

SECTION 2 - WATER SYSTEM DESIGN REQUIREMENTS

2.01. General

The Town of Prosper shall approve the location of all water lines. The arrangement, character, extent, size and location of all water lines shall be in general conformity with the Town's Buildout Water System Capital Improvement Projects, and should be considered in their relation to existing and planned streets, topographical and environmental considerations, and the land uses proposed to be served by such facilities.

Design criteria for all water systems shall comply with Texas Commission on Environmental Quality (TCEQ) Chapter 290 (Rules and Regulations for Public Water Systems), latest revision. All railroad, State Highway and Dallas North Tollway crossings, etc., shall be as approved by the Executive Director of Development and Community Services, or his/her designee. Permits to agencies other than the Town must be submitted through the Town.

Water lines shall be sized and extended through the limits of a property to serve adjacent properties.

Dead end water mains are not allowed unless approved in writing by the Executive Director of Development and Community Services, or his/her designee however, if approved; a flushing device shall be provided.

2.02. Plan Requirements

Plans for water mains sized twelve inches (12") and larger shall include both plan and profile views. Plans for water mains sized eight inches (8") and less may require a profile at the discretion of the Executive Director of Development and Community Services, or his/her designee where crossings or other complex design scenarios may exist. A full civil construction plan check list can be found in the Development Manual on the Town of Prosper website.

2.03. Easements

Water mains located outside of public right-of-way shall be centered in a minimum fifteen feet (15') wide exclusive use water easement. Water easements running parallel to a property line shall be located wholly on one lot. At highway, railroad, creek, and other crossings or locations where the depth of the water main measured to bottom of pipe exceeds ten feet (10'), the width of the water easement shall be increased a minimum of one and one-half (1.5) times the depth of the water main.

Fire hydrants located outside of public easements or right-of-way shall be located in a 10' x 10' exclusive use water easement. Water meters two inches (2") and smaller shall be located in a 5' x 5' exclusive use water easement. Water meters three inches (3") and larger shall be located in a 10' x 10' exclusive use water easement. Easements for other water system appurtenances and facilities not specifically provided for by this section shall be determined by the Executive Director of Development and Community Services, or his/her designee.

Parallel public easements and right-of-way may be used to reduce the required width of a water easement with the approval of the Executive Director of Development and Community Services, or his/her designee provided that the water main is located wholly within the water easement and a minimum distance of one-half the required easement width shall be provided from the center of the water main to the outer edge of the easement.

2.04. Location

Water mains sized sixteen inches (16") and larger located in public right-of-way shall be located five feet (5') behind the back of curb to provide adequate clearance for curb inlets and sign posts.

Water mains sized twelve inches (12") and smaller located in public right-of-way shall be located two feet (2') behind the back of curb. Water mains in right-of-way near storm inlets shall be constructed behind the inlet by pulling the pipe using longitudinal bending in accordance with the manufacturer's requirements.

Water mains located in easements shall be located in the center of the easement except as allowed elsewhere in this chapter when a parallel public easement or right-of-way is used to reduce the required easement width.

2.05. Horizontal Alignment

Water mains constructed in public right-of-way shall follow the alignment of the roadway. Longitudinal bending of the pipe to match the radius of a roadway may be used, provided the radius is not less than the pipe manufacturer's recommendation, typically thirty times the diameter (30xD). All other changes in direction shall be constructed utilizing forty-five degree (45°) or smaller bends to reduce head losses and thrust on the joint.

All junctions on lines sixteen inches (16") and larger shall be three-way junctions. Offset connections or dog-leg connections shall be used where a four-way junction is desired. Pipe sizing through junctions should be consistent with the largest pipe size or as determined by the Executive Director of Development and Community Services, or his/her designee.

2.06. Vertical Alignment

Water mains sized sixteen inches (16") and greater shall have a minimum cover of six feet (6') which is generally sufficient to allow other utilities to cross over the water main. Water mains sized twelve inches (12") and less shall have a minimum cover of four feet (4'). Water mains constructed across or adjacent to rural roadways may be required to have greater cover to allow for future roadway grade changes as determined by the Executive Director of Development and Community Services, or his/her designee. The maximum depth of a water main measured to bottom of pipe shall not exceed ten feet (10') unless explicitly approved by the Executive Director of Development and Community Services, or his/her designee.

Water mains shall be designed to have a consistent profile that avoids excessive numbers of high points and low points. Air release valves, drain valves, or other appurtenances may be required at high points and low points as determined by the Executive Director of Development and Community Services, or his/her designee.

2.07. Clearance to Other Utilities

A. Wastewater

The separation between water mains and wastewater mains, manholes, and other appurtenances is governed by Title 30 of the Texas Administrative Code, Part 1, Chapter 290, Subchapter D, Rule 290.44(e) and Chapter 217, Subchapter C, Rule 217.53(d). In general, water mains and wastewater mains, manholes, and other appurtenances shall be installed in separate trenches and shall have a separation distance of nine feet (9') in all directions measured from the outside surface of each facility.

Crossings of water mains and wastewater mains may be accomplished by using wastewater pipe with a minimum pressure rating of 150 psi OR by encasing the water or wastewater main for a distance of nine feet (9') either side of the crossing with a casing pipe having a minimum pressure rating of 150 psi. Under either scenario, a minimum eighteen-foot (18') joint of water pipe shall be centered on the wastewater main with a minimum separation distance of twelve inches (12").

B. Storm Sewer

Water mains shall maintain a minimum clearance of eighteen inches (18") from storm sewer systems measured from the outside surface of each facility. Where minimum clearance cannot be met, the water main shall be encased in six inches (6") of concrete.

C. Other Utilities

Water mains shall maintain a minimum clearance of twelve inches (12") from other public and private utilities measured from the outside surface of each facility. Where a water main encroaches into a private utility easement, the clearance shall be as specified by the private utility operator.

All mains to be installed under existing Thoroughfares must be dry bored. Rust resistant steel casing minimum one-fourth-inch (1/4") thick shall be used with Raci patented casing spacers, or approved equal. No wood skids will be allowed.

Open cut crossings with Local roads, Collector roads, and Thoroughfares (where deemed necessary by the Executive Director of Development and Community Services, or his/her designee) may be allowed.

2.08. Creek Crossings

Water mains installed under creeks shall be protected by steel encasement at a minimum of ten feet (10') past the toe of the embankment on each side or otherwise as directed by the Executive Director of Development and Community Services, or his/her designee. Isolation valves shall be installed for maintenance and safety purposes.

Any crossing with a creek must be bored. The length of the bore shall be ten feet (10 ft) outside the top of bank on each side of the creek.

The Executive Director of Development and Community Services, or his/her designee may approve an open cut crossing for non-major creeks. If an open cut is approved, stream bank stabilization must be provided.

2.09. Size Required

Water mains shall be sized to meet all demands (See Table 2.1) of each specific land use as well as ensure proper fire flows for all districts are obtained. Fire Flows shall be calculated with a minimum residual pressure of 20 psi under combined fire and domestic (Maximum Daily Demand) water flow conditions and/or the latest requirement by the TCEQ.

Mains are to be sized to ensure less than 1 foot of head loss per 1000 feet of water main using a Hazen Williams coefficient of C = 100 for the Maximum Hourly Demand flow rates within the subdivision internal distribution system.

TABLE 2.1 – Maximum Daily Demand Calculation

Land Use	Maximum Daily Demand Calculation
Single Family	3.5 persons per lot x 200 gallons per person per day
Multi Family	3.0 persons per unit x 200 gallons per person per day
Commercial Industrial	1.0 persons per parking space x 50 gallons per person per day OR 1.0 persons per 400 SF floor space x 50 gallons per persons per day
School	30 gallons per student per day

Nursing Home	240 gallons per day per bed
Hospital	720 gallons per bed per day

Water main sizing will generally be as follows based on the land use being served:

A. Single Family Residential

A twelve-inch (12") water main shall be required to loop through a single-family district and shall typically be located along collector streets or at other locations as determined by the Executive Director of Development and Community Services, or his/her designee. An eight-inch (8") water main will generally be required to distribute water and provide fire protection within the single-family district.

Where dead-end water mains are explicitly approved by the Executive Director of Development and Community Services, or his/her designee, a six-inch (6") water main shall be used for the final 200 feet provided it serves no more than seven (7) lots and one (1) fire hydrant. A blow off hydrant shall be installed at the end of the dead-end main for use by the Public Works Department.

B. Multi-Family Residential

A twelve-inch (12") water main shall be required to loop through a multi-family district. An eight-inch (8") water main will generally be required to distribute water and provide fire protection within the multi-family district provided that the water main does not exceed 600 feet in length or serve more than two (2) fire hydrants or fire sprinkler connections between water main junctions.

Dead-end mains are not allowed except by Executive Director of Development and Community Services, or his/her designee's approval. If dead-end mains are allowed, the developer shall install a blow off hydrant at the end of the dead-end main for use by the Public Works Department.

C. Non-Residential

A twelve-inch (12") water main shall be required to loop through a non-residential district. An eight-inch (8") water main will generally be required to distribute water and provide fire protection within the non-residential district provided that the water main does not exceed 1,200 feet in length or serve more than two (2) fire hydrants or fire sprinkler connections between water main junctions.

Dead-end mains are not allowed except by Executive Director of Development and Community Services, or his/her designee's approval. If dead-end mains are allowed, the developer shall install a blow off hydrant at the end of the dead-end main for use by the Public Works Department.

2.10. Materials

Water main materials shall generally be as follows:

A. PVC Pipe

Eight-inch (8") and smaller water mains shall be AWWA C900 DR 14. Twelve-inch (12") water mains shall be AWWA C900 DR18. Sixteen-inch (16") and larger water mains shall be AWWA C905 DR18. Only potable PVC mains shall be blue in color.

All mains supplying fire sprinkler systems outside of utility easements shall be minimum two hundred (200) psi working pressure and U.L. listed.

B. Ductile Iron Pipe

Sixteen-inch (16") and larger water mains shall be AWWA C151 / ANSI A21.50 with a minimum pressure class of 150 psi. It shall be the Engineer's responsibility to determine if a higher pressure class may be needed.

Polyethylene encasement is required to be installed around the ductile iron pipe and related fittings and valves. This wrap shall be an eight-millimeter (8 mm) thickness polytube. Seams and overlaps shall be wrapped and held in place by two inch (2") wide plastic backed adhesive tape. Polyken 900 or Scotchrap no. 50, or an approved equal, with approximately two-foot (2') laps on the polytube. The wrap on the barrel of the pipe shall be loose enough to allow the film to shift with the soil. The wrap shall be installed without breaks, tears, or holes in the film.

C. Other Pipe Materials

Twenty-four-inch (24") and larger water mains may be Reinforced Concrete Cylinder Pipe (RCCP) complying with AWWA C303 with the explicit approval of the Executive Director of Development and Community Services, or his/her designee. The Design Engineer shall study all conditions that the pipe will be exposed to and provide corrosion protection for the RCCP.

D. Pipe Fittings

All fittings shall be ductile iron with mechanical joint restraints and thrust blocking where appropriate, with a minimum rated working pressure of two hundred-fifty (250) psi. All concrete shall be designed with appropriate sulfate resistant cement or equivalent based on local soil conditions.

E. Valves

Valves shall be Muller Model Series 2360, M&H Model Series 4067/7571 or American Flow Control Model Series 25000. All valves must meet a one hundred and fifty (150) psi test.

F. Tapping Valves

Connections to an existing line shall be made with full body ductile iron tapping sleeve and valve. In order to maintain a manageable parts inventory and working knowledge of tapping sleeve and valves, the following tapping sleeves are approved: Mueller, American Flow Control and U.S. Pipe. With prior approval by the Executive Director of Development and Community Services, or his/her designee, stainless steel Smith Blair 623 may be allowed for connection to existing lines twenty inches (20") or larger.

G. Bends

Two (2) forty-five-degree (45°) turns shall be used at corners along mains. Ninety-degree (90°) turns are not permitted.

H. Fire Hydrants

Fire hydrants shall be Kennedy or American Flow Control (Waterous) traffic model WB 67-250, three-way standard thread with valve in lead or as approved by the Executive Director of Development and Community Services, or his/her designee. All main steamer nozzles have a nominal inside diameter of four and one-half inches (4.5") with a Storz cap.

I. Blow Off Hydrants (Flushing Device)

Blow off hydrants shall be Eclipse No. 85 Ground Hydrant or equal as approved by the Executive Director of Development and Community Services, or his/her designee.

2.11. Fire Hydrants

There shall be sufficient fire hydrants to concentrate the required fire flow, as recommended by the publication "GUIDE FOR DETERMINATION OF REQUIRED FIRE FLOW" published by the Insurance Service Office, and as determined by the Town of Prosper Fire Department.

Fire hydrants shall be located at all entrances and at all intersecting streets and/or fire lanes. Fire hydrants shall be located between two feet (2') and six feet (6') behind back of curb and shall not be located within a sidewalk. Fire hydrant leads shall be six-inch (6") pipe and shall not exceed one hundred feet (100') in length.

Fire hydrants shall not be located within thirty-five feet (35') of a non-residential structure except in urban mixed use or other zero setback districts. Fire hydrants required to supplement water supply for automatic fire protections systems shall be located within fifty feet (50') of the Fire Department Connection (FDC) for such a system.

On public streets, fire hydrants at intersections shall be located ten feet (10') in advance of the curb return to allow adequate room for street lighting, signage, and sidewalk ramps. On fire lanes, fire hydrants at intersections shall be located at the curb return. Fire hydrants shall not be located within an intersection radius or along the top edge of a "T" intersection.

All fire hydrants placed on private property shall be adequately protected by either curb stops or concrete posts or other methods as approved by the Executive Director of Development and Community Services, or his/her designee and the Fire Department and shall be in easements. Such stops or posts shall be the responsibility of the landowner on which the fire hydrant is placed.

Major and minor thoroughfares, railroads, retaining walls, screening walls, creeks, dense landscaping, and other similar features will obstruct the route on which a fire hose will be laid and shall not be crossed to provide fire protection required by this section.

Fire hydrant spacing will vary based on the land use being served:

A. Single Family Residential

Fire hydrants shall be located at all street intersections and at intermediate locations such that the spacing between fire hydrants does not exceed five hundred feet (500') measured along the centerline of the street.

B. Multi-Family Residential

Fire hydrants shall be located at all street and/or fire lane intersections and at intermediate locations such that the spacing between fire hydrants does not exceed three hundred feet (300') measured along the centerline of the street and/or fire lane.

C. Non-Residential

Fire hydrants shall be located at all street and/or fire lane intersections and at intermediate locations such that the spacing between fire hydrants does not exceed three hundred feet (300') measured along the centerline of the street and/or fire lane.

D. Major/Minor Thoroughfares

Fire hydrants shall be located at all street intersections and at intermediate locations along arterial roadways such that the maximum spacing between fire hydrants does not exceed five hundred feet (500') measured along the centerline of the roadway. Fire hydrants shall be alternate between both sides of the roadway.

E. Undeveloped Areas

- F. Fire hydrants shall be spaced every 1,200 feet along water transmission mains in undeveloped areas. Fire hydrants in undeveloped areas outside of public right-of-way shall be marked with a water pipeline marker approved by the Executive Director of Development and Community Services, or his/her designee.

2.12. Water Valves

Water valves shall be located on water mains twelve inches (12") and smaller at all junctions, fire hydrant leads, fire sprinkler connections, and at other locations such that the spacing between valves does not exceed five hundred feet (500') in residential districts and six hundred feet (600') in non-residential districts. No segment between valves, when closed, shall leave more than one (1) fire hydrant or fire sprinkler connection out of service. Water valves shall be arranged in a manner such that preferably two (2) and no more than three (3) valves must be operated to shut down a segment of water main.

Water valves shall be located on water mains sixteen inches (16") and larger at all junctions, fire hydrant leads, and other locations such that the spacing between valves does not exceed 1,200 feet. No segment between valves, when closed, shall leave more than one (1) fire hydrant out of service. The only exception will be along Major/Minor Thoroughfares where no more than two (2) fire hydrants may be out of service.

No water valves shall be installed under parking stalls.

Water valves shall be installed at the end of water mains that are planned to be extended in the future such that twenty feet (20') of pipe extend beyond the valve to anchor it.

Water valves shall be installed on all fire hydrant leads and fire sprinkler connections.

Water valves twelve inches (12") and smaller shall be resilient seal gate valves. Water valves sixteen inches (16") and larger shall be butterfly valves.

Water valves located in undeveloped areas or in open spaces shall have pipeline markers installed indicating the location of the water valve. Water valves installed in developed areas shall be marked on the nearest curb with a sawed "V" pointing toward the water valve.

2.13. Water Services

Water services shall be designed as follows:

A. Residential Subdivision

Water services for single-family, duplex, and townhome subdivisions shall consist of a one-inch (1") diameter service and one-inch (1") meter. A one and one-half inch (1 ½") service and one and one-half inch (1 ½") meter shall be used for developments with minimum lot size over one half (½) acre and/or with minimum home sizes over 5,000 square feet. Smaller (1" minimum) meter and service sizes can be allowed based a technical memo or similar verifying adequate flows and approved by the Executive Director of Development and Community Services, or his/her designee. Single-family homes requiring larger meter sizes than the service size installed with development shall be required to replace water service with same size so meter and service are "size-on-size". Variations from this requirement may be allowed with approval of the Executive Director of Development and Community Services, or his/her designee.

Services for single-family, duplex, and townhome lots shall be located two feet (2') off the side property line and should generally be grouped with the adjacent lot. Water services shall have a minimum separation distance of ten feet (10') from wastewater services. Services shall consist of PE 4710 pipe conforming with AWWA C901.

Water meters shall be installed eighteen inches (18") behind the back of curb at a maximum depth of twelve inches (12"). Water meter boxes shall be plastic with a locking lid and shall be eighteen inches (18") by fourteen inches (14") for one-inch (1") meters and twenty-eight inches (28") by eighteen inches (18") for one and one-half-inch (1 ½") meters. Water meters shall not be located in driveway or sidewalk pavement.

B. Multi-Family and Non-Residential Development

Water services for multi-family and non-residential developments shall consist of a minimum one-inch (1") diameter service and one-inch (1") meter. Larger services and meters may be used as determined by the Design Engineer, provided the service and the meter are the same size. All irrigation services require turbine meters.

Water services shall be located as determined by the Design Engineer. A minimum of one service per building shall be provided. Water services shall have a minimum separation distance of ten feet (10') from wastewater services. Services shall consist of PE 4710 pipe conforming with AWWA C901.

When located adjacent to a public street, water meters shall be installed immediately inside the right-of-way line at a maximum depth of twelve inches (12"). When installed adjacent to an interior driveway, water meters shall be installed two feet (2') behind back of curb.

Water meter boxes shall be plastic with a locking lid and shall be sized such that the entire meter assembly is contained within the box with sufficient room to make minor adjustments. Water meters three inches (3") and larger shall be located in a concrete vault sized such that the entire meter assembly is contained within the vault with sufficient room to repair and replace the water meter if necessary. No meter box shall be installed in a paved area.

C. Restrictions

Water services shall not connect to a fire hydrant lead. Water services shall not exceed fifty feet (50') in length from the water main to the water meter. Bullhead water services shall not be permitted. Water services and water meters shall be identically sized. Parallel water meters serving the same facility shall not be permitted.