

UNIFORM DESIGN AND
CONSTRUCTION STANDARDS
FOR POTABLE WATER
DISTRIBUTION SYSTEMS

SECTION 2

UNIFORM
DESIGN
STANDARDS

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2.00 GENERAL STATEMENT

The water facilities design shall include planning to meet present and future demands, population projections, per capita consumption, industrial expansion, area population densities, and fire protection requirements. These factors must then be considered to size the mains from the various sources of supply to every point in the system. Other design elements are: piping materials selection (after water and soil corrosiveness considerations), the water main pressure requirements, water main location with reference to property lines, sizing of service lines, location and size of line valves, fire hydrants, special valves, and booster pumps. All water system designs shall be prepared by, or under the direction of, a professional engineer licensed in the State of Nevada.

2.01 WATER DISTRIBUTION SYSTEM PRESSURE ZONES

2.01.01 In general, the Agency's pressure zones are designed to maintain a static pressure of forty-five (45) to one hundred (100) psi.

2.01.02 In areas where a static pressure in excess of eighty (80) psi is realized, individual pressure reducing valves are required to be installed and maintained by the owner/developer in accordance with the Plumbing Code. The Engineer will identify on the water plans the services requiring individual pressure reducing valves.

2.01.03 Design parameters for the minimum water pressure in the various pressure zones, during various flow conditions, are as follows:

- A. Static Pressure 45 psi
- B. Maximum Day 40 psi
- C. Peak Hour 30 psi
- D. Maximum Day plus Fire Flow 20 psi *

* Meter and backflow protection losses must be accounted for in master metered developments. (See "Section 4" for meter and backflow tables.)

2.01.04 Where multiple pressure zones exist, the Agency having jurisdiction will determine the pressure zone to service the parcel. No parcel will be provided service from multiple pressure zones.

2.02 WATER DISTRIBUTION MAIN SIZES

2.02.01 General Requirements

- A. All water mains shall be sized based on flow demands and pressure requirements.
- B. The minimum water main size to be installed in the Agency's system shall be eight (8) inches in diameter unless otherwise approved by the Agency. Additionally the agency may establish minimum water main diameters based on road width or other criteria.
- C. Departures from the minimum requirements will be considered only in special circumstances. Water mains in cul-de-sacs, internal streets within subdivisions, and other areas where water mains will not be extended in the future, may be six (6) inches in diameter if that size water main meets the development's domestic and fire protection water demand requirements. Any departure from minimum requirements identified above shall be justified by a network hydraulic analysis.
- D. Additional requirements for system reliability may be required by the Agency on a case by case basis. Requirements may include, but are not limited to, the need to meet the minimum design criteria for fire flow and domestic requirements with portions of the system out of service such as an adjacent water main or a service point.
- E. A maximum water velocity of twenty (20) fps will be utilized when designing for fire flows and/or other emergency conditions.

2.02.02 Size - Fire Protection

- A. When fire protection is to be provided, system design shall be such that fire flows and facilities are in accordance with the requirements of the Fire Department having jurisdiction. All systems must be designed with a minimum residual pressure of twenty (20) psi on the customer's side of the meter and/or backflow assembly during maximum day plus fire flow conditions.
- B. The Engineer will identify the **total** fire flow requirements for the project, and the **on-site** demands to be provided through dedicated fire service(s) or combination fire/domestic service(s) to the **on-site** system(s). The information will be included on the water plans and/or the Project Data Sheet, as required by the Agency.

- C. The minimum water main size providing fire protection and serving fire hydrants shall be six (6) inches in diameter. A maximum length of one-hundred fifty (150) feet of six (6) inch main serving a fire hydrant from a single source will be allowed. A larger size main will be required for any distance greater than one hundred fifty (150) feet. Larger diameter mains will also be utilized, if necessary, to meet the required minimum fire flow while maintaining minimum residual pressure. A fire hydrant shall not be connected to a main which does not have sufficient fire flow capacity.
- D. Fire suppression sprinkler systems shall be designed per the fire codes of the Fire Department having jurisdiction. The design shall not be based on a water pressure greater than ten (10) psi below the available static pressure at the water main. The design shall also take into consideration the pressure loss(es) associated with the lateral, meter, backflow assembly, etc.
- E. Fire hydrants shall conform to the Standards of both the Agency and the Fire Department having jurisdiction. All public fire hydrants shall be located eighteen (18) inches behind the ROW where an easement exists or is provided. Fire hydrants located inside the ROW when easements cannot be obtained must meet the minimum ADA requirements. (See "UDACS Plate 40".)
- F. All water plans must have the approval of the Fire Department having jurisdiction PRIOR to Agency approval.

2.02.03 Oversizing

The Agency may require the Developer to oversize some or all of the proposed water main.

2.03 HYDRAULIC ANALYSES

2.03.01 Submittal of Hydraulic Analyses for Review and Approval

- A. The submission of the hydraulic analysis report prior to water plan submission is strongly recommended and may be required by the Agency.
- B. Two (2) copies of the hydraulic analysis report must be submitted. Listed below are general requirements and specific elements that must be addressed in the hydraulic analysis submittal. The Engineer is encouraged to contact the Agency for guidance in preparing the report.

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2.03.02

General

- A. The hydraulic analyses must be signed and sealed by a professional engineer licensed in the State of Nevada.
- B. The name, address, telephone number and fax number of the engineering consultant, developer, and developer's contact person must be identified on the cover of the report.
- C. Each page of the submittal must be numbered.
- D. The name and version of software used for the hydraulic analyses must be identified.

2.03.03

Project Description - The Project Description Shall Include the Following:

- A. A written description of the type of project, location, and existing facilities.
- B. A site map showing the project boundaries.
- C. Development information including:
 - Gross acreage
 - Land use
 - Number of units
 - Anticipated fire flow requirements
 - Development schedule and phasing requirements
 - Assessor's Parcel Number

NOTE: A separate analysis will be required for each development phase. A land use map should be included for larger developments.

- D. If the project is part of an oversizing agreement, indicate so in the report, and use the developer-required pipeline diameter when modeling the project.
- E. Include a node map clearly delineating the pipeline alignments and diameters, layout and names of streets/roadways in which the pipelines will be installed, the pipe and node numbers used in the analyses, and all fire hydrant locations, if known.
- F. The text and node maps shall use a minimum font size of ten (10) points.

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2.03.04

Source HGL and Demand Calculations

- A. Clearly show the source node provided by the Agency and use the Agency-issued HGLs for that node in the analyses. Enclose a copy of the letter sent by the Agency issuing these HGLs.
- B. Provide the type and location of meters, backflow assemblies, etc., and account for the associated losses, as required by the Agency.
- C. Calculate on-site and off-site demands using demand factors provided by the Agency for gpm/acre and gpm/unit. Use the factor that produces the greater total demand for each development. Show calculations.

2.03.05

Input Data Tables

- A. Provide input data tables for all pipes modeled. Pipe data tables shall include, at a minimum, pipe numbers as shown on the node map, beginning and ending nodes, lengths in feet, diameters in inches, coefficient of friction, and other pertinent information.
- B. Provide input data tables for all nodes modeled. Junction node data tables shall, at a minimum, include node numbers as shown on the node map, elevation in feet for all nodes using the NAVD 88 datum, node demand in gpm, connecting pipes, and other pertinent information. A grading plan may be required for projects adjacent to pressure zone boundaries.

2.03.06

Analysis

- A. Separate analyses for Maximum Day, Maximum Day plus Fire Flow, and Peak Hour conditions are required for each phase of the development, as well as for the entire project. In the analyses for Maximum Day plus Fire Flow, the worst-case scenario must be considered.
- B. Explain any assumptions made as part of conducting the analyses, and provide any comments that may ease and expedite the review of the analyses.

2.03.07

Output Data Tables

- A. Output results for pipes shall include, at a minimum, flow rate in gpm, flow velocity in fps, head loss in feet, and other pertinent information for each pipe.

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- B. Output results for nodes shall include, at a minimum, hydraulic grade in feet, node pressure in psi, elevation, demand, and other pertinent information for each node.
- C. Provide a summary table, for each phase of development, showing the minimum and maximum residual pressures for each condition, and minimum and maximum static pressures.

2.03.08

Miscellaneous

- A. The roughness factors to be used in the analyses should be as follows:

C= 100 for all unlined cast iron pipe

C= 120 for pipe \leq 12" in diameter

C= 130 for pipe \geq 14" in diameter

For any other sizes or materials not covered by the above, the Engineer shall contact the Agency for guidance.

- B. When identifying the fire flow available in a network hydraulic analysis, use the hydrant located at the development's weakest point, generally the highest point in the development and/or the last hydrant on a dead end main. A junction node should be placed at the appropriate location in the model to represent the fire hydrant.
- C. The elevation in the hydraulic analyses should preferably be based on a project grading plan or the anticipated final elevation. If a grading plan deviates significantly from the elevations used in the analyses, a revised analysis will be required.
- D. A chart to be used as a guide to determine water consumption for various types of developments should be obtained from the Agency.
- E. Water plans submitted for review must match the APPROVED Network Analysis as to the diameter of water mains, configuration of the development, and the required fire flow. Any revisions to the water plans may require the resubmittal of a network analysis for review and approval.

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2.04 WATER MAIN LOCATION

2.04.01 Main extensions should be located within a dedicated ROW or private street dedicated for utility purposes.

- A. Water main locations will be in accordance with the Uniform Standard Drawing, Clark County Area DWG No 501 and 501A, included in this document as Figure 2, Section 4, and as specified below:

Diameter of Main	Main Distance From Curb	Location Distance From Property Line
≤ 12-inch diameter	7 Feet	12 Feet
> 12-inch diameter	8 Feet	13 Feet

For cul-de-sacs served by individual septic systems, water mains shall be installed five (5) feet from the street center line to maximize the separation between the water main and the septic systems.

- B. If the dedicated ROW or private street dedicated for utility purposes is not available, the applicant may petition the Agency for an alternate location for the water facilities. Upon Agency approval, a main extension and appurtenances may be located within utility easements granted to the Agency (which may include ROW or private streets), for a total thirty (30) foot utility dedication.
- C. Other utilities may be located in the same easement per Section 2.04.02 and 2.04.03 or as determined by the Agency. However, easement size may be increased due to the additional utilities. **Use of a joint trench is not permitted.**
- D. Parallel mains are to be avoided, if possible. If allowed, parallel mains will be installed in opposite sides of the ROW whenever possible. In the event conditions do not allow installation in this manner, a minimum of a five (5) foot separation is required between the outside of the mains for maintenance purposes.

2.04.02 A distance of no less than three (3) feet horizontally should be provided between water mains and gas mains, or other dry utilities. Use of a joint trench is not permitted.

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- 2.04.03 Mains should be located at a distance no less than ten (10) feet horizontally (outside to outside) from any non potable water line (reclaimed) or sewer line (sanitary or storm), and eighteen (18) inches vertically above any non potable water line or sewer line, or as otherwise specified in Section 2.22 and 2.23.
- 2.04.04 Dead-end mains shall be minimized by looping mains whenever practical.
- 2.04.05 Mains installed in a cul-de-sac shall run the full street length ending approximately five (5) feet past the last service as designated on the plans. The distance between the end of the main and the back of the curb at the end of the cul-de-sac shall not be less than ten (10) feet.
- 2.04.06 A minimum of twelve (12) inches vertical clearance between water mains and dry utilities, and six (6) inches vertical clearance between water laterals and dry utilities will be provided to accommodate future maintenance.
- 2.04.07 Field verification of the location and depth of existing utility lines is recommended during design, and required prior to any construction of water facilities.

2.05 FULL FRONTAGE EXTENSION

Water mains may be required at the Agency's discretion along the entire length of at least one property line frontage of the property to be developed whenever future main extension is possible. The property line frontage is that portion of the property along the public ROW. If a parcel to be developed has more than one property line frontage, the Agency may require a water main to be installed along the other frontage(s). The minimum pipe diameter required in the frontage street shall be in accordance with Section 2.02, or as required by the Agency.

2.06 WATER MAIN MATERIALS

The type and class of all existing and proposed water mains shall be clearly identified on the water plans, as included in the Agency Approved Product List. Higher pressure class materials may be specified for special situations as identified by the Engineer or the Agency.

2.06.01 Polyvinyl Chloride (PVC) Pressure Pipe C900

Unless otherwise specified or shown on the drawings, polyvinyl chloride pressure pipe shall be at least Class 150 DR 18 and shall conform to AWWA Standard C900, "Polyvinyl Chloride (PVC) Pressure Pipe And Fabricated Fittings, Four (4) Inches Through Twelve (12) Inches For Water Distribution".

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2.06.02 Polyvinyl Chloride (PVC) Pressure Pipe C905

Unless otherwise specified or shown on the drawings, all sixteen (16) inch through twenty-four (24) inch diameter polyvinyl chloride pressure pipe shall conform to AWWA Standard C905, "Polyvinyl Chloride (PVC) Pressure Pipe And Fabricated Fittings, Fourteen (14) Inches Through Forty-eight (48) Inches For Water Transmission And Distribution". The minimum pressure rating and corresponding minimum dimension ratio shall be as follows:

Design Pressure	200 PSI
Minimum Pressure Rating	235 PSI
Minimum Dimension Ratio	DR-18

2.06.03 Ductile-Iron Pipe (DIP)

A. Materials

1. Unless otherwise specified or shown on the drawings, ductile iron pipe shall conform to the AWWA Standard C151, "Ductile-Iron Pipe, Centrifugally Cast, For Water" as follows:
 - a. Up to and including twelve (12) inch: Pressure Class 350.
 - b. Fourteen (14) inch up to and including twenty-four (24) inch: Pressure Class 250, or as required by the Agency.
2. The lining of ductile iron pipe (DIP) shall be as follows:
 - a. Cement mortar line (double thickness) in accordance with AWWA Standard C104, "Cement-Mortar Lining For Ductile-Iron Pipe and Fittings For Water".
 - b. Thickness of cement mortar lining:
 - (1) Not less than one-eighth (1/8) inch for four (4) inch to twelve (12) inch.
 - (2) Three-sixteenth (3/16) inch for fourteen (14) to twenty-four (24) inch.

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2.07 WATER MAIN JOINT DEFLECTION

The maximum allowable water main joint deflection for various pipe materials and lengths is listed in the following tables. If these offsets conflict with the pipe manufacturer's recommendation, the more stringent requirement shall apply. Requirements in excess of these deflections identified shall require installation of fittings. However, the number of fittings and pipe joints should be minimized, while maintaining radius requirements. The use of partial lengths of pipe to create additional joints and joint deflections is not authorized. Pipes may be deflected at fitting and pipe joints, with the deflection limited to the pipe being installed.

For changes in direction exceeding the maximum allowable joint deflection, fittings shall be used. The use of vertical ninety (90) degree bends, with vertical sections of water main, is not allowed for the vertical adjustment of pipeline alignment.

2.07.01 Polyvinyl Chloride (PVC) Pressure Pipe C900

Polyvinyl chloride pipe shall be deflected at the fitting and pipe joints only. The maximum allowable joint deflection shall be as stated in the following table.

Pipe Size (Inches)	Maximum Joint Deflection (degrees)	Maximum Pipe End Offset 20 Foot Pipe Lengths (inches)	Minimum Radius of Curvature (feet)
4-12	1	4.187	1,150

2.07.02 Polyvinyl Chloride (PVC) Pressure Pipe C905

Polyvinyl chloride pipe shall be deflected at the fitting and pipe joints only. The maximum allowable joint deflection is limited and shall not exceed manufacturer recommendations. In general, fittings shall be used for all changes in direction.

Maximum Joint Deflection (degrees)	Maximum Pipe End Offset 20 Foot Pipe Lengths (inches)	Minimum Radius of Curvature (feet)
1	4.187	1,150

2.07.03 Ductile Iron Pipe (DIP)

The maximum allowable joint deflection for push-on type joint and mechanical-joint pipe shall be as follows:

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PUSH-ON TYPE DIP JOINT					
Pipe Size (Inches)	Deflection Angle (Degrees)	Maximum Offset (Inches)		Minimum Radius of Curvature (Feet)	
		18' Length	20' Length	18' Length	20' Length
4" - 12"	2.5°	9"	10"	415'	460'
14" - 24"	1.5°	6"	6"	690'	765'

MECHANICAL TYPE DIP JOINT					
Pipe Size (Inches)	Deflection Angle (Degrees)	Maximum Offset (Inches)		Minimum Radius of Curvature (Feet)	
		18' Length	20' Length	18' Length	20' Length
4"	4.0°	15"	17"	260'	290'
6"	3.5°	13"	15"	295'	330'
8" - 12"	2.5°	9"	10"	415'	460'
14" - 24"	1.5°	6"	6"	690'	765'

2.08 DEPTH OF COVER

The minimum depth of cover shall be maintained for all pipe unless otherwise specified. Vehicle traffic over the water mains may be restricted until the minimum depth of cover is obtained. Mains shall be installed with the minimum cover specified below. Except for lowered sections of main associated with utility crossings, all mains shall be installed at a depth of ten (10) feet or less to facilitate future maintenance, unless approved by the Agency. Where a grade change is associated with existing pipelines resulting in a depth of cover in excess of ten (10) feet, the Agency reserves the right to require the replacement of the pipeline with the proper depth of cover.

2.08.01 ROW without an Established Street Grade

For installations where the final street grades are not established, the minimum cover shall be sixty (60) inches for mains twelve (12) inches and smaller, and seventy-two (72) inches for mains sixteen (16) inches and greater. The Agency may require additional cover in addition to the cover specified above. The Engineer shall consider possible, and probable, future development and grading to achieve the minimum depth of cover as described in Section 2.08.02 and following development of the area. (See "UDACS Plate 16".)

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2.08.02 ROW with an Established Street Grade

Where there is an established street grade, the following minimum depth of cover shall be provided. (See “UDACS Plate 17”.):

ROW (Feet)	Pipe Diameter (Inches)	Minimum Depth of Cover (Inches)
Sixty (60) or less	Twelve (12) and smaller	Forty-two (42)
Sixty (60) or less	Greater than twelve (12)	Sixty (60)
Greater than sixty (60)	Twelve (12) and smaller	Forty-eight (48)
Greater than sixty (60)	Greater than twelve (12)	Sixty (60)
Greater than sixty (60)	Greater than sixteen (16)	Seventy-two (72) Minimum

NOTE: Depth of cover is the distance from the finished grade to the top of pipe at the pipe location, and not based on the elevations for the center line of road.

2.08.03 NDOT ROW

A sixty (60) inch minimum depth of cover shall be maintained over all water mains and casings located within NDOT ROW. (See “UDACS Plate 18”.)

2.08.04 Depth of Cover During Construction

A twenty-four (24) inch minimum depth of cover must be maintained during construction.

2.09 CATHODIC PROTECTION

2.09.01 Existing Test Stations

Existing water facility cathodic protection test stations will be shown on the plans and all test stations to be relocated or adjusted will be identified. Test stations to be relocated shall be tested prior to and after relocation by a certified Cathodic Protection Specialist, Corrosion Specialist, Professional Corrosion Engineer, or other qualified person authorized by the Agency.

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2.09.02 Installation Of New Facilities

For installation of ductile iron or MLCP pipe sixteen (16) inch and larger, the Agency may require a corrosion study to be performed by a certified Professional Corrosion Engineer. At a minimum, additional soils testing for corrosive soil characteristics may be required.

2.10 PIPE CASING

2.10.01 Steel Casing

Steel casings are required on all pipe installed using boring method, where required to meet specific Railroad and/or NDOT requirements, to provide structural support, or as required under other special conditions. The pipe casing shall be laid true to line and grade with no bends or changes in grade for the full casing length.

The casing shall be steel fabricated and shall conform to the requirements of ASTM A283, Grade B, C, or D. All joints shall be welded. Interior joints shall be ground to a smooth finish. All welding shall be performed in accordance with AWWA Standard C206, "Field Welding of Steel Water Pipe".

Casing wall thickness shall be in accordance with UDACS Plate 23. The wall thickness for casing installations over twenty-five (25) feet below finished grade shall be determined by a Nevada Licensed Professional Engineer. Casing wall thickness for installations under railroad tracks shall be determined by a Nevada Licensed Professional Engineer and approved by the Union Pacific Railroad.

Casings installed by jack and bore method shall be installed to the grade shown on the drawings, with a maximum vertical deviation of + zero (0)^o and - two (2)^o, and a maximum horizontal deviation of \pm two (2)^o provided the alignment does not conflict with other utilities and/or rights-of-way.

The water pipe installed in the casing shall be supported by Agency approved casing spacers, and installed in accordance with the manufacturer's recommendations. After pipe installation, the casing shall be sealed, and Agency approved end seals shall be installed per the manufacturer's recommendations.

Where installation of casing may be accomplished by open cut methods, water quality RCP casings may be used in lieu of steel casings, as approved by the Agency. If the casing is required in order to meet the requirements of Section 2.22, the RCP sections must be installed using Agency approved elastomeric joint sealants, in compliance with ASTM C920, or joint gaskets. RCP casings installed for future pipeline installations shall be securely

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sealed with removable bulkheads at both ends in a manner acceptable to the Agency.

2.10.02 Polyvinyl Chloride Pipe (PVC)

Water quality PVC casings may be utilized in lieu of steel casing for protection of the water system (See "Section 2.22"), where installation of pipe does not require boring methods, structural support, or for Railroad and/or NDOT requirements.

2.10.03 Reinforced Concrete Pipe (RCP)

Water quality RCP casings may be utilized in lieu of steel casing for protection of the water system (See "Section 2.22"), where installation of pipe does not require boring methods or structural support, as approved by the Agency.

2.10.04 Pipe Spacers

The pipe shall be symmetrically supported about its centerline inside the casing at each joint end with an Agency approved polyethylene spacer, sized and designed per manufacturer recommendations.

2.10.05 Casing End Caps

The casing ends shall be sealed in a manner acceptable to the Agency. The annular space between the pipe and the casing shall be filled with CLSM I or sand, as required by the Agency.

2.11 VALVES

2.11.01 Valve Location

Sufficient valves shall be provided on water mains to minimize inconvenience, degradation of fire protection and sanitary hazards during repairs. Valves shall be generally located as follows, unless otherwise approved by the Agency:

- A. At intervals to isolate no more than two (2) fire hydrants at any time.
- B. In residential areas to isolate a maximum of thirty (30) services.
- C. A maximum of five (5) valves will be required to isolate any location.

- D. At maximum intervals of five hundred (500) feet in commercially zoned areas and residential off-site water mains for distribution mains twelve (12) inches in diameter and smaller, one thousand (1,000) foot intervals for sixteen (16) inches in diameter transmission mains, and one thousand three hundred and twenty (1,320) foot intervals for twenty (20) inch and greater diameter transmission mains. Additional valves may be required by the Agency to meet the requirements of Paragraphs “A” through “C” above. Valves on transmission mains outside of their designated pressure zone or area of service will be located a maximum spacing of one (1) mile.
- E. Valves shall not be located in street gutters, valley gutters, or in driveways.
- F. A valve is required at the end of all temporarily dead-end mains. The valve location is to be a minimum of ten (10) feet upstream of the cap or blow off assembly.
- G. For developments having two (2) or more sources of supply, isolation valves are required such that partial flow can be maintained to the development when any one source is out of service for maintenance or repair.
- H. Valved outlet(s) for future service laterals six (6) inches in diameter and larger may be installed when approved by the Agency. Valved outlet installation approval does not constitute a water commitment. When valved outlet(s) for future service laterals are identified, the following note shall appear on the drawing:

CONDITIONAL APPROVAL OF VALVED OUTLET (Six (6) inches and larger)

The water plans show one or more valved outlets extending out of paved areas. Installation of these outlets is acceptable; however, if the outlets are incorrectly located or not used for any reason when the property is actually developed, the Developer shall abandon the outlets at the connection to the active main in accordance with the Agency's Standards and at the Developer's expense. Approval of the valved outlet does not provide or imply a water commitment.

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- I. A valve immediately adjacent to the water main shall be provided for all laterals greater than two (2) inches in diameter, and for all fire hydrant laterals.
- J. The Agency may require additional valves depending upon the project design.

2.11.02 Gate Valves

- A. Gate valves may be used on all water main diameters up to, and including, twenty-four (24) inches, as required by the Agency.
- B. Gate valves shall be installed in the vertical position with non-rising stems in all locations, except vaults, unless otherwise specified by the Agency.
- C. A minimum six (6) inch bypass valve and piping for pressure relief shall be provided for all gate valves twenty-four (24) inches in diameter and greater, unless otherwise specified by the Agency.
- D. All gate valves shall be resilient seat unless otherwise specified by the Agency.

2.11.03 Butterfly Valves

Butterfly valves may be used on water mains larger than sixteen (16) inches in diameter; unless a tapping (gate) valve is required, or as required and approved by the Agency. The installation of a valve vault shall be required for all butterfly valves.

2.11.04 Valve Stem Extensions

Valve stem extensions are required within two (2) feet of finished grade where the distance from the top of the valve box to the top of the operating nut exceeds five (5) feet.

2.11.05 Valve Boxes

Adjustable valve boxes shall be provided for all buried valves. Valve boxes shall be installed in accordance with UDACS Plate 39.

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2.11.06

Special Valves

- A. Combination air and vacuum relief valves (AVAR) may be required on pipelines' high points and changes in grade, depending on the main size (typically twelve (12) inches and greater) and terrain, in accordance with UDACS Plate 38.
- B. Pressure regulating valves (PRV) will be required where it is necessary to reduce pressure to a maximum value as defined in Section 2.01.
- C. Check valves are to be used where it is required that the water flow in one direction only.
- D. Blow-off valves are required on all permanent dead-end pipe runs and may be required at stub-out locations. Blow-off valves for these locations shall be installed in accordance with UDACS Plate 36.
- E. Six (6) inch manual blow-off valves for installation for larger diameter mains at low points shall be installed in accordance with UDACS Plate 37, as required by the Agency.
- F. Backflow Prevention Assembly requirements are identified in Section 2.20.

2.11.07

Valve Abandonment

- A. Any stub and valved outlet installed, and subsequently not required, must be abandoned.
- B. For valve abandonment, the following note shall appear on the drawing:

ABANDONED VALVES

All valves to be abandoned shall be abandoned in the closed position, unless shown otherwise, by removing a minimum of the top twenty-four (24) inches of the valve box and then filling the bottom of the box with a minimum of eight (8) inches of sand or Type II aggregate base. The remaining portion of the valve box shall be filled with concrete having a compressive strength of at least two thousand (2,000) psi.

- C. If the stub and valve is to be abandoned with the valve in the closed position, the following note shall appear on the drawing:

CUT AND CAP

The lateral must be cut within one (1) foot of the abandoned valve, or as shown on plans, and capped. The Contractor shall cut the existing pipe where shown on the drawing and install a cap complete with thrust block. Where a joint or coupling in the existing pipe is uncovered at the cut and cap locations, the installation of a plug may be permitted with Agency approval. A concrete thrust block shall be installed at all cap or plug locations in accordance with the provisions of UDACS Plate 31.

2.12 ABANDONMENT OF MAIN

All pipelines to be abandoned shall be cut and securely capped (all ends). The cut and cap location on the main to be abandoned shall be a maximum of one (1) foot from the valve or point of termination. Any abandoned pipeline larger than twelve (12) inches must be filled with CLSM I material.

2.13 CAPPING

A cap or plug with blowoff assembly will be required on the ends of all newly installed mains in accordance with UDACS Plate 36.

2.14 THRUST AND ANCHOR BLOCKS

Thrust blocks are required at all caps, valves, reducers, tees, and fittings used to change the pipe direction, and shall be placed in accordance with UDACS Plates 30 and 31 for all locations where the soil bearing capacity is three thousand (3,000) psf or greater. A special thrust block design by a NPE for each location of a thrust/anchor block is required if allowable soil bearing capacity is less than three thousand (3,000) psf. If undisturbed material is not present; (such as in fill sections), then mechanically restrained joints shall be required.

2.15 MECHANICALLY RESTRAINED JOINTS

Mechanically restrained joints are required for all mains sixteen (16) inch and larger, and may be used for smaller diameter mains at the discretion of the Agency. The length of restrained joints shall be clearly identified on drawings and calculations shall be submitted with the project for Agency review and approval.

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2.16 TESTING AND DISINFECTING

- A. All new water facilities shall be pressure tested and disinfected to the Agency's satisfaction as identified in Section 3.27 of this standard and in accordance with the Nevada Division of Environmental Protection requirements (See "NAC 455A.67145".) For guidance on chlorine requirements, refer to UDACS Plate 32.
- B. Provisions shall be made to provide a water velocity of two and one half (2.5) feet-per-second while flushing water mains through the use of blow off valves, fire hydrants, or a combination thereof. (See "UDACS Plate 33".)

2.17 SERVICE LATERALS

2.17.01 Location

- A. All service laterals shall be installed in the ROW unless other provisions have been approved by the Agency.
- B. The full service lateral length between a water main and water meter shall be installed at ninety (90) degrees to the water main horizontal alignment unless otherwise approved by the Agency. A locator ribbon will be installed the entire length of the lateral for all services not installed at right angles to the main.
- C. For service laterals two (2) inches in diameter and smaller, service saddles shall not be closer than eighteen (18) inches to any other service saddle, pipe joint, valve, or fitting.
- D. The sewer and water laterals leading into the property shall be separated horizontally by a minimum of four (4) feet, the sewer lateral must be a minimum of one (1) foot lower than the water lateral, and the laterals shall be located in separate trenches, per State and local health requirements. (See "Section 2.22".)
- E. All service laterals shall be located a minimum of ten (10) feet from septic tanks, and a minimum of twenty-five (25) feet from leach beds and/or seepage pits.
- F. Location of all service laterals shall be clearly defined on the drawings, with all services located outside of driveways, aprons, or sidewalk ramps.
- G. The use of a six (6) inch diameter or larger lateral may be required for services two (2) inches in diameter and smaller if the lateral length is in excess of one hundred (100) feet.

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2.17.02 Lateral Installation

- A. Service saddles shall be installed in accordance with the Agency's approved materials list for the type of pipe used.
- B. Corporation stops shall be male iron pipe thread by compression or flared connection. A corporation stop shall be installed at the water main for all service laterals two (2) inches and smaller.
- C. All services laterals two (2) inches and smaller shall have a minimum lateral diameter equal to the meter size but in no case shall the lateral diameter be less than one (1) inch (i.e. a one (1) inch diameter service lateral is required for five-eighth (5/8) inch, three-quarter (3/4) inch and one (1) inch meters).
- D. All services three (3) inches and larger will require a minimum six (6) inch lateral with valve and shall be installed with a material approved by, and in accordance with, the Agency.

2.17.03 Future Use Laterals

Service laterals two (2) inches in diameter and smaller may be approved for future lots, provided the following conditions are adhered to:

- A. The laterals are to lots identified as a part of a master development and the subdivision map is available in either final or tentative form. Agency approval of the subsequent water plan is required (i.e. future laterals will not be provided for all future lots).
- B. The future laterals will only be installed where the streets over the water main are to be developed or improved with the current project.
- C. The service laterals will be clearly identified on the drawings and the quantity listed as "laterals for future services." Fees may be required by the Agency having jurisdiction for laterals installed as "future services."
- D. Approval of the future use lateral does not provide or imply a water commitment.
- E. The following note shall be included on the drawing:
FUTURE USE LATERALS (One (1) inch through two (2) inch)

If any of the service laterals to be installed for future

lots are incorrectly located or are not used for any reason when the lots are developed, the Developer shall abandon the laterals at the connection to the active main in accordance with the UDACS Standards at the Developer's expense.

Installation of service laterals two (2) inches in diameter and smaller for future lots shall include the service lateral, meter box, angle meter stop, and all fittings per UDACS Plates 1 through 4. The Agency may lock these services to prevent unauthorized water use.

- F. Service laterals will not be approved for future lots not part of a master development or for a development with a different owner.

2.17.04 Lateral Removal

- A. When abandoning existing water service assemblies sized two (2) inches and smaller, the following note shall appear on the drawing:

***ABANDONMENT OF EXISTING SERVICE LATERALS
(Two (2) inch and smaller)***

The Contractor shall notify the Agency two (2) full business days prior to the requested removal time to allow the Agency to take the final meter reading. The Contractor may then begin removal procedures for the affected service as follows:

Existing service laterals to be abandoned from existing water mains shall have the corporation stops turned off at the main, a minimum of twelve (12) inches of the lateral cut out near the corporation stops and a brass cap installed on the corporation stop. If the corporation stop is damaged beyond repair or pulled from the existing water main, the main shall be repaired at the Contractor's expense in a manner approved by the Agency. If it is discovered the corporation stop is not water tight, through no fault of the Contractor, the Contractor shall notify the Agency for further direction. The existing meter(s) shall be removed and delivered to the Agency.

- B. For existing water service assemblies three (3) inches and larger that are to be abandoned, the following note shall appear on the drawing:

***ABANDONMENT OF EXISTING SERVICE LATERALS
(Three (3) inch and larger)***

The Contractor shall notify the Agency two (2) full business days prior to the requested removal time to allow the Agency to take the final meter reading and to notify the Agency's Inspector of the impending work. The Contractor may then begin removal procedures for the affected service as follows:

All valves to be abandoned shall be abandoned in the closed position, unless shown otherwise, by removing a minimum of the top twenty-four (24) inches of the valve box and then filling the bottom of the box with a minimum of eight (8) inches of sand or Type II aggregate base, the remaining portion of the valve box shall be filled with concrete having a compressive strength of at least two-thousand (2,000) psi.

If the valve is to be abandoned in the closed position, the lateral must be cut within one (1) foot of the abandoned valve, or as shown on plans, and capped. Where a joint or coupling in the existing pipe is uncovered at the cut and cap locations, the installation of a plug may be permitted with Agency approval. The Contractor shall install a concrete thrust block in accordance with the provisions of the UDACS Plate 31 at all cap or plug locations.

The existing meter(s) shall be removed and delivered to the Agency. The Contractor shall then remove the vault or a minimum of the vault roof and the top twenty-four (24) inches of the vault walls, and backfill the abandoned vault with Type II material compacted to ninety (90)% of maximum dry density or CLSM I, as approved by the Agency.

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2.17.05 Lateral Relocation

- A. All existing laterals that are to be relocated must first be disconnected from the existing pipeline following abandonment procedures. (See “Section 2.17.04”.) The relocated service installation shall comply with Agency’s current standards.
- B. If meter box relocation is required, Section 2.17.01.B still applies.
- C. The lateral may be extended, rather than replaced, if the existing lateral is of approved copper material or sized six (6) inches in diameter or larger, provided the ninety (90) degree angle from the existing water main is maintained. All polyethylene tubing service laterals must be fully replaced, in lieu of extension or splicing, to the Agency’s current standards. If approved by the Agency, a maximum of one (1) coupling may be used to extend a copper service lateral two (2) inches or smaller. (See “UDACS Plates 1 through 6”.)

2.18 METERS

2.18.01 Size

The meter to be installed will be based on size and service requirements. **The Agency shall have final approval in determining the meter size and type.** The table included in Section 4, Tables A and B reflect the AWWA rated capacities for various meter types and sizes. The size for all domestic services shall be based on continuous flow meter capacities when utilizing Peak Hour Demand. Maximum meter flow capacities may be used for maximum domestic demands, when calculated utilizing the applicable plumbing code or other applicable criteria, and fire flow conditions when associated pressure losses are accounted for in the system design.

2.18.02 Agency Provided Meters

- A. All meters two (2) inches and smaller are provided by the Agency and remain the Agency's property.
- B. All meters three (3) inches and larger shall be provided by the developer and must meet the requirements of, be approved by, and remain the property of, the Agency. (See “Agency Approved Product List” for requirements.)
- C. Meters for single family residences with residential fire sprinkler systems will meet American Water Works Association (AWWA) standards for this application.

2.18.03 Installation

- A. All services shall be installed in accordance with UDACS Plates. Meters will not be allowed at locations not contiguous to the property to be served. For services three (3) inches and larger, the following note(s) shall appear on the drawing.

INSTALLATION OF METER AND VAULT

The meter(s) and vault(s) with traffic/non-traffic bearing cover(s) shall be installed in accordance with the UDACS Vault Drawing No. C-475, latest revision. Precast vaults approved by the Agency may be used in lieu of the cast-in-place vaults.

Any block wall or other fence material shall be designed and constructed around the outside of the easement(s), to allow the Agency direct access to the vault(s) and inlet piping from the adjacent ROW, Easements shall be clearly marked or staked prior to the start of construction.

INSTALLATION OF DOUBLE CHECK DETECTOR ASSEMBLY AND VAULT

The detector check(s) and vault(s) with traffic/non-traffic bearing cover(s) shall be installed in accordance with the UDACS Plate 60 and with UDACS Vault Drawing No. C-475, or latest revision. Precast vaults approved by the Agency may be used in lieu of the cast-in-place vaults.

Easements shall be clearly marked or staked prior to the start of construction.

- B. A bypass line or bypass provision is required for all meters three (3) inches and larger on projects, unless otherwise specified by the Agency.
- C. All meter and meter vaults for services three (3) inches and larger shall be located outside of the ROW (even if there is adequate space for the vault within the ROW) and the appropriate utility easement granted to the Agency, unless otherwise specified by the Agency.

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2.18.04 Meter Boxes

- A. All meter boxes shall be located in the sidewalk, sidewalk area, or within a designated easement in accordance with the UDACS Plates. Meter boxes shall **NOT** be located in driveways or streets.
- B. All meters two (2) inches and smaller shall be installed in an approved meter box, sized per the Agency Approved Products List.
- C. All meters three (3) inches and larger shall be housed in a vault. Refer to UDACS Vault Drawing No. C-475, latest edition, for dimension and construction details.
- D. Provisions for remote reading devices for all vaults shall be provided as required by the Agency.

2.19 EXISTING/ABANDONED PRIVATE WELLS

2.19.01 Existing Private Wells To Remain In Service - If the Agency allows a private well to remain in service, the following note shall appear on the drawing:

EXISTING PRIVATE WELLS TO REMAIN IN SERVICE

If the existing private well is to remain in service, an Agency approved backflow prevention assembly shall be installed immediately downstream of the Agency's water meter in accordance with UDACS Plate 8. The new service shall not be activated until the backflow prevention assembly has been successfully tested by the Agency.

2.19.02 Private Wells To Be Removed From Service - The following note shall appear on the drawing:

PRIVATE WELLS TO BE REMOVED FROM SERVICE

The existing private well is to be abandoned. The installation of a backflow prevention assembly will not be required; however, the Agency water service will remain in the locked position until the well has been abandoned (which must be accomplished within thirty (30) days of the installation of the Agency service) or physically disconnected from the onsite system. An inspection of the on-site system will be made by the Agency's Inspection Division to verify the well has been disconnected from the on-site system and the well is no longer functional. The State of Nevada Division of Water Resources (Telephone Number 702-486-2770) may be contacted for information concerning requirements and procedures for abandoning wells.

2.20 BACKFLOW

Any connection to the Agency's distribution system shall be made in a manner that protects the public potable water supply from contamination or pollution. Containment shall be achieved by the use of an Agency approved backflow assembly that isolates, within the customer's internal distribution system(s) or the customer's private water system(s), such contaminants or pollutants that could backflow into the public water system.

2.20.01 Application

No water service connection to any premises shall be approved, installed, or maintained by the Agency unless the water supply is protected as required by State laws, State regulations, and Agency Standards. Water service to any premises shall not be activated by the Agency if the Agency determines the water service requires a backflow assembly and any of the following conditions prevail:

- A. The backflow assembly is not installed or has been removed after installation.
- B. The backflow assembly has been by-passed.
- C. The backflow assembly is in any way altered.
- D. Any cross-connection or possibility of cross-connection exists.
- E. The backflow assembly receives an "unsatisfactory" test result.

2.20.02 The required backflow prevention assembly type shall be determined by facility use. A partial list of facilities with required backflow prevention is provided in Section 4, Table E. The Agency may require all services to a facility or parcel have an equal level of backflow protection. Facilities not listed in Table E shall be Agency evaluated for backflow prevention requirements on a case by case basis.

2.20.03 Any backflow prevention assembly required herein shall be a model and size approved by the Agency. The term "Approved Backflow Prevention Assembly" shall mean an assembly meeting the Agency's specifications.

2.20.04 When backflow prevention assemblies are required, their installation design shall take into consideration pressure loss across the device and maintenance requirements for critical services. The installation of dual services and/or backflow assemblies is strongly recommended and may be required for critical facilities to minimize the impact of assemblies being taken out of service for maintenance and repair.

2.21 FIRE HYDRANTS

2.21.01 Location and Spacing

- A. All fire hydrants, permanent or temporary, will be installed in accordance with UDACS Plates 40 and 41.
- B. Hydrant spacing and location are ultimately determined by the Fire Department having jurisdiction.
- C. Fire hydrants shall not be located in the following locations:
 - 1. Within six (6) feet of a driveway, curb return, power pole, light standard, or any obstruction.
 - 2. On the circular portion of a cul-de-sac, or within twenty (20) feet of the cul-de-sac radius.
 - 3. Within three (3) feet of any block wall or fence.
 - 4. As Agency specified.

2.21.02 Materials

Fire hydrants shall be approved by, and conform to the requirements of, the Fire Department having jurisdiction.

2.21.03 Hydrant Drains

- A. Hydrant drains shall not be plugged, and a gravel pocket shall be provided.
- B. Hydrant drains shall not be connected to, or located within ten (10) feet of, sanitary sewers or storm drains.

2.21.04 Temporary Fire Hydrants

- A. A temporary fire hydrant is classified as "temporary" due to its projected useful life and in no way reflects a lesser standard of construction. The requirements for temporary fire hydrants, to the extent possible, will be identified during the design stage and included on the developer's plans for review and approval. If possible, this requirement should be satisfied through the use of permanent fire hydrants.
- B. Temporary fire hydrants are not intended to provide fire protection for permanent facilities.

- C. Separate requests for a temporary fire hydrant installation require the submission of a full size (twenty-four (24) inches x thirty-six (36) inches) reproducible site drawing, or an abbreviated drawing (eleven (11) inches x seventeen (17) inches) to include the items listed below. An amendment can be made to a previously approved water plan if the hydrant is for the same project. The application will, as a minimum, identify the following:
 - 1. Dimensions from existing features and property lines, etc., to establish the point of connection to the water line and the extent of construction.
 - 2. Period of time the fire hydrant will be in use, as approved by the Agency, and the work associated with its removal.
 - 3. Procedure for removing / abandoning the fire hydrant upon termination of use.
 - 4. Professional Engineer signature and seal.
 - 5. Agency Standard Notes.
 - 6. Agency approval (signature) block.

2.21.05 Fire Hydrant Permit

A fire hydrant permit and meter will be required to use a fire hydrant for construction and dust control purposes. Charges for their use will be in accordance with the Agency's Service Rules, latest edition. A backflow assembly may also be required as determined by the Agency.

2.21.06 Relocation/Abandonment of Fire Hydrants

- A. If a hydrant lateral needs to be lengthened, continuing further back in the same direction and at the same depth as the original lateral, the hydrant assembly shall be replaced with a new hydrant assembly approved by the Fire Department having jurisdiction, unless otherwise noted on the plans. The following note shall appear on the drawing:

**RELOCATION OF FIRE HYDRANTS
(Extension of Existing Lateral)**

The Contractor shall remove both the upper and lower barrels of the existing fire hydrant(s) where shown, extend the existing lateral as required, and install a

new hydrant(s) at the new location(s) indicated. Installation shall be in accordance with UDACS Plates 40 and 41. The existing fire hydrant shall be delivered to the Agency.

- B. If a hydrant is to be relocated and the hydrant lateral must be abandoned, the following note shall appear on the drawing:

FIRE HYDRANT RELOCATION AND LATERAL ABANDONMENT (Existing Lateral to be Abandoned)

Where shown on the drawing(s), the Contractor shall abandon the existing fire hydrant(s) by removing both the upper and lower barrels of the fire hydrant so that no portion of the remaining fire hydrant assembly is closer than two (2) feet to the existing grade. A new hydrant shall be installed at the new location as indicated on the drawing, in accordance with UDACS Plate 40 and 41. The existing valve shall be abandoned in a closed position, unless shown otherwise, by removing a minimum of the top twenty-four (24) inches of the valve box, and then filling the bottom of the box with a minimum of eight (8) inches of sand or Type II aggregate base. The remaining portion of the valve box shall be filled with concrete having a compressive strength of at least two-thousand (2,000) psi. The lateral shall be cut within one (1) foot of the abandoned valve, or as shown on plans, and capped. Where a joint or coupling in the existing pipe is uncovered at the cut and cap location, the installation of a plug may be permitted, with Agency approval. A concrete thrust block shall be installed at all cut and cap locations in accordance with the provisions of UDACS Plate 31. The existing fire hydrant shall be delivered to the Agency.

- C. If the fire hydrant is to be abandoned, the following note shall appear on the drawing:

FIRE HYDRANT AND LATERAL ABANDONMENT

Where shown on the drawing, the Contractor shall abandon the existing fire hydrant(s) by removing both the upper and lower fire hydrant barrels so no portion of the remaining fire hydrant assembly is closer than two (2) feet to the existing grade. The existing

hydrant shall be delivered to the Agency. The existing valve shall be abandoned in a closed position, unless shown otherwise, by removing a minimum of the top twenty-four (24) inches of the valve box and then filling the bottom of the box with a minimum of eight (8) inches of sand or Type II aggregate base. The remaining portion of the valve box shall be filled with concrete having a compressive strength of at least two-thousand (2,000) psi. The remaining portion of the lateral shall be cut within one (1) foot of the abandoned valve, or as shown on plans, and capped. The existing concrete hydrant pad shall be removed.

D. Vertical Adjustments

Where grades are changed which affect fire hydrants, the Contractor shall make adjustments as necessary to bring the fire hydrant into compliance, without the use of a fire hydrant barrel extension, with UDACS Plates 40 and 41, and Agency requirements.

2.21.07 Fire Department Approval

Approval by the Fire Department having jurisdiction is required PRIOR to obtaining final water plan approval from the Agency. Fire Department approval is also required for revisions to approved plans affecting fire hydrants, fire services, and/or fire flow requirements.

2.22 WATER AND SEWER/STORM MAIN CROSSINGS AND CLEARANCES

2.22.01 Parallel Separations (Mains)

NOTE: The sewer manhole or structure is not considered to be a sewer main provided the water main is greater than eighteen (18) inches above the sewer main.

A. The following separations must be maintained between all storm and sanitary sewer lines which parallel water lines six (6) inches and larger.

1. Water mains and sewer lines shall be installed in separate trenches with at least ten (10) feet of separation measured horizontally from exterior pipe walls.

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2. Water mains shall be placed above sewer lines whenever possible.
- B. Where the required ten (10) foot separation is not practicable, the Engineer may petition the Agency for approval of one of the following options:
1. Less than a ten (10) foot horizontal separation with eighteen (18) inches vertical separation, the following will apply:
 - a. Pipes shall be installed in separate trenches.
 - b. Horizontal separation shall be at least five (5) feet from exterior pipe walls and sewer structures.
 - c. Vertical separation shall be at least eighteen (18) inches between exterior pipe walls with the water main being placed above the sewer main.
 2. Where requirements included in Section 2.22.01A and Section 2.22.01B cannot be met, the following provisions will apply:
 - a. All efforts will be made to place the water line above the sewer main; and
 - b. Horizontal separation shall not be less than six (6) feet from exterior pipe walls; and
 - c. The sewer line will be constructed using one of the following options, in the following priority, and as approved by the Agency(s):
 - (1) The sewer main will be constructed of water supply quality materials meeting AWWA standards; or
 - (2) Sewer mains may be totally encased with a minimum of four (4) inches of cement slurry (CLSM II); or
 - (3) Storm sewers twenty-four (24) inches in diameter or greater may be installed with watertight joints using Agency approved internal elastomeric joint sealant, in compliance with ASTM C920, or joint

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gaskets, with provisions to insure against differential settlement of the storm drain.

3. Where separation requirements cannot be met using the above provisions, the Engineer may petition the Agency for approval to encase the water main with a minimum of four (4) inches of cement slurry (CLSM II), for a limited section; however, the Engineer must demonstrate an alternative alignment is not available.

Encasement will not be permitted for asbestos cement pipe water mains.

2.22.02 Crossing Separations (Mains)

The following separations must be maintained between all storm and sanitary sewer mains which cross water mains six (6) inches and larger.

- A. Sewer mains shall be placed below water mains, and shall be separated vertically by at least eighteen (18) inches between exterior pipe walls.
- B. Where the water main is below the sewer main, or where the water main is above the sewer main with a vertical separation less than eighteen (18) inches, the following provisions shall apply:
 1. A reasonable effort must be made to place water and sewer pipeline joints an equal distance from the crossing point. This requirement does not apply to welded joints.
 2. A vertical separation of no less than six (6) inches must be maintained and structural support for the sewer and/or water main be determined by the Engineer and approved by the Agency having jurisdiction.
 3. The sewer main will be constructed using one of the following options, in the following priority, or as approved by the Agency:
 - a. The sewer main must be constructed of water supply quality materials meeting AWWA standards.
 - b. The sewer main or water main may be installed in a steel sleeve or a sleeve of water quality pipe which extends ten (10) feet perpendicular on each side of the main. (See "UDACS Plate 23".)

- c. The sewer main (depending on field conditions) shall be totally encased in a minimum of four (4) inches of cement slurry (CLSM II) for a distance of ten (10) feet on each side of the crossing.
 - d. The Engineer may petition the Agency for approval to encase the water main (depending on field conditions) in a minimum of four (4) inches of cement slurry (CLSM II) for a distance of ten (10) feet on each side of the crossing. Encasement will not be permitted for asbestos cement pipe.
- C. Where a section of water main is being lowered due to a sanitary sewer, or storm drain conflict, the water main shall be constructed of ductile iron pipe, or as otherwise approved by the Agency. All pipe joints shall be restrained in accordance with the Agency's requirements. The plans shall clearly identify the length of water main to be restrained (i.e. from station "x" to station "y"). The Engineer shall also submit all calculations used to determine the required length of restrained pipe. The water main shall be placed within a steel sleeve in accordance with UDACS Plates 21 or 22, and 23.
- D. Where an existing large diameter water main, twenty-four (24) inches or larger, is below the storm/sewer main to be constructed, or above the storm/sewer main with a vertical separation less than eighteen (18) inches, or where the size of the storm/sewer main prohibits the corrections identified in Paragraph 2.22.02, the following provisions shall apply:
- 1. The storm/sewer shall be constructed of cast-in-place reinforced concrete with no expansion joints within ten (10) feet of the exterior wall of the water main; or
 - 2. The storm/sewer shall be constructed with precast reinforced concrete sections, installed with watertight joints using Agency approved internal elastomeric joint sealant, in compliance with ASTM C920, or joint gasket, with provisions to insure against differential settlement of the storm drain.

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2.22.03 Service Lateral Crossings and Clearances

For purposes of this section, "service laterals" are those sewer and water lines extending from a main and terminating on-site. They are generally of smaller diameters (water: one (1) inch to four (4) inch; sewer: four (4) inch to six (6) inch).

A. Parallel Separation (Service Laterals)

1. Water and sewer service laterals shall be installed a minimum of forty-eight (48) inches apart in separate trenches. Water laterals shall be a minimum of twelve (12) inches above the sewer lateral.
2. For maintenance purposes, service laterals shall be installed a minimum of forty-eight (48) inches from the exterior of the manholes.

B. Crossings (Service Laterals)

1. Where a water service lateral crosses a sewer main or sewer lateral, it shall be above the sewer with a vertical separation of at least eighteen (18) inches. Any relocation of existing water laterals to achieve this clearance must be performed with the approval of and in accordance with the procedures and standards of the Agency responsible for water distribution.
2. When a sewer main or sewer lateral must cross over or under a water lateral or water main with less than eighteen (18) inches clearance, the provisions of Section 2.22.02. B3 shall apply.
3. Schedule forty (40) PVC sleeves may be used on one (1) inch through two (2) inch copper service laterals ten (10) feet either side of the crossing. One (1) inch laterals require two (2) inch sleeves, and one and a half (1 1/2) inch and two (2) inch laterals require four (4) inch sleeves.

2.22.04 Septic Tank Clearances

(See "Section 4, Figure 1" for requirements.)

2.23 NON-POTABLE WATER SYSTEMS

This section is intended to provide the criteria for protection of the potable water distribution system in areas where non-potable, such as reclaimed and raw water

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irrigation systems are installed. All requirements for the construction and operation of these non-potable water distribution systems are not identified in this standard, and the engineer shall review the standards established for these systems prior to design and construction of these systems.

2.23.01 Separation

- A. The following separations must be maintained between all non-potable water mains which parallel potable water mains:
 - 1. Potable water mains and non-potable water mains shall be installed in separate trenches with at least ten (10) feet of separation measured horizontally from exterior pipe walls.
 - 2. Potable water mains shall be placed above non-potable water mains whenever possible.
- B. Where the required ten (10) foot separation is not practical, the Engineer may petition the Agency for approval provided the:
 - 1. Non-potable gravity mains will comply with the potable water location/separation criteria included in Sections 2.04 and 2.22.
 - 2. Non-potable pressurized mains will be constructed of AWWA quality material and:
 - a. The non-potable main should be installed a minimum of eighteen (18) inches below the potable line where possible, and installation at the same level will be avoided to prevent conflicts with tapping the potable main and the construction of potable water laterals.
 - b. Restrained joints may be required for non-potable installation if the non-potable line is installed above the potable line, and the pressure of the non-potable line exceeds eighty (80) PSI.

2.23.02 Non-potable Water Distribution Pressure

The pressure requirements for the non-potable water system should be based on the system design; however, it is desirable that a pressure differential of ten (10) psi or greater be maintained on-site with the potable water supply having the higher pressure.

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2.23.03 Backflow Prevention

Backflow protection shall be provided for all potable water services servicing a site that is also provided non-potable water service. Reduced Pressure Principle Assemblies (RPPA's) shall be the minimum levels of backflow protection provided.

2.24 TAPS FOUR (4) INCHES AND LARGER

2.24.01 Materials

- A. Where the tap diameter is greater than seventy-five (75) percent of the nominal pipe diameter being tapped, and for all taps on ACP mains, Agency approved, full circumference gasket and support tapping sleeves shall be used.
- B. Where the tap diameter is less than or equal to seventy-five (75) percent of the nominal pipe diameter being tapped, mechanical joint or steel fabricated tapping sleeves shall be used for wet taps.

2.24.02 Taps On Steel Cylinder Pipe

Taps on existing steel cylinder pipe may be restricted by the Agency to maintain the reliability and integrity of the large diameter distribution/transmission systems. The engineer may petition the Agency for approval to tap the main, and when approved, the steel cylinder thickness, as well as the mortar lining and coating thickness, must be noted on all project plans where SCCP or MLCP mains are to be tapped. Details of the installation are to be included on the drawings. (See "UDACS Plate 35".)

2.25 LINE STOPS

Line stops may be required by the Agency, with or without by-pass, to insure continuous operation of the water system. Line stops are used to temporarily shut down a pipeline system to complete modifications or repairs. They allow a system to operate without any interruption of service. Plans for line stops must include thrust restraint details, and calculations must be provided to the Agency for review. Bypass requirements must be identified on the water plans. Use of the line stop as part of the bypass configuration will require specific approval by the Agency.

2.26 EASEMENTS

2.26.01 General Requirements

- A. Easements, where identified and allowed by the Agency, are required whenever the water main, service lateral, meter, backflow assembly, or any associated appurtenances are not located in a public ROW. All easement locations shall be identified on the water plan, as well as any area(s) dedicated as public utility easements to be occupied by water facilities, to facilitate field verification.
- B. Trees, shrubs, or decorative rocks, and any block wall or other fence material, shall be designed and constructed around the easement(s) to allow the Agency direct access to the vault(s), backflow assemblies, and piping appurtenances from the adjacent ROW.
- C. The area within the easement shall be graded to provide drainage away from the vault and/or backflow assembly(ies) to prevent vault flooding and provide access for maintenance.
- D. The area within the easement shall not contain any grades or materials such as large rocks (greater than two (2) inches) that would hinder or restrict maintenance of the facilities.
- E. For the installation of meters and backflow assemblies, the final grade within the easement shall be at an elevation equal to back of sidewalk / ROW to allow safe ingress/egress to facilities. Where conditions prevent the above, upon Agency approval, retaining walls may be provided. However, a minimum distance of three (3) feet will be provided from the edge of the pad(s) or vault to any fence or wall.
- F. All easement documents must be received by the Agency with owner signature prior to plan approval, and must comply with Clark County Recorder's Office most current requirements for easement document format.
- G. The Agency may identify other specific requirements or limitations for easements.

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2.26.02 Size

- A. The easement size required for a water main will be per Section 2.04.01, or as specified by the Agency.
- B. The following chart identifies the minimum easement dimensions for various size meter configurations and meters with Agency owned backflow assemblies or where required by the Agency:

METER SIZE	METER TYPE	MINIMUM EASEMENT REQUIRED	
		METER ONLY	METER WITH SINGLE BACKFLOW
2" and Smaller	Outside of ROW	6' X 6'	6' X 6'
3" and 4"	Compound	15' X 15'	15' X 20'
6"	Compound	15' X 20'	15' X 25'
3" through 4"	Turbine & Type 3 Fire Service	15' X 15'	15' X 20'
4"	Turbine & Type 3 Fire Service	15' X 20'	15' X 25'
4"	Type 1 & Type 3 Fire Service	15' X 15'	15' X 20'
6"	Type 1 & Type 2 Fire Service Combination Fire/Domestic	15' X 20'	15' X 25'
8"	Type 1 & Type 2 Fire Service Combination Fire/Domestic	15' X 25'	15' X 30'
10"	Type 1 & Type 2 Fire Service Combination Fire/Domestic	15' X 25'	15' X 30'

NOTE: ***A larger easement may be required by the Agency if the lateral is offset in any manner from the connection to the main, or if dual backflow assemblies are required.***

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- C. The following chart identifies the minimum easement size required for various sizes of backflow prevention assemblies or where required by the Agency:

ASSEMBLY SIZE	DCDA & RPDA	MINIMUM EASEMENT REQUIRED: 10' X 15'
Backflow Prevention Assembly	Perpendicular to ROW	Parallel to ROW
1" through 2"	05' X 10'	05' X 10'
3"	15' X 15'	15' X 15'
4"	15' X 15'	15' X 15'
6"	15' X 15'	15' X 20'
8"	15' X 15'	15' X 20'
10"	15' X 15'	15' X 20'

NOTE: *Above sizes are based on compact assemblies. Size may be adjusted based on specific locations or assemblies, upon Agency approval.*

2.27 PLAN SUBMITTAL

2.27.01 General Requirements

All plans submitted to the Agency for review will meet the minimum requirements identified herein, and additional requirements may be established by the Agency for digital submissions. The following will be included in a submittal:

- A. Two (2) copies of a hydraulic or system analysis for flow and pressure as required by the Agency, unless previously approved.
- B. A legal map or legal property description of the parcel(s) to be served.
- C. A completed Agency Project Data Sheet. Incomplete or inaccurate data sheets will not be accepted. Copies may be obtained at the appropriate Agency Office.

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- D. Two (2) complete sets of the civil improvement plans indicating all water details up to and for the property to be served. The only acceptable size of the submitted drawings shall be twenty-four (24) inch x thirty-six (36) inch with a horizontal scale between one (1) inch = ten (10) feet, and one (1) inch = fifty (50) feet. All lettering shall be clear, legible, and sized to meet the minimum requirement of the Agency. (See Agency AutoCAD standards and submittal requirements for lettering sizing.)
- E. One (1) copy of any miscellaneous drawings (i.e., architectural, floor plan, etc.).
- F. One (1) copy of an overall master plan showing the area to be developed and any other adjoining proposed developments by the builder.
- G. A digital copy of the above documents may be required in accordance with Agency procedures.

2.27.02 Water Plan Drawing Submittal Requirements

The following are the requirements for drawings submitted to the Agency:

- 1. Project (Drawing) name
- 2. Engineer of Record's name
- 3. Engineer of Record's valid Nevada P.E. stamp with signature (Per NRS 625 and Agency requirements)
- 4. Standard Notes
- 5. Number of lots/units
- 6. Legend
- 7. North arrow(s)
- 8. Scale(s) (horizontal and vertical)
- 9. Signature block for Agency approval
- 10. Vicinity map
- 11. Master utility plan
- 12. 24-inch x 36-inch sheets (oversized drawings will not be accepted)
- 13. Profiles will be provided for all mains being installed in an unimproved area and for all mains sixteen (16) inches and larger in diameter, providing invert elevations at fifty (50) foot intervals, changes in grade, and at all fittings. In addition, profiles are required for utility crossings. Additional profiles may be required by the Agency.
- 14. Benchmark data and identification of a tie between existing or proposed survey monuments and the submitted easement documents
- 15. Curve data on deflected water mains

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16. Driveway locations
17. ROW, easement(s), and property lines
18. Street names and ROW dimensions
19. Show all existing mains, laterals, valves, hydrants, etc.
20. Show all proposed mains, stubs, valves, bends, reducers etc., dimensioned from existing stationary markers (street light, sign, hydrant, etc.), and surveyed controls (street intersections, centerlines, property lines, etc.)
21. Show proposed service(s)
22. All new mains shall be drawn true to scale with no break lines
23. Layout should show the adjacent area and the relationship between the new facilities and the existing facilities, (i.e., surface grading, etc.)
24. Identify all other utilities, existing and proposed (i.e., gas, sewer, etc.)
25. Locate all existing or proposed obstructions such as utility vaults, catch basins, traffic islands, etc.
26. Quantity estimates
27. Building information and fire flow requirements for each structure, and location of all existing fire hydrants supporting the project
28. Fire Department approval
29. Notes as required by these Standards
30. Identify NDOT ROW on drawings, if applicable

2.27.03 Subdivision Water Plan Additional Drawing Requirements

In addition to the general water plan drawing requirements, the following will be required on subdivision water plans:

1. Lot and block numbers on all sheets
2. Total number of lots to be served
3. An overview map; e.g., copy of Assessor's Parcel Map, with Assessor Parcel outlines prior to the subdivision under review.
4. Identify lots with static pressure \geq eighty (80) psi.
5. Identify finished floor elevation for all proposed structures.
6. Provide meter box location detail as required clearly identifying the construction of the meter box outside of driveways and other traffic areas.

2.27.04 Above-Ground Structures Additional Drawing Requirements

Above-ground structures and above-ground electrical and mechanical equipment shall be protected against physical damage due to a one-hundred (100) year storm event. Booster pumping stations shall remain fully operational and accessible during a twenty-five (25) year storm event. When required by the Agency, a flood study verifying these requirements must be submitted with the design drawings.

2.27.05 Approval Requirements

A. Preliminary Approval

Preliminary plan technical approval may be obtained after submitting the water plans for plan check, and making all the required changes as requested by the Agency. The preliminary approval will state:

"This project water plan complies with the Agency's technical requirements. However, this water plan is NOT APPROVED FOR CONSTRUCTION at this time and this signature does not provide or imply a water commitment."

The project fees, applications, agreements and/or easements are not required at this time. Final project approval must be obtained before construction is initiated.

B. Final Approval

1. All plans submitted to the Agency must be signed and have the stamp of the Engineer of Record, a Professional Engineer duly licensed in the State of Nevada, in accordance with NRS 625.
2. The Developer's Engineer will submit the original plans for Agency approval. A duplicate original set must be submitted at the time of approval for all subdivisions, water main extensions, or service connections within NDOT's ROW. The Agency will retain this set. A digital submission of the utility plan may also be required by the Agency. Standards for this submission will be established by the Agency having jurisdiction.
3. Prior to Agency water plan approval, the executed agreements, applications, fees, and required easements must be submitted and approved by the Agency.

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4. Signature approval of the Fire Department having jurisdiction must be obtained PRIOR to the Agency's approving the final water plan.
 5. All signatures required prior to the Agency approving the final water plan must be less than one (1) year old.
- C. Revised plans must contain a Professional Engineer stamp and signature of the Engineer of Record (See "Section 2.27.05B" above), and Fire Department signature, if applicable, for each revision.

2.27.06 Expiration Date

Construction must commence within one (1) year of the approval date shown on the plans, and must be diligently pursued to completion or the project may be subject to cancellation and must then be resubmitted for review and approval in accordance with the Agency's Service Rules and requirements.

2.28 NEVADA DEPARTMENT OF TRANSPORTATION (NDOT) PERMITS

A State Highway Permit is required when working on any water facilities within the ROW of any State owned or maintained road. The application for the permit will be made to the State following Agency procedures, and the developer will be responsible for the application fee. An easement for the Agency should be obtained from any underlying fee owner in the event NDOT does not own the full fee simple interest in the ROW. Prior to performing any work within the ROW, approval by the State must be received. The following note shall appear on the drawing:

NEVADA DEPARTMENT OF TRANSPORTATION (NDOT) PERMIT REQUIRED

An approved NDOT Occupancy Permit shall be obtained through the Agency prior to any construction within the NDOT ROW. Plans showing work in NDOT ROW must show NDOT stationing. The developer assumes all liability for work conducted under the Agency obtained permit through warranty expiration.

2.29 SOUTHERN NEVADA WATER SYSTEM (SNWS)/ SOUTHERN NEVADA WATER AUTHORITY (SNWA)

If the project overlays an area involving existing or future SNWS/SNWA facilities, the Developer's engineer shall submit the plans to SNWS/SNWA for their review parallel with the Agency's review. SNWS/SNWA approval must be obtained PRIOR to Agency water plan approval. The SNWS/SNWA may be contacted by telephone at (702) 862-3444, by FAX at 862-3485, or by mail at P.O. Box 99956, Las Vegas, Nevada 89193-9956.

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