

DIVISION THREE - STANDARDS FOR WATER SYSTEMS

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DIVISION THREE - STANDARDS FOR WATER SYSTEMS

SECTION 3.1 GENERAL

Sec. 3.1.1 PURPOSE AND SCOPE

This division establishes the minimum acceptable standards for design, materials and methods to be used in providing water systems for developments in the City of Shafter. Deviations from these standards may be permitted where warranted in the opinion of the City Engineer.

Sec. 3.1.2 PLAN SUBMITTAL PROCESS

- 3.1.2.1 The design data, calculations, and the construction plans for proposed water systems shall be submitted by the developer's engineer to the City Engineer, for review and approval prior to construction.
- 3.1.2.2 An Engineer's Estimate, based on "unit" prices approved by the City Engineer, shall be submitted and approved for the determination of plan check and inspection fees.
- 3.1.2.3 All plan check fees shall be paid to the Office of the City Engineer prior to the approval of any improvement plans.
- 3.1.2.4 An improvement plan checklist and two (2) sets of "blue-lines" shall be submitted for plan checking.
- 3.1.2.5 Calculations, signed by a California Registered Civil Engineer, supporting pipe sizes and demonstrating fire flows may be required prior to approval of water plans.
- 3.1.2.6 Plans are subject to a multiple checks until they are amended to the satisfaction of the City Engineer.
- 3.1.2.7 Water Improvement plans being submitted for "Final Signature" shall be submitted in ink on film or vellum. Once signed by the City Engineer, the developer's engineer shall be responsible for submitting three (3) sets of "blue-lines", to the Office of the City Engineer, at least 48 hours prior to the start of construction.
- 3.1.2.8 **Fire Marshal Approval:** Water improvement plans required to meet the basic requirements for Fire Protection shall have their designs approved by the Kern County Fire Marshall prior to City approval. Documentation of this approval shall be provided to the City prior to City approval of plans.
- 3.1.2.9 **As-Built Drawings:** Upon completion of the improvements and prior to final acceptance of the development the developer's engineer shall submit "As Built, Record Drawings" to the Office of the City Engineer, showing changes from the original drawings and the "as-built" locations of any underground facilities constructed or encountered with the water plans. The "as-built" plans shall be submitted on film or mylar with either hand notations or computer generated

notation. All notations shall completely illustrate the as-built condition in a neat, complete, and legible manner.

Sec. 3.1.3 WAIVER OF REVIEW PROCESS

There are no provisions for the waiver of the review process for water improvement plans.

Sec. 3.1.4 ALTERNATIVE DESIGN

- 3.1.4.1 The provisions of this manual are not intended to prevent the use of any material or method of construction not specifically prescribed by this manual if such alternate has been submitted to and has been approved by the City Engineer.
- 3.1.4.2 The City Engineer may approve alternate designs, if such alternate is found to be for the purpose intended and at least the equivalent of that prescribed in this manual in quality, strength, sanitation, durability, safety, and effectiveness.
- 3.1.4.3 Prior to the approval of an alternate design the City Engineer may require the developer's engineer to submit a sample of such alternate material or method, together with two copies of a technical report, including design data, report of material and chemical analysis, and details of laboratory tests which have been performed, plus copies of all tests and approvals, if any, under "AWWA", "ASA", State Department of Health Services, or other approved testing laboratories.
- 3.1.4.4 In no event will the use of other than new and unused materials be permitted unless specifically approved by the Environmental Health Services Department and the City Engineer.
- 3.1.4.5 See Section 2.2.8 for clearance between water and sewer lines.

Sec. 3.1.5 ENFORCEMENT

- 3.1.5.1 Provisions of these standards for water systems shall be enforceable by the City Engineer, and the County Fire Chief.

Sec. 3.1.6 DEFINITIONS, TERMS, AND ABBREVIATIONS

Whenever any of the following words, expressions or pronouns are used in these minimum standards, they shall be understood to have the meanings given below:

APPLICANT	Any person, governmental agency, or other entity that executes the necessary forms to procure official approval of a project or a permit to carry out construction of a project.
APWA	American Public Works Association
ASTM	American Standards for Testing Materials.
AWWA	American Water Works Association
BACKFILL	Soil materials used to fill an excavation.
BACKFLOW PREVENTION DEVICE	A device, approved by the State Department of Health and by the American Water Works Association, used to counteract back pressure or prevent back-siphoning into the distribution system of a public water supply.

BACKFLOW	A flow of water or other liquids, gases or solids from any source back into the customer's plumbing system or the water purveyor's distribution system.
BUILDING PERMIT	Written permission required by the city for the construction, repair, alteration, addition, removal or demolition to a building or structure.
CERTIFICATE OF OCCUPANCY	A document issued by the City Building Official allowing the occupancy or use of a permitted structure or site.
CITY ENGINEER	The City Engineer for the City of Shafter, or a duly authorized representative.
CITY	The City of Shafter or the City Council for the City of Shafter.
COMPACTION	The densification of materials by mechanical means.
CROSS CONNECTION	Any physical arrangement whereby a public water supply is connected, directly or indirectly, with any other water supply system, sewer, drain, conduit, pool, storage reservoir, plumbing fixture, or other device which contains or may contain contaminated water, sewage, or other wastes or liquids of unknown or unsafe quality, which may be capable of imparting contamination to a public water supply.
DEDICATION	The deliberate appropriating of land by an owner(s) for any general and public uses, reserving to themselves no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property is to be devoted. The intent to dedicate will be evidenced presentation of a deed.
DEVELOPER	The applicant for a development permit, his successors, and/or assignees.
DEVELOPER AGREEMENT	An agreement between the City and the Developer, which contains work descriptions, estimated costs, responsibilities for the work performance and an expiration date.
DEVELOPMENT	Any man-made change of improved or unimproved real estate, the construction, reconstruction, conversion, structural alteration, relocation, or enlargement of any structure; any mining, excavation, landfill, clearing, or land disturbance; or any use or extension of the use of land.
EASEMENT	Interest in land which does not include any rights of possession. A right of one owner of land to make lawful and beneficial use of the land of another created by an express or implied agreement.
EROSION	The wearing away of the ground surface as a result of movement of wind, water, and/or ice.
EXCAVATION	The mechanical removal of earth material.

EXISTING GRADE	The elevation in relationship to mean sea level
FINISH OR FINAL GRADE	The grade of the subject site, which conforms to the permitted plan.
FIRE MAIN	A water line, at least 6 inch diameter, dedicated to serving fire hydrants or fire protection systems.
GRADE	The vertical location of the ground surface to a predetermined elevation datum.
IMPROVEMENTS	Any improvement to public, real, or personal property, including but not limited to, installation of streets, roads, pedestrian/bike facilities, streetlights; landscape features; sewer and waterlines; bridge structures; storm drainage facilities; and traffic control devices.
LOT	The smallest platted parcel of real property created by a legal subdivision.
OBSTRUCTION	Any obstacle of whatever kind or nature and shall include, but shall not be limited to, structures, power poles, telephone or telegraphic poles and appurtenances, pipe lines, conduits and canals.
OSHA	Occupational Safety and Health Administration
PERMITTEE	Any person, governmental agency, or other entity that is performing, or plans to perform, permitted work within the City.
PLANS	The plans, profiles, cross sections, elevations, details, and supplementary specifications, signed by a licensed professional engineer and approved by the Director, showing the location, character, dimensions, and details of the work to be performed.
RIGHT OF WAY	A strip of land acquired by reservation, dedication, forced dedication, prescription, or condemnation and intended to be occupied by a road, crosswalk, railroad, electric transmission lines, oil or gas pipeline, water line, sanitary sewer, storm sewer, or other similar public accesses or public uses; The right of one to pass over the property of another.
ROAD	Synonymous with street.
SITE	For purposes of this manual, a specific location on which any of the following activities are underway: excavation, cutting, or filling of earth or related earthwork.
SITE PLAN	The graphical plan, usually in map form, prepared pursuant the construction of a development.
STANDARD DETAIL	Drawings approved by the City Council and adopted by said Council as part of these standards.

STREET	Includes roads and highways. The terms street, road, and highway are used interchangeably and refer to the rights of way used for vehicular traffic, and except in the case of freeways, for pedestrian traffic.
WATER METER	A water measuring device approved by the Director.

SECTION 3.2 DESIGN STANDARDS

Sec. 3.2.1 WATER SUPPLY REQUIREMENTS

All facilities of the water system shall be designed and constructed to provide adequate size and capacity from the source facilities and storage to meet the required flow requirements.

3.2.1.1 Number of Customers:

See Water Supply Requirement Chart, in the City's standard drawings. The total number of customers shall be determined in accordance with this section.

- a) *Residential Areas:* Each single family home or lot will be counted as one (1) customer. Each dwelling unit of an apartment, duplex, or triplex building will be counted as one-half ($\frac{1}{2}$) customer.
- b) *Commercial and Industrial Areas:* Each acre (including storage and parking area) will be counted as a minimum five (5) customers.
- c) *Parks and Landscaped Areas:* Each acre of land will be counted as two (2) customers, except where specific design indicates otherwise.
- d) *Mobile Home Parks:* Each mobile home or mobile home space will be counted a one-half ($\frac{1}{2}$) customer.

3.2.1.2 Required Residential Supply:

- a) All water systems shall be designed with minimum source and storage capacities as required in this section and as may be required by the California Building Code or the California Fire Code.
- b) The "Water Supply Requirement Chart", City standard detail W-1, shall be used in computing the peak hourly residential flow. The top of the appropriate band shall be used in computing the peak hourly residential.
- c) The peak hourly residential flow or the sum of the required fire flow plus one-half ($\frac{1}{2}$) of the peak hourly residential flow, whichever is greater, shall be maintained for the period of time shown in Section 3.2.9. With the most critical well or pump inoperative, a minimum of $\frac{2}{3}$ of the above flow shall be maintained for the time specified. This requirement may be met by drawing from both well pumping and storage.
- d) The maximum daily residential flow shall be equal to one-half ($\frac{1}{2}$) of the peak hourly residential flow and shall be maintained for a period of three days. This requirement may be met from a combined source of wells and storage.
- e) The average daily residential flow for the maximum month shall be equal to one-third ($\frac{1}{3}$) of the peak hourly residential flow and shall be maintained continuously from the well pumping only.

3.2.1.3 Required Commercial / Industrial Supply

- a) All water systems shall be designed with minimum source and storage capacities as required in this section and as may be required by the California Building Code or the California Fire Code.

- b) The peak hourly flow or the sum of the required fire flow plus one-half ($\frac{1}{2}$) of the peak hourly flow, whichever is greater, shall be maintained for the period of time shown in Section 3.2.9. This requirement may be met by drawing from both well pumping and storage.
- c) Required fire flow quantities and times shall be confirmed by the Kern County Fire Marshal.

Sec. 3.2.2 WATER SYSTEM DESIGN

3.2.2.1 Pressure:

- a) Water distribution systems shall be designed to maintain normal operating pressures of not less than 50 PSIG at the service connection, except that during periods of fire flow plus one-half ($\frac{1}{2}$) of the peak hourly residential flow as defined in Section 3.2.1, the pressure may be reduced to not less than 20 PSIG.
- b) During periods of hourly minimum demand or no flow, the water system pressure may not be more than 100 PSIG.
- c) Variations in pressures under normal operations shall not exceed 50% of the average operating pressure.
- d) Upon request of the City Engineer, computations shall be submitted to demonstrate that these maximum and minimum pressures will be met.

3.2.2.2 Looped Systems:

- a) All distribution systems shall be designed to permit circulation of water flows throughout, unless otherwise waived by the City Engineer.
- b) For cul-de-sacs greater than 330 feet in length, the water main shall be looped through the side lotlines, of the lots near the end of the cul-de-sac, back to adjacent streets, as directed by the City Engineer. Easements are required and are subject to Section 3.2.3.1c.

3.2.2.3 Pipe Diameter:

- a) All diameters shall be full nominal inside diameters; the actual diameters may not be less than the nominal by more than 5.0% when measured approximately three (3) inches from the ends of the pipe.
- b) Water main minimum nominal diameters for developments in the City shall be as follows:

<u>WATER MAIN MINIMUM NOMINAL DIAMETERS</u>	
Cul-de-sacs less than 330 feet in length	6"
Local Streets or Cul-de-sacs greater than 330 feet in length	8"
Local Collector	10"
Major or Minor Collector Arterial	12", or as directed by City Engineer

Sec. 3.2.3 WATER MAIN LOCATION, AND COVER

3.2.3.1 Location:

- a) All water mains shall be located in city owned and maintained streets or alleys a minimum of five (5) feet from the roadway center line. In no case shall a water main be located closer than two (2) feet from an existing or proposed gutter lip.
- b) Water mains shall be designed to clear existing utilities by a minimum of twelve (12) inches as directed by the City Engineer, and proposed utilities by twelve (12) inches. Clearances with other agency utilities shall be as directed by the affected utility company. Clearances with sewer lines shall conform to Section 2.2.8.
- c) Water lines installed outside city owned or maintained streets shall be placed in easements subject to the approval of the City Engineer. Mains will not be permitted in easements between the back yards of single or multi-family lots. Where water lines are located within easements, the easements shall be:
 - (1) Granted with the final map, or
 - (2) Be granted to the entity accepting and maintaining the sewers, or
 - (3) Be dedicated to and accepted by the City of Shafter.
 - (4) The minimum width of any easement for water purposes shall be ten (10) feet. In special cases of terrain, depth of water line, access, etc. the required easement width shall be increased as required and approved by the City Engineer.
 - (5) All easements shall include right of ingress and egress over adjoining property for maintenance, replacement and operation. No permanent structures shall be constructed in such easements, except fences, or utilities which are subject to any overlapping easement.

3.2.3.2 Pipe Depth:

- a) All water mains shall be installed so that the top of the pipe and fittings are not less than thirty (30) inches below finished paving of the street for water mains less than twelve (12) inches in diameter or a minimum cover or thirty-six (36) inches for mains twelve (12) inches and larger in diameter, unless a greater depth is specified in the excavation and/or encroachment permit.
- b) All water service connections shall be installed with a minimum of thirty (30) inches of cover within the right of way.

Sec. 3.2.4 GATE VALVES, VALVE BOXES AND VAULTS

3.2.4.1 Gate valves shall be located with sufficient frequency and spaced so that no large portion of the system will be out of service at any one time during repairs and new construction.

3.2.4.2 A valve box or vault or capped standpipe shall be provided for every valve installed below grade. The cover for all valve boxes and vaults placed in the street pavement or any location where there is vehicular traffic shall be traffic rated, metallic or of reinforced concrete.

3.2.4.3 All valve box caps shall be marked with the word "WATER", or a "W".

Sec. 3.2.5 WATER SERVICES

3.2.5.1 General:

- a) *Residential Developments:* Water services for single family developments shall consist of a single service.
- b) *Commercial / Industrial Developments:* Water services for commercial or industrial uses may have multiple services subject to the approval of the City Engineer. Where property will be served by two or more water service connections from different street water mains or supplies, each service connection shall be equipped with an approved backflow prevention assembly to prevent cross connection flow.

3.2.5.2 Service Size:

- a) *Residential Developments:* Water service connections shall be adequately sized to provide 50 psi at the customer connection during peak hourly residential flow. Water service connections shall not be less than 3/4 inch nominal size (5/8" bore meters are not acceptable).
- b) *Commercial / Industrial Developments:* Water service connections shall be sized for the customers needs, and as approved by the City Engineer.

3.2.5.3 Location:

- a) *Residential Developments:* Water services shall be located behind the sidewalk, opposite of the driveway, and within two (2) feet of the property line.
- b) *Commercial / Industrial Developments:* Water services shall be located behind the curb and gutter, as required by the developer and approved by the City Engineer.

Sec. 3.2.6 AIR AND VACUUM RELEASE VALVES

3.2.6.1 Air and vacuum release valves shall be installed in the water system at all points where it is indicated that air pockets may form, and as directed by the City Engineer.

3.2.6.2 The design shall be such as to ensure the release of air automatically from the water main. These valves may also ensure the entrance of air into the water main when the pressure inside the line is below atmospheric pressure.

3.2.6.3 All valves shall be designed for a minimum of 150 PSI operating pressure.

3.2.6.4 The inlet to each valve shall be provided with a gate valve or corporation stop to provide a positive closure between the main pipeline and the air and vacuum release valve.

Sec. 3.2.7 CHECK VALVES

3.2.7.1 All check valves shall seat readily and completely to assure water tightness. The face of the closure element and valve seat shall be bronze, composition, or other non-corrodible material which will seat tightly under all prevailing conditions of field use.

3.2.7.2 All check valves four (4) inch and larger in size, for use on distribution mains, shall be designed for a minimum of 175 PSI cold water working pressure.

Sec. 3.2.8 FLUSHOUTS (BLOWOFFS)

- 3.2.8.1 A flushout (blowoffs) shall be installed at the terminus of all dead-end water mains or non-circulating flow water mains.
- 3.2.8.2 All flushouts shall be a minimum outlet size of 2" and shall be designed for a minimum operating pressure of 150 PSI.
- 3.2.8.3 A fire hydrant may be used in leu of a flushout (blowoff) at the discretion of the City Engineer. Fire hydrant assemblies are subject to the requirements contained herein.

Sec. 3.2.9 FIRE PROTECTION REQUIREMENTS

- 3.2.9.1 The water distribution system shall be provided with valves and other facilities, such as tanks, so that no point on any lot at the street right-of-way shall be more than one and one-half (1½) times the maximum hydrant spacing from a working hydrant as a result of any single break or shutdown for repairs, except where impractical.
- 3.2.9.2 **Backflow Prevention:** Any connection between a building's fire sprinkler system and the City's water main shall be protected from backflow in accordance with the California Plumbing Code and the City's water requirements.
- 3.2.9.3 **Water Supplies for Fire Protection:** The fire flow requirements shall be determined by the County Fire Chief and shall be computed on the basis of a minimum 20 PSIG residual operating pressure at the point of lowest pressure of the street main from which the flow is measured. In setting the requirements for fire flow, the County Fire Chief may be guided by the minimum requirements set forth in the following table but may require higher standards on the basis of local conditions, exposure, congestion, other regulations, or construction of the buildings.

<u>FIRE FLOW REQUIREMENTS^{††}</u>			
<u>DISTRICT CLASSIFICATION</u>	<u>MINIMUM FIRE FLOW (in gpm)</u>	<u>MINIMUM DURATION (in hours)</u>	<u>MAXIMUM HYDRANT SPACING</u>
<u>RESIDENTIAL</u> Includes: 1 and 2 family dwellings	500	1	660'
<u>COMMERCIAL</u> Includes: all commercial uses, hotels, apartments, multiple residence buildings, and schools	1,000	2	330'
<u>INDUSTRIAL</u>	1,500	4	330'

^{††} Source: Kern County Fire Dept Office of Emergency Services Water Supply Manual

For residential subdivisions, the required fire flows are to be provided in addition to the Required Residential Supply requirements discussed in Section 3.2.1.2.

Sec. 3.2.10 STORAGE FACILITIES

3.2.10.1 **Design:** All steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with "AWWA D100 Standard for Welded Steel Tanks for Water Storage" or "AWWA D103 Standard for Factory Coated Bolted Steel Tanks for Water Storage," and also meet all foundation and seismic requirements of the Building Code.

All pressure (hydromatic) tanks containing more than 1,000 U.S. gallons shall conform to the ASME Code for pressure storage and vessels.

3.2.10.2 **Repairing and Painting:** All inspection, repairing, painting and repainting of steel tanks, standpipes, reservoirs, and elevated tanks for water storage shall comply with "AWWA D102."

SECTION 3.3 MATERIAL STANDARDS

Sec. 3.3.1 GENERAL

- 3.3.1.1 All material that is to become a permanent part of any water system, shall conform to the requirements for the particular materials set forth in these specifications.
- 3.3.1.2 The contractor shall supply any and all certificates of compliance, certified test results or shall perform tests as required to assure the City Engineer that the material being incorporated into the work has met the requirements as specified.
- 3.3.1.3 Requests to use materials not listed in these standards shall require special consideration and approval of the City Engineer.
- 3.3.1.4 **Material Tests**
 - a) All tests to determine compliance with any of these specifications shall be made within the Continental United States.
 - b) If requested by the City Engineer, the test results shall be certified by an established reputable materials testing firm and a copy forwarded to the City Engineer.
 - c) Any materials delivered to the job site and suspected of damage due to shipping or handling, if requested by the City Engineer, shall be tested again and the test results certified by an approved materials testing firm.

Sec. 3.3.2 POLY VINYL CHLORIDE PIPE (PVC)

PVC pipe and fittings shall conform to the following:

- 3.3.2.1 **Materials:**
 - a) Pipe and fittings with nominal diameter of twelve (12) inches or less shall conform to AWWA-C-900, Class 150.
 - b) Pipe and fittings with nominal diameter greater than twelve (12) inches shall conform to AWWA-C-905, Class 150.
 - c) Pipe fittings and couplings made from PVC shall have a minimum cell classification of 12454B or 12454C as defined by ASTM-D-1784.
 - d) Each length of pipe shall be marked with the applicable ASTM, DR, cell classification, nominal pipe size and manufacturer's name or trade mark.
 - e) PVC pipe shall not deviate from straight by more than 1/16th inch per foot (camber) when the maximum offset is measured from the concave side of the pipe.
- 3.3.2.2 **Joints:**
 - a) PVC pipe shall be of the bell and spigot type. Bells shall be factory attached to the pipe. Gaskets shall meet the requirements of ASTM-D-3139.
 - b) Couplings may be used as allowed by the City Engineer.

Sec. 3.3.3 DUCTILE IRON PIPE

3.3.3.1 Materials

- a) Ductile iron pipe shall be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50 for a minimum 150 psi rated working pressure plus a 100 psi surge allowance.
- b) Ductile iron pipe shall be manufactured in accordance with the latest revision of ANSI/AWWA C151/A21.51. Each pipe shall be subjected to a hydrostatic pressure test of at least 500 psi at the point of manufacture.
- c) The class or nominal thickness, net weight without lining, and casting period shall be clearly marked on each length of pipe. Additionally, the manufacturer's mark, country where cast, year in which the pipe was produced, the letters "DI", and "WATER" shall be cast or stamped on the pipe.

3.3.3.2 Joints:

- a) All pipe shall be furnished with push-on type joints,. Joints shall be in accordance with ANSI/AWWA C111/A21.11, of latest revision, and be furnished complete with all necessary accessories.
- b) Field Welding: All procedures shall meet AWWA C-206.

3.3.3.3 Linings:

- a) Ductile iron pipe shall be provided a standard asphaltic exterior coating in conformance with ANSI/AWWA C110/A21.10.
- b) If a ductile iron pipe is installed in a potentially corrosive soil environment, then pipe shall be polyethylene encased per ANSI/AWWA C105/A21.5.
- c) Interior coating shall be required for all ductile iron pipe used for water.
 - (1) Cement-mortar lining shall be per ANSI/AWWA C104/A21.4, of latest revision.
 - (2) Fusion bond epoxy lining in accordance with ANSI/AWWA C116/A21.16.

Sec. 3.3.4 STEEL PIPE

The use of steel pipe below ground shall be restricted to special circumstances such as multiple changes in direction over a short run of pipe, or any other condition as required by the City Engineer. Steel pipe shall be used for any above ground condition.

3.3.4.1 Materials:

- a) Steel pipe shall be designed in accordance with the latest revision of AWWA C200 for a minimum 150 psi rated working pressure plus a 100 psi surge allowance.

- b) Steel pipe shall be ASTM A53, Types E or S, Grade B, and shall conform to the following dimensions:

Nominal Pipe Size (Inches)	Pipe O.D. (Inches)	Appropriate Wall Thickness (Inches)
6"	6.625"	0.25"
8"	8.625"	0.25"
10"	10.625"	0.25"
12"	12.75"	0.25"
14"	14"	0.25"
16"	16"	0.25"
18"	18"	0.25"
24"	24"	0.25"
30"	30"	0.25"

3.3.4.2 Joints:

- a) Welding and welded joints shall be done in accordance with AWWA C206.
- b) All welds shall be full penetration welds. All other joint welding procedures to be used for work shall comply with Section 3, AWWA C206.

3.3.4.3 Flanged Connections:

- a) Carbon steel ring flanges shall conform to AWWA C207, Class D for 150-175 psi working pressure. Raised face, slip on flanges shall be installed. Bolt holes shall straddle the vertical center line of the pipe. Facing, and drilling shall conform to Section 3 of AWWA C207. Welded flanges shall be attached to pipe, fittings, or other appurtenances by means of two fillet welds of thickness equal to the pipe thickness.
- b) Bolts and nuts for above ground connections shall be carbon steel ASTM 307, grades A or B, electroplated for corrosion protection.
- c) Bolts and nuts for below ground connections shall be Type 304 stainless steel with a minimal tensile strength of 60 ksi.
- d) Bolts and nuts shall have regular hexagonal heads in accordance with ANSI B18.2.1 for wrench head bolts and nuts and wrench opening. All bolts shall be threaded in accordance with ANSI B1.1 for screw threads, coarse-threaded series, Class 2A and 2B fit. Minimum bolt lengths shall be the sum of the mating flange thicknesses, the gasket, the washer thicknesses and the depth of the nut plus 1/8 inch before applying torque.
- e) Gaskets shall extend from the inside diameter of the flange to the least inside edge of the bolt holes or may extend beyond the bolt circle to the outside diameter of the flange. Gaskets shall be 1/8 inch thick. Gaskets between flanges shall be constructed of non-asbestos type material.

- 3.3.4.4 Lining and Coating:
- a) The interior of all steel pipe and appurtenances shall be fusion bonded epoxy lined in accordance with AWWA C213, minimum thickness 20 mils. All application and curing shall conform to manufacturer's specifications.
 - b) All underground steel pipe and appurtenances shall be epoxy coated in accordance with AWWA C213, minimum thickness 20 mils. All application and curing shall conform to the manufacturer's specifications.
 - c) All above ground steel pipe and appurtenances shall be painted per the City Engineer.

Sec. 3.3.5 ASBESTOS CONCRETE PIPE (AC, TRANSITE)

- 3.3.5.1 Asbestos Concrete Pipe or Transite Pipe shall not be used for new water mains in the City of Shafter.
- 3.3.5.2 Tapping of Existing AC Pipes:
- a) Direct hot tapping of existing AC or transite water lines shall be approved by the City Engineer.
 - b) Tapping sleeves shall provide gasket protection to assure seal around full circumference of the transite pipe. Tapping sleeves providing gaskets or seals only around the outlet shall not be approved.
 - c) Any lugs and/or bolts provided with tapping sleeve shall be stainless steel.
 - d) Outlet flange shall be 150 lb. Ductile iron. Bolt pattern shall match adjacent tapping valve.
 - e) Tapping Sleeve shall be provided with a thrust block in conformance with these standards.

Sec. 3.3.6 VALVES

- 3.3.6.1 **Resilient-Seated Gate Valves** shall be cast-iron body, all bronze mounted interior, non-rising stem, for cold water service of 200 PSI working water pressure and shall meet or exceed the standards in accordance with "AWWA C509", as last revised.
- 3.3.6.2 **Butterfly Valves** shall be rubber seated and shall comply with "AWWA C504", class 125-16 gear operated unless otherwise authorized. Disc shall be of hi-resist alloy cast-iron and shall rotate 90 degrees between the fully open and fully closed positions. Rubber seats shall be securely held in place by nickel cast-iron or type 316 stainless steel retaining segments, and shall not require bonding or cementing to the body.
- The butterfly valve standard is not intended to cover valves for installation where service conditions exceed the shutoff pressures and line velocities stated in Table 1 of "AWWA C504" or on lines supplying fire hydrants.
- The use of butterfly valves on the public water system must have the special approval of the City Engineer.
- 3.3.6.3 **Check Valves** shall be as approved by the City Engineer and conform to "AWWA C508".

Sec. 3.3.7 PIPE FITTINGS

- 3.3.7.1 **Flanged (FL) Fittings:** Flanged fittings shall conform to the latest revision of ANSI/AWWA C110/A21.10. Flange surface shall be faced & drilled in accordance with ANSI Class 125 B16. 1. Nominal body thickness shall be per manufacturer but shall not be less than that specified by ANSI/AWWA C153/A21.53. Working pressure shall be 250 PSI for flanged fittings. Gaskets for flange to flange connections shall be 1/8" thick non-asbestos material with dimensions conforming to Appendix A of ANSI/AWWA C110/A21.10 and approved by the fitting manufacturer.
- 3.3.7.2 **Mechanical Joint (MJ) Fittings:** Mechanical joint fittings shall conform to the latest revision of ANSI/AWWA C110/A21.10. Nominal body thickness shall be per manufacturer but shall not be less than that specified by ANSI/AWWA C153/A21.53. Working pressure shall be 350 PSI for mechanical joint fittings.
- 3.3.7.3 **Interior Coatings:** Fittings shall be provided a standards asphaltic coating on its exterior in conformance with ANSI/AWWA C110/A21.10. The interior of each fitting shall be either:
- a) Cement lined and seal coated in accordance with ANSI/AWWA C104/A21.4.
 - b) Fusion bond epoxy lined & coated in accordance with ANSI/AWWA C116/A21.16.
- 3.3.7.4 **Rubber-Gasket Joints:** All rubber-gasketed joints for ductile iron fittings shall conform to ANSI/AWWA C111/A21.11.

Sec. 3.3.8 WATER SERVICE CONNECTIONS

- 3.3.8.1 **Threads:** All threads for underground service line fittings and materials for these fittings, corporation and meter stops, shall comply with "AWWA C800".
- 3.3.8.2 **Water Service Pipe and Tubing:**
- a) All the following materials shall conform either to IAPMO IS 3-89 "Installation of Copper Plumbing Tube, Pipe and Fittings" or IAPMO IS 7-90 "Installation Standard for Polyethylene (PE) Cold Water Building Supply and Yard Piping" in the current adopted edition of the California Plumbing Code.
 - b) All 3/4 inch and larger water service connections may be seamless copper water tubing (ASTM B 88) or polyethylene plastic tubing, conforming to "copper tubing size" (ASTM D2239, PE 3408).
 - c) All 1½ inch and larger water service connections may also use seamless red brass pipe conforming to (ASTM B 43), or copper pipe conforming to (ASTM B 42).
- 3.3.8.3 **Corporation Stops:**
- a) All corporation stops, if used, shall be bronze or brass, round, with inlet for either corporation stop (C.S.) thread or iron pipe standard (I.P.S.) thread, and outlet for the type of service pipe used in accordance with AWWA C800.

3.3.8.4

Meter Stops:

- a) All 3/4 inch and 1 inch (curb) meter stops shall be bronze or brass, with inlet for the type of service pipe used, and outlet for the type or service pipe or meter coupling used.
- b) For 1½ inch and 2 inch service, bronze or brass curb stop valve, straight ground key curb stop, or bronze gate valve (Minimum of 200 PSI rated working pressure) may be used. Inlet and outlet shall be appropriate for the type of service pipe or meter flange used. All valves shall be factory hydro-tested to 300 PSI or air-tested to 100 PSI under water.

3.3.8.5

Service saddles:

- a) Double strap saddles shall be used for service taps, and must be approved by the City Engineer prior to approval of the construction plans.

3.3.8.6

Water Meter:

- a) All water meters shall be cast bronze and meet or exceed "AWWA C700" standards, as approved by the City Engineer.
- b) The bore diameter shall have a minimum dimension of 3/4 inches for both the inlet and outlet.
- c) The meter shall have a register that measures in "GALLONS".

Sec. 3.3.9 FIRE HYDRANT ASSEMBLY

3.3.9.1

Wet barrel fire hydrants shall be used for most developments in the City of Shafter. Where water systems can not be looped or fire flows are difficult to obtain, the City Engineer may approve the use of dry barrel fire hydrants.

3.3.9.2

Hydrants shall conform with AWWA Specification C-502 or C-503 2½" and 4½" national standard threaded connections as required. Hydrant shall be painted John Deere Yellow. See the City's standard drawings. A fully assembled fire hydrant Assembly shall consist of the following:

- a) All water mains serving hydrants shall have a minimum nominal diameter of six inches (6"). Stub lines over 330 feet in length or supporting more than one hydrant shall have a minimum nominal diameter of eight inches (8").
- b) The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be as required and approved by the County Fire Chief.
- c) Fire Hydrants shall be installed with a maximum spacing between hydrants as indicated in Section 3.2.9. A hydrant shall be placed at each intersection except where this would provide excessive hydrant coverage.

Exception: The spacing of hydrants shall have an individual tolerance of 10 percent. However, the average spacing between any three (3) adjacent hydrants shall not exceed the required spacing.

- d) Fire hydrant spacing shall be computed separately for each side of major highways, divided roadways, canals, or railways.

- e) The last hydrant on a cul-de-sac or stub street shall not be more than one-half the maximum spacing from the end of the street.
- f) Whenever any hydrant or other valve, which is intended for use by the County Fire Chief for fire suppression purposes, is installed or replaced, the same shall be installed or replaced in accordance with the City's Standard drawings.
- g) The bury for hydrants shall conform to AWWA standard specifications C-502 or C-503, height to be sufficient to ensure 30" minimum cover. Bury to be coated with coal tar enamel or coal tar epoxy.
- h) Fire hydrants shall be designed with a 6" scored spool with break-a-way bolts as shown in the City's standard drawings.
- i) Fire hydrant barricades shall be installed where considered necessary by the County Fire Chief to protect fire hydrants. Fire hydrant barricades shall not obstruct the outlets and shall consist of 4" diameter standard steel pipe filled with concrete, extending 3' above and 3' below ground and imbedded in concrete 12" in diameter and 3'-4" deep. All steel pipe above ground shall be painted with a minimum of two (2) coats of primer paint and a finish coat of John Deere Yellow Paint.

Sec. 3.3.10 MISCELLANEOUS HARDWARE

- 3.3.10.1 **Bronze Gate Valves:** All 1½ inch through 3 inch gate valves shall be all bronze and comply with "AWWA C500" and ASTM standards. The valve shall be opened with either a handwheel or 2 inch square key, as directed by the City Engineer.
- 3.3.10.2 **Standard Service Seal Clamps:** All Service clamps and straps shall conform to AWWA Standards, be approved for use by the City Engineer, and installed in accordance with the manufacturer's recommendations.
- 3.3.10.3 **Repair Service Clamp:** A long-body service clamp shall be used for repair to contractor damaged pipelines, as approved by the City Engineer.

SECTION 3.4 CONSTRUCTION STANDARDS

Sec. 3.4.1 CONNECTION TO EXISTING WATER LINE

- 3.4.1.1 Where new water mains are to be connected to the City's existing water system, the tie-in location & hardware must be as approved by the City Engineer.
- 3.4.1.2 The contractor shall exercise proper care in the construction of the tie-in so as not to contaminate the existing water system.
- 3.4.1.3 Charging the new water system with the city's system pressure must be done in the presence of the city inspector.
- 3.4.1.4 Hot taps must be approved by the City Engineer. Hot taps will only be allowed when the new water main is two (2) inches or smaller than the existing water main. Only "long-body" tapping clamps shall be allowed for use. Hot taps to existing PVC waterlines shall be done in accordance with Unibell Publication Uni-B-8 - Recommended Practice for the Direct Tapping of Poly(Vinyl Chloride) (PVC) Pressure Water Pipe

Sec. 3.4.2 MATERIAL HANDLING

- 3.4.2.1 All pipe material shall be handled, laid, blocked and joined in accordance with the manufacturer's recommendations.
- 3.4.2.2 All open ends of all water mains being installed shall be properly covered at the end of each day's work to prevent entry of foreign matter, animals, debris, or children.
- 3.4.2.3 **Storage and Handling of PVC Pipe:** PVC pipe shall be stored on a smooth bed. The pipe shall not be dropped or dragged. Stored pipe shall be covered to protect it from ultraviolet light (sun's rays). PVC pipe with noticeable color changes resulting from exposure to ultraviolet light shall be rejected by the City Engineer.

Sec. 3.4.3 THRUST DEVICES

- 3.4.3.1 All tees, plugs, caps, bends of more than 5 degrees, hydrant branches or pipe reducers shall be restrained against movement by use of thrust devices.
- 3.4.3.2 All reaction or thrust backing devices shall be designed for a minimum static pressure of 200 PSIG.

Sec. 3.4.4 EXCAVATION AND TRENCHING FOR WATER LINES

- 3.4.4.1 All excavations, trenching, and shoring shall be performed in a manner to provide the highest possible worker safety and protection of property and in conformance with all rules, orders and regulations of all local, state, and federal agencies having jurisdiction over such matters.
- 3.4.4.2 The width of trench for all pipe shall provide a minimum clear distance between the outer surface of the pipe and the side of the excavation in conformance with City standard details.
- 3.4.4.3 The trench shall be excavated to a flat bottom, cut true and even to the indicated grade. Where rock or other hard substances are present on the trench bottom they shall be removed to a depth of 6 inches deeper than the indicated trench bottom and refilled with well tamped granular earth, fine gravel or coarse sand. Any uneven

areas in the trench bottom shall be shaved off or filled in with well tamped material as specified.

3.4.4.4 Whenever wet or otherwise unstable soil that is incapable of properly supporting the pipe, as determined by the City is encountered in the bottom of the trench, such soil shall be removed to the depth required and the trench backfilled to the proper grade with suitable material as specified.

3.4.4.5 The trench and other excavation shall be kept entirely free of water while pipe is being placed and until the joints have been made and approved.

Sec. 3.4.5 TRENCH BEDDING

3.4.5.1 Only Class IA, IB, II, and III embedment materials will be considered suitable. Embedment materials (Class IA, IB, II, and III) shall conform to Table 1 of ASTM D-2321, a portion of which has been recreated as follows:

CLASS	TYPE	SOIL GROUP SYMBOL D-2487	DESCRIPTION	PERCENTAGE PASSING SIEVE SIZES		
				1½ inch	No. 4	No. 200
1A	Manufactured Aggregates: open-graded, clean	None	Angular, crushed stone or rock, crushed gravel, broken coral, crushed slag, cinders or shells; large void content, contain little or no fines	100%	≤10%	< 5%
1B	Manufactured, Processed Aggregates: dense-graded, clean	None	Angular, crushed stone (or other Class 1A materials) and stone/sand mixtures with gradations selected to minimize migration of adjacent soils; contain little or no fines	100%	≤50%	< 5%
II	Coarse-Grained Soils, clean	GW	Well-graded gravels and gravel-sand mixtures; little or no fines	100%	< 50% of "Coarse Fraction"	<5%
		GP	Poorly graded gravels and gravel-sand mixtures; little or no fines			
		SW	Well graded sands and gravelly sands; little or no fines		> 50% of "Coarse Fraction"	
		SP	Poorly graded sands and gravelly sands, little or no fines			
	Coarse-Grained Soils, borderline clean to w/fines	e.g. GW-GC, SP-SM	Sands and gravels which are borderline between clean and with fines	100%	Varies	5% to 12%

CLASS	TYPE	SOIL GROUP SYMBOL D-2487	DESCRIPTION	PERCENTAGE PASSING SIEVE SIZES		
				1½ inch	No. 4	No. 200
III	Coarse-grained soils with fines	GM	Silty gravels, gravel-sand-silt mixtures	100%	< 50% of "Coarse Fraction"	12% to 50%
		GC	Clayey gravels, gravel-sand-clay mixtures			
		SM	Silty sands, sand-silt mixtures		> 50% of "Coarse Fraction"	
		SC	Clayey sands, sand-clay mixtures			

3.4.5.2 Soil classification is in conformance with Unified Soil Classification System ASTM Designation D-2487 and D-2488. Native soils meeting the requirements for Class II and Class III materials may be accepted by the City.

3.4.5.3 Bedding procedure shall conform to Table 2 of ASTM-D-2321 and the following:

- a) Bedding shall be placed and compacted for all main lines as shown on the City's standard drawings.
- b) After placement and compaction of bedding and prior to installation of water main and laterals, the bedding placement and compaction shall be inspected.

Sec. 3.4.6 INSTALLATION OF WATER PIPE AND FITTINGS

3.4.6.1 Pipe shall be laid to plan with uniform bearing under the full length of the barrel of the pipe. Suitable excavation shall be made to receive the socket or bell, which shall not bear upon the subgrade or bedding

3.4.6.2 Installation of fittings shall be in accordance with manufacturer's recommendations.

3.4.6.3 Thrust restraint devices & thrust blocks will be installed prior to trench backfill.

3.4.6.4 Special Conditions for PVC Water Pipe:

- a) PVC pipe exposed to the sun during summer months shall be allowed to cool prior to placement of haunching. Allowance shall be made for the movement of pipe along the main line and at the laterals. Fittings shall be sized to receive type of pipe used.
- b) PVC pipe shall be stored on a smooth bed. The pipe shall not be dropped or dragged.
- c) Stored pipe shall be covered to protect it from ultraviolet light (sun's rays). PVC pipe with noticeable color changes resulting from exposure to ultraviolet light shall be rejected by the City Engineer.

Sec. 3.4.7 TRENCH BACKFILL AND COMPACTION

3.4.7.1 Backfilling of pipe trenches shall commence immediately after the pipe joints have been approved to preclude damage to the installed pipe.

- 3.4.7.2 Water jetting and flooding shall not be used for backfill compaction for pipe.
- 3.4.7.3 **Embedment: Haunching** shall conform to Table 2 of ASTM-D-2321, and the following:
- a) After cooling of the PVC pipe, haunching shall be placed and compacted for all main lines as shown on the City's standard drawings.
 - b) Materials used for haunching shall be the same class as that used for bedding.
 - c) Care shall be exercised in placing haunching material to prevent damage to or displacement of, the water pipe.
- 3.4.7.4 **Embedment: Initial Backfill** shall conform to Table 2 of ASTM-D-2321 and the following:
- a) After placement and inspection of haunching, initial backfill placement shall be completed and compacted for all main lines as shown on the City's standard drawings.
 - b) Materials used for initial backfill shall be the same class as that used for haunching.
 - c) Prior to placement and compaction of initial backfill, the placement of the water main and laterals, haunching and compaction shall be inspected.
 - d) Care shall be exercised in placing initial backfill material to prevent damage to or displacement of, the water pipe.
 - e) Initial backfill shall be installed to a minimum of 12 inches above the pipe crown.
- 3.4.7.5 **Embedment: Initial Backfill within easements on private property** shall conform to the following:
- a) Water lines installed in easements on private property shall be backfilled with cement sand slurry to a minimum of twelve (12) inches above the pipe and a minimum of six (6) inches to the sides of the pipe.
 - b) A continuous warning ribbon shall be placed along the top of the waterline a minimum of eighteen (18) deep.
- 3.4.7.6 **Final Backfill (within dedicated City street right-of-ways or easements):** The remainder of the trench backfill shall conform with Section 19-3 of the Standard Specifications and as follows:
- a) Sand slurry backfill is allowed for special circumstances per the direction of the City Engineer. Sand slurry backfill shall be performed in accordance with Section 19-3.062, "Slurry Cement Backfill", of the Standard Specifications.
 - b) Prior to placement and compaction of final backfill, the initial backfill and compaction shall be inspected.
 - c) Backfill material shall be free of all rock or lumps, exceeding six (6) inches maximum dimension.

- d) Backfill over joints, valves or fittings shall not exceed the initial backfill until they have been inspected, tested, and approved.
- e) Compacting of final backfill material shall be required for all main lines and service connections as shown on the City's standard drawings.

3.4.7.7 **Final Backfill (outside dedicated City street right-of-ways or easements):**

- a) Subject to the approval of the City Engineer, the engineer in charge of the design and construction of the water system shall specify compaction requirements for the backfill of all waterline trenches not located in streets dedicated or offered for dedication.
- b) Prior to acceptance of the water system the developer's engineer shall certify by letter that all trenches have been backfilled in accordance with the specifications.

Sec. 3.4.8 FINAL ACCEPTANCE

3.4.8.1 All installed water pipe shall be tested in accordance with the following standards, the recommendations of the manufacturer, and as acceptable to the City Engineer.

3.4.8.2 The Office of the City Engineer shall be given at least a 24 hour notice prior to testing and inspection.

3.4.8.3 **Pressure / Leakage Testing:**

- a) Distribution mains shall be tested for leakage in conformance with "AWWA Manual of Water Supply Practices M23, PVC Pipe - Design & Installation" and this section.
- b) All PVC pipe shall be filled with potable water for at least 24 hours before applying the hydrostatic test pressure, and all entrapped air shall be thoroughly bled off.
 - (1) If disinfection procedures are performed prior to pressure testing, all highly chlorinated water shall be flushed from the system prior to performing pressure testing.
- c) For all types of water mains, there shall be no visible leakage at any joint or section of pipe and the allowable leakage for the total lengths of all water mains under test shall not exceed that amount as specified in the table shown below.
- d) Water mains shall be brought to a hydrostatic test pressure of 100 PSIG. The minimum duration of the test shall be two hours.
- e) All tests shall be made in the presence of the City inspector.
- f) Allowable Leakage for AWWA PVC Pipe
 - (1) "Allowable Leakage" is defined as the quantity of water that must be supplied into the pipe section being tested, to maintain pressure of 100 PSIG.
 - (2) Allowable leakage shall be determined using the methods established in Chapter 8 of the "AWWA Manual of Water Supply Practices M23, PVC Pipe - Design & Installation" and as tabulated below.

<u>NOMINAL PIPE SIZE</u>	<u>ALLOWABLE LEAKAGE PER 1000 FT. (OR 50 JOINTS) FOR 2 HOUR TEST</u>
4"	0.54 Gal.
6"	0.82 Gal.
8"	1.08 Gal.
10"	1.36 Gal.
12"	1.62 Gal.
>12"	per City Engineer

- g) If the tested pipe exceeds the allowable leakage, the pipe must be uncovered, repaired, and tested until it meets the allowable leakage, at the contractor's expense.

3.4.8.4

Disinfection:

- a) All new or repaired water mains, pumps, tanks, wells, and other facilities before being placed in service, shall be completely disinfected in accordance with "Procedures for Disinfecting Water Mains, AWWA C651" and any additional requirements, as required by the State Department of Health Services.
- b) Contractor to ensure highly chlorinated water does not backflow into the public water supply.
- c) Water used for testing shall be potable and contain a minimum residual chlorine content of 50 ppm after a time period of 24 hours, after which the water mains and/or waterworks shall be thoroughly drained and flushed.
- d) Before being placed in service, a bacteriological test of the system shall be performed in compliance with the requirements of the appropriate health agency.

SECTION 3.5 WATER CONSTRUCTION PLANS

Water construction plans shall contain all notes, details and specifications necessary to complete the proposed work. For sake of simplicity, Water Plans can be combined with Sewer Plans whenever applicable. Maximum sheet size shall be 24" x 36". Project information shall include, but not be limited to the following:

Sec. 3.5.1 COVER SHEET

- Project Title
- Vicinity Map
- Key Map drawn to a scale of 1" = 200'
- Engineer's Certificate with seal and license expiration date.
- General Notes - see Section 3.5.4
- Special Notes - notes particular to the project
- Material Specifications
- Legend
- Bench Mark
- Sheet Index
- Total number of sheets
- Materials List - show Engineer's Estimate of Quantities
- City Engineer's Approval/Signature Block
- Developer's name and address/Engineer's address and contact person/Legal Description
- Engineer's Certificate:**

I hereby certify that these plans and specifications comply with City of Shafter ordinances, standards, and design criteria, and that they include all improvement requirements of the Advisory Agency or other review board.

I am responsible for all calculations and drawings on these plans and any errors, omissions, or violations of those ordinances, standards, and design criteria shall be corrected during construction.

Sec. 3.5.2 PLAN SHEETS

- Horizontal on each sheet (1" = 50' max). Same scale to be used on all sheets.
- North arrow
- Water line location relative to centerline or property line
- Pipe size and length, fittings, valves, and services
- Relation to existing pipes, utilities, etc. - show by cross sections with verified depths
- Fire hydrant locations, existing and proposed
- Connection to existing water lines.
- Required sewer and water line separations, utility separations
- Stationing (centerline) - from south to north and west to east; coincident with street stationing; show 100 foot interval ticks on street centerline
- Construction phasing limits shown
- Easements - show dimensions & relations to property lines, street centerlines, and pipe. Show recordation data.

Sec. 3.5.3 DETAIL SHEETS:

Provide Details as Applicable

- SW-1 Pipe Backfill and Compaction
- SW-2 Pipe in Casing

- W-1 Water Supply Requirement Chart
- W-2 Thrust Blocks
- W-3 Water Valve Cover and Sleeve
- W-4 Fire Hydrant Standard Detail
- W-5 Fire Hydrant Alternate Detail
- W-6 3/4" Residential Service, Long Connection
- W-7 3/4" Residential Service, Short Connection
- W-8 2" Water Service, Commercial Connection

- W-12 Air Release Assembly
- W-13 Blowoff (Surface Mount)
- W-14 Blowoff (Wharf Hydrant)
- W-15 Backflow Preventer, Typical Installation

- Tie-in Details - as approved by City Engineer
- Other Details as required by City Engineer

Sec. 3.5.4 SAMPLE GENERAL NOTES

General notes shall include all necessary notes to convey the intent of the City of Shafter Water Design Standards, the project at hand, and as directed by the City Engineer. They shall include, but not be limited to the following.

- 3.5.4.1 24 hour inspection notice - Prior to the start of any phase of construction, the Office of the City Engineer shall be given at least 24 hours notice. Phone: (661) 746-2065.
- 3.5.4.2 Compaction test note - Compaction testing shall be the responsibility of the developer/subdivider/contractor. The number and location of required test shall be determined by the City Engineer.
- 3.5.4.3 For the location of existing underground utility lines the Contractor shall notify both the City of Shafter Department of Public Works, and Underground Service Alert (USA) at least two (2) working days prior to the start of construction.
USA Phone: (800) 642-2444
City of Shafter: (661) 746-2065
- 3.5.4.4 Contractor shall obtain all necessary permits before start of construction. A permit shall be obtained from the Office of the City Engineer for all work to be performed in city right-of-way.
- 3.5.4.5 The locations of existing utilities and underground pipelines shown on these plans are approximate only. The contractor shall determine the exact location of all existing utilities and underground pipelines before commencing work. Contractor assumes all liability for any and all damages to existing utilities occasioned by his failure to exactly locate, preserve, and protect any and all underground utilities and pipelines.
- 3.5.4.6 Any trenching conducted within this project shall be backfilled and compacted in accordance with the City's standard drawings.
- 3.5.4.7 The contractor shall remove and/or relocate all obstructions within the street right-of-way as directed by the City Engineer.
- 3.5.4.8 Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including the safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; that the contractor shall defend, indemnify, and hold the owner,

engineer, and the City of Shafter harmless from any and all liability, real or alleged, in connection with the performance of work on this project, excepting the liability arising from the sole negligence of the owner/engineer/City of Shafter.

- 3.5.4.9 All construction work shall be performed in accordance with City of Shafter Standards, the State of California, Department of Transportation Standard Specifications, and as directed by the City Engineer.

Sec. 3.5.5 SAMPLE STANDARD WATER NOTES (PVC PIPE)

Water notes shall provided detailed information regarding project material, construction, and testing requirements, applicable ASTM and AWWA specifications, and references to City Standards. Below is a set of notes typically seen on water pipeline projects using PVC pipe.

- 3.5.5.1 General: Contractor will furnish all materials, tools, labor, equipment and supervision necessary to complete installation and testing of water improvements as shown on the approved plans and specified in the bidding documents.
- 3.5.5.2 Water transmission and/or distribution mains: All water transmission and/or distribution mains shall be AWWA C900 or C905, CL. 150 PVC
- 3.5.5.3 Valves and Fittings: All valves shall be resilient seat wedge gate valves meeting appropriate AWWA standards as specified in the bidding documents. All fittings shall be ductile iron and shall meet the requirements of AWWA C110 standards.
- 3.5.5.4 Testing
- a) Immediately after the water line is completed, the contractor shall test the water line for leakage in accordance with City specifications in the presence of the city inspector. Any pipe or fittings that fail to pass the maximum allowable leakage requirements shall be removed and replaced with new materials at the expense of the contractor.
 - b) The lines shall be tested to a pressure of 150 psi. The contractor shall provide all labor and materials required for the test.
- 3.5.5.5 Disinfection
- a) The work shall be accomplished by the contractor, after all pressure and leakage tests are completed, in accordance with AWWA Specification C-651.
 - b) The disinfecting agent shall be liquid chlorine fed through a mixing equipment which gasifies and dissolves the chlorine in water in strong solution and delivers the solution immediately into the pipe line being treated.
 - c) The work shall be supervised by a competent person experienced in the process, who shall use an approved chlorine test comparator with standardized orthotolidene solution for making the tests.
 - d) The contractor shall furnish all necessary water, chemicals, equipment and personnel.
 - e) Application: the rate of applications shall produce a solution of at least 25 parts per million by weight in samples taken from the portion of the main most distant from the point of application and from the end of each branch.
 - f) After completion of the application, the pipe lines shall remain closed for 24 hours. Samples shall then be taken at the same points as before and shall show

no less than 10 parts per million available chlorine by weight; failing which, additional disinfection shall be effected as directed. Chlorine shall be added to the new line at the upper end. If the chlorine residual drops below 25 parts per million in any portion of the line, additional chlorine shall be added in that vicinity.

- g) Flushing: After the 24-hour sterilization period, the line shall be thoroughly flushed to remove all strongly chlorinated water until samples taken at various points, as directed, test not in excess of 1 part per million.
- h) Care shall be taken to prevent strong chlorine solution in the line being treated from flowing back into the existing system.
- i) During the process of chlorinating the pipe line, all valves and other devices shall be operated while the pipe line is filled with the heavily chlorinated water.

3.5.5.6 Backfill & Compaction: Backfill & compaction shall be performed in accordance with City of Shafter standards.