SECTION 11: TECHNICAL STANDARDS AND SPECIFICATIONS

11.1 General Provisions

11.1.1 Introduction

This document outlines the general and specific construction requirements for water systems operated and maintained by or for Public Utility District No. 1 of Jefferson County (District). All references to the District shall mean the District Manager or his authorized representative. In general, all construction activities and material specifications shall conform to:

1. Applicable County rules, regulations, ordinance and standards.
5. Recommendations of the manufacturer of materials or equipment.
6. This document.

11.2 Design Standards

11.2.1 Facility Placement

All District owned lines, pumps, wells, storage and other facilities shall be located on property owned by the District or public rights-of-way or utility easements dedicated to the District. Normally utility easements will be a minimum of 20 feet in width and lines will be installed no closer than five feet from the edge of easement. All location of District facilities within County rights-of-way must be approved by the Jefferson County Public Works Department. District lines located in County road rights-of-way must comply with franchise requirements outlined in ordinances passed by the County Board of Commissioners authorizing such use of the road and rights-of-way.

11.2.2 Water Source Development

11.2.2.1 Water Source Construction
New water sources must be designed to meet the Department of Ecology (DOE) and Department of Health (DOH) regulations and design guidelines. Reference documents include RCW 18.104, Water Well Construction, administered by DOH; WAC 173-160, Minimum Standards for Construction and Maintenance of Water Wells, administered by DOE; and WAC 246-290 for Group A water systems and 246-291 for Group B water systems, regulations regarding the health aspects of public water system, as administered by DOH.

All test and production wells must be drilled in accordance with detailed drilling and testing specifications, which have either been prepared by, or approved by the District.

All new groundwater sources shall be provided with an access port for insertion of devices to measure depth of water and total production.

11.2.2.2 Water Rights

Water rights must be obtained in accordance with DOE regulations and procedures. Water rights documents, correspondence, and other associated records will be maintained by the District.

11.2.2.3 Water Quality

Water quality must be proven to conform with the Federal Safe Drinking Water Act (as amended), DOH criteria specified in WAC 246-290 for Group A water systems and 246-291 for Group B water systems, and/or any additional requirements of the Jefferson County Health District.

The District reserves the right to reject any source whose water quality does not meet these criteria, or sources having excessive costs associated with treatment requirements.

11.2.3 Storage Facilities

Minimum storage requirements are based upon adding the three components listed below, less any credit for the operation of reliable multiple wells, with the largest producing well assumed to be out of service:

(1) Operational storage. This is the amount allowed for the normal pumping cycle, between off and on. Usually 1 to 2 feet.

(2) Standby storage (one peak day demand) required to supplement production from water sources during high demand periods.

(3) Equalizing storage is \((PHD-Q)150\) required to supplement production from water sources during high demand periods.
(4) Fire storage is equal to the flow/duration required for the area by applicable County ordinances, or the appropriate local fire district, whichever is more stringent.

(5) Dead storage. Storage within the reservoir that does not provide the minimum 30 psi at the service meter during normal operations, or 20 psi during fire fighting conditions.

11.2.4 Pressure Requirements

Water systems shall be designed to maintain a minimum residual pressure of 30 psi at meter outlets under maximum demand flow conditions, excluding fire demand. Furthermore, water systems shall be hydraulically designed to provide a maximum pressure range of 30-100 psi, with a desired range of 40-90 psi. For water systems requiring fire flow capability, the design shall be adequate to maintain, under fire flow conditions, positive pressure throughout the system and a 20 psi residual pressure in mains supplying fire hydrants in use as per WAC 246-90 for Group A water systems and 246-291 for Group B water system requirements.

11.2.5 Pipe Sizing

Water mains shall be sized using the current edition of "Sizing Guidelines for Public Water Supplies," prepared by DOH. In general, pipe sizes shall not be less than 6-inches diameter. For sizes 6 inches and above, minimum line size may be established by a licensed engineer using recognized hydraulic analysis techniques. Water line size shall be adequate to deliver required fire flow and to maintain the pressure requirement defined in paragraph 11.2.4 above.

Design criteria and analysis for water line improvements will normally use a maximum design velocity of seven feet per second and a maximum head loss of 10 psi per 1,000 feet, although both criteria may be exceeded in certain cases under transient high flow conditions.

Water mains serving fire hydrants, as part of new construction, planned phased improvements, or replacement projects, shall be not less than eight inches in diameter for a dead end line, nor less than 6 inches in diameter if looped. Hydrant leads extending less than 50 feet or across a street shall be of suitable size to carry the required fire flow, but shall not be less than 6 inches in diameter. In a dead end cul-de-sac, a normal domestic main (i.e. less than 6 inches in diameter) may be installed from the last hydrant to remaining residences.

11.2.6 Pipe Cover

The depth of trenching, installation of water lines, and backfill shall be such as to give a minimum cover of 36 inches over the top of the pipe. This standard applies to transmission, distribution, and service line. Backfill and compaction will be in accordance with applicable construction standards identified below. Materials capable of damaging the pipe or its coating shall be removed from the backfill material. Backfill material shall not contain rocks greater than 3/4 inch in diameter.
11.2.7 **Isolation Valves**

Valves shall be installed at all crosses and tees. The number of valves at each intersection shall equal the number of connecting lines. In addition, unvalved lengths of pipe shall not exceed 500 feet in school, commercial, or multi-family areas, and 800 feet in other residential service areas. Dead end mains installed, having the potential for future extension, will be required to have a valve installed on the end of the main. The valve shall be the same size as the existing main.

11.2.8 **Air and Air-vacuum Relief Valves**

In order to minimize problems associated with air entrainment, air or combined air-vacuum relief valves shall be installed at points of high elevation throughout each distribution system. To prevent freezing, the vault lid and vault cavity will be insulated as directed by the District. These valves shall be installed as per these standard specifications and Standard Detail #1.

11.2.9 **Blowoff Valves**

A blowoff valve assembly shall be installed on all permanent dead-end runs and at designated points of low elevation within the distribution system. The blowoff valves shall be installed on District property or utility rights-of-way except where a written access and construction easement is provided to the District. In no case shall the location be such that there is a possibility of back-siphoning into the distribution system.

11.2.10 **Fire Hydrant Locations**

Jefferson County Ordinance No. 134, current revision, shall dictate the location and placement of fire hydrants.

11.2.11 **Water and Sewer Line Separation Distances**

Transmission and distribution water piping shall be separated at least ten feet horizontally from waste disposal piping, drain fields, and/or waste water gravity or forced mains. The bottom of the water main shall be 18 inches above the top of the sewer component. All parallel and crossing installations of water and sewer lines shall be in accordance with provisions of WAC 246-90 for Group A water systems and 246-291 for Group B water system (septic systems) and Section 2.413 of the Washington State Department of Ecology criteria for sewage works design.

11.3 **Material and Installation Specifications**

11.3.1 **Introduction**

All pipe, valves, meters, hydrants, fittings, and special material shall be new, undamaged, and designated for use in potable water systems. All material suppliers shall be bonded sufficiently for
the value of material supplied. Material used on water projects shall comply with AWWA Standards, and each project's detailed plans and specifications. The subsequent paragraphs list specific requirements of the District. As time passes, industry is expected to develop water system components which are superior to the products or standards specified below. Use of components with proven, superior qualities is encouraged, however, deviations from the specifications in this manual will require prior, written authorization of the District. Where a component is specified by manufacturer and/or model number, "or approved equivalent", the District must approve the equivalent component in writing. All materials with significant water contact must be certified pursuant to Nation Sanitation Foundation Standard 61.

11.3.2 Pipe, Joints, and Fittings

11.3.2.1 General

All pipe sizes, as shown on the drawings, and as specified herein, are in reference to "nominal" diameter, unless otherwise indicated. All pipe shall meet the District's standard specifications. One type of pipe shall be used throughout entire projects, except as necessary to match existing water lines, or as otherwise specified in writing by the District. Where relocation of, or replacement of, existing water lines is necessary during construction, materials used shall be subject to the written approval of the District.

The District does not allow the installation of new lead-based pipe, joints, or fittings.

11.3.2.2 Ductile Iron Pipe (DI)

Ductile iron pipe shall conform to the requirements of AWWA C151-76 specifications. Pipe thickness shall be of Class 50 or greater, if required, in accordance with the criteria specified in AWWA C150-76.

DI pipe shall be cement lined and sealed in accordance with AWWA C104-80. In addition, all pipe shall have mechanized joints or push-on rubber gasket joints and be furnished in ten to twenty foot lengths unless design conditions dictate otherwise.

DI pipe shall be Pacific States, or approved equivalent.

11.3.2.3 Polyethylene (PE) Pressure Pipe

PE pipe shall be used for all new installations 2" and smaller. PE pipe shall conform to the requirements of AWWA C901-88 specifications. PE pipe for distribution lines shall be Class 200PSI. PE pipe shall conform to the outside diameter dimensions of iron pipe sizes (OD based, IPS pipe) or the inside diameter dimensions of iron pipe sizes (ID based, IPS pipe).

PE pipe can be joined to other PE pipe or fittings by either brass compression or brass insta-
tite couplings. The use of insert fittings with external stainless steel clamps will not be permitted.

11.3.2.4 Polyvinyl Chloride (PVC) Pipe

PVC pipe shall be made from Class 12454-A or Class 12454-B virgin compounds, as defined in ASTM D1784. Joints shall conform to ASTM D3139 using a restrained rubber gasket conforming to ASTM 3477. Solvent welded pipe joints will not be permitted.

PVC pipe shall be AWWA C900 Johns Manville, or approved equivalent.

11.3.2.5 Galvanized Iron Pipe (GI)

Galvanized iron pipe shall conform to the latest revision of ASTM A-120 or A53, Grade A, Schedule 40, seamless pipe that has been manufactured in the United States. Pipe shall be hot-dip galvanized. Pipe fittings shall be galvanized and threaded.

11.3.2.6 Fittings

All fittings shall be of the size, and type specified on the plans or by the pipe manufacturer.

11.3.2.7 Locator Wire and Warning Tape

All pipe shall be laid with one piece of No. 16 insulated copper wire. The locating wire shall be placed immediately adjacent to the pipe and connected to all valves. Warning tape WILL NOT be used as an alternative to wire but in all situations will be used in addition to the wire. Warning tape will be laid approximately 18 inches below the finished grade. Split nut connectors shall be used in all wire splices. Locator wire shall be extended one foot above the ground at all valve locations. For fire hydrants and blow-off valves the locator wire shall be extended one foot above the hydrant traffic flange and one foot above grade at the blow off valve.

11.3.3 Valves

11.3.3.1 Gate Valves

Valves shall be manufactured and tested in accordance with AWWA C500 specifications. They shall be equipped with mechanical joints or flange ends of Class 125 in accordance with ANSI B16 1. All gate valves shall open counterclockwise and, unless otherwise specified, shall be non-rising stem type, equipped with standard square stem nuts.

Gate valves, two inches and larger, shall be iron-body, resilient wedge valves which conform to AWWA C509 standards.
Gate valves smaller than two inches shall be 125 psi, wedge disk, all brass or bronze valves with screwed, soldered, or flanged ends which are compatible with the connecting pipe.

Gate valves shall be Dresser, Kennedy, or approved equivalent.

11.3.3.2 Butterfly Valves

Butterfly valves shall be approved for use only where special applications are required. Butterfly valves shall meet or exceed all AWWA C504-80 specifications and shall be Class 150-B valves with short body which are suitable for direct bury. When they are installed, they shall have a position indicator which clearly shows the position of the disc. All butterfly valves shall be installed with the operator nut located toward the center line of the street. All valves shall be equipped with an underground manual operator with AWWA 2-inch square nut, and shall open with a counterclockwise rotation.

All butterfly valves shall be Dresser, Pratt, or approved equivalent.

11.3.3.3 Check Valves

Check valves, three inches or larger, shall be iron body, iron disc, bronze-mounted, swing type, clearway, quiet closing, lever and spring valves with flanged ends. All valves shall comply with AWWA C508-76 specifications.

Check valves, smaller than three inches, shall be bronze body, bronze-mounted, swing type with flanged or threaded ends depending upon installation.

Check valves shall be Dresser, Mueller, or approved equivalent.

11.3.3.4 Air and Air-Vacuum Relief Valve Assembly

Air and air-vacuum relief valves shall have cast iron bodies and covers and stainless steel floats. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valves shall be designed for operating service to 150 pounds per square inch (psi). Air and air-vacuum relief valve assembly materials shall conform to Standard Detail #1A.

Air and air-vacuum relief valves shall be APCO Model #142 or #143C for one-inch, or #144 or #145C for two-inch, or approved equivalent.

11.3.3.5 Pressure Reducing Valve (PRVs)

PRVs within distribution systems shall maintain a constant outlet pressure with varying inlet pressures. PRVs shall be hydraulically operated, pilot-controlled, diaphragm-type, globe or angle valves. The main valve shall have a single removable seat and a resilient disc. The stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in
the valve seat. No external packing glands are permitted, and there shall be no pistons operating the main valve or any pilot controls. The pilot control shall be a direct-acting, adjustable, spring-loaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice.

A bypass line of shall be no less than one-half the size of the main line PRV with isolation valves and pressure reducer installed in parallel to the main PRV to manage low flows and assure continuity of service in event of main PRV failure.

Main line PRV installations shall conform to Standard Detail #2.

Main-line PRVs shall be Cla-Val Co., or approved equivalent and must have local service representation.

Individual service pressure reducing valves shall be of bronze body construction with a renewable stainless steel seat, stainless steel integral strainer, and temperature resistant diaphragm. When required, they will be installed as directed by the District, on the owner's service line after the meter.

Individual service PRVs shall be Watts, Wilkins, or approved equivalent.

11.3.3.6 Valve Boxes

All valve boxes shall be two-piece cast iron, and equipped with a suitable extension for a 36-inch to 65-inch trench depth. Top sections and lids will be designed for installation in vehicular areas. Lids will be labeled "WATER", and lid tabs will point in the direction of the water main. All valves and valve boxes will be set plumb with the valve box centered on the valve. Valve box installation shall comply with Standard Detail #3A for paved area locations and #3B for unpaved area locations.

Cast iron valve boxes shall be Olympic Foundry or approved equivalent and must be compatible with the District's system.

11.3.3.7 Blowoff Valve Assembly

Two-inch blowoff assemblies shall be provided in accordance with either Standard Detail #4A or #4B at locations prescribed by the District.

The blowoff assembly shall consist of an approved saddle or cap, two-inch galvanized iron pipe, a valve box, a two-inch square nut gate valve, a two-inch stand pipe extending 36 inches above ground (24" between the valve and the stand pipe), an elbow at the bottom of the standpipe with a drain hole which discharges to drainage rock, a two-inch elbow with a
two-inch male IPS inlet and a 2 1/2-inch male NST outlet, and a 2 1/2-inch fire cap.

11.3.3.8 Valve Marker Posts

A flexible valve marker post shall be furnished and installed with each single or closely grouped combination of valves. Marker posts shall be located as directed by the District. Size of valve and distance (to the nearest foot) shall be decaled on the face of the post with a two-inch black painted figures. The top portion of the marker will be painted with blue enamel on all sides to aid location.

Valve marker posts shall be 60" Carsonite Utility Marker, or approved equivalent.

11.3.4 Fire Hydrant Assembly

11.3.4.1 Fire Hydrant

Fire hydrant installation and flow requirements shall comply with the specifications and standards of Jefferson County Ordinance No. 134, current revision.

Fire hydrants shall conform to AWWA Standard 502-80 for post-type, dry-barrel, self-draining hydrants suitable for at least a 54-inch depth. Each hydrant shall have a six-inch inlet, a minimum valve opening of 5-1/4 inches, two 2-1/2 inch hose connections, and a 4-1/2 inch pumper port with storz fitting. All ports shall have National Standard Threads or other connection devices consistent with local fire protection authority requirements. All valves and caps shall open counterclockwise and have a 1-1/2-inch flat point pentagon operation and cap nuts. Hydrants shall be break-away traffic models.

The configuration of the fire hydrant assembly shall be as shown in Standard Detail # 5. The assembly shall have a cast iron tee (with mechanical joint connections to the main) a flanged tee, a six-inch flanged gate valve with valve box, a six-inch ductile iron pipe extension and shackle rods to connect the hydrant to the auxiliary valve at the main. The shackle rods shall be 3/4-inch diameter steel rods of suitable length. Wash. D.O.T. Spec 7-14.3(2)A.

Hydrants added to existing systems will be installed by wet tap. The hydrant shall have at least an 18 inch clearance between the ground and the lower port, and a 36 inch unobstructed radius around it for operation of a hydrant wrench. The steamer/pumper port shall face the street or the most likely direction of emergency approach.

Fire hydrants shall be Mueller, Iowa, or approved equivalent.
11.3.4.2 Hydrant Guard Posts

At locations specified by the District, reinforced concrete posts six feet long and a minimum of nine inches in diameter shall be installed according to standard detail #5 for fire hydrant installations.

Hydrant Guard Posts shall be Fog Tite Meter Seal or approved equivalent.

11.3.5 Thrust Blocking

All hydrants, valves, tees, and bends shall be thrust blocked. Only concrete thrust blocking is acceptable for installation of water system facilities. Concrete blocking shall be APWA Class 5 (1 1/2) concrete mix, poured in place against undisturbed soil. Thrust blocking shall comply with the provisions of Standard Detail #6.

11.3.6 Cross Connection Control Devices

Where the possibility of contamination of the supply exists, water services shall be equipped with appropriate cross connection control devices. All cross connection control devices will be specified by the District based on the degree of potential hazard. Such devices will comply with models approved by the Department of Health (DOH) in accordance with WAC 246-90 for Group A water systems and 246-291 for Group B water system. Cross Connection control is normally accomplished by:

* Approved Air Gap Separation
* Mechanical Protective Devices. The five general types of mechanical devices are:

1. Reduced pressure principle backflow devices (RPBD)
2. Double check valve assemblies (DCVA)
3. Double detector check valve assembly (DDC)
4. Pressure vacuum breakers (PVB)
5. Atmospheric vacuum breaker (AVB)

Cross connection control mechanical device details are provided in Standard Detail Drawings 9A through 9D.

11.3.7 Service Connections

11.3.7.1 General

Water service installations shall comply with Standard Detail #7A and B. The location and type of corporation stop, meter yoke, and locating wire on all individual services must be as indicated on Standard Detailed drawings #7A and B. In addition, if pressure reducing
valves are required for individual service connections, a meter yoke shall be provided and installed in accordance with Standard Detail #15A. Meter sets and yokes will be specified by the District.

All double service connections shall have a curb stop located immediately before the U-branch connection, as shown on Standard Detail #7B. U-branch connections may be connected directly to the meter yokes with a union for adjacent meter sets.

11.3.7.2 Main Tap and Corporation Stop

Service saddles shall be designed for iron pipe threads and use with polyethylene pipe. Service saddles shall be Ford, Smith Blair 313, or approved equivalent.

Corporation stops for one inch to two inch service saddles shall be bronze body, male, iron pipe threaded, which are Ford F-500, or approved equivalent.

11.3.7.3 Service Lines

Service Lines shall be IPS one-inch polyethylene for single services and one-inch polyethylene for double services and service connections which must cross under a roadway. Double services shall utilize a Ford, or approved equivalent, U-branch connection with a one-inch inlet and 3/4-inch outlets. A one-inch curb stop shall precede U-branch connections. Adapters for service lines shall be Ford Pack Joint or approved equivalent.

11.3.7.4 Meter Set Assembly

Meter sets shall be installed using a meter setter equipped with a locking angle meter valve and an angle check valve. Meter yoke inlets and outlets shall have male iron pipe size threads.

Meter yoke assemblies shall be Ford Setter VH 72-12, or approved equivalent.

Where static water pressure exceeds 80 psi, pressure reducing valves may be installed as directed by the District. Pressure reducing valves shall be Wilkins 600 or approved equivalent.

If meters need to be raised, Ford Resetter, or approved equivalent shall be used.

11.3.7.5 Meter Boxes

Meter boxes shall be pre-cast concrete with steel cover and reader lid; Fog-tite No. 1-D or approved equivalent. Carson 1419-15 with reader lid or approved equivalent may be used when meter location is away from vehicle traffic.
11.3.7.6 Meters

In applications where a developer is to provide the meter, the District will specify the type of meter to be installed. PUD standard is Badger AMR.

11.4 General Construction Standards

11.4.1 Connection to District Owned Systems

Connections to District owned water mains shall not be made without first completing the necessary arrangements with the District. Work shall not be started until all of the materials, equipment, and labor necessary to properly complete the work are assembled on the site. Once work is started on a connection, it shall proceed continuously, without interruption, and as rapidly as possible until complete. No shut-off of mains will be permitted overnight, over weekends, or during holidays.

If a connection to an District owned system involves turning off the water, the Contractor shall be responsible for notifying the residents affected by the shut-off. The District will advise which owners need to be notified.

Contractors shall acquaint themselves with all aspects of District owned systems prior to starting construction on new mains. Existing water service lines shall be located by Contractors prior to beginning work so they may be properly protected and maintained in service, during construction. Pertinent information concerning existing systems may be obtained from District personnel and may be verified from District records.

Only District personnel are permitted to operate valves on the certified, potable water side of a line, including emergencies unless personnel safety is threatened. Exposing a potable water line during construction without the Districts concurrence can result in a penalty being imposed.

11.4.2 Notification of Construction

Contractors shall notify the District a minimum of 48 hours in advance of construction to facilitate project coordination. This paragraph does not remove any responsibility from contractors in regard to proper notification of property owners prior to construction.

11.4.3 Work on Non-District Rights-of-Way

Work on a state highway, county road, or any other right-of-way not owned by the District, shall conform with the requirements of the authority having jurisdiction over such rights-of-way. Contractors are responsible for notifying the proper authorities and acquiring permits before beginning work on a right-of-way. Contractors will ascertain restoration requirements and determine that schedules of operations proposed are satisfactory to applicable authorities. Copies of rights-of-way permits shall be provided to the District before construction can begin.
11.4.4 Traffic Maintenance

Contractors shall conduct work so as to interfere as little as possible with public travel. Access for fire fighting equipment shall be provided at all times, and Contractors shall keep the local fire protection authorities informed of the location of construction operations and fire lanes. Contractors shall also notify the authorities in charge of any municipal, private, or school transportation system at least 48 hours in advance of road closures that will force a change in the regular routing of the transportation system. Contractors shall also provide and maintain suitable detour routes for the system. Road closures will not be allowed without written permission from the Jefferson County Public Works Department, except verbal permission may be used in an emergency. Work which involves State or County road rights of way shall be restricted to the hours between 8:00 AM and 5:00 PM and no work shall be allowed in such rights of way on Saturdays, Sundays or Holidays unless authorized by the District.

11.4.5 Safety

Contractors will be solely and completely responsible for conditions at job sites, including safety of all persons and property during the performance of work. This requirement will apply continuously and not be limited to normal working hours.

The contractor shall comply with safety and health standards identified in the most current edition of the Standard Specifications for Road, Bridge and Municipal Construction published by the Washington State Department of Transportation and the American Public Works Association (Washington State Chapter), including, without limitations, Sections 1-07.1 and 1-07.23 of these specifications.

11.4.6 Inspection Requirements

Unless previously authorized by the District, work on water mains shall not proceed without a District inspector being present. The District may refuse acceptance of any water mains installed without a District inspection. The presence or absence of an Inspector on any job will be at the sole discretion of the District. Such presence or absence of an Inspector will not relieve a Contractor of responsibility to deliver the construction results specified in the contract documents.

To permit scheduling an inspector, the District must receive a hard copy of the construction schedule at least two full working days before construction activities covered by the schedule begin. The District must be kept advised of changes to the construction schedule. When significant breaks in construction occur, the contractor must give two working days notice before resuming work.

All projects require design by a registered professional engineer. All work shall be inspected by the District or its designated representative, before closure of any excavation. Inspectors will be provided by the District or its designated representative. Inspectors will have access to work sites as necessary to keep the District informed of the progress of the work and the manner in which it is
being done, to keep records, to act as liaison between the Contractor and the Manager, and to report any deviations from Plans or Specifications.

Inspectors shall have authority to reject defective material and to suspend any work that is not conducted in accordance with the District's Technical Standards and Specifications. Failure of an inspector to call the attention of a Contractor to faulty work or deviations from the Plans or Specifications shall not constitute acceptance of said work.

District Inspectors will not be authorized to issue instructions or to approve or accept any portion of the work which is contrary to the Plans and Specifications. Approvals, acceptances, or instructions, when given, must be in writing and signed by the District Manager or his designated representative.

Any personal assistance which an Inspector may give a Contractor will not be construed as the basis of any assumption of responsibility in any manner, financial or otherwise, by the Inspector, the Engineer, or the District.

Jefferson County may inspect facilities under construction at any time. They may also have an inspector on site when working on County rights-of-ways.

11.4.7 Overtime and Holiday Work

Should a Contractor elect to work more than eight hours per day, or more than five days per week, or on holidays during the course of a project, all costs of resulting District overtime/holiday engineering and inspection will be charged to the Contractor at 1.5 times the normal rates for overtime and 2.0 times the normal rate for emergencies and holidays.

11.4.8 Materials Delivery

Pipe and appurtenances shall be handled in such a manner as to ensure delivery to the trench in a sound, undamaged condition. Particular care shall be taken not to injure the pipe, pipe coating, or lining. Before installation, the pipe and appurtenances shall be cleaned of foreign material and inspected for defects. Valves shall be cleaned of all foreign material and operated before installation to ensure proper functioning.

Pipe will not be strung out along a trench or shoulder of a road in a manner which causes a safety hazard to the public.

Rubber gaskets shall be stored in a cool, dark place to prevent damage from the direct rays of the sun.

11.4.9 Alignment

Pipe shall be laid to specified grade and alignment as staked in the field. Alignment deviation shall not exceed plus or minus 0.5 feet. Replacement of stakes lost or destroyed shall be made at the Developer's expense and in accordance with contract plans, including modifications specified by the
11.4.10 Trench Excavation and Backfill

Trench excavation and backfill shall be performed in accordance with APWA Section 73-3, with a minimum cover of 36 inches. Grade staking, when required, will be done by the District's designated representative prior to installation of the mains. Compaction of backfill shall be accomplished by mechanical tamper in lifts not exceeding six inches to obtain 95 percent compaction. In most cases, material removed from a trench is suitable for trench backfill. However, if the trench soil is unsuitable for trench backfill, as determined by the Inspector, the Contractor shall remove and dispose of unsuitable material and backfill the trench with approved backfill. The Contractor will keep the District informed of the disposal site of all unsuitable material removed from the project. New or unsuitable material shall not be dumped on neighboring properties.

Finished backfill work shall leave all existing drainage ditches, culverts, and other appurtenances in a useable state equal to or better than their original condition. Excavation within County rights-of-way shall be coordinated with the Jefferson County Department of Public Works.

11.4.11 Surface Restoration

Roads, driveways, shoulders, landscaping and all other areas removed, broken, caved-in, settled or otherwise damaged as a result of construction work, shall be repaired and/or resurfaced to match the existing surface or landscaped areas.

Existing shoulders and gravel surfaces shall be restored with like, crushed rock surfacing. Existing lawns shall be re-sodden after proper back-filling and consolidation. Existing landscaping, fences, mailboxes, ornamentation, etc. shall be restored as close to original conditions as possible. Private driveways, walks, and other surfaced areas shall be restored, patched, or resurfaced as required to match the original surface condition.

When county roads and rights-of-way are involved, the Contractor must coordinate all trenching and restoration activities with the District and the Jefferson County Department of Public Works. Open cuts must be approved by the Jefferson County Department of Public Works.

11.4.12 Timbering and Sheeting

Timbering and sheeting shall be provided in accordance with the provisions of the State of Washington Department of Labor and Industries Safety Standards for Construction. All timbering and sheeting shall be removed prior to back-filling unless otherwise authorized in writing by the District. When left in place, only sheeting shall be left below the top of the pipe. Removal of timbering shall be accomplished in such a manner that there will be no damage to the work or to other properties.
11.4.13 **Construction Site Erosion Control**

If construction site or weather conditions require that erosion control measures be taken, procedures found in Jefferson County Ordnance 148-1992 Interim Ordinance for the Control of Erosion and Sedimentation on Construction Sites shall be followed.

11.4.14 **Sanitation Requirements**

Extreme care should be used in checking and cleaning all pipe and fittings of dirt, debris and foreign matter during installation. All material shall be kept clean. Plugs shall be used to seal installed water mains when they are to be left for any period of time, including lunch breaks, coffee break, overnight, etc. Material contaminated by petroleum products or questionable chemicals will be rejected. No trench water shall be allowed to enter installed water mains.

11.4.15 **Main Testing and Flushing**

All water mains shall be pressure tested in accordance with the District's Technical Standards and Specification. The applicant's contractor will provide all testing equipment. During construction, new water mains must be separated from the existing system (eg. with a gate valve). Until satisfactory flushing, disinfection, and bacteriological sampling has been completed, the new water main must be treated as if it were contaminated. A connection can be made from District water mains to supply water for initial flushing, line filling, pressure testing, and disinfection. An approved backflow prevention assembly must be used on the supplying water line. The final testing shall be performed in the presence of a District inspector. Only District personnel are permitted to operate valves on the potable water side of a system.

11.4.16 **Hydrostatic Pressure and Leak Testing**

A hydrostatic pressure and leakage test will be conducted on all newly-constructed water mains, fire lines, fire hydrant leads, and stub-outs, after flushing, in accordance with APWA Section 7-11.3(11) and AWWA C-600 specifications.

11.4.17 **Disinfection and Bacteriological Testing**

All water lines, reservoirs, and appurtenances shall be disinfected and tested at the contractor's expense in accordance with AWWA C601-68 and D105-80, DOT/APWA Section 7-11.2(12), and the requirements of DOH. Disinfected lines shall be flushed with water from the District's system and samples collected from all mains for bacteriological testing. A District inspector shall take all samples for bacteriological testing. Copies of test results shall be retained by the District. If test results are not satisfactory, lines shall again be disinfected, flushed, and tested until two consecutive, satisfactory series of samples are obtained. Bacteriological testing must satisfy DOH criteria prior to acceptance or utilization of new water facilities.
11.4.18 **Disposal of Disinfection Water**

The chlorine concentration used for disinfection procedures (minimum 25 mg/l) renders water non-potable. Disinfection water, which contains chlorine, must be disposed of in accordance with Department of Ecology specifications. Discharge of disinfection water into a storm drain, drainage ditch or natural channel is a discharge to waters of the State and is prohibited by State law. Permission to discharge disinfection water must be obtained in advance from the Water Quality Section of the Department of Ecology's Northwest Regional office unless the water has been previously treated with a neutralizing agent. The chlorine in the water used to disinfect water lines, components, storage units, etc. may be toxic to fish and other aquatic life in the receiving waters.

11.4.19 **Utility Location**

New water lines and facilities shall be installed in accordance with the applicable County ordinance and specified utility location system. Separation between water and sewer lines shall meet standards of chapter 256-272-09501 Location of the WAC. The local health officer may approve a sewer transport line within 10 feet of a water supply line if the sewer line is constructed in accordance with section 2.4 of the department of ecology’s “Criteria Fore Sewage Works Design”, revised October 1985, or equivalent, found in the Department of Ecology’s *Criteria for Sewage Works*. Where no ordinance applies, water mains shall be installed so as to be compatible with the existing water system, the terrain, geology, and the location of other utilities. Where practical, all water mains shall be installed parallel to the centerline on the North or East side of the street or road as shown on Standard Detail 8A and 8B. Deviations from standard locations must be documented, receive prior written approval by the District, and be accompanied by accurate "As-Built" maps. Water lines shall be located as follows:

**11.4.19.1 Shoulder and Ditch Configuration**

If practical, outside the ditch line, otherwise, in the shoulder, three feet from the edge of the travel lane.

**11.4.19.2 Curb and Gutter Configuration**

Three feet outside of the curb.
11.5 Standard Detail Drawings

Installation of water facilities shall conform with the preceding material and construction standards, and standard detail drawings below:

1  Air and air-vacuum relief valve assembly
2  Pressure reducing station
3A Valve box - paved roadway
3B Valve box - unpaved roadway
4A 2-inch blowoff assembly
4B 2-inch blowoff assembly - bottom connection
5  Fire hydrant assembly
6  Concrete thrust blocking
7A Single service connection
7B Double service connection
8A Standard utilities location - shoulder and ditch configuration
8B Standard utilities location - curb and gutter configuration
9A Reduced pressure principle backflow devices (RPBD)
9B Double check valve assemblies (DCVA)
9C Double detector check valve assemblies (DDC)
9D Pressure & Atmospheric vacuum breakers (PVB/AVB)
10 Altitude Valve
11 Air Gap for Make Up Tank
12 Typical Trench Detail
13A  Typical Pump House & Well, plan view
13B  Typical Pump House & Well, vertical side view
13C  Typical Pump House & Well, vertical end view
14    Compound Meter
15A  1½" and 2" meter yoke
15B  Meter set with PRV