be adjustable cast iron type with a deep skirted lid. Valve boxes shall be a minimum of 4 inches in diameter and shall have a minimum thickness at any point of 1/16 inch, and shall be provided with suitable cast iron bases and stay-put covers. Covers shall have cast thereon “WATER” on the top. They shall be as manufactured by Parkson, Tyler, APCO, or approved equal.
8. The valve box shall have at least 6 inches adjustment above and below specified depth of cover over pipe.
9. Valves shall be located to provide maximum accessibility for emergency access. Valves shall not be placed in locations that may be subject to routine parking or storage operations.

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- H. Restraint Systems:** All valves and fittings shall be restrained by using a joint restraint system compatible with the type of pipe. The Department of Public Infrastructure shall approve all restraint systems. The length of the restraint system shall be shown on the construction plans and complete supporting data on the restraint system design shall be submitted to the Department of Public Infrastructure for review and approval. Refer to Standard Detail Drawings W-19 and W-20 in Appendix C for typical joint restraining lengths for various size of pipe.
1. Follower gland-type joint restraint systems may be used for 12 inch diameter pipe and smaller, including the following devices:
    - a. “EBAA Iron, Inc.” Megalug - PVC and DI compatible series;
    - b. “Uniflange” - PVC and DI compatible series.
- I. Looping and Terminal Mains:** System looping and terminal main requirements are summarized below:
1. Where possible, all distribution mains shall be looped into the existing and proposed water distribution system to ensure at least two feed sources and maintain system pressure.
  2. Where allowed, terminal or dead-end distribution mains shall not be more than 600 feet long, measured along the entire centerline length of the terminal main from the connection main to the terminus. The City of Rio Rancho reserves the right to reduce the length if conditions warrant in order to maintain fire flows.
  3. All terminal mains shall have a fire hydrant at the terminus. Fire hydrant installations shall be offset from the terminus to ensure that the hydrant can be removed for maintenance while the terminal main remains in service. Fire Hydrants shall be installed in accordance with Standard Drawing W-3 in Appendix C.
  4. Service taps along terminal mains shall not be located closer than 3 feet to the terminus nor located between the fire hydrant connection and the terminus.
- J. Extensions:** Water mains shall extend to the far edge of the property being served plus 10 feet or to the edge of the platted subdivision, whichever is greater, to ensure perpetuation of the water distribution system. The location, size, and configuration of the proposed development or subdivision, with respect to the existing water distribution system, may

dictate that water mains be extended to the far edge of more than one property or subdivision boundary to accommodate system perpetuation.

- K. Future Connections:** When future main extensions are provided for by “stub-out” or terminal connections, the stub-out or terminal main extension shall extend 20 feet beyond the pavement and be valved so that only one valve must be closed when the future main is extended. The valve shall be restrained to the existing distribution main to allow closure of the stub-out or terminal main section without creating a pressure separation of the valves from the in-service distribution main. When future connections are made, the entire main beyond the stub-out or terminal main extension shall be flushed, chlorinated, and pressure tested.

### 3.7 TRANSMISSION MAINS –DESIGN CRITERIA

- A. General:** Transmission water mains are typically 14 inches in diameter and larger. No service taps are permitted on transmission mains.
- B. Pipe Sizing:** Transmission mains shall be sized to carry the designed peak flow required without exceeding the velocities and headlosses shown in Table 3.6 below:

**Table 3.6: Allowable Velocity/Headloss**

Pipe Size (in.)	Max. Allowable Velocity (ft/s)	Max. Allowable Headloss (ft/1000 ft)
14 & 16	5	2
20	5	1.5
24 and larger	5	1

*Note: The above table is based on a Hazen-Williams pipe roughness coefficient of C = 120.*

- C. Location/Alignment:** A stationed horizontal alignment of the proposed transmission main is required to define the route with lines, angles, and curvatures referenced to land corners and other official survey control points when available. Negative stationing will not be allowed. Vertical alignment must be carefully considered in the design of transmission mains. A profile shall be provided for all transmission main designs.

- a. To facilitate City review of a proposed main, a profile of the entire main shall be provided on a single sheet in condensed form.
- b. A roller coaster type of vertical alignment shall be avoided to minimize air pocket formation at the high points of the profile. Design of the main shall provide for a minimum number of high and low points consistent with economic feasibility.

**D. Transmission Main Cover:** Transmission mains shall adhere to the minimum cover requirements shown in Table 3.7 and Standard Drawing W-7 in Appendix C, unless otherwise noted in plans or required by the City of Rio Rancho. As the transmission main size increases, the minimum cover requirements may increase. If finished grade cannot be identified a minimum of 18-inches additional cover is required.

**Table 3.7: Minimum Cover Requirements**

Condition	Depth of Bury (ft)
Paved Street (top of pavement)	4
Unpaved and Maintained Street	5
Unpaved and Un-maintained Street	6

**E. Taps:** No main extension or fire hydrant taps smaller than 6 inches in diameter shall be installed in any main 14-inches or greater. Service line taps shall not be installed in any transmission main. Unless otherwise approved by the City Engineer or designee, all taps installed onto a transmission main shall be made under “wet tap” conditions, using a tapping tee and valve, to allow the transmission main to remain in service.

**F. Valves:** Valves on 14-inch mains and larger shall be butterfly valves. Valves on transmission lines larger than 16 inches shall be full size butterfly valves with flanged end connections. Valve boxes shall be placed over valve operators as shown in Standard Drawing W-3 in Appendix C.

- a. Butterfly valves shall be rubber-seated conforming to the AWWA C504 and designed for buried service.
- b. The valves shall be designed to operate as open or closed with a design velocity of 8 fps.

- c. The valves shall have a cast iron body with mechanical joint ends conforming to ANSI 21.11, AWWA C111 and shall be rated for a design working pressure of 150 psi.
- d. Valves shall be manufactured by Keystone or approved equal.
- e. Discs shall be cast or ductile iron with stainless steel, type 304, either stub or one piece shafts.
- f. Shaft bearings shall be the bushing type of nylon or Teflon.
- g. Seats shall be rubber vulcanized to the body and designed to provide bubble tight shutoff.
- h. The valve operator shall be traveling-nut type in an enclosed body, sealed to prevent the entrance of groundwater up to 5 feet above the valve.
- i. Table 3.8 below shows the maximum spacing for valves on transmission mains.

**Table 3.8: Valve Spacing**

Pipe Size (inches)	Maximum Valve Spacing (ft)
14-30	2500
Greater than 30	5000

- j. If the Department of Public Infrastructure requires the installation of electronic monitoring and remote operation equipment, the line valve must be a butterfly valve with a rectangular vault, housing the valve operator and telemetry equipment. Each installation will require individual details. The design engineer shall check with the Department of Public Infrastructure on acceptable equipment and specific design requirements.
11. In addition to the valve spacing requirements listed above, valves shall be installed at the following locations:
- a. At all connections with transmission mains. Where a distribution main connects with a transmission main, a valve shall be installed on the distribution main at the transmission main.
  - b. Where possible, valves shall be aligned with extensions of property lines or right-of-way lines. Valves shall not be placed in locations that may be

subject to routine parking or storage and shall not be placed within public sidewalks, multi-use paths, or on-street bike paths.

- G. Restraint Systems:** All valves and fittings shall be restrained by using a joint restraint system compatible with the type of pipe. The Department of Public Infrastructure shall approve all restraint systems. The length of the restraint system shall be shown on the construction plans and complete supporting data on the restraint system design shall be submitted to the Department of Public Infrastructure for review and approval. Refer to Standard Drawings W-19 and W-20 in Appendix C for appropriate joint restraining lengths for various size of pipe.
1. Follower gland-type joint restraint systems may be used for 12 inch diameter pipe and smaller, including the following devices:
    - a. “EBAA Iron, Inc.” Megalug - PVC and DI compatible series;
    - b. “Uniflange” - PVC and DI compatible series.
- H. Bypass Assemblies:** Transmission mains between valves shall be treated as an independent unit with provisions for dewatering, filling, removing air and adding air as appropriate for the transmission main construction and maintenance. In all transmission mains, a bottom tangent flanged outlet shall be provided at all profile low points and a top tangent flanged outlet shall be provided at all profile high points.
- I. Air/Vacuum Valve Assemblies:** All air/vacuum valve assemblies for transmission mains require individual approval by the Department of Public Infrastructure. Air/vacuum relief valve assemblies shall be installed in accordance with Standard Drawing W-14 in Appendix C at high points in the transmission main at locations approved by the Department of Public Infrastructure.
- J. Pressure Blow-Off Assemblies:** All blow-off assemblies/flushing valves for transmission mains require individual approval by the Department of Public Infrastructure. Pressure blow-off/flushing valves assemblies shall be installed in accordance with Standard Drawing W-15 in Appendix C at low points in the transmission main at locations approved by the Department of Public Infrastructure. Pressure blow-off assemblies/flushing valves are to be used only when it is determined that a fire hydrant is not appropriate.

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- K. Design Survey Requirements:** To establish the vertical profile of the transmission main, an existing and finished ground surface profile of the proposed alignment based on City of Rio Rancho datum and tied to at least two survey benchmarks is required. Additional semi-permanent benchmarks shall be established every 1500 feet along the route by closed loops of third-order accuracy. The existing ground profile shall consist of ground surface elevations along the proposed transmission main centerline at every 100-foot station and at pronounced grade breaks.

Topographical features within the street or right-of-way and any topographic feature outside the right-of-way, which may interfere with the operation or installation of the transmission main, shall be accurately surveyed and depicted on the plans. Topographic features may be compiled by aerial photogrammetry or field survey methods.

In areas where the ground slope perpendicular to the centerline of the transmission main exceeds 5%, cross sectional data shall be surveyed at all 100-foot station profile points and shall extend at least 25 feet to each side of the centerline.

All utility crossings or close utility interference shall be located and exposed by potholing. The design survey shall record the size, nature, and location of the potential interference by station, offset, and elevation.

### **3.8 FIRE HYDRANT CRITERIA**

- A. General:** The purpose of this section is to clarify City of Rio Rancho requirements for fire hydrants. Adherence to these requirements is necessary to provide a usable, readily accessible water supply for maintenance and fire fighting purposes. Fire hydrants shall be installed in accordance to Standard Drawing W-3 in Appendix C.
- B. Ordinance Requirements:** All fire line installations shall conform to the specifications of NMAPWA and all requirements and standards are as set forth in the City of Rio Rancho Code of Ordinance Title V: Public Works, Chapter 51 Water and Wastewater Rules and Rates and Standard Drawing W-13 in Appendix C.

- C. Fire Flow Demand:** The required fire flow and peak day flow rate shall be available in the system. The municipal fire flow required by the City for any one particular location varies depending on the land use and/or the building type or use. The number of hours that the required fire flow shall be available also varies depending on the land use. Table 3.9 outlines required fire protection flows. It should be noted that this table is not all-inclusive for every type of development and/or land use. It is the responsibility of the design engineer or architect to coordinate all fire flow requirements with the City Engineer or designee and Fire Marshall, as the Department of Public Infrastructure and/or the Fire Department may require a fire flow greater than those shown in Table 3.9.

**Table 3.9: Minimum Fire Flow Requirements**

Type of Development/Land Use	Fire Flow Demand (gpm)
Single-Family Residential Development	1500
Multi-Family Residential Development	1500
Commercial Development	3000
Institutional Development	3000
Industrial Warehouse Development	4000

- D. General Design Standards:** Fire hydrants must be located where they can be quickly found and easily used by fire engines arriving at an incident. Standardized location criteria are based on predictability, visibility, unobstructed accessibility, the type of development, Fire Department tactical needs, and the expected route fire engines will travel to the site.

Determining proper fire hydrant location requires application of engineering judgment and common sense to the specific conditions found in each project. Minor variances in the locations or spacing of individual hydrants may be approved provided the functional intent of these design standards is achieved.

1. All fire hydrants shall be Kennedy Guardian Model K-81 or Mueller Super Centurion 200, conforming to AWWA C502, the City of Rio Rancho Standard Drawing W-3 in Appendix C, and the standard products list.
2. Locate fire hydrants where they are readily visible by fire engines traveling along the street or approaching on intersecting streets. Never obscure or obstruct hydrants behind fences, gates, walls, or landscaping.

3. Existing fire hydrants on major streets, collector streets, or any other street having four (4) or more lanes of traffic, that are not divided by raised median islands can be included in the coverage analysis. If the streets are divided by raised median islands then the existing hydrant can only be included in the coverage analysis if its location is on the same side as the new development.
2. When designing a fire hydrant layout, the “first” hydrant is to be located at street intersections and at the main entrance(s) into a subdivision, apartment complex, or commercial development. Additional hydrants must then be spaced approximately evenly between these points at a distance not to exceed the maximum spacing between hydrants. Spacing is measured along route of travel of a fire engine.
3. Fire hydrants separated from a subdivision, building, or other development by continuous fence, wall, or other obstruction cannot be counted as providing protection to that subdivision or development.
4. A fire hydrant shall be placed within 30 feet of the end of all dead end water mains greater than 100 feet to facilitate flushing and maintenance of the water main (including all cul-de-sacs). Refer to Standard Drawing W-3 in Appendix C.

**E. Residential Subdivision Hydrant Location Standards:** Fire hydrant locations will be reviewed and approved as part of the subdivision approval process and the following general design standards apply:

1. Start by locating a fire hydrant at the intersection of each public and/or private street entrance into the subdivision unless an existing fire hydrant meets spacing requirements.
2. Then space additional fire hydrants approximately 500 feet apart along all public and/or private streets within the subdivision and along all perimeter streets.
3. For cul-de-sacs, a fire hydrant shall be placed within 30 feet of the dead end water main. If dead end lines lengths are such that additional hydrants are required, assure that a minimum of 30 feet along the line is required between the fire hydrant and the line termination.

**F. Commercial and Multi-Family Hydrant Location Standards:** Fire hydrant locations will be reviewed and approved as part of the site plan/building permit approval process. Provide a site plan showing all existing and proposed fire hydrant locations, all designated fire lanes,

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and all fire department connections for building standpipe or sprinkler systems for comment and approval by the Fire Marshal.

- G. Fire Hydrant Spacing:** Table 3.10 shows the maximum spacing for fire hydrants. Spacing distance shall be measure along the centerline of the street or route, which the fire truck will most likely travel.

**Table 3.10: Fire Hydrant Spacing**

Type of Development/Land Use	Maximum Fire Hydrant Spacing (ft)
Single-Family Residential	500
Single-Family Residential Cul-de-sac	350
Two-story Townhouses and Apartments	300
Commercial and Industrial Development	300
Institutional Development	300

Fire hydrants shall not be placed within six (6) feet of an above ground obstruction and shall have a minimum of 15 inches of clearance between ground and the lowest hydrant outlet cap and shall be as approved by the Fire Marshal. If required by the Department of Public Infrastructure, hydrants shall be located within water easements providing at least six (6) feet of clearance on all sides of the hydrant, including protective bollards as directed.