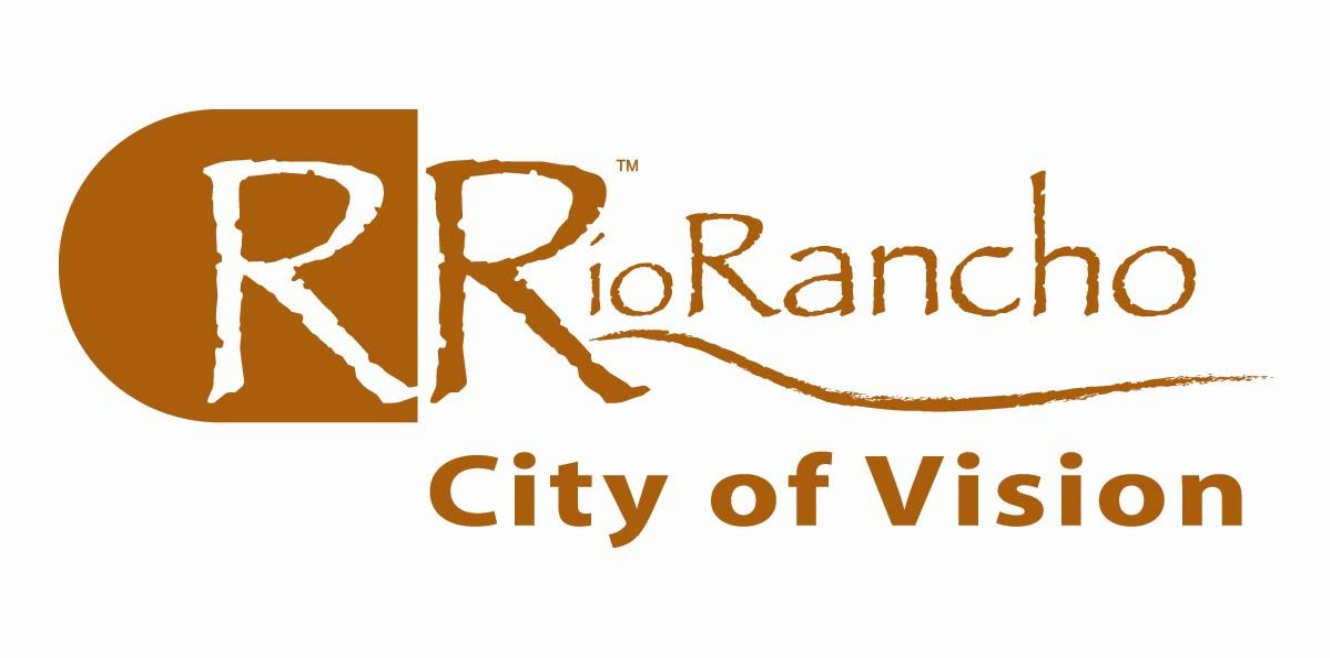
# City of Rio Rancho

## Department of Public Infrastructure




# Water and Wastewater Design Criteria – 6/2006

**Version 1.1**

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# CHAPTER 1 - INTRODUCTION

## 1.1 PURPOSE OF DESIGN STANDARDS MANUAL

The purpose of this design standards document/manual is to provide guidelines and minimum design criteria for the design of wastewater systems in the City of Rio Rancho either as part of Capital Improvement Program projects or as private development projects that will construct and dedicated systems to the City. It is the intent of the City of Rio Rancho Department of Public Infrastructure to adhere to all applicable Federal, State, and local regulations and guidelines for wastewater systems design.

The design manual applies to existing systems that are being expanded, modified, upgraded, and/or rehabilitated. Additionally, the manual applies to the construction of all new facilities. It should be noted that this document is not intended to be used as a replacement to construction specifications. It is the design criteria for engineers, developers, etc., to use when designing water and wastewater infrastructure with the City of Rio Rancho.

All units of measurement used in this manual are U.S. customary standard units unless otherwise noted.

## 1.2 AUTHORITY

The design standards set forth in this manual are promulgated by the City Engineer or designee of the City of Rio Rancho pursuant to the authority granted to him/her in the City of Rio Rancho Code of Ordinances Title V: Public Works, Chapter 51 - Water and Wastewater Rules and Rates, Section 51.24 - Main Extension Policy, Including Subdivisions.

The administration of these standards including interpretation, enforcement, revision, waiver, and variance is hereby delegated to the City Engineer or designee or an appointed representative.

Standards included in this manual do not supersede applicable Federal and State requirements. In addition, these standards shall meet the requirements of all local and regional authorities such as the Southern Sandoval County Arroyo and Flood Control Authority (SSCAFCA).

## 1.3 EFFECTIVE DATE OF STANDARDS

These standards shall be effective immediately upon the City Engineer or designee's signature and shall supersede all former applicable engineering standards for utilities design and construction.

## 1.4 REVISIONS

These standards may be revised, amended, or added to periodically. Such revisions, amendments, and additions shall be binding and effective when published.

## 1.5 CITY OF RIO RANCHO DEPARTMENT OF PUBLIC INFRASTRUCTURE CONTROL

These standards shall apply to the design, installation, operation, and maintenance of all water and wastewater facilities under the control of the City of Rio Rancho Department of Public Infrastructure. Such control shall be exercised in accordance with all applicable ordinances of the City of Rio Rancho.

Adherence to these standards is required by any person, including any owner, operator, or agent of an owner or operator of any wastewater facility in regard to any wastewater system related improvements. Variation or deviation from the standards herein is not allowed without permission of the City Engineer or designee. All water and wastewater system construction (including connections, disconnections, repairs, new waterline and sewer line construction, or other such work) to the water and wastewater system operated by the City of Rio Rancho Department of Public Infrastructure, in direct violation of any standards herein is subject to the enforcement of corrective action.

## 1.6 ORGANIZATION AND INTERPRETATION OF MANUAL

The standards in this manual are composed of the following:

- Written engineering standards,
- References to established standards of other organizations and agencies, and
- Standard details of the Department of Public Infrastructure.

The City Engineer or designee, whose interpretation shall be binding and controlling in its application, shall make the interpretation of any section or of differences between sections.

## 1.7 DEFINITIONS

Definitions of terms used in this manual can be found in Appendix A.

## 1.8 ABBREVIATIONS

Abbreviations used in this manual can be found in Appendix B.

## 1.9 STANDARD SPECIFICATIONS AND DETAILS

The standard specifications and standard details relating to water and wastewater systems that are referenced in this manual include the following:

A. New Mexico Standard Specifications and Details for Public Works Construction sponsored and distributed by the New Mexico Chapter – American Public Works Association (NMAPWA) Specifications Committee. These specifications and details are herein referred to as NMAPWA Specifications and Details. These specifications and details are revised and updated periodically and are available through the New Mexico Chapter of APWA.

B. City of Rio Rancho Supplements to New Mexico Standard Specifications and Details for Public Works Construction. These specifications and details are herein referred to as Supplemental Details or Supplemental Standards. These specifications and details are updated and revised periodically and are available through the Department of Public Infrastructure.

C. Uniform Standard Details and Drawings developed by the City of Rio Rancho Department of Public Infrastructure. These details and drawings are herein referred to as Standard Details and Standard Drawings. All Standard Drawings are included in Appendix C.

D. American Water Works Association (AWWA) Standards sponsored and distributed by the AWWA Standards Committee. These standards are intended to represent a consensus of the water industry that the product described will provide satisfactory service. These standards are updated and revised periodically and are available through AWWA.

E. American National Standards Institute (ANSI) Standards sponsored and distributed by the ANSI Technical Committees. These standards are intended to serve as a guide to aid the manufacturer, the consumer, and the general public in the use of various products, processes, and/or procedures. These standards are updated and revised periodically and are available through ANSI.

F. American Society for Testing and Materials (ASTM) Standards sponsored and distributed by the ASTM Technical Committees. These standards are intended to provide a forum for producers, users, ultimate consumers, and those having a general interest to meet on common ground and write standards for materials, products, systems, and services. These standards are updated and revised periodically and are available through ASTM.

G. Code of Federal Regulations, 40 C.F.R. – Protection of Environment. The Code of Federal Regulations is a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government.

H. All other related standard specifications and details that are applicable but not listed here.

## 1.10 GENERAL NOTES

The Water and Waste Water General Notes can be found on the City's General Notes sheet located on the website at:

http://www.ci.rio-rancho.nm.us/index.asp?nid=539

## 1.11 STANDARD PRODUCTS LIST

An approved standard products list for water and wastewater facility system components can be found in Appendix D.

## 1.12 AVAILABILITY STATEMENT PROCESS

Availability statements shall be obtained in accordance with the Utilities Commission Policy Statement, "Guidelines for Issuing Water & Wastewater Letters of Availability." A copy of this document and a copy of the water and wastewater service availability information request form are included in Appendix E.

# CHAPTER 2 – UTILITY ENGINEERING REPORT

## 2.1 REQUIREMENT

The City Engineer or designee will require the preparation of a utility engineering report to assess the impacts and service demands of any project or development proposal connecting to the public water and wastewater systems. The utility report shall be prepared by a licensed engineer and include a technical report, preliminary plan, connection and isolation plan as outlined in the following subsections.

## 2.2 REPORT

For designs including water and wastewater system components, the utility engineering report shall provide an overview of the proposed project or development, proposed water and wastewater utility improvements, service demands an flows, system impact and feasibility, and basic design requirements, and include the following information:

**Water System**

**A.** **Water Demands:** Include estimated water demands based on projected land use, occupancy, and building type for the following conditions.

1. Maximum-hour (gallons per minute, gpm),
2. Maximum-day (gpm),
3. Average-day (gpm),
4. The Fire Marshal will determine Fire Flows (gpm), and
5. Irrigation (gpm)

**B.** **Conformance with City's Water Master Plan:** Describe how the proposed improvements conform to the City's adopted Water Master Plan.

**C.** **System Layout:** On a plan sheet describe the proposed distribution system layout, including locations for connections with the existing water utility system.

**D.** **Network Analysis:** Once the data is gathered it will be submitted to the City Engineer or designee who will use it to perform a computer simulation, identifying any systems impacts based on proposed demands and providing design solutions to ensure perpetuation of future water utility system growth and maintain system pressures and flow rates.

**Note:** Computer simulations of hydraulic analyses are to be performed using electronic input data for the existing water system provided by the City on software compatible with the City's network analysis program. Results of the computer analyses are to be submitted in hard copy format.

**E.** **Main Sizing:** Indicate the required sizing of proposed distribution mains based on water demands. It is possible that a larger size line will be required after the City Engineer or designee evaluates the requirements for the surrounding developments.

**F.** **Design Alternatives:** Discuss alternative system layouts and methods of providing water service, including an evaluation of each alternative and reasons for selecting the recommended design.

**G.** **Special Conditions:** Identify any special conditions, such as presence of erosive soils, conflicts with other utilities, unusual installation depths, or over sizing requirements that require special provisions for improvements construction.

**Wastewater System**

**A.** **Wastewater Demands:** Include estimated wastewater demands based on projected land use, occupancy, and building type for the following conditions.

1. Average day (gallons per day, gpd),
2. Peak flow or Maximum-day (gpd),
3. Minimum-day (gpd), and
4. Infiltration/Inflow (gpd)

**B.** **Conformance with City's Wastewater Master Plan:** Describe how the proposed improvements conform to the City's adopted Wastewater Collection Master Plan.

**C.** **Service Area:** Describe the initial and ultimate area, measured in acres, that could be served by the new wastewater facilities.

**D.** **Population Density:** Define the initial and ultimate population densities that could be served by the new wastewater facilities.

**E.** **Industrial Wastes:** Define the estimated quantities and quality of any industrial wastes that could be discharged to the wastewater system.

**F.** **System Layout:** Describe the proposed collection system layout, including locations for connections with the existing wastewater utility system.

**G.** **Collection System Analysis:** Include a collection system analysis as required by the City Engineer or designee, identifying any system impacts based on proposed demands and

providing design solutions to ensure perpetuation of future wastewater utility system growth and maintain system capacity.

**H.** **Main Sizing:** Indicate the required sizing of proposed collection mains based on wastewater demands. It is possible that a larger size line will be required after the City Engineer or designee evaluates the requirements for the surrounding developments.

**I.** **Design Alternatives:** Discuss alternative system layouts and methods of providing wastewater service, including an evaluation of each alternative and reasons for selecting the recommended design.

**J.** **Special Conditions:** Identify any special conditions, such as conflicts with other utilities, unusual installation depths, or oversizing requirements that require special provisions for improvements construction.

**K.** **Wastewater Characteristics:** Include information concerning the characteristics of proposed wastewater effluent, as described in 40 C.F.R, Part 122, Appendix D, Tables 2-5, at each connection to the City's wastewater collection system as required by the City Engineer or designee, including the following:

1. Acidity-alkalinity,
2. Phosphorus,
3. pH,
4. Sulfates and sulfides,
5. Synthetic and organic compounds,
6. Hazardous constituents,
7. $BOD_5$ (total and soluble fraction, carbonaceous and nitrogenous demand),
8. COD (total and soluble),
9. TSS,
10. Nitrogen (TKN, $NO_3$, $NO_4$, $NH_4$, organic), and
11. Inorganics (salts and metals)

## 2.3 CONCEPTUAL LAYOUT

A conceptual layout shall be included in the utility engineering report to provide a plan view and reference for the proposed water and wastewater system improvements, and identify issues addressed in the report. The preliminary plan/layout is to include the following:

**A.** **Preliminary Design:** Illustrate proposed methods and alternatives for providing site water distribution and service and wastewater collection and service.

**B.** **Property Boundaries:** Include legal boundaries of the proposed project or development site, including existing and proposed property and lot lines, existing and proposed rights-of-way, any utility easements, and boundaries of adjacent properties. Identify any right-of-way, easements, and/or rights of entry/temporary construction permits that must be acquired to legally construct improvements.

**C.** **Topography:** Include site topography at 2-foot (minimum) interval contours and the elevation and location of City-recognized benchmarks with reference to local, USGS, and NAD 83 data.

**D.** **System Area:** Define and delineate the system area included in the network analysis.

**E.** **Existing Utilities:** Illustrate all existing utilities (private and public), including waterlines and services, meters, fire hydrants, valves, sanitary sewer lines and services, sanitary sewer manholes, drainage facilities, storm drains, natural channels, and improved channels within 400 feet of the proposed development.

**F.** **Unusual Features:** Identify unusual features, such as creeks railroads, and irrigation ditches, that might influence the location of underground utilities.

**G.** **Proposed System Layout:** Identify the general layout, drawn to scale, of the proposed water distribution mains, valves, and fire hydrant locations, wastewater collection mains, and manhole locations including construction phasing.

**H.** **Emergency Maintenance Access:** Identify methods and routes for providing emergency and maintenance access to all proposed fire hydrants, valves, and manholes.

## 2.4 CONNECTION AND ISOLATION PLAN

A connection and isolation plan shall be provided in the utility engineering report to identify proposed connection points with the existing water systems and design conditions for providing required system isolation for maintenance and flushing. The connection and isolation plan is to include the following:

**A.** **Valve Locations:** Identify all valves necessary to isolate a point of connection for the proposed water system onto the existing system. Existing system valves should be inspected for location and accessibility.

**B.** **Thrust Restraint:** Determine and include design and construction requirements for sufficient thrust restraint for existing water mains and valves at proposed connection points ("stub-outs" and terminal extensions) to allow construction while the existing water system remains in service in accordance with Chapter 1, Section 10.

**C.** **System Isolation:** Identify water main sections that can be isolated within the proposed and existing water systems that provide for emergency maintenance and identify discharge points for system flushing.

# 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

## 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.

**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 Infrastructurehas 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.

**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.

**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.

**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.

**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.

**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,

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.

# CHAPTER 4 – WATER PRODUCTION FACILITIES

## 4.1 GENERAL REQUIREMENTS

**A. General:** This document in conjunction with City of Rio Rancho's Standard Drawings, located in the appendix, provides guidance and minimum basic design criteria and standards, as set forth by the Department of Public Infrastructure for water production facilities within the City of Rio Rancho. It is intended for use in the planning and design process. Where not specified in these standards, the City Engineer or designee will specify the standards to be applied to the design and construction of water production facility improvements in order to protect the public health, safety, and welfare of all those served by the water system in the City of Rio Rancho.

**B. Project Site Requirements:** Prior to beginning the design of the facility, a detailed project site study and/or report shall be completed. This analysis should be conducted with input from the Department of Public Infrastructure to ensure that the lot or land area that is being considered is an adequate size and is consistent with the City's master plans. If appropriate the report must address the existing water source to provide adequate flow, static pressure, and fire flow. Consideration should also be given to electrical power supply to the facility.

## 4.2 PRESSURE REDUCING STATIONS

**A. General:** Pressure Reducing or Regulating Valves (PRV) are utilized to control pressures between distribution zones within the distribution system. When water main extension plans are submitted for review and water availability analysis, the need for a PRV installation will be determined and located based on existing pressure zones and the existing distribution system layout by the Department of Public Infrastructure on a case-by-case basis. In certain situations, the Department of Public Infrastructure shall require monitoring of the valve(s) via SCADA equipment. PRVs and vaults shall be constructed in accordance with Standard Drawings W-8 and W-9 in Appendix C.

## 4.3 PUMPING FACILITIES

**A. General:** Water pumping facilities and booster stations shall be designed to maintain the sanitary quality of pumped water and shall conform to the requirements as set forth in NMED's Recommended Standards for Water Facilities and these design guidelines.

**B. Pumping Units and Size:** Pumping stations shall consist of a combination of pumps (at least two units should be provided) with the capacity to provide fire demand, maximum day demand, and maximum hour demand. With any pump out of service, the remaining pump(s) should be capable of producing the maximum day pumping demand of the system. Special care shall be exercised in the selection of pumping units and associated components to prevent pressure surges and insure the suitability, flexibility, and adaptability of the units to the hydraulic conditions of the system from which water is taken and the system into which water is pumped.

The horsepower rating of each pump motor shall be such that the motor will carry continuously the maximum load that is possible to develop at any point on the pump curve without exceeding 95% the motor nameplate rating and without using the service factor.

**C. Design Criteria:** The minimum requirements by the Department of Public Infrastructure for pumping facilities and booster stations are as follows:

1. Pump station shall be secured against unauthorized entry.
2. Building architecture shall be aesthetically pleasing and compatible with the surrounding area.
3. Provide an eight (8) foot tall masonry perimeter wall with locked entrance enclosing the compound. The wall shall be compatible with the surrounding environment, including landscaping.
4. The facility entrance shall have dual-swing access gates with at least 16 feet clear space.
5. The station shall have a paved or graveled access road at least 12 feet wide with maximum slope not to exceed 12%. A 42-foot radius turn-around shall be provided if the access road exceeds 50 feet in length.
6. The interior of the compound shall be surfaced with 4-inches compacted aggregate base.

7. Pump station site shall be located so that it is not subject to flooding.
8. Pump station shall be located and designed to provide service vehicle access to major station components for maintenance and inspection purposes. This includes access and parking for several vehicles on pump station site.
9. Down cast facility lighting shall be provided with at least one photocell-operated light. A manual light switch shall be located next to the access gate in the interior of the compound.
10. A backup/emergency power supply capable of operating the pump station for eight hours during power outages shall be supplied. Specific criteria for backup generation type and capacity shall be given during the design process by the Department of Public Infrastructure.
11. Provide a spare pump for backup capability.
12. Heavy equipment access for a boom crane shall be incorporated in the site layout.
13. The site shall be graded to provide adequate drainage away from structures and to prevent water from backing up into the pump station from other sources.
14. Provide a frost proof gravity line or sump pump for pump station drainage.
15. Provide ventilation, heating, and cooling in the pump station.
16. Provide sound attenuation in residential areas as required by the Department of Public Infrastructure to meet 40 decibels at the property at any time.
17. Provide local and remote electronic telemetry equipment for monitoring discharge pressure and pump motor status.
18. Ample clearances between equipment shall be provided for operation and maintenance activities. Sufficient space shall also be provided for future pump(s) and piping.
19. In general, piping should:
    a. Be designed so that friction losses are minimized,
    b. Not be subject to contamination,
    c. Have watertight joints, and
    d. Be such that each pump has an individual suction line or that the lines be manifolded that they will insure similar hydraulic and operating conditions.
20. Piping shall be protected against surge or water hammer and provided with suitable restraints where necessary. Check valves and flow control valves are recommended

for this purpose. A surge control study may be appropriate, especially for large pumping stations.

21. The suction piping should be arranged to avoid high points where air or gas may collect. The discharge piping should be arranged to avoid high points and air relief valves should be provided at high points.
22. Pipe supports shall be provided to keep weight off the pump. All discharge piping shall be rigidly piped to prevent movement.
23. Suction couplings should be provided on the pump to permit removal and replacement of the pump. The coupling is best located on the suction side due to less frequent pressure variations in the suction line.
24. The discharge isolation valve shall be located downstream from the check valve.
25. The allowable fluid velocities in the suction and discharge piping when the pumps are operating are as follows:
    a. Less than 6 fps for suction piping,
    b. Less than 10 fps for discharge piping, and
    c. In multi-pump suction manifolds, the velocity in the manifold pipe shall be less than 3 fps.
26. Discharge piping shall include:
    a. End spools
    b. Flow control or check valve
    c. Spool with NPT tapped outlets or welded couplings to accommodate a flow sensor and pressure gauge, etc.
    d. Hand wheels for all above ground gate valves
    e. Reducing wye at the manifold
    f. Restrained flexible closure section for access
27. Pump discharges shall be joined to a common header, which shall pass through an above ground flow meter with isolation valves and a valved bypass.
28. A pressure relief valve shall be provided between the discharge header and the supply line.
29. Depending on the motor size and electrical power system, provide reduced voltage motor starters.
30. Electric power controls.
31. Corrosion protection for underground steel and iron.

32. On-site chlorine generation equipment.

33. All equipment exposed to weather shall be capable of operating under the local exposed conditions. This shall include meeting the appropriate NEMA rating and temperature ranges expected or as established by the Department of Public Infrastructure.

34. Provide local and remote instrumentation for monitoring the following:

    a. Discharge valve positions.
    b. Discharge header pressure and flow.
    c. Reservoir level (if applicable).
    d. Upstream pressure (if applicable).
    e. Suction header pressure (if applicable).
    f. Pump status (on-off).
    g. Diesel engine stand-by generator status (on-off).
    h. Total kilowatt demand (station).

35. Provide sensors and alarms to detect the following local and remote:

    a. Water on the floor.
    b. Bearing high temperature for each pumping unit bearing.
    c. Motor windings high temperature for each pumping unit.
    d. Pump building door intrusion.
    e. High and low room temperature.
    f. Electrical ground fault.
    g. Low accumulator pressure (if applicable).
    h. Power failure.
    i. High and low reservoir level (if applicable).
    j. Fire and/or smoke.

36. All facilities require site plan and building safety review and approval by the Department of Public Infrastructure. Such review may result in additional requirements that must be satisfied.

## 4.4 WELLS

**A. General:** Wells shall conform to the requirements as set forth in NMED's Recommended Standards for Water Facilities and these design guidelines. A drilling permit from the New Mexico State Engineer's Office shall be obtained. A design report of system capabilities and production influence will be required.

**B. Design Criteria:** The minimum requirements by the Department of Public Infrastructure for wells are as follows:

1. An eight (8) foot tall masonry perimeter wall with locked entrance enclosing the compound. The wall shall be compatible with the surrounding environment, including landscaping.
2. The facility entrance shall have dual-swing access gates with at least 16 feet clear space.
3. The station shall have a paved or graveled access road at least 12 feet wide with maximum slope not to exceed 12%. A 42-foot radius turn-around shall be provided if the access road exceeds 50 feet in length.
4. The interior of the compound shall be surfaced with 4-inches compacted aggregate base.
5. Service vehicle access to major station components shall be incorporated in the station design.
6. Down cast facility lighting shall be provided with at least one photocell-operated light. A manual light switch shall be located next to the access gate in the interior of the compound.
7. Heavy equipment access for a boom crane shall be incorporated in the site layout.
8. The site shall be graded to provide adequate drainage away from structures.
9. On-site chlorine generation.
10. Well casings shall be continuous and watertight from top to bottom except for well screens. The surface shall extend a minimum of 24 inches above the 100-year flood level of record.
11. The well screen diameter shall be the minimum size permitted that will maintain an aperture entrance velocity of 0.1-0.5 fps and a vertical velocity within the screen barrel of five (5) fps or less. The screen length, aperture size, and construction shall be in accordance with AWWA A100.

12. Joints between screen sections and blank casing spacers shall be welded or threaded and be watertight, straight and strong as the screen.
13. The well shall be sealed and protected from the entry of contaminants or water from any source other than the selected aquifers.
14. The top of the well shall be constructed so that no foreign matter or surface water can enter during or after construction. On completion of the well, the well shall be temporarily capped to prevent surface pollutants from entering until pumping equipment is installed.
15. Wells shall be constructed round, plumb, and true to line within the following tolerances:
    a. Maximum allowable horizontal deviation from the vertical shall not exceed 2/3 of the smallest inside diameter of the part of the well being tested per 100 feet of depth.
    b. The alignment must be satisfactory for the successful installation and operation of the permanent pumping equipment.
    c. Wells shall be tested for alignment and plumb in accordance with AWWA A100, Section 8.
16. Well vents shall also terminate a minimum of 24 inches above the final ground elevation and not less than 24 inches above the 100-year flood level of record, whichever is higher. The vent shall be covered with a number 16 mesh screen. Any equipment that will permit direct open access to the well shall also meet the height requirements and shall be sealed or screened to prevent entrance of foreign matter, surface water, or contaminants into the well.
17. The pump base concrete slab shall extend a minimum of three (3) feet from the center of the well, be 6-inches thick and slope away from the well head a minimum of ¼ inch per foot. The site shall drain away from the well and be protected against erosion and surface runoff from entering the well.
18. Provide a check valve on discharge line.
19. Provide a hose bib type sampling tap on system side of check valve.
20. Provide an air release valve between the pump and check valve.
21. Below ground pits to house pumping equipment are prohibited.
22. New wells shall be performance tested to acquire water samples and to determine well capacity, draw down, and production on a long-term basis. Testing methods

shall be in accordance with AWWA A100, Section 10 and approved by the Department of Public Infrastructure.

23. After placement of the pump, wells shall be disinfected.
24. All facilities require site plan and building safety review and approval by the Department of Public Infrastructure. Such review may result in additional requirements that must be satisfied.

## 4.5 WATER STORAGE FACILITIES

**A. General:** Water storage facilities shall conform to the requirements as set forth in NMED's Recommended Standards for Water Facilities and these design guidelines. All storage facilities shall have built-in provisions for draining as well as access and provisions for cleaning including a suitable source of water. The overall objectives of finished water storage are to:

1. Assist in meeting peak flow requirements.
2. Equalize system pressures.
3. Provide emergency water supply in case of component failure.
4. Provide for fire flows.
5. Provide additional needed treatment.

**B. Design Criteria:** The minimum requirements by the Department of Public Infrastructure for water storage facilities are as follows:

1. An eight (8) foot tall masonry perimeter wall with locked entrance enclosing the compound. The wall shall be compatible with the surrounding environment, including landscaping.
2. The facility entrance shall have dual-swing access gates with at least 16 feet clear space.
3. The station shall have a paved or graveled access road at least 12 feet wide with maximum slope not to exceed 12%. A 42-foot radius turn-around shall be provided if the access road exceeds 50 feet in length.
4. The interior of the compound shall be surfaced with 4-inches compacted aggregate base.
5. Service vehicle access to major station components shall be incorporated in the station design.

6. Down cast facility lighting shall be provided with at least one photocell-operated light. A manual light switch shall be located next to the access gate in the interior of the compound.
7. A backup power supply capable of operating any electrical components of the tank for eight hours during power outages shall be supplied. Specific criteria for backup generation type and capacity shall be given during the design process by the Department of Public Infrastructure.
8. Other important design considerations and features are summarized in Table 4.1.

**Table 4.1: Water Storage Design Considerations and Features**

| Water Storage Design Considerations and Features | |
|---|---|
| 1. Heavy equipment access | 13. Overflow weir |
| 2. Adequate drainage from structures | 14. 24" flanged inspection hatch centered over weir. |
| 3. On-site chlorine generation | 15. Hinged shell manhole |
| 4. Acceptable interior and exterior coating systems for potable water | 16. Altitude valve, isolation valves, bypass line, and vault |
| 5. Concrete foundation ring | 17. Tank discharge line and tank fill line |
| 6. Inside and outside steel ladders | 18. Booster station suction line (where applicable) |
| 7. Outside ladder safety cage | 19. Tank drain |
| 8. Probe bottles | 20. Disinfection system |
| 9. Water level indicator | 21. Electrical and telemetry system |
| 10. Tank vent housing | 22. Pressure transmitter for telemetry |
| 11. Two separate 24" square-hinged roof access openings (one with inside and outside ladder) | 23. Clear area around reservoir to allow vehicle passage |
| 12. Overflow pipe and splash pad | 24. Cathodic protection |

**C. Chlorination System Requirements:** Due to the nature of storage projects, no set design criteria can be maintained for all sites. A general set of criteria has been developed in order to provide guidelines for the design of each site. Based on previous analysis, the following table identifies the minimum design criteria for chlorine facilities:

**Table 4.2: Chlorine Facilities Minimum Design Criteria**

| Item | Design Criteria |
|---|---|
| Low Level Chlorine | 0.2 ppm |
| High Level Chlorine | 0.8 ppm |
| Design Chlorine Dosage | 1.0 ppm |
| Volume Turnover Maximum Time Required | 3 days |
| Chlorine Monitoring | Constant, amperometric method |

# CHAPTER 5 – WASTEWATER COLLECTION SYSTEM

## 5.1 GENERAL REQUIREMENTS

**A. General:** This document in conjunction with City of Rio Rancho's Standard Drawings, located in the appendix, provides guidance and minimum basic design criteria and standards, as set forth by the Department of Public Infrastructure, for providing and maintaining the public sewage collection system of the City of Rio Rancho. It is intended for use in the planning and design process. 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 sanitary sewer improvements in order to protect the public health, safety, and welfare of all those served by the sewer system in the City of Rio Rancho.

## 5.2 SUBMITTALS

**A. General:** A design or Utility Engineering report shall be completed and submitted to the Department of Public Infrastructure, unless waived by the City Engineer or designee. The requirements and format of this report are outlined and detailed in Chapter 2 of these standards.

## 5.3 WASTEWATER DESIGN FLOWS

**A. General:** Wastewater design flows utilized in the preparation of engineering design reports, plans, and specifications shall as a minimum conform to the criteria set forth in this section. Alternate methods for determining design flows will be considered by the Utility Systems Engineer on a case by case basis.

**B. Population Densities:** The City of Rio Rancho uses a population equivalent of **2.78 persons/dwelling unit (DU)** for the determination of wastewater flows.

**C. Average Daily Flows:** Average daily flow estimates based on land development/use shall conform to Table 5.1. The average day values indicated in the table represent minimum estimates for determining design flows. Where a proposed development is known (based on specific applications and/or use), and the anticipated wastewater flows exceed the minimum

forecast demands, the greater flow shall be used to determine the design flows. Where the project land does not fit within the tabulated categories, an average daily unit flow of 210 gallons per dwelling unit per day shall be used.

**Table 5.1: Average Daily Wastewater Flow Estimates**

| Type of Development/Land Use | Average Daily Flow |
|---|---|
| Residential | 175 gpd/DU |
| Light Commercial | 1,230 gal/ac-day |
| Heavy Commercial | 5,968 gal/ac-day |
| Light Institutional | 226 gal/ac-day |
| Heavy Institutional | 1,788 gal/ac-day |
| Light Industrial | 447 gal/ac-day |
| Medium Industrial | 1,680 gal/ac-day |
| Heavy Industrial | 9,266 gal/ac-day |

**D. Peaking Factors:** All gravity sewers, lift stations, and force mains shall be designed for peak flow conditions. Peak dry weather flow is calculated as the product of the peaking factor and the average daily flow. For all sewer main diameters a peak dry weather factor of 3.0 shall be used unless otherwise approved by the Department of Public Infrastructure.

**E. Wastewater Collection Main Design Flow Criteria:** The following is a list of the major design flow criteria for wastewater collection lines.

1. Wastewater collection mains shall be designed to convey the peak flow.
2. Wastewater collection mains shall be designed to meet minimum slope and velocity requirements as set forth in these design standards.
3. Wastewater collection mains designs shall avoid exceeding maximum slope and velocity conditions as set forth in these design standards.
4. The peak flow shall be determined using average day flows adjusted by a peaking factor and including the allowed and any existing system infiltration or inflow.
5. Flow capacity and loading data of existing and future conditions for the City's major wastewater collection system shall be obtained from the Department of Public Infrastructure for use in designing and analyzing proposed improvements.

6. Average day and ultimate/final design flow estimates shall be well documented and shall include calculations for the following: the ultimate service area, population density, existing and anticipated wastewater flow, existing and anticipated industrial/commercial discharge, and projected infiltration/inflow.
7. Surface water, ground water, or cooling water shall not be discharged into the wastewater collection system. Prohibited connections include roof drains, storm inlets, foundation perimeter drains, area drains for open patios or driveway entrances to parking structures, and ground water sump systems.

## 5.4 GRAVITY SANITARY SEWER LINES – DESIGN CRITERIA

**A. General:** All issues and elements presented in this section are typically included and must be addressed in all wastewater infrastructure projects. The design and construction of gravity sanitary sewer mains shall conform to the design standards in this manual and Standard Drawings S-4 and S-5 in Appendix C.

**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.

**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. Acceptable Pipe Materials:** The type of pipe to be installed shall comply with these standards, meet NMAPWA specifications, and shall be based upon applicable design flows, pressures, site conditions, corrosion protection, and maintenance requirements. Gravity sewer mains 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.

**F. Roughness Coefficient:** The wastewater collection system shall be designed for gravity (open channel) flow conditions, using a Manning's roughness coefficient, "n factor," of 0.011 for PVC pipe and 0.013 for DIP.

**G. Pipe Sizing:** Gravity sewer lines shall be sized to accommodate the peak design flow subject to the following limitations:

1. At the peak dry weather flow condition, the following shall be maintained for gravity sewer pipes:
   a. d/D ratio shall be no greater than 0.75
   b. q/Q ratio shall be no greater than 0.85
2. The minimum pipe size shall be 8 inches.
3. All changes in pipe size shall require a manhole at the size change. The design shall call for differing pipe sizes to match soffits at the entrance and exit of the manhole. The soffit is the bottom of the top of the pipe or the uppermost point on the inside of the structure.

**H. Depth/Cover:** Gravity sewer lines shall be sufficiently deep to ensure gravity drainage of service connections and avoid conflicts of service connections with water mains and dry utilities. Sewer lines shall be installed at the depth required to serve the ultimate gravity drainage area, which may include areas outside of the development project.

1. Minimum Cover: All collection mains shall have a minimum depth of cover of four (4) feet, measured from the top of the pipe to the final surface grade.
2. Shallow Cover Protection: Where collection main depths are less than four (4) feet, and the main is located under a right-of-way, street, driveway, parking lot, or areas where live loading is a concern, special pipe materials (such as ductile iron pipe) or other structural measures (such as concrete or steel encasement) shall be provided in accordance with Standard Drawing S-5 in Appendix C.
3. Provision for Basements: Proposed collection mains shall be designed with adequate depth to provide wastewater service to basements, where possible and appropriate.

**I. Slope and Velocities:** Sewers shall be laid with a constant and uniform slope between manholes. All changes in slope shall require a manhole at the slope change connection. Collection mains shall be designed with an adequate slope to achieve flow velocities of at least 2.0 ft/s when flowing full. Design velocities shall not exceed 10 ft/s. Table 5.2 shows the minimum and maximum slopes required in different size gravity sewer pipes.

**Table 5.2: Minimum and Maximum Design Slopes**

| Pipe Size in inches | Minimum Design Slope %, (ft/ft) | Maximum Design Slope %, (ft/ft) |
|---|---|---|
| 8 | 0.500 (0.0050) | 8.50 (0.0850) |
| 10 | 0.280 (0.0028) | 6.25 (0.0625) |
| 12 | 0.220 (0.0022) | 5.00 (0.0500) |
| 15 | 0.150 (0.0015) | 3.75 (0.0375) |
| 18 | 0.120 (0.0012) | 2.80 (0.0280) |
| 21 | 0.100 (0.0010) | 2.40 (0.0240) |
| 24 | 0.080 (0.0008) | 2.00 (0.0200) |
| 27 | 0.068 (0.00068) | 1.70 (0.0170) |
| 30 | 0.060 (0.0006) | 1.50 (0.0150) |
| 36 | 0.048 (0.00048) | 1.15 (0.0115) |

**J. Alignment and Easement Requirements:** The following alignment and easement requirements shall be followed for gravity sewer line designs. Note that these requirements will be different for sanitary sewers that are HDPE.

1. Sewers shall be laid with straight alignments between manholes.
2. Sewer alignment shall not meander across the street centerline.
3. Sewers shall be located in street right-of-ways and the alignments shall be parallel to property lines or street centerline, or as close as possible.
4. Sewer lines are to be located within the public right-of-way and aligned in accordance with the Utility Locations as shown in the Typical Plan View for Streets" drawings in Appendix C. Sewer lines shall be located so they can be maintained without disturbing any sidewalk, curb, gutter, structure, or any other utility.
5. If it not possible to utilize designated public right-of-way or align in accordance with the Utility Locations, alternate alignments will be considered and must be approved by the City Engineer or designee.
6. If not in a public right-of-way, the sewer 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 sanitary sewer and water, 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 sewer and water both within the same easement.

7. Sewer and water 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/sewer line easements. No landscaping shall be placed and/or planted within the easement that would render the easement inaccessible by equipment. The Utilities Division 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 sewer line easements is the responsibility of the property owner.

**K. Sewer Main Connections at Manholes:** Gravity sewer main connections (not services) at a manhole are described as the upstream pipe connection, the downstream pipe connection, and the intersecting pipe connections. Gravity sewer main connections shall be in accordance with Standard Drawings S-3, S-10, and S-15 in Appendix C. There shall be no more than four main connections at a manhole.

Flow will not be permitted to change horizontal flow direction by more than 90 degrees in a manhole. Under the following conditions, the maximum horizontal change in flow direction permitted will be 50 degrees although special design considerations will be made where the situation warrants:

1. All lines larger than 36 inches.
2. Any lines with design flow greater than 3.0 MGD and a design velocity of 5.0 ft/s or greater.
3. Any junction of two flows, each with design flow greater than 3.0 MGD, where one line has a design pipe velocity of 5.0 ft/s or greater.

The upstream pipe shall be the same or smaller diameter than the downstream pipe. The design shall call for differing pipe sizes to match soffits at the entrance and exit of the manhole.

Where onsite sewage collection systems from developments connect to mains on arterial streets, the invert of the intersecting pipe should be at or above the crown elevation of the downstream pipe. Intersecting pipes shall be of equal or smaller diameter than the downstream pipe.

In all cases, the invert of the downstream pipe shall be at least 0.1 feet lower than the invert of the upstream pipes and intersecting pipes and shall be low enough to maintain the energy gradient across the manhole.

**L. Cross Connections:** There shall be no physical connections between a public or private potable water supply system or storm drainage system and a sanitary sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply or storm drainage system. No water pipe shall pass through or come into contact with any part of a sanitary sewer manhole.

**M. Separation from Water Mains:** To minimize the potential for cross contamination, gravity sanitary sewer mains and force mains shall be laid at least 10 feet horizontally from any existing or proposed water 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 sewer main is laid in a separate trench or an undisturbed earth shelf located on one side of the water line at an elevation so that the bottom of the water main is at least 18 inches above the top of the sewer line.

Gravity sanitary sewer mains and force mains crossing water lines should be laid to provide a minimum separation of 18 inches between the outside of the sewer main and outside of the water line. This separation should be maintained where the sewer main is either above or below the water line. The crossing should 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 should be designed and constructed equal to the water main and should be pressure tested to

assure watertightness. Encasement of the water line may also be required by the City Engineer or designee in accordance with Standard Drawing S-5 in Appendix C.

**N.** **Separation from Storm Drains and Culverts:** Sewer mains shall maintain six (6) feet horizontal and two (2) feet vertical separation from storm drains and culverts as measured between the crown of the lower and invert of the upper. Sewer lines crossing less than two (2) feet below a storm drain or culvert will require pipe encasement. Whenever possible, the sanitary sewer should be placed below the storm sewer.

**O.** **Separation from Other Utilities:** Sewer mains shall maintain a minimum six (6) feet horizontal separation and two (2) feet vertical separation to any underground utility, all measurements outside to outside.

**P.** **Locator Tape and Tracer Wire:** Install detectable marking tape continuous over the top of the pipe. The marking tape shall be buried eighteen (18) inches over the top of the buried force main. 12 gage tracer wire shall also be buried along with the pipe.

**Q.** **Buoyancy:** Buoyancy of sewers shall be considered and flotation of the pipe shall be prevented with appropriate construction where high groundwater conditions are anticipated.

**R.** **Trenching, Bedding, and Backfill:** Trenching, bedding, and backfill for shall conform to NMAPWA standards and Standard Drawing S-4 in Appendix C.

**S.** **Testing Procedures:** Air testing, exfiltration testing, vertical deflection testing, and televising of sanitary sewer pipes shall follow and adhere to the requirements and protocols as outlined in the NMAPWA specifications.

## 5.5 MANHOLES – DESIGN CRITERIA

**A.** **General:** The design and construction of gravity sanitary manholes shall conform to the design standards in this manual and Standard Drawings S-1, S-2, and S-3 in Appendix C.

**B. Manhole Locations:** Manholes shall be installed at the following locations:

1. Changes of grade or slope
2. Changes of pipe size
3. Changes of horizontal or vertical alignment
4. Changes in pipe material
5. Pipe intersections except with service connections less than 8-inches in diameter
6. Service connections 8-inches in diameter and larger
7. The end of each public sewer line
8. At distances not to exceed the spacing shown below

Where feasible, manholes are to be installed at street intersections. Manholes should also be located outside of bike lanes, sidewalks, or multi-use paths whenever possible. Manholes shall not be located in areas subject to immersion during storm events, such as gutters and ponding areas.

Direct access by maintenance vehicles shall be provided to each manhole. The access drive shall be a minimum of 10 feet in width and shall be an all-weather surface, such as asphalt or concrete paving, or adequate gravel base and shall be capable of supporting maintenance vehicles weighing up to 14 tons.

**C. Manhole Spacing:** Manholes shall be required along collection mains at distances not greater than the maximum manhole spacing as shown in Table 5.3 below.

**Table 5.3: Maximum Manhole Spacing**

| Pipe Size (inches) | Maximum Manhole Spacing (feet) |
|---|---|
| $\leq$ 21 | 450 |
| $\geq$ 24 | 500 |

**D. Manhole Diameter:** The minimum manhole diameters and standard frame and cover sizes for various pipe sizes are shown in Table 5.4 below.

**Table 5.4: Minimum Manhole Diameters**

| Pipe Diameter (inches) | Manhole Depth (feet) | Minimum Manhole Diameter (inches) | Minimum Frame and Cover Diameter (inches) |
|---|---|---|---|
| ≤ 15 | ≤ 12 | 48 | 30 |
| ≤ 15 | > 12 | 72 | 30 |
| > 15 | any | 72 | 30 |

**E.** **Clean Outs:** Shall conform to the design standards within this manual and Standard Drawing S-12 in Appendix C. Clean outs are not permitted on mains.

**F.** **Manhole Stub Outs:** Manholes on the boundaries of subdivisions and at other locations directed by the City Engineer or designee shall include full line size stubs with shaped inverts, oriented to accommodate future connections or extensions. All 20-foot stub outs shall be plugged.

**G.** **Manhole Separation from Water Mains:** No water pipe shall pass through or come into contact with any part of a sewer manhole or connection structure.

**H.** **Drop Manholes:** Drop manholes shall be required where the invert of the upstream pipe section entering the manhole is greater than two (2) feet above the invert of the downstream pipe section exiting the manhole. Drop manholes shall be designed and constructed in accordance with Standard Drawing S-10 in Appendix C.

**I.** **Flow Channel:** Flow channels shall be required in all manholes, connecting the inverts of the upstream and downstream pipe sections. The flow channel straight through a manhole shall be made to conform as closely as possible in shape, and slope to that of the connecting sewers. Flow channel height and slope requirements are shown in Tables 5.5 and 5.6 below.

**Table 5.5: Minimum Flow Channel Heights**

| Pipe Diameter (inches) | Minimum Flow Channel Heights |
|---|---|
| < 15 | ½ of the pipe diameter (to pipe centerline) |
| > 15 | ¾ of the pipe diameter |

**Table 5.6: Minimum Flow Channel Slopes**

| Type of Manhole/Flow Channel | Minimum Flow Channel Slope |
|---|---|
| Manholes on continuous slope, straight alignment pipe lines | 2.5% slope from entrance to exit |
| Manholes at changes in pipe size | Match soffits at entrance and exit of manhole |

**J.** **Bench:** A bench shall be provided on each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench shall be sloped to provide a minimum 3-inch fall from the top of the bench to the crown of the pipe or one-half inch per foot (1/2"/ft), whichever is greater. No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench. Refer to Standard Drawing S-3.

**K.** **Water Tightness:** Manholes shall be of the pre-cast concrete or cast-in-place concrete type. Manhole lift holes and grade adjustment rings shall be sealed with non-shrinking mortar. Inlet and outlet pipes shall be joined to the manhole with a gasketed flexible watertight connection or any watertight connection arrangement that allows differential settlement of the pipe and manhole wall to take place. Refer to Standard Drawing S-3.

**L.** **Covers:** Where manholes must be located within the 100-year floodplain, or in a location where runoff may accumulate and pond, the manhole shall be installed with a watertight, bolting-type cover to prevent inflow/outflow. The manhole ring shall be bolted to the manhole cone to prevent possible damage due to surcharge. Locked manhole covers with bolting-type covers may be desirable in isolated easement locations or where vandalism may be a problem. Manhole frames and covers shall be designed and constructed in accordance with Standard Drawings S-1 and S-2 in Appendix C.

**M.** **Testing:** Manholes shall be tested for leakage in accordance with NMAPWA specifications.

**N.** **Corrosion Protection for Manholes:** Where corrosive conditions due to septicity or other causes are anticipated, consideration shall be given to providing corrosion protection on the interior of the manholes.

## 5.6 SERVICE CONNECTIONS

**A. General:** Service connections to the City of Rio Rancho wastewater system shall conform to Article 51.08 of Chapter 51 of the Rio Rancho Code of Ordinances and Standard Drawings S-6, S-7, and S-8 in Appendix C.

**B. Taps:** Wastewater service connections to newly constructed collection mains shall require the installation of a tee or wye, in conformance with these standards. A directional fitting shall be used at all tap connections.

**C. Separate Service to Lots:** All platted lots, whether existing or proposed as part of a subdivision, shall front on and have a separate wastewater service connection to a collection main without crossing adjacent lots.

**D. Service Alignment:** Wastewater services shall be installed perpendicular to the collection main, for that portion of the service line that is located in the public right-of-way or easement. Where this is not possible, the wastewater service alignment shall be subject to determination by the City Engineer or designee.

**E. Service Connection Sizes:** Table 5.7 below shows the service connection sizes based on the development type.

**Table 5.7: Service Connection Sizes**

| Development Type | Service Connection Size (inches) |
|---|---|
| Residential Lots | 4 or 6 |
| Commercial Lots | Minimum 6 |
| Multiple Family Lots | Minimum 6 |
| Industrial Lots | Minimum 6 |

**F. Separation from Water Service:** Wastewater services shall maintain a minimum horizontal separation of ten (10) feet from water services.

**G.** **Maximum Main Size for Taps:** Service connections shall not be directly made into sewer mains 30-inches in diameter and larger. Service connections shall require a minimum 8-inch public sewer main extension, which shall be constructed from the nearest downstream manhole to the point of service.

**H.** **Prohibited Connections:** No surface water or ground water, may be discharged into the wastewater service. Prohibited connections include roof drains, storm inlets, foundation perimeter drains, area drains for open patios or driveway entrances to parking structures, and ground water sump systems.

**I.** **Manhole Connections:** Service connections to manholes shall be avoided, except where:

1. The service size is 8 inches in diameter or larger (which requires the installation of a manhole);
2. The service connection is tied to a terminal manhole, located at the end of a cul-de-sac or easement, and there is no possibility of extending the collection main in the future;
3. The service connection elevation cannot be tapped above the springline of the sanitary main.

**J.** **Service Connection Installation:** Service connections to the sewer main shall be watertight and not protrude into the sewer. Saddle type connections shall not be used. All materials used to make service connections shall be compatible with each other and with pipe materials to be joined and shall be corrosion proof.

Normally taps extend at right angles to the main. When a tap is made at a manhole the tap may be installed at an angle to the main providing the installation does not restrict flow. The invert of the service connection shall be at or above the crown of the sewer main.

## 5.7 WASTEWATER LIFT STATIONS

**A.** **General:** Shall be designed according to the NMED, Construction Programs Bureau, "Recommended Standards for Wastewater Facilities, 2003 Edition (or latest version)."

**B. Design Analysis Report (DAR):** In addition to meeting the requirements set forth in the "Recommended Standards for Wastewater Facilities, 2003 Edition", the design engineer shall submit a DAR to the City of Rio Rancho, Utility Department, for review.

1. Table 5.8 summarizes the minimum requirements of a lift station DAR.

**Table 5.8: Lift Station DAR Requirements**

| Item | Description |
|---|---|
| 1. | Average Influent Station Flow, gpm |
| 2. | Peaking Factor |
| 3. | Wet Well Volume, gallons and cubic feet |
| 4. | Average Flow Fill Time, minutes |
| 5. | Peak Flow Fill Time, minutes |
| 6. | Diameter of Proposed Force Main, inches |
| 7. | Velocity in the forcemain under normal operating conditions (if multiple pumps are used, velocity for each multiple pump operation condition should be shown) |
| 8. | Pump and System Curve with Duty Point, including the Duty Point for parallel pump operation if applicable. |
| 9. | Pump Time based on Average Flow, minutes |
| 10. | Pump Time based on Peak Flow, minutes |
| 11. | Number of Pump Cycles per Hour |
| 12. | Surge Analysis and Recommendations |
| 13. | 4 floats – "stop", "lead", "lag", and "high" |
| 14. | Grading and Drainage Plan – Slope site for accessibility of a vactor truck (<3%) |
| 15. | Instrumentation and Control considerations including SCADA, alarms, etc. Provide a transducer with digi-gauge output to SCADA |
| 16. | Site Layout including emergency generator (ATS) location and overflow prevention location, a 12-foot all weather access road, and a security fence with a 14-foot wide rolling gate for service vehicles. |

2. All new lift stations shall be provided with an on-site, permanently installed, emergency generator sized to provide emergency electrical service to the site. Calculations justifying the size of the generator shall be provided. In addition the lift station shall have a spare pump and site lighting.

## 5.8 FORCE MAINS

**A. General:** All force mains shall be designed according to the NMED, Construction Programs Bureau, "Recommended Standards for Wastewater Facilities, 2003 Edition (or latest version)."

**B. Cleanouts:** Cleanouts will be installed at a maximum spacing of every five hundred (500) feet or not to exceed a volume of wastewater over three thousand (3,000) gallons between cleanouts. Special consideration will be given to cleanout spacing where the required force main diameter is larger than twelve (12) inches. The cleanouts will be constructed in accordance with the City of Rio Rancho Standard Drawing S-13, unless otherwise specified by the City of Rio Rancho City Engineer or designee.

**C. Locator Tape and Tracer Wire:** Install detectable marking tape continuous over the top of the pipe. The marking tape shall be buried eighteen (18) inches over the top of the buried force main. 12 gage tracer wire shall also be buried along with the pipe.

**D. Leakage Testing:** All force mains within the City of Rio Rancho wastewater service area shall be hydrostatic tested at a minimum of fifty (50) psi above the design working pressure.

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