Standard Design
And
Construction Specifications
For Treated Water Systems

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Amador Water Agency

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Improvement Standards

1. General Conditions of Private Work, Pipeline Extension Agreements

1.1. Release for Construction

Before release for construction of any work to be done under a Mainline Extension Agreement (“MLX”), the plans shall be approved and signed by the Agency Engineer; the MLX shall be signed by the MLX Applicant and the Agency; all necessary deposits and fees shall be paid; approved insurance shall be received; all required easements and permits shall be submitted and accepted by the Agency; and a faithful performance guarantee for facilities to be constructed within the public right of way shall be given to the Agency.

Any work done prior to release for construction may be rejected by the Agency.

1.2. Standards

All water facilities to be accepted for ownership and maintenance by AWA, including but not limited to water and service lines, service boxes, valves and all miscellaneous appurtenances, shall conform to the latest revision of these Specifications and be designed for a minimum 50 year lifespan. The MLX Applicant, and the MLX Applicant’s Developer, Engineer, Contractor and/or Architects shall be responsible for obtaining all necessary information, requirements, bid and complete the work as shown on the approved plans.

All contractor’s working on AWA facilities shall possess the following classification or type of contractor’s license issued by the Contractors State License Board: Class A, California.

1.3. Insurance

The MLX Applicant or the MLX Applicant’s Contractor shall carry insurance as outlined in the MLX. The insurance shall specifically name the Agency, its directors, officers, and employees as additional insured.

Before work is commenced, the Applicant or its Contractor shall furnish the Water Agency with certificates of insurance as satisfactory proof that he carries worker’s compensation insurance as required by law and liability insurance in compliance with the MLX Agreement requirements.

1.4. Notification

The MLX Applicant shall establish one single point of contact for the duration of design and another for the duration of construction and shall provide the necessary contact information.

The MLX Applicant and/or the MLX Applicant’s Contractor shall contact the Agency Inspector at (209)223-3018, 48 hours or two (2) business days, whichever is greater, prior to beginning water line installation, or any excavation within twenty feet (20’) of any existing Agency facilities. This information shall include the type of work planned. The Contractor shall contact the Agency Inspector by 4:00 p.m. prior to each and every day that work shall be performed on or near Agency facilities. The Contractor shall notify all
other public agencies affected by the proposed construction and shall obtain and pay all costs for any and all required permits.

1.5. Inspection

One or more inspectors may be assigned by the Agency Engineer to observe any and/or all of the work. The inspector(s) may inspect any part of the work and/or materials and shall have full authority to accept or reject said work and/or Contractor of the obligation to conduct comprehensive inspections or the work, to furnish acceptable materials, perform acceptable work and to provide adequate safety precautions.

The MLX Applicant shall be billed and shall pay all Agency costs of, but not limited to, inspection, mapping, clerical and administrative support, testing and engineering review. A pre-construction meeting shall be conducted prior to starting construction.

1.6. Existing Utility Location

For location of existing water lines, appurtenances and other utilities, the Developer and/or the Contractor or any subcontractor on a project shall notify U.S.A. (Underground Service Alert) at (800) 227-2600 and WUUA (Western Underground Utilities Alert) at (800) 424-3447, forty-eight (48) hours before performing any excavation. Not all existing utility owners participate in U.S.A. or WUUA and proper procedures for location vary.

Proper location of existing water lines, appurtenances and other utilities is the Developer’s and/or the Contractor’s responsibility. All costs for utility location shall be paid for by the Developer and/or the Contractor. The utility locating shall be completed prior to starting construction by the Developer and/or the Contractor. Only Agency approved locating methodologies shall be used, including Electromagnetic Line Locating (EMLL), Magnetic Detection (Metal Detecting), Ground Penetrating Radar (GPR), Acoustic Pipe Locating, Hydro or Vacuum Excavation, and Potholing. No other means of line location shall be utilized to verify the location of buried water lines, appurtenances, or other utilities. Dowsing, witching, or divining rods of any sort, material, shape, or known by any other name, shall not be used to locate buried water lines, appurtenances, or other utilities. Any utilities found having been marked using non-approved methods shall be deemed inaccurate, at which time, all construction shall cease immediately and may not resume until all utilities have been marked by approved methods.

1.7. Staking

The MLX Applicant or the Applicant’s Contractor shall provide stakes for line and grade for the water installation.

1.8. Soils Compaction Testing

The Agency shall require soils compaction testing, and the MLX Applicant shall pay the Agency’s costs associated with such testing.

Density of soil will be determined in place by the sand cone method, ASTM D 1556 or by nuclear methods, ASTM D 2922 and D 3017. Compaction tests will be performed as directed by the Agency’s Engineer or Inspector. At a minimum, one test shall be performed per lift, per 100 linear feet of pipe. Laboratory moisture-density relations of soils
will be determined per ASTM D 1557. Relative density of cohesionless soils will be
determined per ASTM D 4253 and D 4254. Backfill materials will be sampled per ASTM
D 75. No tests shall fall below the specified relative compaction. For all failed tests, the
lift being tested shall be removed, recompacted and retested per original specifications.
The Contractor shall pay the costs of any rework and retesting of work not conforming to
the specifications.

1.9. Hydrostatic Testing, Chlorination & Flushing

The Contractor shall provide all labor and materials required for hydrostatic and
bacteriological testing, chlorination, and flushing. All testing and flushing shall be done
under the direct supervision of the Agency. Agency personnel shall collect all test
samples.

1.10. Submittals

The Contractor shall furnish four (4) copies of submittals for approval by the Agency
Engineer for all pumping, pressure reducing or electrical facilities, for any materials and/or
installations not covered and/or specified in the Technical Provisions or detailed on the
Plans and as required by the Agency Engineer. Each submittal shall be named and
submitted separately for each item or manufacturer.

All fire hydrants are to be utilized only for the purpose of fire protection and system
analysis. Any attempt to utilize water from a hydrant or service connection or other
appurtenance without an Agency approved water meter and Agency approval will
result in punishment under California Penal Code Section 490 or 625.

1.11. Construction Water

Any and all water to be used shall be arranged through the Agency’s Customer Service
Department (209) 223-3018. All construction water charges shall be paid prior to
acceptance of the job.

1.12. As Builts

The Contractor shall maintain and make available to the Inspector on the jobsite one
complete plan set. After each portion of the work is installed, the Contractor shall record
all deviations from the original design shown in the drawings either by additional sketches
or red ink thereon. Upon completion of the job, the MLX Applicant or Contractor shall
deliver this record set and a digital set to the Agency Engineering Department.

1.13. Acceptance

Agency assumes no obligation for maintenance of the facilities included in a MLX
Agreement until such time as they are formally accepted in writing by the Agency. Any
costs incurred by the Agency due to emergency or other repairs prior to final acceptance
by the Agency shall be billed to, and paid by, the MLX Applicant.

The system shall not be accepted and water service shall not be initiated until all
conditions contained within the MLX Agreement are satisfied, As-Built Record Drawings
have been received and AWA has provided a Certificate of Acceptance.
2. Plan Sheet Requirements

2.1. Drawing Size and Scale

All improvement plans shall be prepared on reproducible sheets twenty-two inches by thirty-four inches (22” x 34") or twenty-four inches by thirty-six inches (24” x 36”). Scales: Horizontal one inch equals twenty feet, forty feet or fifty feet (1” = 20’, 40’ or 50’); Vertical one inch equals two feet, four feet or five feet (1” = 2’, 4’or 5’). The scales selected shall be that which is appropriate for the sheet and provides clarity within the drawing.

2.2. Drafting Standards

All line work must be clear, sharp and heavy. Letters and numerals must be one eighth of an inch (1/8") minimum height, well-formed and sharp.

Each sheet within the set of drawings shall have a title block showing the sheet title, number, date, scale and the Consulting Engineer’s name, address, phone number, revision block and California Professional Engineer’s Stamp with wet ink signature, registration number and expiration date.

2.3. Title Sheet

A title sheet shall be prepared showing the following:

- Subdivision map, parcel map or other project boundaries
- Location Map
- Index of Sheets & Sheet Listing. Sheet index shall show a layout of all plan and profile sheets on an overall plan. Sheet index may be incorporated on the wastewater line layout sheet.
- Legend of symbols
- Title Block
- Signature Block for the Amador Water Agency Manager of Engineering & Planning, and County, City or both as applicable. The title sheet and subsequent revised drawing sheets shall have an approved signature block. The approval blocks shall be signed before any construction occurs. Any changes to the plans after initial approval shall be shown as revisions and shall be approved by the Amador Water Agency.
- MLX Applicant’s name, address and phone number
- Standard Notes shall be per Standard Drawing SS002.

H. Standard Notes, including , but not limited to:

Water Facilities - Amador Water Agency Inspector – Phone (209) 223-3018

Water lines and appurtenances shall be constructed in accordance with the Agency’s latest revised specifications. The Contractor shall contact Amador Water Agency Inspector forty-eight (48) hours prior to commencement of initial water line construction, and by 4:00 p.m. prior to each day work on water installation occurs. These plans are approved for use for waterline improvements only. Conflicts with other improvements shall be the responsibility of others. The Contractor is hereby notified that prior to
commencing construction, he is responsible for contacting the utility companies involved and requesting a verification at the construction site of the location of their underground utilities where such facilities may possibly conflict with the placement of improvements as shown on these improvement plans. The Contractor or any subcontractor for this contract will be required to notify members of Underground Service Alert (U.S.A.) and Western Utilities Underground Alert (WUUA) 48 hours in advance of performing excavation work (U.S.A. – (800) 227-2600; WUUA – (800) 424-3447). Excavation, for the purpose of these requirements, shall be defined as being twelve inches (12") or more in depth below the existing surface.

2.4. Water Line Layout Sheet

The treated and raw water system shall be shown on an overall plan layout with a scale of one inch equals one hundred feet (1" = 100’). This layout shall show pipe size, valving, hydrants, existing valving to be used for tie-ins, boundary lines, property lines, lot numbers, street names, section lines and corners and public easements. This layout must be incorporated into the improvement plans and may be shown on the title sheet if desired. Care must be taken to make sure the scale and orientation are correct since the layout sheets are used to generate Agency master water system maps.

2.5. Plan Details

The following details shall be shown on Plans submitted for approval.

2.5.1. Right of Way

Right of way lines, the boundaries of lots fronting on the street, drainage easements, utility easements, planting easements, section lines and corners, land grant lines and temporary construction easements, both existing and proposed, shall be shown on the plans. All right of way and easement lines shall be properly dimensioned.

The MLX Application shall provide a minimum twenty feet (20’) non-exclusive recordable easement, ten feet (10’) on either side of all water lines, to the Agency for all water lines installed outside a public right of way. The location of the easement and easement language shall be approved by the Agency. The project will not be accepted, nor service provided until the Agency receives the easements and they are recorded.

2.5.2. Contours and Elevations

Show existing contours or supporting elevations, and the limits of grading, cuts and fills with finished elevations. Profiles and benchmarks shall be USGS elevations at minimum five feet (5’) intervals.

2.5.3. Plan View

The plans shall show stationing, size and types of pipes, class or pressure rating, degree of pipe angles, valves, BOVs, AVRVs, hydrants, services, backflow prevention devices, meters, meter sizing, service lateral sizing and all other appurtenances. Service lateral size shall be indicated if larger than one inch.

2.5.4. Profile View
The plans shall show the corresponding profiles of all existing and proposed ground elevations, roadway centerlines, drainage ditches, and utilities. All profiles of proposed improvements shall show invert elevations, grades, vertical curves, other vertical alignment data and other utilities. The profile of water lines should show total length of pipe in linear feet (LF), size, type, pressure rating, all fixtures such as BOVs, AVRVs, fire hydrants, valves, pipe slope, depth of cover, and stationing.

2.5.5. Other Utilities

The plans shall show all existing or proposed utilities within twenty feet (20') of proposed or existing Agency facilities, including sewer lines and laterals, storm drain lines and laterals, gas, electric, cable and telephone. Where elevations of these utilities may be established, they shall be shown. The plans shall indicate minimum horizontal and vertical clearances where applicable.

2.6. Project Submittals

At the time a MLX Applicant requests a MLX Agreement from the Amador Water Agency, the applicant shall pay the required plan check and inspection deposit as determined by the Engineer. Prior to the Pre-Construction meeting, the applicant shall provide two (2) full size and one (1) half size copies of the fully signed set of plans to the Water Agency. Amador Water Agency will not attend the Pre-Construction meeting nor perform any inspection until the aforementioned copies of plans have been provided.

3. General Design Criteria

3.1. Introduction

These design criteria shall govern the engineering design of all Agency water facilities.

3.2. Intent of Criteria

The intent of these criteria is to ensure that the water system constructed that will dependably and safely convey the required amount of high-quality water throughout the distribution system at the least overall cost. In establishing the required amount of water, periods of peak day demand occurring in conjunction with an emergency fire flow demand, and peak hour demands, shall be considered.

3.3. Current Standards

Pertinent and current requirements of the following agencies or standards shall be complied with:

- Laws and Standards of the State of California, Department of Public Health, relating to Domestic Water Supply, and particularly therein the Standards of Minimum Requirements for Safe Practice in the Production and Delivery of Water for Domestic Use.

- Title 17, Chapter V, Sections 7583-7622, California Administrative Code, regarding cross connections.
• Applicable ordinances, rules and regulations of all local agencies, such as Amador County, cities, fire districts, etc.

3.4. Water Supply Pressure

Distribution design operating pressures shall not be less than forty (40) PSI, nor more than one hundred (100) PSI in the water main, service connection and meter box at all times, including peak hour. Normal operating pressures greater than one hundred (100) PSI will require special approval and design criteria, as required by the Agency Engineering Department. The minimum pressure at any point in the system during periods of coincident peak hour plus fire flow shall not be less than twenty (20) PSI.

The minimum peak hour (peak hour during the peak day or PHD) pressure in the system shall be not less than forty (40) PSI. Services on which the peak hour pressure at the point of use is less than forty (40) PSI shall be equipped with an individual backflow prevention device and hydro-pneumatic or pumped system, which shall be designed, installed, owned and maintained by the property owner.

The maximum day demand (MDD) shall equal 150% of the maximum month demand (MMD). The MMD shall equal 150% of the average day demand (ADD). Both are consistent with 22 CCR § 64554. Water models of the existing water system, using the above criteria, will have an average day to max day peaking factor of 2.25. PHD shall be a minimum of 167% of the MDD, or the AWA engineer approved MDD to PHD factor, whichever is greater.

Services with more that eighty (80) PSI static pressure shall be equipped with a pressure regulator set to less than eighty (80) PSI. The regulator shall be owned, operated and maintained by the property owner. Pressure regulators shall be installed at the time of service line construction by the property owner, and shall be located after the customer owned shut off valve, outside of the AWA meter box.

3.5. Water Connections and Flows

A standard residential water connection, also called an Equivalent Dwelling Unit (EDU), shall be considered to have an ADD of 400 gallons per day (gpd) and a MDD of 900 gpd. Fixture unit calculations shall not be allowed in determining water usage.

Use one (1) gallon per minute (gpm) per connection as the MDD for new medium to high density land use with five-eighths inch by three-fourths inch (5/8") x (¾") meters for city wide planning purposes. For large lot projects of one (1) acre or more per lot, use three (3) gpm per connection for the MDD. For projects with less than 100 residential units, larger meters and/or commercial or industrial uses, contact the Engineering Department regarding peak day flows.

3.6. Fire Flow

Water system storage or capacity shall be met entirely through reliable potable water treatment and storage capacity in each individual pressure zone and in the system as a whole, and shall not include allowances from additional pumping, alternate treatment capacity, source capacity, emergency source connections or non-automatic connections. All capacity shall be reliable, as determined with the largest unit out of service.
The local fire protection authority shall determine the fire flow requirements. A minimum of 1,000 gpm fire flow is required per AWA requirement, in addition to other flow requirements. Fire flow for sprinklers shall also be added to the required fire flow, a minimum of 60 gpm shall be used, or larger as required. The maximum allowable velocity anywhere in the system during all peak day demand conditions shall be seven (7”) feet per second (fps). The maximum allowable velocity during all peak day demand conditions plus fire flow rate shall be eleven (11”) fps. The maximum allowable pipe headloss during all peak day demand conditions plus fire flow rate shall be ten (10) feet per thousand feet. The minimum system-wide residual pressure during all peak day demand conditions, shall be forty (40) PSI. The minimum system-wide residual pressure during all peak day demand conditions, plus fire flow, shall be twenty (20) PSI.

3.7. Distribution System Design

3.7.1. Hydraulic Analysis

A hydraulic analysis of any proposed distribution system, impacted existing facilities, and associated necessary improvements to the existing system shall be provided to the Agency upon request, in compliance with AWWA M32. The hydraulic analysis shall be based on the 10 year historical maximum day demand, in addition to all added connections and contractual requirements. The hydraulic analysis shall include analysis of average day, peak day and peak day with fire flow, each before and after any proposed improvements. If the Project will be phased, water models are also required for every phase. All project requirements shall be met with each phase, including fire flow and looping requirements.

The hydraulic analysis shall be accurate to within 10% of approved fire flow tests and shall fully recover after a peak day. The hydraulic analysis report, including written explanation of assumptions, calibration and results, shall be stamped by a CA licensed professional engineer, and submitted along with the associated computer files in H2ONET or EPANET 2.0 format. Water models submitted to the Agency are required to be geo-referenced in the NAD83 State Plane California Zone 2 Feet Coordinate System and Lambert Conformed Conic Projection.

3.7.2. Sizing

The minimum water meter size for new residential homes with fire sprinklers shall be 1” meters per SW009, unless a separate fire protection service is provided. Compound water meters shall not be allowed.

The minimum offsite transmission pipe size shall be eight inches (8”). The minimum distribution pipe size shall be eight inches (8”), or six inches (6") if fully looped. The minimum pipe size to serve a single fire hydrant shall be a looped (two-way feed) six inch (6") or a single feed eight inch (8”). Water mains, hydrants, hydrant laterals and flushing appurtenances shall be sized to provide a minimum 2.5 ft/s continuous flushing velocity.

3.7.3. Material

Allowable waterline pipe materials shall be Ductile Iron Pipe, Polyvinyl Chloride (PVC) Pressure Pipe with minimum pressure rating of one hundred fifty (150) PSI.
3.7.4. Water Service Piping

Five-eighths inch (5/8”), three-fourths inch (3/4”) and one inch (1”) meters shall be served with one inch (1”) service piping. One inch (1”) service piping shall be blue polyethylene jacketed copper. Piping shall be marked at least every three (3) feet with pipe size, specification information, and manufacturing code.

One and one-half inch (1½”) and two inch (2”) meters shall be served with two inch (2”) service piping. Two inch (2”) service piping shall be blue polyethylene jacketed copper. Piping shall be marked at least every three (3) feet with pipe size, specification information, and manufacturing code.

Three inch (3”) and larger meters shall be served by four inch (4”) diameter or larger size piping. Allowable service piping for 3” and larger meters shall be polyvinyl chloride, or ductile iron pipe. Service lines larger than two inches (2”) shall have a buried service gate valve with two inch (2”) operating nut at the main.

Crimping or uncrimping of service piping or tubing shall not be permitted. Where crimping has been performed, the entire service line shall be replaced without splicing.

3.8. Distribution System Layout Requirements

3.8.1. Water Line Locations and Clearances

Water lines shall be placed in a public right of way unless the Agency deems the alignment impractical, in which case a twenty foot (20’) easement is required. Water lines shall be installed in the center of the required 20’ easement. Water lines shall be placed five feet (5’) off centerline on north and west alignments when in public street right of ways. Water lines shall be installed with a minimum of three feet (3’) clearance from the lip of the gutter within public street right of ways. Water lines that parallel sidewalks, drainage ditches, curbs, or gutters shall not be installed under said improvements, and shall have a minimum of two feet (2’) horizontal clearance from said improvements.

When in a highway right of way, railroad crossing, and where required by the Agency Engineer, water lines shall be cased. Casings shall extend five feet (5’) beyond the right of way wherever possible. Water lines parallel to highways shall be installed with a minimum of five feet (5’) horizontal separation from the edge of pavement.

All parallel dry utilities and other utilities shall be installed with a minimum of twenty-four inches (24”) horizontal separation and twelve inches (12”) vertical separation from the water line. At a minimum, unless otherwise listed as requiring additional separation, all parallel utilities, including other potable water pipelines, shall be installed with a minimum of twenty-four inches (24”) horizontal separation from the water line.

Storm drainage, disinfected tertiary recycled water, and raw water lines shall maintain a minimum of four feet (4’) horizontal separation and one foot (1’) vertical clearance. Untreated sewer lines, primary or secondary treated sewage, disinfected secondary-2.2 recycled water, disinfected secondary-23 recycled
water, and hazardous fluid lines shall maintain a minimum of ten feet (10’)
horizontal separation and one foot (1’) vertical clearance.

All crossing utilities shall be installed with a one foot (1’) minimum vertical
separation (nearest outside diameter to nearest outside diameter), and non-
potable lines (e.g. sewer, backwash and recycled water lines) shall cross under
the water lines. All crossings shall be made at a ninety degree (90º) angle unless
otherwise approved by the Agency Engineer. No connection joints are allowed in
a potable pipeline within eight (8) horizontal feet of the non-potable pipeline. All
sewer/water crossings shall conform to California State Health Department
regulations and Amador Water Agency regulations, utilizing whichever is more
stringent.

New water mains shall not be installed within 100 horizontal feet of the nearest
dge of any sanitary landfill, wastewater disposal pond, or hazardous waste
disposal site, or within 25 horizontal feet of the nearest edge of any cesspool, septic
tank, sewage leach field, seepage pit, underground hazardous material storage
tank, or groundwater recharge project site.

Water distribution lines shall be looped and connected wherever possible by
development, even if outside the boundaries of the development and where
required by the Agency Engineer. In all cases, water lines shall be extended to the
property lines of the development along all access roads or routes, where looping
is possible, and where potential future development or connections may exist. All
water systems shall be fully looped, with water being supplied from two sources or
locations, with bidirectional flow.

When an area outside the development, but in reasonably close proximity as
determined by Amador Water Agency Staff, can be logically served by future
extension of a proposed water main, the water main shall extend to the tract
boundary or to the end of a paved street in a manner to facilitate the future
extension and include any necessary diameter over sizing and extra depth.

Private or non-Agency facilities shall not be allowed within Agency trench sections,
without written approval from the Agency Engineer.

Water service connections shall not be allowed on transmission pipelines.

### 3.8.2. Service Lines

Service lines from the water main to the property line or edge of easement shall
normally be installed at the time the main is constructed. Service lines from mains
installed in private roads shall extend 1 foot (1’) beyond the edge of the pavement.
Meters and boxes shall not be located in driveways.

Service lines shall be placed grouped at property lines and not placed on property
lines having other utilities if possible.

Service lines shall have a maximum length of one hundred (100) LF from the water
line to the meter.

Manifold services to more than one parcel shall not be permitted.
Multi-family residential, commercial and industrial customers shall have separate
distribution line connections and meters for domestic use and fire protection.

Multi-family residential, commercial and industrial customers with more than 5,000
square feet of irrigated landscape shall have a separate distribution line connection
and meter for irrigation use only.

No service lines shall be permitted to tap into a fire hydrant lateral.

3.8.3. Line Valves

The distribution system shall be equipped with a sufficient number of line valves
so that no single shut-down will result in shutting down a transmission main of more
than one thousand feet (1,000'), a distribution main of more than five hundred feet
(500') or necessitate the removal from service of length of pipe greater than five
hundred feet (500') in other areas. Preferably no more than two fire hydrants shall
be removed from service.

Valves shall preferably be located at street intersections. If it is necessary to install
valves between street intersections, they shall be located on property lines.

All valves shall be flanged or flange x M.J. Valves are required on all sides of tees
and crosses. Use three (3) valves on all tees and four (4) valves on all crosses.
Exceptions shall be shown on the plans and approved by the Agency Engineer.

Valve size shall conform to pipe size, unless clearly stated and approved otherwise
on the plans. Ten inch (10”) and smaller valves shall be gate type. Twelve inch
(12”) and larger valves shall be butterfly type. Valves sixteen inches (16”) and
larger shall have a minimum two inch (2”) bypass valve.

3.8.4. Blow-Off Valve

Blow off valve assemblies shall only be permitted in temporary locations. All
installations where a permanent blow-off is required shall be accomplished through
the use of a standard fire hydrant.

A. A fire hydrant blow-off shall be installed at all low points in the pipeline and at
the ends of all water lines. All pipe shall slope down to fire hydrant blow-offs.
Wherever possible, the fire hydrant blow-off shall be installed in the street right of
way. In no case shall the location be such that there is a possibility of back-
siphonage into the distribution system.

B. On stubs for future service extensions, a two inch (2") end of line BOV shall be
installed.

3.8.5. Combination Air-Vacuum Release Valve (CAVRV)

A combination air-vacuum release valve shall be installed at all high points, and
between valved sections of pipe as determined by the Agency engineer. All pipe
shall slope up to CAVRVs.

Provide one inch (1”) CAVRV on line sizes up to twelve inches (12”); two inches
(2”) CAVRV on line sizes fourteen inches (14”) to eighteen inches (18”), the
CAVRV size shall be approved by the Agency Engineer.
3.9. Minimum Site and Equipment Requirements

- Inlet and outlet piping shall be pressure class 350 ductile iron, with isolation valves on all inlet an outlet piping. All exposed piping shall have adequately sized and located thrust blocks. A check valve isolated by shut off valves is required on all inlet and outlet piping.

- Fall protection shall be provided where appropriate.

- Site, building and equipment drains shall be provided.

- Permanent phone connectivity, where possible, direct wire to Agency SCADA systems, and a backup radio transmitter shall be provided for systems communications.

- SCADA controls operating with the Agency SCADA system and compliant with Agency SCADA Standards shall be provided. All equipment shall be remotely controlled and alarmed via SCADA.

- Level sensing shall be via transducers. Additionally, a backup alarm system connected to an auto-dialer with battery back-up shall also be provided.

- Three phase PG&E power shall be brought to the site, where available. The service shall be sized to allow startup of the largest pump, with all other equipment running. Where not available, solar power shall be provided, with sizing based on the coincidence of peak demand and 50% cloud cover for seven consecutive days.

- All electrical equipment shall be placed in minimum NEMA 4x rated enclosures.

- Arc Flash certification, labeling and working space requirements shall be provided.

- All above grade electrical conduit shall be PVC coated rigid conduit.

- Provide sun and weather protection as appropriate for all equipment and working spaces.

- 48 hour battery backup for all equipment is required. Surge protection and lighting arrestors shall be provided.

- Sufficient interior and exterior lighting shall be provided for Agency crews to perform night work. Interior and exterior receptacles shall be provided.

- The entire site shall be paved with a) 2-inches of Asphalt Concrete over 5-inches of Class II Aggregate Base or b) 4-inches of Portland Cement Concrete.

- The site shall be accessible either via a minimum 12-foot driveway with a hammerhead turnaround and constructed of a) 2-inches of Asphalt Concrete over 5-inches of Class II Aggregate Base or b) 4-inches of Portland Cement Concrete. The driveway shall be accessible from a PUE or access easement dedicated to the Agency.

- The entire site shall be enclosed with 6 foot chain link fence with colored slats and 3-strand barbed wire. A minimum of one 16-foot wide double gate and one man gate, on the opposing side of the site, shall be provided.
• The site shall be a separate lot deeded to the Agency. The site shall be sized to allow for 20’ level clearance on all sides from any equipment, buildings, fencing or piping, and shall include a replacement tank site.

• Complete O&M manuals shall be submitted and the Contractor shall provide all training necessary for maintenance and operation of facility.

3.9.1. Minimum Tank Requirements

o Tanks shall be welded steel with concrete ringwall, per AWWA D100. Tanks shall be coated per Agency standards with NSF approved products, with an interior coating system of 15 mils minimum.

o Minimum storage capacity within the tank shall be calculated as follows: two and one quarter (2.25) average days demand (or one maximum day demand, whichever is greater) for emergency storage, plus 33% maximum day demand for operational storage, plus typical system losses, plus the maximum required fire flow plus sprinkler fire flow for two (2) hours.

o Maximum storage capacity of the tank shall be calculated from one foot above the top of the outlet pipe to one foot below the invert of the overflow pipe or greater, depending on piping arrangement.

o The tank shall have separate inlet and outlet piping. Tanks shall be equipped with Tideflex Series 35 mixing systems or Agency Engineer approved equal, which shall be fully modeled and proven effective under normal operating conditions.

o Flexible Couplings are required on all inlet and outlet tank piping.

o A visible, exterior, descending, half size water level indicator shall be provided.

o Baffling of the tank may be required at the discretion of the Agency Engineer.

o All overflow and drain water discharge plans shall be reviewed and approved by the governing entity and the Agency. A 24” air gap separation shall be provided on all drain and overflow pipelines.

o All exterior tank and piping coatings and color shall be determined by the Agency.

o Tank type, location and construction methodology shall be selected by the Agency. Tanks shall be welded steel or concrete, be supported by a structurally sound concrete ringwall, have seismic anchor bolts and be fully coated, inside and out, where applicable.

o Tank modeling shall be performed to the satisfaction of the Agency and shall show the tank provides adequate circulation, turnover, and chlorine residuals throughout the distribution system.

o Adequate storage shall be contained within two storage tanks. Multiple tanks in sequence or parallel shall not be permitted. An equal size replacement tank site, adjacent to the existing tank site shall be provided.
o The tank shall have a minimum of two (2) manway entry points. Each manway shall be a minimum of 36" in diameter. All doors and lids shall require no more than 50 pounds force to open, provide lift assistance as required.

o Tanks shall be equipped with minimum 36" diameter roof vents, stainless steel inside ladder, OSHA approved outside ladder, 36” square roof hatch, OSHA approved roof handrails completely around the tank, ½ travel liquid level gauges, and inlet and outlet magnetic flow meters connected to AWA SCADA. All metal parts in contact with water shall be stainless steel.

o Permanent lettering at least 4" high shall be provided on the tank, nearest to the entrance, labeling the tank name, base elevation and rated capacity.

o 20 year cathodic protection and monitoring shall be provided.

3.9.2. Minimum Pump Station Requirements

o Pump design shall be a minimum of 3 gpm per lot, plus 75 gpm, deliverable with a single domestic pump. Domestic pumps shall be a minimum of 5 horsepower and provide a minimum of 75 gpm. Full size redundant/backup domestic pumps shall be installed, for a minimum of two full size domestic pumps. Pumps shall be designed for maximum use with largest unit out of service. Pumps shall operate lead-lag and cycle the lead pump.

o Fire pumps shall be provided, based on the sizing requirements of the AHJ, plus peak hour domestic demand and in home fire sprinkler demand.

o Pumps and Motors shall have a minimum combined efficiency of 80%. All pumps shall be VFD controlled. Pumps shall run in automatic or hand mode.

o Rubber expansion joints are required on all suction and discharge piping.

o Full size pump bypass piping is required.

o Pumps, VFD’s and pump control wiring shall be installed in a fully enclosed, secure, sound attenuated and waterproof concrete or CMU building. A maximum of 60 dBA at the nearest property line is allowed. Allowed internal ambient air temperature shall be a maximum of 100 degrees and a minimum of 50 degrees. Provide heating, HVAC or ventilation as appropriate. Minimum 3’ working spaces shall be provided in front of all equipment and on three sides of all pumps. Minimum 5’ working spaces shall be provided in front of all electrical equipment.

o Hydrostatic tanks shall be provided on all pump stations. Tanks shall be a minimum of 750 gallons, with sizing based on Agency Engineer requirements.

o A permanently mounted backup propane generator and tank with automatic transfer switch is required. The generator shall be sized to allow startup of the largest pump, with all other equipment running. Sound attenuation, as described above, and silencer are required.

4. Cross Connection Control
4.1. Purpose

The purpose of this program is:

1. To protect the public water supply against actual or potential contamination through cross connections by isolating sources of contamination that may occur within a water user’s premises because of some undiscovered or unauthorized cross connection on the premises.

2. To eliminate existing connections between drinking water systems and other sources of water that are not approved as safe and potable for human consumption.

3. To eliminate cross connections between drinking water and sources of contamination.

4. To prevent the making of cross connections in the future.

These regulations are adopted pursuant to the State of California Administrative Code, Title 17 – Public health entitled “Regulations Relating to Cross Connections.”

It is unlawful for any person, firm or corporation at any time to make or maintain or cause to be made or maintained, temporarily or permanently, for any period of time whatsoever, any cross connection between plumbing pipes or water fixtures being served with water by the Agency and any other source of water supply or to maintain any sanitary fixture or other appurtenances or fixtures which, by reason of their construction, may cause or allow backflow of water or other substances into the water supply system of the Agency and/or the service of water pipes or fixtures of any consumer of the Agency.

4.2. Definitions


B. Air-Gap Separation: The term “air-gap separation” means a physical break between a supply pipe and a receiving vessel. The air-gap shall be at least double the diameter of the supply pipe measured vertically above the top rim of the vessel, in no case less than one inch (1”).

C. Approved Backflow Prevention Device: The term “Approved Backflow Prevention Device” shall mean devices which have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the California Department of Health Services.

D. Approved Water Supply: The term “approved water supply” means any water supply whose potability is regulated by a State or local health Agency.

E. Auxiliary Supply: The term “auxiliary supply” means any water supply on or available to the premises that is connected or poses a reasonable likelihood of being connected other than the approved water supply.

F. AWWA Standard: The term “AWWA Standard” means an official standard developed and approved by the American Water Works Association (AWWA).

G. Backflow: The term “backflow” shall mean a flow condition caused by a differential in pressure that causes the flow of water or other liquids, gases, mixtures or substances into the distributing pipes of a potable supply of water from any source or sources other than
an approved water supply source. Backspiphonage is one cause of backflow. Back pressure is the other cause.

H. Contamination: The term “contamination” means a degradation of the quality of the potable water by any foreign substance which creates a hazard to the public health, or which may impair the usefulness or quality of the water.

I. Cross Connection: The term “cross connection” means any unprotected actual or potential connection between a potable water system used to supply water for drinking purposes and any source or system containing unapproved water or substance that is not or cannot be approved as safe, wholesome and potable. Bypass arrangements, jumper connections, removable sections, swivel or changeover devices, or other devices through which backflow could occur, shall be considered cross connections.

J. Double Check Detector Check Valve Assembly: The term “double check detector check valve assembly” means an assembly of at least two independently acting check valves including flanged, full port resilient wedge shut off valves on each side of the check valve assembly.

K. Health Agency: The term “health Agency” means the California Department of Health Services, or the local health Agency with respect to a small water system.

L. Local Health Agency: The term “local health Agency” means the Amador County Environmental Health Department.

M. Person: The term “person” means an individual, corporation, company, association, partnership, municipality, public utility, or other public body or institution.

N. Premises: The term “premises” means any and all areas on a water user’s property, which are served or have the potential to be served by the public water system.

O. Public Water System: The term “public water system” means a system for the provision of piped water to the public for human consumption that has five (5) or more service connections or regularly serves an average of twenty-five (25) individuals daily at least 60 days out of the year.

P. Reclaimed Water: The term “reclaimed water” means a wastewater which, as a result of treatment, is suitable for other than potable use.

Q. Reduced Pressure Principle Backflow Prevention Device: The term “reduced pressure principle backflow prevention device” means a device incorporating two or more check valves and an automatically operating differential relief valve located between the two checks, a flanged, full port resilient wedge shut off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing.

R. Service Connection: The term “service connection” refers to the point of connection of a user’s piping to the water supplier’s facilities.

S. Water Supplier: The term “water supplier” means the person who owns or operates the approved water supply system.

T. Water User: The term “water user” means any person obtaining water from an approved water supply system.
4.3. Cross Connection Protection Requirements

4.3.1. General Provisions

Unprotected cross connections with the public water supply are prohibited. Whenever backflow protection has been found necessary, the Agency will require the water user to install an approved backflow prevention device by and at his expense for continued services or before a new service will be granted.

Wherever backflow prevention has been found necessary on a water supply line entering a water user’s premises, then any and all water supply lines from the Agency’s mains entering such premises, buildings, or structures shall be protected by an approved backflow prevention device. The type of device to be installed will be in accordance with the requirements of this program.

Minimum clearance of 6” shall be provided on all sides of all backflow devices. Minimum clearance of 24” shall be provided on all sides of backflow devices 3” and larger.

4.3.2. Where Protection is Required

Each service connection from the Agency’s water system for supplying water to premises having an auxiliary water supply shall be protected against backflow of water from the premises into the public water system unless the auxiliary water supply is accepted as an additional source by the Agency, and is approved by the public health Agency having jurisdiction.

Each service and fire connection from the Agency’s water system for supplying water to any premises on which any substance is handled in such fashion as may allow its entry into the water system shall be protected against backflow of the water from the premises into the public system. This shall include the handling of process waters and waters originating from the Agency’s water system which have been subjected to deterioration in sanitary quality.

Backflow prevention devices shall be installed on the service connection to all commercial buildings and any premises having (a) internal cross connections that cannot be permanently corrected and controlled to the satisfaction of the state of local health department, or (b) intricate plumbing and piping arrangements or where entry to all portions of the premises is not readily accessible for inspection purposes, making it impracticable or impossible to ascertain whether or not cross connections exist.

Any other connection or use of water from the Agency’s system, where protection of the Agency’s system is in question (such as hydrant connections for construction purposes), shall have backflow protection.

All backflow prevention devices 3” and larger shall be installed with a 5/8” x 3/4” bypass meter, 3/4” bypass backflow device of the same type as the main backflow device (unless otherwise approved by USC), 3/4” shutoff valves per SW015 layout and test cocks for testing the water tightness of each check valve.

4.3.3. Fire Protection Systems Using Chemicals
Antifreeze solutions must be premixed in accordance with sections 3.4.1.1, 7.6.2, of NFPA 13.

Installation of antifreeze fire protection systems must follow all applicable standards in NFPA 13, Sections 7.6 and 23.1.3, NFPA 13R, Sections 5.4.2 and 5.4.3, and NFPA 13D Sections 9.2 and 12.3.5.

Inspections, tests, and maintenance of antifreeze fire protection systems must follow standards in NFPA 25.

Antifreeze solutions must be tested and verification provided to ensure compliance with the above conditions.

Any other antifreeze solution shall not be permitted.

### 4.3.4. Type of Protection Required

The minimum types of backflow protection required to protect that approved water supply, at the user’s water connection to premises with varying degrees of hazard are given in Table 1. Situations which are not covered in Table 1 shall be evaluated on a case-by-case basis and the appropriate backflow protection shall be determined by the Agency.
Table I
Type of Backflow Protection Required

If more than one hazard is present, the more protective device type shall be required, as determined by the Agency.

A. Reduced Pressure Principle Device is required for:
   - All non-residential applications, including all non-residential fire protection systems.
   - Premises where there are irrigation systems into which fertilizers, herbicides or pesticides are, or can be, injected, spread or sprayed.
   - Premises where chemicals or contaminants may be introduced into the water system.
   - Fire protection systems using chemicals, per Section 4.3.3.
   - All services where there is an unopposed auxiliary water supply interconnected with the public water supply.
   - Residences where there is an unapproved auxiliary water supply (e.g., well) but not interconnected with public water systems.

B. Double Check/Detector Check Valve Assembly is required for:
   - Residential fire protection systems not using chemicals.

C. Double Check Valve Assembly is required for:
   - Two or more domestic service supplying water from different street mains to the same building, structure or premises through which an inter-street main flow may occur.

4.3.5. Cross-Connection Control Hazard Assessment

In order to be in compliance with Title 17 and its proposed changes, we have had to revise how we keep track of our cross-connection control issues. Cross-Connection control issues pertain to treated water facilities; therefore, surveys and service orders are not needed on raw-water and wastewater accounts.

Assessment accounts would only be involved when a customer owns a rental and the testing requirements need to be tracked on the owner's account.
**AMADOR WATER AGENCY**  
**CROSS-CONNECTION CONTROL HAZARD ASSESSMENT**

<table>
<thead>
<tr>
<th>CUSTOMER INFORMATION (Please print legibly)</th>
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<tbody>
<tr>
<td>Customer Name(s):</td>
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<tr>
<td>Service Address:</td>
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<tr>
<td>Legal Owner(s):</td>
</tr>
</tbody>
</table>

**QUESTIONNAIRE**  
(This form is to be used for existing and new services)

1. Who is completing this questionnaire?  
   - [ ] Legal Owner  
   - [ ] Renter  
   - [ ] Other

2. Is there (or do you plan to have) a business on the property?  
   - [ ] Yes  
   - [ ] No

   If yes, please indicate the type of business. (e.g. hardware store, professional office etc.)

Does (or will) this commercial property have a sprinkler system for landscaping?  
- [ ] Yes  
- [ ] No

Please indicate if any of the following activities occur (or will occur) at your place of business. (Check all that apply)

- [ ] Medical/Dental/Mortuary Services
- [ ] Manufacturing; Type: ________________________________
- [ ] Chemical Handling; Type: ________________________________
- [ ] Photo or Printing Services
- [ ] Other Biological, or Chemical Processing (Give brief description on back)

3. In addition to being served treated water from the Amador Water Agency, do you have an alternate source of water?  
   - [ ] Yes  
   - [ ] No (Please mark all that apply)

   - [ ] Untreated Water from the Amador Canal or Ione Pipeline. Acct. ________________ (check this box if you have, or are applying for, a raw water service)
   - [ ] Private Well.
   - [ ] Pond, Spring, Canal, or Creek
   - [ ] Swimming Pool, Hot Tub, Decorative Fountain or Pond.
4. Do you have (or plan to have) an auxiliary fire fighting system on your property?  □ Yes □ No  
   (i.e. fire sprinklers, fire meter, pumps etc.)

5. Do you have (or plan to have) a solar water heating system?  □ Yes □ No

6. Do you have (or plan to have) any animal watering troughs on your property?  □ Yes □ No

7. Do you utilize (or plan to utilize) a booster system for water pressure?  □ Yes □ No

**CERTIFICATION**

I/we hereby certify that I/we am/are the □ Owner(s) □ Renter(s) □ Other of the above-identified parcel, and the forgoing is true and correct to the best of my/our knowledge.

<table>
<thead>
<tr>
<th>Signature</th>
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<td>Print Name</td>
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4.4. **Backflow Prevention Devices**

4.4.1. **Approved Devices**

Only backflow prevention devices which have been approved by the California Department of Health Services shall be acceptable for installation by a water user connected to the Agency’s potable water system. A list of approved backflow prevention devices can be found at http://fccchr.usc.edu/list.html.

4.4.2. **Installation**

Backflow prevention devices shall be installed in a manner prescribed in Section 7603, Title 22 of the California Administrative Code and as shown on Standard Drawings No. SW016 and SW017. Location of the devices should be as close as practical to the user’s connection. The Agency shall have the final authority in determining the required location of a backflow prevention device.

4.4.3. **Testing and Maintenance**

The owners of any premises on which, or on account of which, backflow prevention devices are installed, shall have the devices tested by a person who is licensed and has demonstrated their competency in testing of these devices to the Agency. Backflow prevention devices must be tested at least annually and immediately after installation, relocation or repair. The Agency may require a more frequent testing schedule if it is determined to be necessary. No device shall be placed back in service unless it is functioning as required. A report in a form acceptable to the Agency shall be filed with the Agency each time a device is tested, relocated or repaired. These devices shall be serviced, overhauled or replaced whenever they are found to be defective and all costs of testing, repair and maintenance shall be borne by the water user.

4.4.4. **Removal**

Approval must be obtained from the Agency before a backflow prevention device is removed, relocated or replaced.

A. **Removal**: The use of a device may be discontinued and the device removed from service upon presentation of sufficient evidence to the Agency to verify that a hazard no longer exists or is not likely to be created in the future;

B. **Relocation**: A device may be relocated following confirmation by the Agency that the relocation will continue to provide the required protection and satisfy installation requirements. A retest will be required following the relocation of the device;

C. **Repair**: A device may be removed for repair, provided the water use is either discontinued until repair is completed and the device is returned to service, or the service connection is equipped with other backflow protection approved by the Agency. A retest will be required following the repair of the device; and

D. **Replacement**: A device may be removed and replaced provided the water use is discontinued until the replacement device is installed. All replacement devices must be approved by the Agency and must be commensurate with the degree of hazard involved.
Technical Standards

5. Piping and Plumbing

5.1. Treated Waterline Piping

Allowable treated waterline pipe materials shall be Ductile Iron Pipe, Polyvinyl Chloride (PVC) Pressure Pipe. Specifications for individual pipe materials are given below.

All pipes shall be designed for a minimum internal working pressure of 150 PSI or as otherwise specified by the Agency Engineer.

Design Conditions:
A. Trench width shall be one pipe outside diameter plus twelve inches (12”).
B. Bedding tamped to twelve inches (12”) above pipe, load factor 1.5.
C. Soil density one hundred thirty-five pounds per cubic foot (135 lbs./ft3).
D. Bedding angle ninety (90) degrees.
E. Live load AASHTO H-20, sixteen thousand pound (16,000 lbs.) wheel load.
F. Rigid pipe 1.5 factor of safety versus crushing.
G. Flexible pipe allowable deflection – as specified by pipe manufacturer.
H. Above design conditions apply to an empty conduit with no internal pressure.

Any waterline placed within the Caltrans Right of Way shall be Ductile Iron Pipe with a minimum cover of thirty-six inches (36”).

No Star Pipe Products materials are allowed.

5.2. Pipeline Depths

Depth of cover to be minimum thirty-six inches (36”), except as listed below.

- 18” to 24” Cover: Use Ductile Iron Pipe only, encased in 2,000 psi concrete. 6” minimum of granular pipe bedding shall be placed under the pipe per AWA standards, pipe installation and locating wire per AWA standards; encasement shall consist of concrete backfill concurrently poured around the pipe above the bedding course and above the pipe to 12” minimum depth concrete above the pipe or to the bottom of the roadway base course, whichever is greater. Encasement shall be as wide as the trench width or 12” outside of pipe wall on both sides, whichever is less. Locating tape shall be laid on top of the concrete.
- 24” to 36” Cover: Use C-900 Class 235 or Ductile Iron Pipe, encased in 2-sack sand slurry.
- No service connections or ARV shall be allowed where cover is less than 36” without special permission from the Agency Engineer.

Maximum trench bottom depth shall be six feet (6’).

5.3. Pipeline Types

5.3.1. Ductile Iron Pipe
5.3.1.1. Materials

Ductile iron water pipe shall conform to current AWWA C151 specifications, shall be cement lined per AWWA C104, and shall be plastic film wrapped. Ductile iron pipe shall be minimum pressure class 350 and thickness class 50 unless otherwise required by the pressure, loading or as specified on the plans.

5.3.1.2. Joints

Joints that are aboveground, submerged, or located in vaults and structures shall be flanged. Joints in buried piping shall be of the restrained, slip-on or mechanical-joint type per AWWA C111 except where flanged joints are required to connect to valves, meters, and other equipment. Provide unrestrained buried joints except where restrained joints are specifically shown in the drawings. Restrained joints shall consist of a follower gland having a seal gasket and individually actuated wedges that increase their resistance to pullout as pressure or external forces increase. The system manufacturer shall provide all the components (follower ring, wedges, and gaskets) for the restraining device. The device shall be capable of full mechanical joint deflection during assembly and the flexibility of the joint shall be maintained after burial. Dimensions of the gland shall be such that it can be used with mechanical joint bells conforming to AWWA C111 and AWWA C153. Minimum rated pressure shall be 350 psi for sizes 15 inches and smaller. Products: Megalug Series 1100 as manufactured by EBAA Iron, Inc., or Agency Engineer approved equal.

Assembly of pipe and joints shall follow the manufacturer’s instructions. After assembly of each slip-on joint, the final location of rubber rings within each joint shall be checked by gauge as recommended by the manufacturer.

Joints between ductile iron pipe and other types of pipe shall be made by means of the proper sized and type compression adapter.

All ductile iron, steel, ferrous, copper, brass or metal pipe and joints shall be completely bonded and cathodically protected.

5.3.1.3. Fittings

Fittings shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings. Mechanical joint ductile-iron fittings conforming to AWWA C110 (except for laying length) with a minimum pressure rating of 250 psi may also be used. Fittings shall be cement-mortar lined per AWWA C104 and shall be protected with bituminous coating.

5.3.1.4. Flanges

Flanges shall be solid back, minimum Class 125 per AWWA C115. Flanges on pipe shall be either cast or threaded. Flanged pipe and fittings shall be shop fabricated, not field fabricated. Threaded flanges shall comply with
AWWA C115. Flanges shall be individually fitted and machine tightened in the shop, then machined flat and perpendicular to the pipe barrel. Flanges shall be backfaced parallel to the face of the flange. Prior to assembly of the flange onto the pipe, apply a thread compound to the threads to provide a leak-free connection. There shall be zero leakage through the threads at a hydrostatic test pressure of 250 psi without the use of the gasket. Material for blind flanges shall be cast or ductile iron. Restrained flange adapters may be used in lieu of cast or threaded spool pieces. See Section 5.6.25.

5.3.1.5. Polyvinyl Chloride (PVC) Pressure Pipe

5.3.1.6. Small & Large Diameter PVC

Polyvinyl Chloride (PVC) Pressure Pipe in sizes four inches (4") through thirty-six inches (36"), shall conform to current AWWA C900 and have Underwriters' Laboratories, Factory Mutual and NSF approval. PVC pipe shall be dimension ratio (DR) twenty five (25), Pressure Class (PC) 165 for internal working pressures up to one hundred thirty five (135) PSI; use DR eighteen (18), PC 235 for internal working pressures between one hundred thirty five (135) PSI and two hundred five (205) PSI. For internal working pressures greater than two hundred five (205) PSI, the pipe DR/Class shall be approved by the Agency Engineer. Butt Fused PVC pipe shall not be allowed.

5.3.1.7. Reserved

5.3.1.8. Joints

Lengths of PVC shall be joined by a locked-in flexible elastomeric gasket coupling with bell and spigot configuration. Lubricants intended for use with PVC pipe shall be compatible with the plastic material and not adversely affect the potable quality of the water being transported.

Joints between PVC pipe and fittings shall be slip-on type or mechanical type as shown on the plans. Slip-on type joints shall be sealed by means of rubber rings designated for use with the type of pipe being installed.

Joints between PVC pipe and other types of pipe shall be made by means of the proper sized compression type adapter.

5.3.1.9. Fittings

Fittings shall conform to AWWA C110 with a minimum pressure rating of 250 psi. Size bells specifically for OD of cast iron equivalent PVC pipe including rubber ring retaining groove. Mechanical joint fittings conforming to AWWA C153 may be used in lieu of AWWA C110 fittings. Fittings shall be cement-mortar lined cast or ductile iron fittings or fusion bonded epoxy lined and coated fabricated steel fittings.

5.3.2. Brass Pipe

Brass pipe shall conform to ASTM B43.

5.3.3. Galvanized Steel Pipe
Galvanized steel pipe shall conform to ASTM A53.

5.4. Treated Water Service Piping

Meters shall be five-eighths inch (5/8”), three-fourths inch (¾”) and one inch (1”) served with one inch (1”) service piping. One inch (1”) service piping shall be copper.

One and one-half inch (1½”) and two inch (2”) meters shall be served with two inch (2”) service piping. Two inch (2”) service piping shall be copper.

Three inch (3”) and larger meters shall be served by four inch (4”) diameter or larger size piping. Allowable service piping for 3” and larger meters shall be polyvinyl chloride, or ductile iron pipe. Service lines larger than two inches (2”) shall have a buried service gate valve with two inch (2”) operating nut at the main. Crimping or uncrimping of service piping shall not be allowed.

Specifications for individual pipe materials are given below.

5.4.1. Copper

Copper pipe shall be Type K, soft, manufactured according to ASTM B88, and blue polyethylene jacketed. Piping shall be marked at least every three (3) feet with pipe size, specification information, and manufacturing code. Recommended manufacturer is Mueller, or Agency Engineer approved equal. Crimping or uncrimping of service piping shall not be allowed. Soldering shall not be permitted.

5.4.2. Polyvinyl Chloride (PVC)

Three inch (3”) PVC pipe shall be Schedule 80, and shall conform to ASTM Designation D1784 for rigid PVC compounds. It shall bear the National Sanitation Foundation seal of approval and shall conform to the requirements of commercial standard 256 and ASTM D2241. Pipe shall be manufactured to Iron Pipe Size (IPS) dimensions and furnished in minimum standard lengths of twenty feet (20’). Four inch (4”) and larger diameter polyvinyl chloride shall conform to current AWWA C900.

Unless otherwise required, all chemical feed piping three inches (3”) and smaller shall be schedule 80 PVC as specified in this section.

All PVC fittings shall be molded fittings manufactured of the same material as the pipe and shall be suitable for either solvent weld or screwed connections. Solvent weld type couplings and fittings shall be of a pressure rating greater than that of the pipe and shall be of a type recommended by the pipe manufacturer. Priming and solvent welding of pipe and fittings shall be per manufacturer’s recommendations.

5.4.3. Ductile Iron Pipe

Ductile iron water pipe shall be pressure class 350, conform to current AWWA C151 specifications, be minimum thickness class 50 and shall be cement lined per AWWA C104. Fittings and appurtenances shall have a pressure rating at least as high as the pipe. Fittings shall conform with with AWWA C110 or C153 and shall be cement-mortar lined per AWWA C104. All ductile iron pipe and fittings shall be protected with bituminous coating.
5.5. **Reserved**

5.6. **Valves and Appurtenances**

5.6.1. **Gate Valves**

Treated waterline valves two inches (2") to ten inches (10") shall be gate type.

Gate valves shall be resilient seated wedge type, minimum two hundred fifty (250) PSI WOG rated, and conform to AWWA specification C509 or C515 with ASME B16.1 Class 125 flanges minimum. All interior ferrous surfaces shall be protected against corrosion by factory applied fusion-bonded epoxy coating, which shall be a minimum of eight (8) mils thick and per AWWA C550. Valves shall have a smooth inside bore on the bottom half so that sediment cannot accumulate. Valves shall open counter-clockwise. Valves installed underground shall have a non-rising stem and a two inch (2") square operating nut that is accessible through a valve box. Valves installed above ground shall have outside stem and yolk (OS&Y), rising stem, and be hand wheel operated.

Stems shall be Type 304 or 316 stainless steel or cast, forged, or rolled bronze. Stem nuts shall be made of solid bronze. Bronze shall conform to ASTM B 62 or ASTM B 584 (Alloy C83600). All exterior valve body bolting shall be type 304 stainless steel with hexagonal heads. Valves shall be NSF 61 and NSF 372 certified.

Surfaces of gate valves one and a half inches (1½") and smaller that are in contact with water shall be constructed of lead-free brass (e.g. UNS C28500, C89550 or C89833). Valves 1½" or smaller shall be hand wheel operated, non-rising stem, minimum two hundred (200) PSI WOG.

Valves installed above ground shall be flanged and hand wheel operated. End connections for buried gate valves 4" and larger shall be mechanical joint, flanged, or mechanical joint by flanged type as required.

5.6.2. **Butterfly Valves**

All butterfly valves shall be rubber seated, minimum two hundred fifty (250) PSI WOG rated, and conform to the requirements of AWWA Specification C504 with ASME B16.1 Class 125 flanges. Valves shall be short cast iron body type.

Valve shafts shall be Type 304 or 316 stainless steel. Valve shafts shall be stub shaft or one-piece units extending completely through the valve. Body bolts and nuts shall be Type 304 or 316 stainless steel. Where the rubber seat is applied to the disc, it shall be bonded to a stainless steel seat retaining ring which is clamped to the disc by Type 304 or 316 stainless steel screw fasteners. The rubber valve seat shall be secured to or retained in the valve body.

Valve disks shall be ductile iron ASTM A536 grade 65-45-12. The valve assembly shall be furnished with a non-adjustable factory set thrust bearing to center the disk at all times. Valves shall be NSF 61 and 372 certified.

All butterfly valves shall be operated manually and shall open counter-clockwise. Valves installed underground shall be traveling nut operated with all gearing fully encased with a double stop feature and have a two inch (2") square operating nut.
that is accessible through a valve box. Actuators on twelve inch (12") to fourteen inch (14") butterfly valves shall have ratings of four hundred fifty foot pounds (450' lbs.) input torque at the open and closed stops without damage. Actuators shall be sized to provide sufficient output torque to operate the valve.

Valves installed above ground shall be flanged and be lever operated through eight inch (8") and hand wheel operated for larger sizes. Butterfly valves four inches (4") and larger shall be flanged with flange adaptors as required.

Treated waterline valves twelve inches (12") or larger shall be butterfly type. All interior ferrous surfaces shall be protected against corrosion by a factory applied fusion-bonded epoxy coating which shall be a minimum of eight (8) mil thick per AWWA C550.

5.6.3. Tapping Valves
Flanged gate valves shall be used for hot tapping waterlines. All gate valves conform to these specifications.

5.6.4. Tapping Sleeves/Saddles
Tapping sleeves shall be entirely Type 304 Stainless Steel, including the flange, nuts and bolts, as manufactured by JCM, Ford, Smith-Blair or Romac. Tapping saddles shall be ductile iron as manufactured by Mueller.

For 2" and smaller taps on pipelines, the taps shall be spaced a minimum of 24” apart and installed 45 degrees apart. For 3” and larger taps on pipelines, the taps shall be spaced a minimum of 4’ apart. No tapping sleeve or saddle shall be placed within 24” of any bell, fitting or cut end.

5.6.5. Flanged Gaskets
Gaskets for ductile iron flanged joints shall be full-face type SBR or Neoprene elastomer per ANSI/AWWA C111/A21.11 and shall be 1/8" thickness. Flanged gaskets shall be U.S. Pipe FLANGE-TYTE II or Agency Engineer approved equal. No bonding agent (i.e. Permatex) shall be used on the flange or gasket. The flange face shall be free of any foreign matter and/or rough surface.

5.6.6. Nuts and Bolts
Nuts and bolts, not specified elsewhere, shall be stainless steel conforming to ASTM F593 & F594, SAE Grade 2 or better. Threads shall be coated with Loctite anti-seize, or equivalent, before assembly.

The bolt shall extend at least three (3) threads past the nut and no more than one inch (1”).

5.6.7. Service Saddles
All service saddles shall be female NPT (aka FIPT, FIP or female “iron pipe”) threads. Service saddles shall be NSF 61 certified. Service saddles for ductile iron pipe shall be of 85-5-5-5 bronze construction and may be wide strap, double strap type, or a combination of the wide/double types. Service saddles for all other types of pipe shall be wide strap. Recommended manufacturers are Mueller, Ford, Jones, and Romac, or Agency Engineer approved equal.
5.6.8. Corporation Stops

Corporation Stop components that are in contact with the water shall be of made of lead-free brass alloy (e.g. UNS C89833, C89550 or C28500). Components not in contact with the water may be 85-5-5-5 bronze (UNS C83600) as manufactured by the James Jones Company, Mueller Company or Ford. Corporation stops must comply with AWWA C 800.

Inlet threads shall be male iron pipe (MIP) threads. Outlet shall be copper tube size compression, or Mueller “Insta-tite.”

5.6.9. Plastic Film Wrap

This wrap shall be used around all ductile iron pipe, buried valves, bolted flanges and other fittings. The polyethylene film shall be of virgin polyethylene as produced from DuPont Alathon resin and shall meet the requirements of ASTM Designation D3350 and AWWA C105, and shall have a flow rate or nominal melt index of 0.4 g/min maximum.

The polyethylene film shall be minimum six (6) mils in thickness. The length shall be sufficient to firmly attach the film to the pipe on either side of the valve, flange or fitting with ten (10) mil tape.

5.6.10. Meter Boxes

For meters smaller than one inch (1”), meter boxes shall be dual Christy B16 Utility Boxes or a single Christy B30 Utility Box, lids shall be marked “Water” and have a touch read port. For one inch (1”) to two inch (2”) meters, meter boxes shall be dual Christy B30 Utility Boxes or a single Christy B36 Utility Box, lids shall be marked “Water” and have a touch read port. For three inch (3”) and larger meters, boxes shall be sized to allow adequate room for the meter, meter stop, gate valve, check valve and full line size bypass with locking valve. In all cases, the meter box shall be large enough for proper placement and reading of meter. In areas where vehicle traffic may occur, meter boxes shall be traffic rated. An accessible walking path, from the street to each meter box shall be provided with a maximum 10% slope.

5.6.11. Angle Meter Stops

Angle Meter Stops shall have a locking wing. Components that are in contact with the water shall be of made of lead-free brass alloy (e.g. UNS C89833, C89550 or C28500). Components not in contact with the water may be 85-5-5-5 bronze (UNS C83600) as manufactured by Mueller, James Jones, or Ford. Inlet shall be copper tube size compression or Mueller “Insta-Tite,” with a meter coupling nut outlet. Angled meter stops greater than one inch (1”) shall have a flange connection to the meter.

5.6.12. Combination Air and Vacuum Release Valves

Air and vacuum release valves shall be combination air and vacuum release valves (CAVRV or ARV) as manufactured by the Valve and Primer Corporation (APCO) 143C, 145C, etc., Crispin UL10, 20, etc. or Val-Matic 201C, 202C, etc., bronze or
stainless steel trim. Size shall be per these Specifications, as shown on the plans and/or Standard Drawing No. SW005. Boxes shall be sized as necessary.

Provide one inch (1") CAVRV with a minimum air release orifice diameter of 5/64" on line sizes up to twelve inches (12") and two inches (2") CAVRV with a minimum air release orifice diameter of 3/32" on line sizes fourteen inches (14") to eighteen inches (18"), the CAVRV size shall be approved by the Agency Engineer.

Pipe taps for CAVRV shall always be at actual high points of waterline, except as noted in 1.2.1. The service line from the water main to CAVRV shall slope up at a minimum of 2% and be at least the same size as the nominal CAVRV size. Service lines for CAVRVs 2" and smaller shall comply with 3.7.4 Water Service Piping.

5.6.13. Control Valves

Control valves include all pressure reducing and pressure relief valves. Control valves larger than two inches (2") shall be of the diaphragm type with hydraulic pilot controls that are top mounted in the factory and tested prior to shipment as manufactured by Clayton. Control valves two inches (2") and smaller shall be direct acting type. All control valves of any given type shall be supplied by one manufacturer. All operators shall be hydraulically controlled with manual overrides that can shut down on the valve without disrupting the spring setting on the pilot control.

Control valves shall be equipped with these features: Pilot line wye strainers, inlet and outlet pressure gauges, flanged, closing speed control, opening speed control, portion indicator, stainless steel ball shutoff valves (not on pressure relief valves), v-port seating, fusion epoxy coating (wetted parts only), stainless steel trim and stainless steel tubing. Control valves shall have flanged isolation valves.

All control valves require submittals, which shall be reviewed and approved prior to field installation.

5.6.13.1. Pressure Reducing Valves

Pressure Reducing Valves (PRV) shall be a combination pressure reducing and pressure sustaining, Clayton Model 92-01. No comparable products or equals shall be allowed due to standardization requirements. Properly designed CAVRVs shall be installed immediately downstream of all PRVs.

5.6.13.2. Pressure Relief Valves

Valves shall be diaphragm type designed to maintain a steady upstream pressure by relieving excess pressure without causing line surges, Clayton Model 50-01. No comparable products or equals shall be allowed due to standardization requirements.

5.6.13.3. Altitude Valves

Altitude valves shall be hydraulic operated, diaphragm actuated, pilot controlled type. Valves shall be single-seated and have a resilient disc for tight closure. Valves shall be combination altitude and pressure-sustaining valves equipped with pressure sensitive closing, differential control, opening speed control. Valves shall be Clay-Val Type 210-01. No comparable
products or equals shall be allowed due to standardization requirements. Valves shall be furnished with options and featured similar to Pressure Control Valve requirements. For differential pressure higher than 60 PSI, valve shall be piston type or include an orifice plate.

5.6.14. Reserved

5.6.15. Ball Valves

5.6.15.1. Ball Valves (Copper Piping)

Ball valves two inches (2") and smaller and which are used in copper piping systems shall have a bronze body, stem, side rings, disc rings and packing bolt, Teflon or chrome plated ball, seating and upper and lower packing.

5.6.15.2. Ball Valves (PVC, Galvanized & Brass Piping)

Threaded ball valves, 2 inches and smaller shall have lead-free bronze (e.g. UNS 87600, 89836, 89833, 89550, 69300, 27451, 46500, 23000, 28500 etc.) body and plug ball retainer. Ball and stem shall be bronze (as specified for the body) or Type 316 stainless steel. Provide chrome plated ball, if ball is bronze. Valves shall have screwed ends (ANSI B1.20.1), non-blowout stems, reinforced Teflon seats, and have plastic-coated lever operators. Valves shall have a pressure rating of at least 300 psi WOG at a temperature of 150°F.

Double true union thermoplastic ball valves, 3 inches and smaller shall be rated at a pressure of 150 psi at a temperature of 105°F. Body, ball, and stem shall be PVC conforming to ASTM D 1784, Type 1, Grade 1. Seats shall be Teflon. O-ring seals shall be EPDM. Valve ends shall be of the double-union design. Ends shall be socket welded except where threaded or flanged-end valves are specifically shown on the plans. Valves shall have handle for manual operation. Valves shall be as manufactured by Spears Manufacturing Company, or Agency Engineer approved equal.

5.6.16. Globe Valves

Globe valves, 3 inches and smaller, shall be all bronze with screwed ends, union bonnet, inside screw, rising stem, and composition or PTFE disc. Valves shall have a pressure rating of at least 300 psi at a temperature of 150°F. Wetted surfaces shall be lead-free bronze (e.g. UNS 87600, 89836, 89833, 89550, 69300, 27451, 46500, 23000, 28500 etc.). Stem shall be bronze: ASTM B 371 (Alloy C69400), ASTM B 99 (Alloy C65100), or ASTM B 584 (Alloy C87600). Valves shall be Crane 7TF, or Agency Engineer approved equal.

Globe valves larger than three inches (3") shall be iron body with yoke bonnet and bronze trim and shall have a designated working pressure of 200 psi.

5.6.17. Solenoid Valves

Solenoid valves shall be two-way, full line size, normally closed, diaphragm type, one hundred twenty-five (125) minimum PSI body pressure, five (5) PSIG minimum operating differential for use with cold water or air. Solenoid valves shall have forged brass (Alloy C23000) or bronze (ASTM B 62) bodies with Teflon main seats.
Internal plunger, core tube, plunger spring, and cage assembly shall be stainless steel (Types 302, 304, or 305). Seals shall be Teflon. Valve shall be suitable for one hundred fifteen (115) volt, sixty (60) Hz AC power supply, and shall be as manufactured by Automatic ASCO Switch Company, Model 8210, or Agency Engineer approved equal.

All solenoid valves shall have manual operators, encapsulated coils and shall have electrical characteristics as indicated on the drawings. All valves shall be mounted horizontally.

5.6.18. Swing Check Valves

Swing check valves one and a half inches (1½”) and smaller shall be minimum Class 125, wye or tee pattern, lead-free brass (UNS C89550 or C28500). Ends shall have female NPT threads per ANSI B1.20.1. Disc shall be lead free brass (UNS C89550 or C28500), swing type. Minimum working pressure shall be 200 psi WOG at a temperature of 150°F.

Swing check valves for waterlines two inches (2”) and larger shall be cast iron (ASTM A 48, Class 30, or ASTM A 126, Class B) body and cover. Flapper shall consist of a steel disk insert and a steel bar hinge covered with Buna-N vulcanized to the metal pieces. Provide O-ring seal vulcanized onto the disk. Valve shall be designed for a working pressure of not less than one hundred seventy-five (175) PSI and tested at three hundred fifty (350) PSI. They shall be of the balanced, swing gate type with a clear opening at least equal to that of the connecting pipe and shall have an external lever and counter weight. Cast in place or pre-cast concrete vaults will be required for all buried swing check valve installations. 2” and larger swing check valves shall be APCO Series 100R or Agency Engineer approved equal.

5.6.19. Valve Boxes

Valve boxes shall be provided for all underground valves and shall be pre-cast concrete, Brooks or Christy G5 Traffic Valves boxes. Lids shall be cast iron traffic type G5C and marked “WATER.” If noted on the plans additional markings may be necessary.

5.6.20. Valve Riser Extensions

Eight inch (8”) diameter PVC conforming to AWWA Section C900 water pipe or SDR35 sewer pipe shall be used and installed as shown on Standard Drawing No. SW004. Valve operating nuts shall be installed within 4’ of the top of the surface or G5, whichever is higher, or extended per SW010.

5.6.21. Strainers

Unless otherwise noted, air and gas line strainers shall be Y-pattern bronze body, with 40 mesh screen packed with copper or stainless steel wool. Air line strainers shall be fitted with a brass blowoff cock.

Unless otherwise noted, water line strainers shall by Y-pattern, iron body with 20 mesh Monel screen, and fitted with a brass blowoff cock.

5.6.22. Pressure Gauges
Unless otherwise noted, pressure gauges shall be stainless steel bourdon type with a two and a half inch (2½”) diameter dial and black alumalite cases suitable for mounting as required. Pressure range and calibrations shall be as required and the dial shall be engraved with the units in which the gauge is calibrated. All pressure gauges shall be glycerin filled.

Pressure gauges shall be rated for service intended, including negative pressure (vacuum gauge or compound gauge). All pressure gauges shall be installed with a brass isolation valves and blowoff valve. Full scale pressure range shall be approximately twice the normal operating pressure. The normal operating pressure should not exceed seventy-five percent (75%) of the full range scale.

5.6.23. Locating Cable & Locator Tape

Direct burial blue copper wire solid, Soft Drawn No. 10 insulated, shall be taped to the top of all pipe every ten (10) feet. The wire shall be procured from the vendor complete with an approved splice and insulation kit and cable joints shall be spliced in accordance with the manufacturer's instruction to form a set of continuous electrical conductors throughout the pipe system. Where pipe branches occur, the wire shall be branched also so that wire is provided to each valve, fire hydrant, water service, all other appurtenances and to the locating wire of the branch if the existing branch has one.

All water pipe shall be marked with a 3” blue metallic locator tape, located 12” directly above the pipe and bedding material. The tape shall be marked with 1½” black “CAUTION – WATER LINE BURIED BELOW” lettering and be placed face up in the trench.

5.6.24. Flexible Couplings

Flexible couplings shall have a minimum pressure rating equal to the pipe class. Care shall be taken to see that smooth surfaces have been provided on the pipe so that the coupling can be properly fitted. Flexible couplings for cast iron, ductile iron, PVC or AC pipe shall be Smith-Blair Model 411, 441 or Agency Engineer approved equal. Transition couplings shall be Smith-Blair Model 413, 441 or Agency Engineer approved equal. Reducing couplings shall only be used where approved of by the Agency engineer and shall be Smith-Blair Model 415, R441, or Agency Engineer approved equal.

5.6.25. Flanged Coupling Adapters

Flange adapters shall be made of ductile iron conforming to ASTM A536 and have flange bolt circles that are compatible with AWWA C115.15. For PVC pipe, the flange adapter shall have a pressure rating equal to or greater than the pipe. For Ductile Iron pipe, the flange adapter shall have a minimum safety factor of 2:1. The flange adapter shall be Series 2100 Megaflange adapter by EBAA Iron, Inc., or Agency Engineer approved equal.

5.6.26. Rubber Expansion Joints
Rubber expansion joints, which allow expansion and control vibration when connecting rigid piping to pumps and other mechanical equipment, shall be Holz Series 980, by Holz Rubber Company.

5.6.27. Fire Hydrants

Fire hydrants shall be wet barrel type for installations below two thousand feet (2000’) in elevation, and meet AWWA Standard C503. Fire hydrants installed above two thousand feet (2000’) in elevation shall be dry barrel type, with 5¼” main valve, and meet AWWA Standard C502. Unless otherwise indicated on the plans or as required by the governing fire district, all hydrants shall have one, four and a half inch (4 ¼”) outlet and two, two and a half inch (2 ½”) outlets with National Standard Fire Hose Threads (NH/NST). Hydrants shall be installed with breakaway spools. Where fire flow requirements exceed 1,000 gpm, 8” hydrant laterals shall be used. Where fire flow requirements exceed 1,750 gpm, 10” hydrant laterals shall be used. Where fire flow requirements exceed three thousand (3,000) gpm, two, four and a half inch (4 ½”) outlets and one, two and a half inch (2½”) outlet will be required along with special design considerations as determined by the Agency and the governing fire district. All fire hydrants, guard posts and bollards shall be coated with a minimum 8 mils of chrome yellow epoxy per NFPA 291 sec 5.2.1.1.

Approved Hydrants:

Wet Barrel – Clow 960
Dry Barrel – Mueller Super Centurion

An Agency Engineer approved equal to the fire hydrants listed above may be installed provided that the Agency Engineer reviews and approves the fire hydrant in writing. For every one to five (1-5) hydrants installed, and for every five (5) hydrants thereafter, contractor shall provide a complete rebuilding kit including but not limited to all special tools, O-rings, gaskets, seats, seals, caps, shear and clevis pins, bolts, nuts, nozzles washers, safety couplings, bonnets, stems, oils, sleeves, greases and break-a-way spool prior to the installation of the hydrant.

Bollards per SW007 are required on all sides of fire hydrants where required to protect the hydrant from vehicle impact as determined by the Agency Engineer. Bollards shall have 3” blue high intensity reflective tape wrapped all the way around the bollard between 3’ and 5’ off of the ground, after coating. Tape shall be type 3 or better, ASTM D4956 compliant, warranted for 10 years.

5.6.28. Sampling Stations

Sampling stations shall have a twenty-four inch (24”) bury, with a three quarter inch (¾”) FIP inlet and a three quarter inch (¾”) unthreaded nozzle. All stations shall be enclosed in a lockable, non-removable aluminum housing. When opened, the station shall require no key for operation, and the water will flow in an all brass waterway. All working parts will also be of brass or stainless steel and be removable from above ground with no digging. The exterior piping will be brass. Unless otherwise approved by the Agency, all sampling stations shall be Station Guard XLT manufactured by Koraleen Enterprises, as per Standard Drawing No.
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SW012. All piping shall be protected with closed cell pipe insulation, minimum 1” thick.

5.6.29. Vaults

Cast in place or pre-cast concrete vaults will be required for all buried valves and appurtenances. Valve vaults shall provide twenty-four inches (24”) minimum clearance from the inner wall of the vault to any piping, valves or appurtenances. Traffic rated lids shall be used in all traffic areas. Lids weighing over 50 lbs shall be equipped with mechanical lift assistance devices so that no more than 50 lbs of effort is required to open the lids. Fiberglass tanks or vaults shall not be permitted. All vaults and boxes shall have a 12” x 12” concrete collar with two horizontal #4 rebar placed 4” apart vertically and 4” from any edge. The exterior and interior of all vaults shall be thoroughly coated with Thoroseal (MasterSeal 581) or Agency Engineer approved equal prior to installation.

5.7. Backflow Devices

All backflow prevention assemblies shall be as approved by the State of California department of Health Services. All backflow assemblies shall be installed above ground. See Standard Drawing No. SW015 and SW016.

5.8. Installation and Testing

5.8.1. Location of Existing and New Utilities

Location of all utilities shown on plans is approximate. At least two working days prior to starting work on the project, not counting the day it is called in, the Underground Service Alert (USA) shall be contacted at (800) 227-2600 and Western Underground Utility Alert (WUUA) shall be contacted at (800)424-3447 for location by the Contractor. The locations of various utilities shown on the plans are solely an accommodation to the Contractor without any representation or guarantee concerning completeness and/or accuracy. The Contractor is responsible for ascertaining the location of, and providing protection for, all utilities to be encountered in the performance of the required work.

5.8.2. Quality Control

The Contractor shall use appropriate quality control procedures to ensure that all pipe and fittings shall be of the first grade and quality conforming to these Specifications. Pipe shall be stored and transported in a proper manner and kept clean after delivery to the job site. All work on pipe shall be performed in a skillful and professional manner in accordance with the manufacturer’s recommendations.

5.8.3. Laying of Pipe

Pipe trenching and/or excavations shall not be permitted until the site has been brought to finish grade or the roadway has been brought to subgrade.

Pipe shall be laid and joined in accordance with manufacturer's and/or Agency Engineer's directions. Necessary facilities including slings shall be provided for lowering and properly placing pipe sections into the trench without damage.

Each section of pipe shall be thoroughly cleaned before it is lowered into the trench.
If clean pipe sections and fittings cannot be placed in the trench without getting dirt into open pipe, the Agency Engineer may require a piece of material to be tied over the ends of the pipe or fitting until it has been lowered into position in the trench. After the pipe has been lowered the trench, all foreign matter shall be completely brushed from the pipe ends before assembly.

The pipe shall be cut to provide closure pieces of correct lengths to permit the proper location of the pipe sections, or to locate valves, fittings and appurtenant structures where specified on plans.

The pipe and fittings shall be laid to the lines and grades specified on plans, and centered in the trench. All horizontal and/or vertical bends consisting of eleven and one fourth (11¼) or more shall have thrust blocks as shown on Standard Drawing No. SW013.

The alignment and elevation of the pipeline as shown on the drawings are designed to avoid conflict with new and existing underground utilities. Utility locations were obtained from sources of varying reliability and are the responsibility of others.

Trenches must be kept dry until pipe has been laid, joints closed and backfill completed to a depth of one foot (1') above top of pipe. Crushed rock or pea gravel shall be provided for drainage, backfill and/or bedding as directed by the Agency. Crushed rock shall not be used for PVC pipe bedding.

Temporary water tight plugs shall be provided for closure of the open ends of the pipelines each time pipe laying activity stops and at the end of each working day to prevent the entry of dirt and/or other contaminants.

5.8.4. Bedding and Backfill

Bedding and backfill in pipe trenches shall be of the type, placement and compaction as shown in Standard Drawing No. SW002. Pipe shall be bedded/laid on six inches (6") of approved imported sand. Material placed from trench bottom to twelve inches (12") above top of pipe shall be imported sand. The use of recycled class II AB or recycled rock products shall not be permitted. See SW002 and Section 7.5 for additional requirements regarding bedding and backfilling.

Sub grade and final grade materials and compaction shall be as designated by the roadway controlling Agency/district/etc.

All backfill shall be carefully placed and spread in uniform eight inches (8") maximum horizontal layers (lifts). Backfill shall be placed to about the same elevation on both sides of the pipe to prevent unequal loading and displacement of pipe. If compaction tests indicate insufficient density of the completed backfill in the trench, the Contractor shall be required to remove the backfill, and re-compact the backfill until the proper density is obtained at the Contractor’s expense. Backfill shall be placed to a minimum depth of thirty-six inches (36") above the top of the pipe and a maximum depth of sixty inches (60") above the top of the pipe.

5.8.5. Connections to Existing Pipelines

All connections to existing pipelines shall be made as shown on the plans and in accordance with these Specifications.
Where the existing main is provided with fittings for connecting to the new main, the face of the connection shall be clean and free of all foreign materials. The Contractor shall remove the plug, cap or blind flange, clean the ends and make the new joint.

Where the existing main is not provided with fittings for connecting to the new main, connections shall be made either by hot tap or by cutting and inserting sections of pipe and fittings, as shown on the plans or as directed by the Agency Engineer.

For hot tap installations, the tapping saddle shall have a test plug and shall be air tested at fifty (50) PSI for five (5) minutes. Tapping valves shall be flange by flange. All hot taps shall be witnessed by the Agency Inspector.

When deemed necessary by the Agency Engineer, shutdowns of existing in-service pipeline and other distribution facilities shall be made by the Agency as required to complete pipeline connections. A shutdown shall be for as short a period as amount of lead time necessary for shutdown and connection to existing mains varies with each job and must be planned accordingly. Unless dictated by water system consideration, or emergencies, in no case will a shutdown and/or connection be scheduled with less than ten (10) working days’ notice. Interference with the operation of the Agency’s distribution system shall be kept at a minimum. While an existing pipeline is shut down, the connection work shall be performed without interruption, continuing after regular working hours if necessary, until completed, unless otherwise directed by the Agency Engineer. Shutdowns may be required by the Agency Engineer at times other than normal working hours and/or days. Shutdowns shall not be scheduled on consecutive days, weekends, holidays, Mondays or Fridays without special approval of the Agency Engineer. All costs for labor, equipment and meals shall be the responsibility of the Contractor.

The Agency Engineer shall be notified at least ten (10) working days prior to any connection operations so that advance preparation on the part of the Agency can be made, and shall confirm such advance notice in writing. In no case shall any connection operations occur prior to passing pressure and bacteria tests.

In all cases, shutdowns shall be made under the direction of the Agency Engineer. If the work is not fully excavated and product assembled as much as possible 18 hours prior to the scheduled shutdown, the shutdown shall be deemed mishandled due to the contractor failing to diligently prosecute the work, and the shutdown shall be cancelled, rescheduled and re-noticed as required above. If the shutdown is cancelled in this way due to the contractor’s failure to properly prepare or schedule the work the labor, time, noticing and material costs of the shutdown and rescheduling shall be paid for by the Contractor or Developer. The Agency shall close all valves in making a shutdown and shall open all valves to restore pressure to the existing main, as well as initiate pressure to the new installation.

5.8.6. Abandonment of Existing Facilities

Existing facilities shall be abandoned as indicated on the plans and specifications. Ends of pipelines four inches (4”) and larger to be abandoned in place shall be plugged with concrete for a distance of not less than twelve inches (12”), unless
otherwise shown on the plans. Valve boxes to be abandoned shall be removed and the valve risers shall be filled with concrete.

5.8.7. Hydrostatic Testing

The Agency Engineer shall be notified two full business days prior to testing and must approve any water placement in any portion of the pipeline. All new, rehabilitated or otherwise taken out of service pipelines exceeding 20’ in length shall be positively separated from the water system by means of pipe plate or other means of physical separation. Until all testing, flushing, disinfection, chlorination, secondary flushing and approval from AWA is completed, all new water mains shall be connected to the existing system and filled only through an RP type backflow device with a certification from the last year. The pipeline shall be filled with water and all air evacuated.

For treated water lines, the pressure shall then be slowly increased to one hundred fifty (150) PSI or one hundred fifty percent (150%) of working pressure, whichever is greater. The test pressure shall be maintained for measuring the quantity of water required to maintain full pressure in the line for the test period of two (2) hours. During the test no pressure drop is allowed. Any drop in pressure during the test, no matter how small, shall constitute a failed hydrostatic test.

All pipelines with failed tests shall be repaired, regardless of the amount of loss, at the Contractor’s expense. All leaks shall be repaired, regardless of the amount of leakage, at the Contractor’s expense.

All or part of the pipeline may be drained as necessary to repair leaks. All leaks shall be repaired in a manner approved by the Agency Engineer and retested before acceptance by the Agency. The Contractor shall provide all labor, equipment and materials required for filling and testing the pipelines. After successful completion of the hydrostatic test, the high velocity flushing chlorination, chlorination flushing and bacteriological testing may be completed per these specifications with Engineer approval.

5.8.7.1. Make-up Water Allowance for PVC Pipe

The maximum make-up water allowance shall be per the pipe manufacturer’s recommendations, AWWA, or as directed by the Agency Engineer, whichever is more stringent.

Make-up water allowance for PVC pipe shall be determined from the following equation:

\[ M = \frac{SD(P^{1/2})}{148000} \]

Where:

- \( M \) = Make-up Water Allowance (gal/hr)
- \( S \) = Length of Pipe Tested (ft)
- \( D \) = Nominal Diameter of Pipe (in)
- \( P \) = Average Test Pressure (PSI)
The table below provides a summary of the make-up water allowance per one thousand feet (1,000‘) for various pipe sizes and pressures calculated from the equation above.

### Make-up Water Allowance for PVC Plastic Pipe
**With Elastomeric Joints**
**in Gallons per hour per 1000 LF**

<table>
<thead>
<tr>
<th>Nominal Pipe Size (Inches)</th>
<th>Average Test Pressure in Line (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>.27</td>
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<td>.54</td>
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<td>10</td>
<td>.68</td>
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<tr>
<td>12</td>
<td>.81</td>
</tr>
</tbody>
</table>

### 5.8.7.2. Make-up Water Allowance for DIP Pipe

Make-up water allowance for DIP shall be determined from the following equation:

\[
M = \frac{SD(P^{1/2})}{133200}
\]

Where:
- \( M \) = Make-up Water Allowance (gal/hr)
- \( S \) = Length of Pipe Tested (ft)
- \( D \) = Nominal Diameter of Pipe (in)
- \( P \) = Average Test Pressure (PSI)

The table below provides a summary of the make-up water allowance per one thousand (1000) LF for various pipe sizes and pressures calculated from the equation above.
### Make-up Water Allowance for DIP

**With Elastomeric Joints**

in Gallons per hour per 1000 LF

<table>
<thead>
<tr>
<th>Nominal Pipe Size (Inches)</th>
<th>Average Test Pressure in Line (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
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<tr>
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<td>.3</td>
</tr>
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<td>10</td>
<td>.75</td>
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<tr>
<td>12</td>
<td>.90</td>
</tr>
</tbody>
</table>

#### 5.8.8. Disinfection/Chlorination and Flushing

After successful completion of the hydrostatic test, the Contractor shall make the necessary piping connections, furnish and install all necessary equipment required for, and conduct the high velocity flushing operations. High velocity flushing is required on all water mains and shall include a scour flush at 3.0 feet per second or greater, for a minimum of three pipe volumes. The Contractor shall provide for safe and legal disposal of water from such flushing. The Contractor shall remove all temporary flushing facilities. All costs for chlorination, bacteriological testing and flushing shall be paid by the Contractor or MLX applicant.

After successful completion of the high velocity flushing, the Contractor shall chlorinate, flush and test the pipeline per AWWA C651 by one of three methods including: the continuous-feed method, the slug method, or the spray method. The tablet/granule method of chlorination shall not be utilized in any treated water pipeline. The Agency Engineer shall approve which method is most suitable for each situation considering length and diameter of pipeline, type of joints present, availability of materials and safety considerations. The interior of all pipe and fittings used in making final connections shall be swabbed or sprayed with 1% hypochlorite solution.

For the continuous-feed method the chlorinated water shall be retained in the main for at least a twenty-four (24) hour hold time, or per AWWA C651, whichever is greater. At the end of this hold time the treated water in all portions of the main and appurtenances shall have a residual of not less than ten parts per million (10 ppm). During the hold time, new valves shall be exercised to promote disinfection of the appurtenances.
After chlorination, the pipeline shall be flushed and de-chlorinated per AWWA C651 Section 4.9. Flushing shall continue until the chlorine residual in the water leaving the main is no higher than that of the existing distribution system or 0.3 ppm. The water shall then remain unmoved for a minimum of twenty-four (24) hours after which the Agency shall collect bacteriological samples which shall be tested by an independent laboratory. Bacteriological testing shall be per AWA Standards and AWWA C651, Section 5.1, whichever is more stringent, and shall be completed by the Agency at the Contractor’s cost. The number and location of samples shall be per AWWA C651, Section 5.1 or as directed by the Agency Engineer, and shall be approved by the Agency Engineer prior to sampling. If emergency work is under way, disinfection is to be per AWWA C651 Section 4.11, or as directed by the Agency Engineer.

5.8.9. Continuity Testing

The Contractor shall test for the continuity of the locating wire prior to the final walk-thru. The Contractor shall provide all labor, equipment and materials required for testing the continuity of the locating wire at each meter, valve, fire hydrant, blow off and AVRV. Should continuity not be present and/or observed, the Contractor shall repair, replace and retest as necessary, entirely at Contractor’s expense.

5.8.10. Facility markers

Whenever any water facilities are located outside of traveled roadways, approved facility markers shall be installed unless otherwise approved by the Agency Engineer. Facility markers shall be placed every five hundred feet (500’), at horizontal angle points, valves, ARVs, blow offs and at any other appurtenances. Facility markers shall conform to Standard Drawing No. SW003.

6. Concrete Work

6.1. Scope

Concrete work includes the construction of all inlet and outlet structures, footings, slabs, floors, ramps, walkways, columns, beams, and other concrete items completed with reinforcement steel as detailed and specified on the plans.

6.2. Materials

All concrete work and materials shall conform to the requirements of California Department of Transportation “Standard Specifications”, latest revision, Sections 52 and 90 and applicable items under Sections 51 and 73, except as modified herein or on the plans.

All concrete shall be Type II with a three quarter inch (¾”) aggregate and a maximum four-inch (4”) slump unless otherwise noted on the plans. Concrete admixtures shall not be used without prior written approval of the Agency Engineer.

6.3. Execution

The Agency shall be notified a minimum of twenty-four (24) hours prior to concrete placement. The maximum allowable combined transit and holding time before concrete placement shall be one 1½ hours.
The surface finish shall be as shown on the plans or as directed by the Agency Engineer. A three quarter inch chamfer shall be used on all vertical and horizontal finished edges. All newly place concrete shall be cured as directed by the Agency Engineer.

7. Earthwork

7.1. Scope

This work shall consist of: performing all operations necessary to excavate earth and rock or other material, of whatever nature, including removing water, regardless of character and subsurface conditions necessary for the construction of the project facilities; placing backfill for all project facilities, including site grading, structures, transmission piping, electrical underground conduit, ditch and channel excavation, culverts, minor concrete structures, roadwork; removing and replacing unsuitable material; placing embankment material for all required project facilities; other earthwork shown on the plans and indicated in the Specifications including excavating and backfilling all structures, trenches and depressions resulting from the removal of obstructions, removing and replacing unsuitable material.

7.2. Trench Excavation

Trench excavation shall include the removal of all materials or obstructions of any nature, except as otherwise specified to be protected, and the installation and removal of all sheeting and bracing and the control of water, necessary to construct the work as shown. Unless otherwise indicated on the drawings or permitted by the Agency Engineer, excavation shall be open cut. Trenching machines may be used except where their use will result in damage to existing facilities or where hand trenching is required to prevent damage to trees, tree roots or other utilities.

Excavate the trench to the lines and grades shown in the drawings with allowance for pipe thickness, sheeting and shoring if used, and for pipe base or special bedding. If the trench is excavated below the required grade, refill any part of the trench excavated below the grade at no additional cost to the Owner with pea gravel or imported sand. Place the refilling material over the full width of trench in compacted layers not exceeding 8 inches deep to the established grade with allowance for the pipe base or special bedding.

All paving shall be saw cut to a neat line, which is wider than the trench wall. Where concrete paving is encountered it shall be saw cut to a minimum of six inches (6") wider than the trench at each trench wall.

7.3. Trench Width

Maximum trench width at the top of the trench shall be as shown on the Standard Drawings for the designated type bedding.

Trenches shall meet OSHA requirements.

7.4. Special Foundation Bedding Treatment

Whenever the bottom of the trench is soft, yielding or, in the opinion of the Agency Engineer, otherwise unsuitable as a foundation for the pipe, the unsuitable material shall be removed to a depth such that when replaced with bedding material or three quarters
of an inch (¾”) minus drain rock, it will provide a stable and satisfactory foundation. Whenever the trench bottom is in rocky material, the trench shall be excavated to six inches (6”) below the flow line and backfilled with bedding material as specified.

7.5. **Trench Backfill**

Pipe shall be bedded and backfilled uniformly throughout its length. The specified bedding shall be placed to give the required minimum thickness after placing the pipe and shall be compacted to give a uniform surface for laying the pipe.

Pipe shall not bear on bells, couplings or joints. The trench shall be excavated at these locations as necessary to provide at least two inches (2”) of bedding material below the bell, coupling or joint. No permanent wedging and/or blocking of pipe shall be permitted. Care shall be taken when compacting the material around the bells, couplings or joints.

In connection with these Specifications, tests shall be made in accordance with the Caltrans Standard Specifications, and these requirements:

<table>
<thead>
<tr>
<th>Tests</th>
<th>ASTM</th>
<th>Test method No. California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Analysis</td>
<td></td>
<td>302</td>
</tr>
</tbody>
</table>

In trenches placed in easements, which are not in traveled County, City, Town and State road rights-of-way, backfill shall be compacted to mound so that drainage to the trench shall not occur. Upon request, a sample and gradation report shall be given to the Agency for all imported trench backfill material for Agency review and approval.

7.5.1. **Bedding and Backfill**

Backfill shall be the material placed between the top of the bedding and twelve inches (12”) above the top of the pipe.

Bedding and backfill material shall consist of select import clean, non-corrosive sand. Bedding and backfill shall be clean and free from vegetative matter and other deleterious substances and shall be of such a nature that it can be compacted readily to form a firm, stable base.

Imported sand used in the pipe zone or for the pipe base shall have the following gradation (+/- 5%):

<table>
<thead>
<tr>
<th>Sieve Size</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8-Inch</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>75 – 100</td>
</tr>
<tr>
<td>No. 30</td>
<td>12 – 60</td>
</tr>
<tr>
<td>No. 100</td>
<td>5 – 20</td>
</tr>
<tr>
<td>No. 200</td>
<td>0 – 10</td>
</tr>
</tbody>
</table>
One half inch (½") river run pea gravel, or three quarter inch (¾") minus crushed rock shall be used as bedding and backfill in areas with groundwater and with approval of the Agency Engineer.

The initial backfill shall be placed immediately after the pipe joints have been completed and inspected. The backfill shall be carefully placed so as not to disturb and/or damage the pipe and/or joints, and shall be brought up evenly on both sides of the pipe. The initial backfill shall be manually compacted using care not to damage the pipe or joints to a relative compaction of ninety percent (90%). “Manually compacted” does not exclude careful use of hand-controlled, power-operated units such as air tampers, vibrating tampers other hand-controlled tools used so as not to damage the pipe or joints.

7.5.2. Compaction

Compaction of backfill shall be by means other than jetting. Compaction shall be performed in layers not exceeding eight inches (8") and be compacted to a density as shown on Standard Drawing No. SW002.

The location and depth of all compaction tests shall be determined by the Agency Engineer. If a test fails, the area shall be reworked and retested to the satisfaction of the Agency and until passing test are achieved. Contractor shall pay all costs associated with testing.

Jetting of backfill shall not be permitted.

7.6. Embankment Construction

Embankment shall be constructed of excavated or imported material that is free from organic matter, roots, debris, rocks larger than 3" in the greatest dimension, and shall not have more than fourteen percent (14%) of the rocks larger than one and a half inches (1½"), and shall have these properties:

Maximum Plasticity Index: 15

Maximum Percent Passing the No 200 Sieve: 50

Placement and compaction of embankment material shall be in conformance with Caltrans Standard Specifications Sections 19 – 6.1 and 19 – 6.2.

7.7. Structural Backfill

Backfill around structures shall be select import or native earth if it if is suitable for compaction. This backfill material shall consist of clean sandy material with one hundred percent (100%) passing a three quarter inch (¾") sieve and shall be clean and free from vegetative matter and other deleterious substances and shall be of such a nature that it can be compacted readily under watering to form a firm, stable base.

8. Clearing, Grubbing and Stripping

8.1. General

This section describes the work included in clearing, grubbing, stripping and otherwise preparing the project site for construction operations.

8.1.1. Clearing
Remove and dispose of shrubs, brush, limbs and other vegetative growth. Remove all evidence of their presence from the surface including sticks and branches greater than two inches (2") in diameter or thickness. Remove and dispose of trash piles, rubbish and fencing. Protect trees, shrubs, vegetative growth and fencing which are not designated for removal.

8.1.2. **Grubbing**

Remove and dispose of wood or root matter below the ground surface remaining after clearing, including stumps, trunks, roots or root systems greater than two inches (2") in diameter or thickness, to a depth of twelve inches (12").

8.1.3. **Stripping**

Remove and dispose of all organic sod, top soil, grass and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped.

8.2. **Materials**

8.2.1. **Trees and Shrubbery**

Existing trees, shrubbery and other vegetative material may not be shown on the plans. Inspect the site as to the nature, location, size and extent of vegetative material to be removed or preserved, as specified herein. Preserve trees that are specifically shown on the plans as designated to be preserved.

8.2.2. **Preservation of trees, Shrubs and Other Plant Material**

All plant materials (trees, shrubbery and plants) beyond the limits of clearing and grubbing shall be saved and protected from damage resulting from the work. No filling, excavating, trenching or stockpiling of materials will be permitted within the drip line of these plant materials. To prevent soil compaction within the drip line area, no equipment shall be permitted with this area.

When trees are close together, restrict entry to drip line area by fencing. In areas where no fence is erected, the trunks of all trees two inches (2") or greater in diameter shall be protected by encircling the trunk entirely with boards held securely by twelve (12) gage wire and staples. This protection shall extend from ground level to a height of six feet (6’).

8.3. **Execution**

8.3.1. **Clearing and Grubbing Limits**

All excavation areas associated with new pipelines, structure, slabs and special areas shown on plans shall be cleared and grubbed.

8.3.2. **Disposal of Clearing and Grubbing Debris**

Do not burn combustible materials. Remove all cleared and grubbed material from the worksite and dispose of in accordance with all local laws, codes and ordinances.

8.3.3. **Areas to be Stripped**
All excavation areas associated with new pipelines, structures, slabs and special areas shown on plans shall be stripped.

8.3.4. Disposal of Strippings
Remove all stripped material and dispose offsite.

9. Boring, Jacking and Tunneling
Allowable casings shall be steel. Alternate casings may be permitted by the Agency Engineer if they meet or exceed steel strength specifications and pose no health or safety hazards. Lap weld or corrugated pipe shall not be used for boring nor open cut casing. Casing shall be of a size to permit installation and removal of the carrier pipe. Multiple casing installations shall conform to the latest revised copy of the California Department of Transportation’s specifications.

When practical, the bores and tunnels shall be installed before open cut carrier pipe. If (due to permits, etc.) it is not possible to install bores or tunnels at the start of construction, then one hundred feet (100’) of carrier pipe at the bore pit side, and three hundred feet (300’) at the receiving pit side shall not be constructed until after completion of the bore or tunnel.

For casing pipe crossing under roadways, railroads, or other installations not within the jurisdiction of the Owner, comply with regulations and permit requirements of said authority.

State highway casing installations shall be as specified in the California Department of Transportation specifications.

Casing installations for railroads shall be as specified by the American Railway Engineering and Maintenance-of-Way Association, Vol. 1, Ch. 1, Section 5.3, "Specifications for Pipelines Conveying Non-Flammable Substances."

9.1. Reserved

9.2. Steel Casing
Fabrication of casing shall be in accordance with AWWA C200, as modified below. Casing material shall conform to ASTM A 283, Grade C; ASTM A 139, Grade B; or ASTM A 36. Spiral weld steel casing shall have three sixteenths of an inch (3/16) maximum weld height over plate thickness. Spiral welds shall be one hundred percent (100%) of the welds.

9.2.1. Outside Diameter Tolerances
The outside diameter (O.D.) shall not vary by more than the following (percent of O.D.):

6” O.D. through 18” O.D.   +0.75%  -0.75%
20” O.D. and larger       +1.00%  -1.00%

For casing used in any one bore, maximum variation between maximum and minimum outside diameter shall not exceed a quarter inch (¼) for six inches (6”) O.D. to forty-eight inches (48”) O.D. and one half inch (½) for over forty-eight inches (48”) O.D.
9.2.2. Wall Thickness Tolerances

The wall thickness in any one location on the casing shall not vary from the required thickness by more than the following (percent of wall thickness):

- 6” through 18”  
  +15.0%  -10.0%
- 23” and larger  
  +17.5%  -10.0%

9.2.3. Wall Thickness Minimum

Minimum wall thickness for steel pipe casing shall be as shown on the table that follows. However, in no case shall wall thickness be less than a quarter inch (¼).

The Contractor may select a greater thickness and diameter to accommodate the method of work, loadings involved, the site and possible interferences, but at no additional cost to Owner.

Minimum Casing Dimensions  
(Smooth Steel Pipe)

<table>
<thead>
<tr>
<th>Diameter Pipe</th>
<th>Min. Casing Diameter</th>
<th>Length (1’-100’)</th>
<th>Length (100’-200’)</th>
<th>Length (Over 200’)</th>
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</thead>
<tbody>
<tr>
<td>6”</td>
<td>18”</td>
<td>¼”</td>
<td>Max Length 100’</td>
<td></td>
</tr>
<tr>
<td>8” – 10”</td>
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<td>¼”</td>
<td>Max Length 120’</td>
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<tr>
<td>12” – 14”</td>
<td>24”</td>
<td>¼”</td>
<td>3/8”</td>
<td>Max Length 150’</td>
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<tr>
<td>16” – 18”</td>
<td>30”</td>
<td>¼”</td>
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<td>Max Length 200’</td>
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<td>20” – 26”</td>
<td>36”</td>
<td>¼”</td>
<td>5/16”</td>
<td>3/8”</td>
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<tr>
<td>28” – 32”</td>
<td>42”</td>
<td>5/16”</td>
<td>3/8”</td>
<td>½”</td>
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<tr>
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<td>½”</td>
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<td>TBD</td>
<td>5/8”</td>
<td>5/8”</td>
<td>¾”</td>
</tr>
</tbody>
</table>

Lengths listed as “Maximum” may be exceeded, if ground conditions are favorable, and the Agency Engineer can give larger alignment tolerances than shown in Paragraph 5.6.

For six inches to forty inches (6”-40”), a heavy wall lead joint may be required due to adverse ground conditions. If a heavy wall lead joint is required, it should be ten
feet (10’) long, but must be one (1) diameter long, and shall have a minimum wall thickness of one and a half (1½) times the wall thickness of the casing being used.

9.2.4. Casing Surface Conditions

Casing shall be bare or coated with pneumatically applied enamel. The enamel coating is not required, but when it is used, it shall not exceed three (3) mils in thickness. No wrapped casing shall be allowed.

9.2.5. Lengths and Ends

Unless otherwise approved, the casing shall be square cut by mechanical methods. Torches held by machinery shall be considered to meet this requirement. This does not apply to field cutting. All casing lengths shall be equal to the auger length.

9.2.6. Straightness

Casing shall be measured by the cord method with either string or wire stretched taut to take out all visible sag. Maximum cord measured along the casing shall be true length x 0.02 percent. This is to be measured on actual lengths before loading for delivery to the job site.

9.2.7. Welding

All welding shall be done by qualified welders in accordance with the requirements of the American Welding Society (AWS). Welders and welding operations shall be qualified by tests as prescribed in AWS D1.1. Section 5. Proposed operators may be examined at the site of work and upon satisfactory completion of test welds, designated by the Engineer, may be permitted to perform welding operations on the project. The Contractor shall furnish to the Agency upon request records the welder has been engaged in similar processes of welding for which he/she is pre-qualified for a period of six (6) months prior to the work and records of all welding test results and certifications of any welder prior to and during that period.

9.3. Grouting

Fittings shall be put at the proper position to fill all known cavities. When grouting, the road or railroad surface and the casing being installed shall be watched closely so that the road, railroad surface, casing or other structure(s) nearby, are not altered or damaged. Grouting pressure shall be the minimum pressure to feed the grout, but in no case shall it be more than four (4) PSI measured at the grouting fitting. For safety reasons, the minimum size casing allowable for inside grouting shall be thirty inches (30”). Grouting shall be necessary only if there is reason to believe that voids, exceeding one inch (1”) over the outside diameter of casing or liner plate, are present. If grouting is required, grout fittings shall be at a maximum of two (2) rows. Each row shall be twenty-two and a half (22½) degrees off top center, one (1) row left and one (1) row right. If casing joints are ten feet (10’) or in multiples of ten feet (10’), each row shall have fittings spaced at a minimum of ten feet (10’) on centers, staggered so there is one fitting for every five lineal feet (5 LF) of casing.
If the casing joints are eight feet (8') or in multiples of eight feet (8'), each row shall have fittings spaced at a minimum of eight feet (8'), on centers, staggered so one fitting for every four lineal feet (4 LF) of casing. In tunneling, when liner plates or sets are used, the fittings shall be placed uniformly in sets, but shall not exceed the five lineal feet (5 LF) on centers specified as maximum spacing. Small casings shall be grouted from top of ground in severe conditions only, and shall be five feet (5') on centers on center line of casing. Reinforced concrete pipe (RCP) grout fittings shall be at least two feet (2') from edge of the joint. After completion of grouting, close the grout connections with cast-iron threaded plugs.

9.4. Wing Cutters/Bands/Flairs

Wing cutters, if they are used shall cut a maximum of one inch (1") larger than the casing measured on the outside diameter. Any voids that occur from the use of wing cutters are required to be grouted in accordance with Section 5.3. Bands or flairs shall not create a hole over one inch (1") larger than the outside diameter of the casing.

9.5. Jacking and Receiving Pits

Casing placed within conventional highways shall extend five feet (5') from the back of the curb on one side to five feet (5') in the back of the curb on the opposite side, or to the right-of-way of the road line if less than five feet (5'). Where Portland cement concrete (PCC) cross-gutter exists, the casing shall extend at least five feet (5') beyond the back of the cross-gutter. In rural areas, the distance from the edge of the pavement to each end of the bore shall be ten feet (10') or five feet (5') beyond the outside toe of the slope. Jacking and Receiving Pits shall conform to these specifications or to the Roadway Authority's requirements, whichever is more stringent.

All boring, jacking, and receiving pits shall be:
A. located at least 10 feet from edge of pavement in rural areas;
B. located 5 feet behind concrete curb or asphalt concrete (AC) dike in urban areas;
C. located five feet (5') outside toe of slope in embankment areas;
D. located at least twenty feet (20') from center line of main line Railroad;
E. adequately fenced and/or type “K” barrier placed; fence shall be six foot (6') high, in panel sections, securely fastened together with reflectors secured to the side of the fence that faces the traffic. Partially buried posts with fencing attached to form a continuous fence, with reflectors secured to the side of the fence that faces the traffic may also be used; and
F. adequately shored in accordance with Cal/OSHA or FED-OSHA.

9.6. Alignment Tolerances

The centerline of the casing shall not vary in line or grade from the desired alignment by more than one percent (1%).

9.7. Rotary Drilling

The face must be mechanically cut (not cut with fluid pressure); the water must be mixed with bentonite, as required by ground conditions; the fluid must be supplied to the face
from a controlled tank. (Under no circumstances shall the fluid line be hooked directly to the water system or the water truck while drilling); the controlled tank must be able to mix and agitate the fluid; the controlled tank must also be capable of regulating volume and pressure; and the fluid mix shall be used only for lubrication and to bring back cuttings, not to cut the face. This method can be used for various sizes, lengths and ground conditions.

9.8. **Casing Insulators/Spacers**

Lined steel casing insulators with plastic runners or skids shall be used to support and insulate the carrier pipe within the casing. The size, type, spacing, installation and manufacture of these insulators shall be per the manufacturer’s recommendations and these Specifications. If a discrepancy exists between the two, these Specifications shall override. Casing insulators shall be by PSI, Inc., Cascade Waterworks Mfg. Co., Calpico Inc., or Agency Engineer approved equal.

9.8.1. **Band/Shell**

The bank, shell, or body of the insulator shall be constructed of fourteen (14) gage 304 stainless steel, or shall be hot rolled, pickled, fourteen (14) gage steel with a coating of rust-inhibiting enamel or hot fused PVC.

9.8.2. **Connecting Flanges**

The connecting flanges shall be of the same material as the shell and shall be ribbed or gusseted for rigidity.

9.8.3. **Bolts/Studs**

All bolts or studs shall be five sixteenths of an inch (5/16”) or larger in diameter and shall be cadmium plated steel or stainless steel.

9.8.4. **Insulating Liner**

The insulator shall have an insulating liner made of Polyvinyl Chloride. It shall have a thickness of 0.090 inches or greater and shall be 85-90 durometer.

9.8.5. **Skids/Runners**

The insulator shall have high density plastic skids. The skids shall have a high resistance to abrasion and a low coefficient of friction. The skids may be supported by a riser to be of the same material as the shell and welded thoroughly to the shell. The skids shall be either bolted or have a stud welded connection to the shell or riser. Glued connections are not acceptable.

Skids shall be greased before installation of carrier pipe into casing.

9.9. **Carrier Pipe**

Carrier pipe shall be ductile iron pipe. All carrier pipe joints shall be restrained using a method approved by the Agency Engineer.
WATER STANDARD DETAILS
LIST OF FIGURES

SW001 WATER SYMBOLS LEGEND
SW001A WATER GENERAL NOTES
SW002 PIPE TRENCH BEDDING AND BACK FILL
SW003 WATER FACILITY MARKER
SW004 VALVE AND LOCATING WIRE INSTALLATION
SW005 COMBINATION AIR & VACUUM RELEASE VALVE
SW006 FIRE HYDRANT & BLOW OFF ASSEMBLY
SW007 FIRE HYDRANT PAD PLAN
SW008 STANDARD SERVICE CONNECTION FOR 5/8" AND 3/4" METERS
SW009 STANDARD SERVICE CONNECTION FOR 1", 1 1/2" AND 2" METERS
SW009A LARGE METER VAULT LAYOUT
SW010 VALVE OPERATING NUT EXTENSION
SW011 WATER LINE CROSSING
SW011A WATER LINE PARALLELING
SW012 WATER QUALITY SAMPLING STATION
SW013 THRUST BLOCK DETAILS
SW013A THRUST BLOCK DETAILS - LARGE PIPE
SW014 CASING & CARRIER PIPE
SW015 BACK FLOW PREVENTION ASSEMBLY FOR FIRE FLOW OR OTHER SYSTEMS
SW016 BACK FLOW PREVENTION ASSEMBLY
SW017 TEMPORARY BLOW OFF
SW018 TEMPORARY DEAD END
SW019 PRESSURE REDUCING STATION LAYOUT
SW020 NO TRESPASSING SIGN

WATER STANDARD DETAILS

DRAWN BY: B.M.C.  SCALE: N.T.S.  DRAWING NO.: SW000  REV. -
APPROVED: D.E.E.  DATE: 9/10/2019

AMADOR WATER AGENCY
NOTES:

1. THESE SYMBOLS SHALL BE USED ON ALL PLANS TO BE APPROVED BY THE A.W.A.

2. VALVE SIZE IS SAME AS LINE SIZE UNLESS OTHERWISE NOTED.
GENERAL NOTES:

1) THE TYPES, LOCATIONS, SIZES, AND DEPTHS OF EXISTING UNDERGROUND UTILITIES AS SHOWN ON THESE IMPROVEMENT PLANS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY AND ARE APPROXIMATE. A REASONABLE EFFORT HAS BEEN MADE TO LOCATE AND DELINEATE ALL KNOWN UNDERGROUND FACILITIES. HOWEVER, THE ENGINEER CAN ASSUME NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF THE DELINEATION OF SUCH UNDERGROUND FACILITIES, NOR THE EXISTENCE OF OTHER BURIED OBJECTS OR FACILITIES WHICH MAY BE ENCOUNTERED BUT WHICH ARE NOT SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE EXISTING UTILITIES, WHETHER SHOWN OR NOT SHOWN ON THE DRAWINGS AND TO FIELD VERIFY THE EXACT LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL ENGAGE ALL UNDERGROUND FACILITIES THAT ARE TO BE CONNECTED TO OR THAT ARE IN THE PATH OF THE PROPOSED IMPROVEMENTS FOR VERIFICATION OF LOCATION AND ELEVATION PRIOR TO THE COMMENCING OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTING THE WATER LINE AND APPURTENANCES PER THE IMPROVEMENT PLANS DESPITE THE PRESENCE OF BURIED OBJECTS OR FACILITIES WHICH WERE NOT EXPECTED TO BE ENCOUNTERED, AND THE CONTRACTOR SHALL NOT BE REIMBURSED FOR ANY EXPENSES BROUGHT UPON BY SUCH BURIED OBJECTS OR UTILITIES. THE CONTRACTOR OR ANY SUBCONTRACTOR SHALL NOTIFY UNDERGROUND SERVICES ALERT (USA) AT (600) 227-2600 IN ACCORDANCE WITH THE SPECIFICATIONS PRIOR TO ALL EXCAVATION.

2) AMADOR WATER AGENCY (AGENCY) INSPECTOR: (209) 223-3018. THE CONTRACTOR SHALL CONTACT THE AGENCY INSPECTOR SEVEN (7) DAYS PRIOR TO COMMENCEMENT OF THE PRE-CONSTRUCTION MEETING, 48 HOURS OR TWO (2) BUSINESS DAYS, WHICHERVER IS GREATER, PRIOR TO COMMENCEMENT OF INITIAL WATER LINE CONSTRUCTION OR RESTARTING NON-CONTINUOUS WORK, AND 24 HOURS OR ONE (1) BUSINESS DAY, WHICHERVER IS GREATER, PRIOR TO EACH DAY FOR WHICH CONTINUOUS WORK ON WATER UTILITY INSTALLATION OCCURS.

3) ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE MOST CURRENT AMADOR WATER AGENCY STANDARDS AND "STANDARD SPECIFICATIONS OF THE STATE OF CALIFORNIA, DEPARTMENT OF TRANSPORTATION, 2015", WHERE THERE IS ANY CONFLICT, AGENCY STANDARDS SHALL PREVAIL.

4) THE CONTRACTOR SHALL TAKE ALL PRECAUTIOUS MEASURES NECESSARY TO PROTECT EXISTING IMPROVEMENTS THAT ARE TO REMAIN IN PLACE. ALL IMPROVEMENTS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE EXPEDITIOUSLY REPAIRED OR RECONSTRUCTED AT THE CONTRACTOR'S EXPENSE AND INSPECTED BY THE AGENCY OR CONTROLLING AGENCY, WITHOUT ADDITIONAL COMPENSATION.

5) ALL PIPING SHALL HAVE 36" MINIMUM COVER, EXCEPT WHERE SPECIFICALLY NOTED ON THE PROJECT PLANS. IF INVERT ELEVATION SHOWN ON PROFILE DRAWINGS RESULT IN LESS THAN 36" OF COVER, THEN 36" OF COVER SHALL PREVAIL.
   • GREATER THAN 60' OF COVER NOT ALLOWED.
   • 60' TO 36' OF COVER USE CSO, PC 165 OR GREATER PIPE.
   • 24' TO 36' OF COVER USE CSO, PC 235 OR GREATER PIPE, ENCASED IN 2-SACK SAND SUICY.
   • 18' TO 24' OF COVER USE DUCTILE IRON PIPE, ENCASED IN 2,000 PSI CONCRETE.
   • LESS THAN 18" OF COVER NOT ALLOWED.
   WATER LINES GREATER THAN 12" OR WITH HAZARDOUS LAYING CONDITIONS REQUIRE DIFFERENT MATERIAL SPECIFICATIONS, SEE AGENCY STANDARDS AND DETAILS.

6) PIPE BENDS AND TIE IN DETAILS INDICATED ON THE PLANS ARE APPROXIMATE HORIZONTAL ANGLES AND ARE INTENDED TO SHOW THE ESSENTIAL ELEMENTS REQUIRED OF THE CONTRACTOR. ACTUAL FIELD PIPING ANGLES MAY BE DIFFERENT, THE CONTRACTOR SHALL SUPPLY ALL LABOR, STANDARD OR FABRICATED FITTINGS, AND APPURTENANCES REQUIRED FOR THE BEND OR TIE-IN INSTALLATION, WITH NO ADDITIONAL REIMBURSEMENT.

7) THE CONTRACTOR SHALL NOT EXCEED THE MANUFACTURER'S RECOMMENDATION FOR LAYING PIPE ALONG HORIZONTAL CURVES, WHEN SLOPES ARE GREATER THAN 10% PIPE SHALL BE LAID UPHILL UNLESS OTHERWISE NOTED. CUT OFF WALLS SHALL BE INSTALLED EVERY 200' FOR SLOPES BETWEEN 10% AND 20% GRADE AND EVERY 100' FOR SLOPES GREATER THAN 20% UNLESS OTHERWISE NOTED.

8) THE CONTRACTOR SHALL PROVIDE THE LABOR AND MATERIALS REQUIRED FOR HYDROSTATIC & BACTERIOLOGICAL TESTING, CHLORINATION AND FLUSHING. ALL TESTING AND FLUSHING SHALL BE OBSERVED AND ACCEPTED BY THE AGENCY. AGENCY PERSONNEL SHALL COLLECT ALL SAMPLES FOR BACTERIOLOGICAL TESTING. ACTUAL CONNNECTIONS TO EXISTING AGENCY WATER LINES WILL NOT BE PERMITTED PRIOR TO THE COMPLETION OF STERILIZATION AND TESTING OF NEW WATER LINES. ALL EXISTING WATER VALVES SHALL BE OPERATED BY AGENCY PERSONNEL ONLY.

9) THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYOUT OF THE LINE AND GRADE OF THE SITE AND ALL PIPING WITHIN THE PROJECT SITE.

10) THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING RECORD DRAWINGS FOR ALL WORK THROUGHOUT THE COURSE OF CONSTRUCTION AND BE AVAILABLE ON SITE FOR INSPECTION AT ALL TIMES. SUCH DRAWINGS SHALL RECORD THE LOCATION AND GRADE OF ALL UNDERGROUND IMPROVEMENTS CONSTRUCTED AND SHALL BE DELIVERED TO THE OWNER PRIOR TO, AND IN CONSIDERATION OF THE OWNER'S ACCEPTANCE OF WORK.

11) THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL SURPLUS EXCAVATION MATERIAL AND DEBRIS PROMPTLY FROM THE SITE AND SHALL MAINTAIN THE SITE IN A NEAT AND ORDERLY CONDITION. THE CONTRACTOR SHALL OBTAIN ALL NECESSARY FILL AND GRADE PERMITS. THE CONTRACTOR SHALL ADJUST ALL GRADE RINGS, VALVE BOXES AND VAULTS TO FINISHED GRADE UNLESS OTHERWISE SHOWN ON DRAWINGS OR DIRECTED.

12) PIPE STATIONING IS BASED ON HORIZONTAL DISTANCE AND DOES NOT REPRESENT ACTUAL LENGTH OF PIPE.

13) CONTRACTOR SHALL AT ALL TIMES COMPLY WITH THE SAFETY RULES AND REGULATIONS ESTABLISHED BY CA OSHA AND OTHER AGENCIES HAVING JURISDICTION OVER THE WORK AND SHALL BE REQUIRED TO OBTAIN ALL PERMITS. CONTRACTOR 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.

14) WATER SERVICE LINES SHALL BE MARKED WITH THE LETTER "W" STAMPED ON THE BACK OF THE SIDEWALK OR ON THE TOP OF CURB. THE UNDERGROUND CONTRACTOR SHALL PROVIDE SUFFICIENT RECORDS AND SHALL LEAVE ADEQUATE MARKS IN THE FIELD FOR THE CONCRETE CONTRACTOR TO ACCURATELY STAMP THE LETTER "W" FOR ALL WATER SERVICES.

15) ALL EXISTING IMPROVEMENTS, INCLUDING BUT NOT LIMITED TO LANDSCAPING, DRIVEWAYS, CULVERTS, DRAINAGE DITCHES AND MONUMENTS, SHALL BE RESTORED TO THE CONDITION IN WHICH THEY WERE PRIOR TO CONSTRUCTION, OR BETTER.

16) A WRITTEN REQUEST TO REMOVE AND/ OR TRIM ANY TREES SHALL BE SUBMITTED IN WRITING TO THE OWNER. NO REMOVAL AND/ OR TRIMMING SHALL TAKE PLACE WITHOUT WRITTEN RESPONSE BY THE OWNER.

17) ALL DRAINAGE DITCHES SHALL BE GRADED TO DRAIN IN ORIGINAL DIRECTION AND PROTECTED FROM EROSION. DRIVEWAYS ARE TO BE REPLACED IN KIND.

18) THRUST BLOCKS SHALL BE INSTALLED PER SW013.

20) PLAN APPROVAL IS VALID FOR TWO YEARS FROM DATE OF AGENCY SIGNATURE OR CONDITIONAL WILL SERVE COMMITMENT EXPIRATION, WHICHERVER OCCURS FIRST. PLAN APPROVAL IS NOT A COMMITMENT OF SERVICE.

WATER GENERAL NOTES


AMADOR WATER AGENCY
TRAVELED AREAS  

UNTRAVELED AREAS

ROAD SECTION SHALL CONFORM TO ROAD CONTROLLING ENTITY’S SPECIFICATIONS
AC THICKNESS SHALL MATCH EXISTING PAVEMENT THICKNESS

SAW CUT EXISTING PAVEMENT

INTERMEDIATE BACK FILL
85% COMPACTION

AC—MATCH EXISTING, 2” MIN

SUBGRADE—5” CLASS II AGGREGATE
BASE OR 2 SACK SLURRY, 95% RC

INTERMEDIATE BACK FILL
95% COMPACTION

BLUE METALLIC LOCATOR TAPE

#10 A.W.G. SOLID COATED
SOFT DRAWN COPPER WIRE
SEE STD. DWG. #SW004
TAPE WIRE TO PIPE
EVERY 10’

PIPE BEDDING AND BACK FILL
90% COMPACTION, ASTM D-1557

36” MIN. COVER
60” MAX. COVER

12” MIN.

PIPE TO BE LAID WITH LABEL FACING UP

6” MIN.

8” MIN.  

PIPE BEDDING: COMPLY WITH A.W.A. STANDARD SPECIFICATION 7.5

INTERMEDIATE BACK FILL: IMPORTED OR NATIVE MATERIAL WITH ALL ROCKS OVER 3” REMOVED AND FREE OF VEGETATIVE MATERIAL OR 2 SAC SAND SLURRY

NOTES:

1. MINE TAILINGS ARE UN-ACCEPTABLE FOR ANY TRENCH BACKFILLING.

2. 40” OR GREATER PIPE COVER MUST BE PRE-APPROVED BY A.W.A.

3. BLUE LOCATOR TAPE AT TOP OF SAND TO BE MARKED: "CAUTION — WATER LINE BURIED BELOW".

AMADOR WATER AGENCY
NOTES:

1. LOCATION OF MARKER SHALL BE APPROVED BY AGENCY ENGINEER BEFORE PLACEMENT.

2. TARGET PLATE & POST SHALL CONFORM TO SECTION 82 OF CALIFORNIA STANDARD SPECIFICATIONS.

3. ALL NUMBERS AND LETTERS SHALL BE STENCILLED IN WHITE.

LEGEND

V = VALVE
ARV = AIR RELEASE VALVE
PRV = PRESSURE REDUCING VALVE
BOV = BLOW OFF VALVE
STA.0+00 = WATERLINE STATION
AP = ANGLE POINT
NOTES:

1. WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES. A CONTINUITY TEST SHALL BE PERFORMED BY CONTRACTOR PRIOR TO FINAL ACCEPTANCE BY AGENCY.

2. ALL FITTINGS TO BE WRAPPED W/ MINIMUM 6 MIL. POLYETHYLENE FILM.

PLAN VIEW

WIRE REQUIRED BETWEEN VALVES

INSULATE SPLICE WITH SHRINK-PACK OR EQUAL.

SPlice DETAIL

G5 CONCRETE VALVE BOX WITH G5C CAST IRON LID, MARKED "WATER"

GATEWELL TO EXTEND INTO VALVE BOX NOT LESS THAN 6" AND NO MORE THAN 10"

8" PVC GATEWELL EXTENSION SINGLE CONTINUOUS LENGTH OF PIPE.

CLASS B CEMENT CONCRETE 6" WIDE X 12" DEEP W/ 2-#4 REBAR

6" LOOP OF WIRE IN ALL AREAS

#10 A.W.G. COATED SOFT DRAWN COPPER WIRE TAPE WIRE TO PIPE EVERY 10'.

WATER MAIN

VALVE

NOTE: ALL BOXES SET OUTSIDE OF TRAVELED WAYS SHALL BE SET 3" HIGH W/CONCRETE COLLAR INSTALLED TO TOP OF BOX

PROFILE

VALVE INSTALLATION

VALVE AND LOCATING WIRE INSTALLATION

DRAWN BY: K.J.K. SCALE: N.T.S. DRAWING NO.: SW004

APPROVED: E.M.C. DATE: 7/23/03

REV.: 09/18/17

AMADOR WATER AGENCY
NOTES:
1. UNLESS OTHERWISE CALLED OUT SADDLES, BALL VALVES, ETC. SHALL COMPLY WITH AWA STANDARD SPECIFICATIONS. MATCH ALL PIPE AND APPURtenANCE SIZES TO COMBINATION AIR & VACUUM RELEASE VALVE SIZE.
2. COMBINATION AIR & VACUUM RELEASE VALVE MUST BE PLACED IN BOX SO THAT IT MAY BE REMOVED WITHOUT REMOVING THE BOX.
3. PLACE VENT AT BACK OF SIDEWALK OR OUTSIDE TRAVELED WAY AS DIRECTED BY AGENCY ENGINEER.
4. VENT SIZE SHALL MATCH COMBINATION AIR & VACUUM RELEASE INLET SIZE.
5. LOCATE COMBINATION AIR & VACUUM RELEASE VALVE AT ALL INTERMEDIATE HIGH POINTS AND AS CALLED FOR ON PLANS.
6. PROVIDE 1” CAVRV ON LINE SIZES UP TO 12” AND 2” ON LINE SIZES 14” TO 18” OR AS DIRECTED OR REQUIRED.
7. MAINTAIN MINIMUM 2% CONTINUOUS UPWARD SLOPE FROM CORP STOP TO AIR VALVE.
8. BOLLARDS REQUIRED IF AIR & VACUUM RELEASE VALVE IS NOT BEHIND CURB, LARGE ROCK, OR OTHERWISE PROTECTED.
9. GRAVEL TO BE 3/8” CLEAN RIVER RUN PEA GRAVEL, CLASS II AB OR APPROVED EQUAL.

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**ITEM** | **DESCRIPTION**
--- | ---
1 | SERVICE SADDLE
2 | CORPORATION STOP
3 | 90° BRASS ELBOW
4 | TYPE K SOFT COPPER PIPE
5 | BRASS NIPPLE
6 | BRONZE ANGLE METER STOP
7 | UNION
8 | 6” PVC SLEEVE
9 | GRAVEL

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**COMBINATION AIR & VACUUM RELEASE VALVE**

**DRAWN BY:** P.S.L.  **SCALE:** N.T.S.  **DRAWING NO.:** SW005  **REV.:** 1/27/15

**APPROVED:** B.M.C.  **DATE:** 3/15/04  **AMADOR WATER AGENCY**
1. HYDRANT LOCATION TO BE DETERMINED BY AWA, IN COORDINATION WITH LOCAL FIRE DISTRICT. CONTRACTOR TO SET FIRE HYDRANT TO CORRECT GRADE.
2. INSTALL HYDRANT AND BOLLARDS PER DETAIL SW007, UNLESS OTHERWISE APPROVED.
3. FIRE HYDRANTS MUST BE COVERED (BAGGED) UNTIL AVAILABLE FOR USE.
4. HYDRANT LATERALS SHALL BE DUCTILE IRON, FULLY RESTRAINED & INSTALLED PER DETAIL SW002.
5. HYDRANT LATERALS LONGER THAN 50’ SHALL BE A MINIMUM OF 8” PIPE, WITH AN ADDITIONAL SHUTOFF VALVE INSTALLED PER SW004 5’ FROM THE HYDRANT.
6. ALL GLANDS, WEEP HOLES, NUTS & BOLTS SHALL REMAIN CLEAR OF CONCRETE.
7. WET BARREL HYDRANTS - BELOW 2,000’ ELEVATION = CLOW 960 RANGER. DRY BARREL HYDRANTS - ABOVE 2,000’ ELEVATION = MUELLER SUPER CENTURION.

FIRE HYDRANT - SEE AWA SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS

COAT HYDRANT CHROME YELLOW, 8 MIL EPOXY PAINT (NFPA 291 5.2.1.1)

TWO 2 1/2” OUTLETS

ONE 4 1/2” OUTLET TO FACE THE STREET.

AS REQ’D.

BREAKOFF SPOOL MJ. F.H.
BURY ELL.

BREAKAWAY BOLTS (WITH NUT ON BOTTOM), TOP & BOTTOM FLANGE.

CONCRETE THRUST BLOCK PER DETAIL SW013

#4 REBAR COATED GRADE 60

LOCATING WIRE TAPE TO TOP OF PIPE.

6” DIA. PIPE

EIGHT CUBIC FEET OF 1/2” GRAVEL REQUIRED AROUND WEEP HOLE FOR DRY BARREL INSTALLATIONS

WATER MAIN, TEE & THRUST BLOCK PER DETAIL SW013

36” MIN.

8” EXT. AS REQ’D.

3” MIN/6” MAX

18” TO 30”

FIRE HYDRANT & BLOW OFF ASSEMBLY


APPROVED: B.C. DATE: 3/15/04

AMADOR WATER AGENCY
WELD TWO 1 1/2"X 1 1/2"X 3" PIECES OF SQUARE STEEL TUBING TO GUARD POST, 12" APART FOR SNOW STAKES, WHERE ABOVE 2,000’ ELEVATION.

VALVE BOX SHALL NOT BE LOCATED IN V-DITCH OR DRAINAGE SWALE

EDGE OF PAVEMENT

EDGE OF RIGHT OF WAY

TOP OF FILL OR TOE OF CUT WITH SLOPE STABILIZATION AS REQUIRED BY AWA AND ROADWAY CONTROLLING AGENCY

PLAN

4" SCH. 40 GALV. STEEL PIPE FILLED WITH CONCRETE, COAT PIPE WITH TWO COATS OF CHROME YELLOW (8 MILS) EPOXY

HYDRANT INSTALLATION AS PER SW006

3' BLUE TAPE, REFLECTIVE

FIRE HYDRANT PAD SHALL HAVE PROPER DRAINAGE

2% SLOPE

2:1 SLOPE

NOTES:

1. GUARD POSTS ARE REQUIRED ON ALL SIDES AS NEEDED TO PROTECT THE HYDRANT.
2. THE HYDRANT PAD SHALL BE CONSTRUCTED PER ROADWAY EMBANKMENT SPECIFICATIONS AND HAVE A MINIMUM 95% COMPACTION.
3. BOLLARDS ARE NOT REQUIRED IF HYDRANT IS PROTECTED BY CURB OR EQUIVALENT.

PROFILE

FIRE HYDRANT PAD PLAN

DRAWN BY: B.C.
APPROVED: R.F.

SCALE: N.T.S.
DATE: 7/23/03

DRAWING NO.: SW007

REV.: 9/1/20

AMADOR WATER AGENCY
NOTES:
1. ALL PIPING FROM WATER MAIN TO METER BOX SHALL BE 1" TYPE "K" SOFT COPPER, WITH BLUE POLYETHYLENE JACKETING, FOR ALL 3/4" AND SMALLER METER INSTALLATIONS.
2. ALL PIPE CONNECTIONS SHALL BE COMPRESSION TYPE: MUeller "C-110"; FORD "PACK JOINT"; OR EQUAL.
3. METER BOXES SHALL BE LEVEL AND SHALL NOT BE IN DRIVEWAYS OR AREAS WITH VEHICLE TRAFFIC.
4. METER BOXES SHALL BE BEC C-36W, CHRISTY B-36 OR EQUAL. LID SHALL BE MARKED "WATER" AND HAVE TOUCH READ PORT. A SINGLE SERVICE FOR TWO PREMISES SHALL NOT BE PERMITTED.
5. METER LOCATION VARIANCES SHALL BE APPROVED BY AWA ENGINEER.
6. BEDDING & BACK FILL REQUIRED ALONG SERVICE LINE PER STANDARD DETAIL DWG. SW002.
7. NON—SINGLE FAMILY RESIDENTIAL CONNECTIONS SHALL HAVE A SEPARATE CONNECTION FOR FIRE PROTECTION.

STANDARD SERVICE CONNECTION:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>SERVICE SADDLE</td>
</tr>
<tr>
<td>2</td>
<td>CORPORATION STOP</td>
</tr>
<tr>
<td>3</td>
<td>TYPE K SOFT COPPER TUBING</td>
</tr>
<tr>
<td>4</td>
<td>LOCKABLE 1&quot; ANGLED METER STOP</td>
</tr>
<tr>
<td>5</td>
<td>METER—SUPPLIED BY AWA</td>
</tr>
<tr>
<td>6</td>
<td>BRASS CHECK VALVE</td>
</tr>
<tr>
<td>7</td>
<td>BRASS GATE VALVE</td>
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<tr>
<td>8</td>
<td>BRASS REDUCER (AS NEEDED)</td>
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</tbody>
</table>

STANDARD SERVICE CONNECTION
FOR 5/8" AND 3/4" METERS

DRAWN BY: B.M.C.
SCALE: N.T.S.
DRAWING NO.: SW008
APPROVED: D.W.
DATE: 11/04/11
REV.: 4/1/18

AMADOR WATER AGENCY
NOTES:
1. ALL PIPING FROM WATER MAIN TO METER BOX SHALL BE TYPE "K" SOFT COPPER, WITH BLUE POLYETHYLENE JACKETING. PIPING SHALL BE 1" FOR 1" METERS, AND 2" FOR 1.5" TO 2" METERS.
2. ALL PIPE CONNECTIONS SHALL BE COMPRESSION TYPE: MUELLER "C-110"; FORD "PACK JOINT"; OR EQUAL.
3. METER BOXES SHALL BE LEVEL AND SHALL NOT BE IN DRIVEWAYS OR AREAS WITH VEHICLE TRAFFIC.
4. METER BOXES SHALL BE BES C-36W, CHRISTY B-36 OR EQUAL. LID SHALL BE MARKED "WATER" AND HAVE TOUCH READ PORT. A SINGLE SERVICE FOR TWO PREMISES SHALL NOT BE PERMITTED.
5. METER LOCATION VARIANCES SHALL BE APPROVED BY AWA ENGINEER.
6. BEDDING & BACK FILL REQUIRED ALONG SERVICE LINE PER STANDARD DETAIL DWG. SW002.
7. NON–SINGLE FAMILY RESIDENTIAL CONNECTIONS SHALL HAVE A SEPARATE CONNECTION FOR FIRE PROTECTION.

STANDARD SERVICE CONNECTION:

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>1</td>
<td>SERVICE SADDLE</td>
</tr>
<tr>
<td>2</td>
<td>CORPORATION STOP</td>
</tr>
<tr>
<td>3</td>
<td>TYPE K SOFT COPPER TUBING</td>
</tr>
<tr>
<td>4</td>
<td>LOCKABLE ANGLED METER STOP</td>
</tr>
<tr>
<td>5</td>
<td>METER–SUPPLIED BY AWA</td>
</tr>
<tr>
<td>6</td>
<td>BRASS CHECK VALVE</td>
</tr>
<tr>
<td>7</td>
<td>BRASS GATE VALVE</td>
</tr>
<tr>
<td>8</td>
<td>BRASS REDUCER (AS NEEDED)</td>
</tr>
</tbody>
</table>
NOTES:

1. LARGE METER AND METER VAULT DETAIL IS INTENDED TO ILLUSTRATE A TYPICAL LAYOUT OF REQUIRED EQUIPMENT & CLEARANCES. THIS DETAIL IS NOT INTENDED FOR CONSTRUCTION PURPOSES. DIFFERENT PIPING SIZES WILL REQUIRE A SLIGHTLY DIFFERENT LAYOUT. METER & METER VAULT DESIGN SUBJECT TO AWA APPROVAL.

2. PIT SUMP SHALL DRAIN TO DAYLIGHT THROUGH A 4" DIA. DRAIN PIPE OR HAVE SOME OTHER POSITIVE MEANS OF DRAINAGE SUCH AS A SUMP PUMP OR EDUCTOR.

3. ALL EXPOSED PIPE & FITTINGS SHALL BE COATED WITH 8 MIL. EPOXY PAINT.

VAULT SHALL HAVE FULL OPERATING SPRING ASSISTED TRAFFIC RATED LID WITH STAINLESS STEEL HARDWARE & PADLOCK LOCKING LATCH.

* LADDER REQUIRED IF VAULT DEPTH GREATER THAN 5' PER OSHA

---

### LARGE METER VAULT LAYOUT

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WALL PENETRATION SEAL – THUNDER LINE LINK SEAL OR EQUAL.</td>
</tr>
<tr>
<td>2</td>
<td>DISMANTLING JOINT</td>
</tr>
<tr>
<td>3</td>
<td>HAND WHEEL OPERATED FLANGED GATE VALVE AND PIPE SUPPORT, TYP (3)</td>
</tr>
</tbody>
</table>

**Drawn by:** L.C.C.  **Scale:** N.T.S.  **Drawing No.:** SW009A  **Rev.:** 8/31/17
NOTES:

1. REQUIRED WHERE VALVE NUT IS DEEPER THAN 4" BELOW FINISHED GRADE.

2. TOP OF FABRICATED EXTENSION TO BE 24" – 36" FROM FINISHED GRADE.
NOTES:

1. IF NON-POTABLE MAIN OR LATERAL IS CUT OR DAMAGED, IMMEDIATELY NOTIFY NON-POTABLE UTILITY.

2. ALTERATION OF THE NON-POTABLE GRADE WILL BE PERMITTED ONLY AFTER WRITTEN PERMISSION HAS BEEN RECEIVED BY AWA FROM THE NON-POTABLE UTILITY.

3. ALL STATE & LOCAL NON-POTABLE UTILITY REQUIREMENTS MUST BE MET.

4. ALL CROSSINGS SHALL BE AT 90°, UNLESS OTHERWISE APPROVED BY THE AGENCY ENGINEER.

5. NO CONNECTION JOINTS ALLOWED IN THE WATER MAIN WITHIN 8 HORIZONTAL FEET OF THE NON-POTABLE FLUID PIPELINE.

6. IF THE SEPARATION REQUIREMENTS OF TITLE 17 OR TITLE 22, ESPECIALLY SECTION 64572, CANNOT BE MET, WRITTEN AUTHORIZATION AND AN APPROVED INSTALLATION PLAN FROM THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD MUST BE PROVIDED TO AWA PRIOR TO CONSTRUCTION.

NON-POTABLE PIPELINE FLUIDS:

1) UNTREATED SEWAGE
2) PRIMARY OR SECONDARY TREATED SEWAGE
3) DISINFECTED SECONDARY—2.3 RECYCLED WATER
4) DISINFECTED SECONDARY—23 RECYCLED WATER
5) HAZARDOUS FLUIDS OR GASES (FUELS, INDUSTRIAL WASTES, SLUDGE, ETC.)
6) DISINFECTED TERTIARY RECYCLED WATER
7) STORM DRAINAGE
8) RAW WATER

WATER LINE CROSSING

DRAWN BY: L.C.C
SCALE: N.T.S
DRAWING NO.: SW011
REV.: 12/31/18
APPROVED: D.E.E
DATE: 11/9/17

AMADOR WATER AGENCY
NOTES:

1. IF NON-POTABLE MAIN OR LATERAL IS CUT OR DAMAGED, IMMEDIATELY NOTIFY NON-POTABLE UTILITY.

2. ALTERATION OF THE NON-POTABLE GRADE WILL BE PERMITTED ONLY AFTER WRITTEN PERMISSION HAS BEEN RECEIVED BY AWA FROM THE NON-POTABLE UTILITY.

3. ALL STATE & LOCAL NON-POTABLE UTILITY REQUIREMENTS MUST BE MET.

4. IF WATER MAIN IS INSTALLED GREATER THAN 10’ HORIZONTALLY FROM NON-POTABLE PIPELINES, THE VERTICAL SEPARATION REQUIREMENT OF 12” NO LONGER APPLIES.

5. IF THE SEPARATION REQUIREMENTS OF TITLE 17 OR TITLE 22, ESPECIALLY SECTION 64572, CANNOT BE MET, WRITTEN AUTHORIZATION AND AN APPROVED INSTALLATION PLAN FROM THE CALIFORNIA STATE WATER RESOURCES CONTROL BOARD MUST BE PROVIDED TO AWA PRIOR TO CONSTRUCTION.

INSTALLATION IN ZONE A PROHIBITED
IF NON-POTABLE PIPELINE CONVEYS:
1) UNTREATED SEWAGE
2) PRIMARY OR SECONDARY TREATED SEWAGE
3) DISINFECTED SECONDARY—2.2 RECYCLED WATER
4) DISINFECTED SECONDARY—23 RECYCLED WATER
5) HAZARDOUS FLUIDS OR GASES
INSTALLATION IN ZONE B PROHIBITED
IF NON-POTABLE PIPELINE CONVEYS:
1) DISINFECTED TERTIARY RECYCLED WATER
2) STORM DRAINAGE
3) RAW WATER

RAW WATER PIPELINES ARE TO BE PLACED 4’ HORIZONTALLY AND 1’ VERTICALLY BELOW ANY WATER MAIN.
NOTES:

1. UNLESS OTHERWISE CALLED OUT SADDLES, BALL VALVES, ETC. SHALL COMPLY WITH AWA STANDARD SPECIFICATIONS. MATCH ALL PIPE AND APPURTENANCE SIZES TO SAMPLE STATION SIZE.
2. BOLLARDS REQUIRED IF SAMPLE STATION IS NOT BEHIND CURB, LARGE ROCK, OR OTHERWISE PROTECTED.
3. SAMPLE STATION AND BOXES SHALL BE BEDDED IN 12” OF 3/8” CLEAN RIVER RUN PEA GRAVEL OR APPROVED EQUAL.

* WATER QUALITY SAMPLING STATION

1  ALUMINUM LID
2  ALUMINUM HOUSING—6” DIA. (O.D.)
3  FLUSH MOUNTED LOCK
4  1/2” X 3/8” BALL VALVE
5  BRONZE ANGLE METER STOP
6  1/2” TYPE K SOFT COPPER PIPE

NOTE:
1. USE SPECIFIED MANUFACTURER OR EQUAL.
2. USE STATION GUARD XLT OR KOR—COLD ABOVE 2,000’ ELEVATION.

KORALEEN ENTERPRISES
1340 Loma De Paz, Escambrido, CA 92027
Phone 760-743-0407
Fax 760-743-1396

WATER QUALITY SAMPLING STATION

DRAWN BY: K.J.K.  SCALE: N.T.S.
APPROVED: E.M.C.  DATE: 3/18/04
DRAWING NO.: SW012  REV.: 2/22/17

AMADOR WATER AGENCY
1. THRUST BLOCK AREAS & VOLUMES GIVEN ARE FOR A TEST PRESSURE OF 150 psi AND
   A SOIL BEARING PRESSURE OF 2000 lb/sf. INSTALLATIONS USING HIGHER PRESSURES OR
   LOWER SOIL BEARING PRESSURES WILL REQUIRE ADJUSTMENT OF THRUST BLOCK SIZE;
   SUBJECT TO APPROVAL BY AGENCY ENGINEER. CONTRACTOR SHALL CONFIRM
   SOIL CONDITIONS.
2. THRUST BLOCKS TO BE CONSTRUCTED OF CLASS "B" CONCRETE & SHALL BE POURED
   AGAINST UNDISTURBED SOIL.
3. WRAP ALL FITTINGS, NUTS, & BOLTS WITH 6 MIL. POLYETHYLENE FILM.
4. JOINTS, FACE OF PLUGS AND NUTS & BOLTS TO BE KEPT CLEAR OF CONCRETE AND
   MUST BE ABLE TO OPERATE WITHOUT DISTURBING THRUST BLOCK.
5. VERTICAL BENDS SHALL USE RESTRAINED JOINTS AND A FULL LENGTH OF
   PIPE ON EACH SIDE OF FITTING.
6. #5 REBAR SHALL BE PLACED AS SHOWN, REBAR TO BE SHAPED WITH 90° BEND
   AT EACH END, AND COATED WITH TWO COATS OF CHRISTY'S HD50 OR APPROVED EQUAL,
   18 MILS EACH COAT.

<table>
<thead>
<tr>
<th>NOMINAL PIPE DIA. (IN.)</th>
<th>HORIZONTAL THRUST BLOCK</th>
<th>VERTICAL THRUST BLOCK</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BEARING AREA (SQ. FT.)</td>
<td>VOLUME OF CONCRETE (CU. YD.)</td>
</tr>
<tr>
<td></td>
<td>(\Delta = 11, 1/4^\circ)</td>
<td>(\Delta = 22, 1/2^\circ)</td>
</tr>
<tr>
<td>4&quot;</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>6&quot;</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>8&quot;</td>
<td>1.0</td>
<td>2.2</td>
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<tr>
<td>10&quot;</td>
<td>1.5</td>
<td>3.1</td>
</tr>
<tr>
<td>12&quot;</td>
<td>2.2</td>
<td>4.4</td>
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<tr>
<th>NOMINAL PIPE DIA. (IN.)</th>
<th>TEE</th>
<th>TEE W/ BLD. FLG.</th>
<th>CROSS</th>
<th>DEAD END</th>
<th>IN LINE VALVE</th>
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<tr>
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<td>11.3</td>
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</table>

EACH HORIZONTAL THRUST BLOCK BEARING AREA (SQ. FT.)

THRU BLOC DTL

AMADOR WATER AGENCY
NOTES:

1. THRUST BLOCK AREAS & VOLUMES GIVEN ARE FOR A TEST PRESSURE OF 150 psi AND A SOIL BEARING PRESSURE OF 2000 lb/sf. INSTALLATIONS USING HIGHER PRESSURES OR LOWER SOIL BEARING PRESSURES WILL REQUIRE ADJUSTMENT OF THRUST BLOCK SIZE; SUBJECT TO APPROVAL BY AGENCY ENGINEER. CONTRACTOR SHALL CONFIRM SOIL CONDITIONS.

2. THRUST BLOCKS TO BE CONSTRUCTED OF CLASS "B" CONCRETE & SHALL BE POURED AGAINST UNDISTURBED SOIL.

3. WRAP ALL FITTINGS, NUTS, & BOLTS WITH 6 MIL. POLYETHYLENE FILM.

4. JOINTS, FACE OF PLUGS AND NUTS & BOLTS TO BE KEPT CLEAR OF CONCRETE AND MUST BE ABLE TO OPERATE WITHOUT DISTURRING THRUST BLOCK.

5. VERTICAL BENDS SHALL USE RESTRAINED JOINTS AND A FULL LENGTH OF PIPE ON EACH SIDE OF FITTING.

6. #5 REBAR SHALL BE PLACED AS SHOWN, REBAR TO BE SHAPED WITH 90° BEND AT EACH END, AND COATED WITH TWO COATS OF CHRISTY’S HD50 OR APPROVED EQUAL, 18 MILS EACH COAT.

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<td>VOLUME OF CONCRETE (CU. YD.)</td>
</tr>
<tr>
<td></td>
<td>$\Delta^\circ = 11\ 1/4^\circ$</td>
<td>$\Delta^\circ = 22\ 1/2^\circ$</td>
</tr>
<tr>
<td>14”</td>
<td>3.1</td>
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<tr>
<td>16”</td>
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<td>12.2</td>
</tr>
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<td>24”</td>
<td>9.0</td>
<td>17.6</td>
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<tr>
<th>NOMINAL PIPE DIA. (IN.)</th>
<th>TEE</th>
<th>TEE W/ BLD. FLG.</th>
<th>CROSS</th>
<th>DEAD END</th>
<th>IN LINE VALVE</th>
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<tbody>
<tr>
<td>14”</td>
<td>15.4</td>
<td>15.4</td>
<td>15.4</td>
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<td>15.4</td>
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<tr>
<td>16”</td>
<td>20.1</td>
<td>20.1</td>
<td>20.1</td>
<td>20.1</td>
<td>20.1</td>
</tr>
<tr>
<td>18”</td>
<td>25.4</td>
<td>25.4</td>
<td>25.4</td>
<td>25.4</td>
<td>25.4</td>
</tr>
<tr>
<td>20”</td>
<td>31.3</td>
<td>31.3</td>
<td>31.3</td>
<td>31.3</td>
<td>31.3</td>
</tr>
<tr>
<td>24”</td>
<td>45.1</td>
<td>45.1</td>
<td>45.1</td>
<td>45.1</td>
<td>45.1</td>
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</tbody>
</table>

EACH HORIZONTAL THRUST BLOCK BEARING AREA (SQ. FT.)

THRUSt BLOCK DETAILS — LARGE PIPE

DRAWN BY: L.P.B.  SCALE: N.T.S.  DRAWING NO.: SW013A  REV.: 7/14/06

APPROVED: L.P.B.  DATE: 7/23/03

AMADOR WATER AGENCY
NOTES:

1. SKIDS OF CARRIER PIPE SUPPORTS SHALL BE GREASED BEFORE INSTALLATION.
2. SPACING OF CARRIER PIPE SUPPORTS SHALL BE PER MANUFACTURES’ RECOMMENDATION OR 9’, WHICH EVER IS LESS.
3. CARRIER PIPE SHALL BE TESTED BEFORE SEALING ENDS.
4. BELLS OF CARRIER PIPE SHALL NOT REST ON CASING PIPE.
5. CASING LENGTH & THICKNESS SHALL CONFORM TO AGENCY STANDARDS OR ROADWAY CONTROLLING AGENCY’S SPECIFICATIONS WHICH EVER IS MORE STRINGENT.
6. CARRIER PIPE TO BE DUCTILE IRON PIPE WITH RESTRAINED JOINTS.
7. VALVES SHALL BE LOCATED ON EACH SIDE OF CASING.

ELEVATION

STAINLESS STEEL BAND CLAMPS
CARRIER PIPE SUPPORT
PSI OR EQUAL NEOPRENE END SEAL
CARRIER SUPPORT & INSULATOR
PSI MODEL PE OR APPROVED EQUAL
CASING PER SPECIFICATIONS

END VIEW

CASING & CARRIER PIPE

DRAWN BY: K.J.K.   SCALE: N.T.S.   DRAWING NO.: SW014   REV.: 8/8/18
APPROVED: E.M.C.   DATE: 7/23/03

AMADOR WATER AGENCY
NOTES:
1) ALL PROPERTY HAVING A SECOND SOURCE OF WATER, SUCH AS A WELL OR RAW IRRIGATION WATER, SHALL HAVE AN APPROVED BACK FLOW PREVENTION ASSEMBLY INSTALLED ON THE PROPERTY SIDE OF AND ADJACENT TO THE WATER METER. WHERE CONSTRUCTION OR EQUIPMENT LOCATION PRESENT CITING PROBLEMS FOR THE ABOVE NOTED ASSEMBLY, A DEVIATION MAY BE GRANTED, PROVIDING SUCH REQUEST IS MADE IN WRITING PRIOR TO INSTALLATION OF THE ASSEMBLY.
2) NO TEES, TAPS, OUTLETS OR OTHER CONNECTIONS ARE ALLOWED ON THE AMADOR WATER AGENCY (AGENCY) SIDE OF THE ASSEMBLY. THE BACK FLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS CLOSE AS PRACTICAL TO THE MAIN AND SHALL NOT BE INSTALLED BELOW GRADE.
3) ALL BACK FLOW PREVENTION DEVICES SHALL CONFORM TO THE LATEST REVISED CALIFORNIA DEPARTMENT OF HEALTH SERVICES' APPROVED LIST FOR CROSS-CONNECTION.
4) THE TYPE OF DEVICE (REDUCED PRESSURE PRINCIPAL ASSEMBLY OR DOUBLE CHECK/DETECTOR ASSEMBLY) SHALL BE DETERMINED BY THE AGENCY.
5) THE CUSTOMER SHALL OWN & MAINTAIN THE BACK FLOW DEVICE AND ALL PIPING FROM PROPERTY LINE.
6) INITIAL INSTALLATION, TESTING, ANY ADDITIONAL RE-TESTING AND ANNUAL TESTING TO BE THE RESPONSIBILITY OF THE CUSTOMER.
7) VALVE REQUIRED AT MAIN PER STANDARD DETAIL SW004.
8) ABOVE GROUND INSULATED ENCLOSURES REQUIRED IN AREAS SUBJECT TO FREEZING. DEVICE SHALL BE EASILY ACCESSIBLE FOR TESTING.

BACK FLOW PREVENTION ASSEMBLY
FOR FIRE FLOW OR OTHER SYSTEMS

CUSTOMER RESPONSIBILITY FROM PROPERTY LINE

FLOW

PLAN

5/8"x3/4" DETECTOR METER
(READS IN CUBIC FEET)

BACK FLOW PREVENTION DEVICES

RESILIENT WEDGE VALVE, TYPICAL

TEE MAY BE USED FOR PIPING TO FIRE DEPT. CONNECTIONS.

FLANGED STEEL OR DUCTILE IRON PIPE

ELEVATION

CONCRETE THRUST BLOCK

LOCATING WIRE

CUSTOMER RESPONSIBILITY FROM PROPERTY LINE

PROPERTY LINE (REFERENCE ONLY)

AMADOR WATER AGENCY
NOTES:
1) ALL PROPERTY HAVING A SECOND SOURCE OF WATER, SUCH AS A WELL OR RAW IRRIGATION WATER, SHALL HAVE AN APPROVED BACK FLOW PREVENTION ASSEMBLY INSTALLED ON THE PROPERTY SIDE OF AND ADJACENT TO THE WATER METER. WHERE CONSTRUCTION OR EQUIPMENT LOCATION PRESENT CITING PROBLEMS FOR THE ABOVE NOTED ASSEMBLY, A DEVIATION MAY BE GRANTED, PROVIDING SUCH REQUEST IS MADE IN WRITING PRIOR TO INSTALLATION OF THE ASSEMBLY.
2) NO TEES, TAPS, OUTLETS OR OTHER CONNECTIONS ARE ALLOWED ON THE AMADOR WATER AGENCY ('AGENCY') SIDE OF THE ASSEMBLY. THE BACK FLOW PREVENTION ASSEMBLY SHALL BE INSTALLED AS CLOSE AS PRACTICAL TO THE MAIN AND SHALL NOT BE INSTALLED BELOW GRADE.
3) ALL BACK FLOW PREVENTION DEVICES SHALL CONFORM TO THE LATEST REVISED CALIFORNIA DEPARTMENT OF HEALTH SERVICES' APPROVED LIST FOR CROSS-CONNECTION. THE TYPE OF DEVICE (REDUCED PRESSURE PRINCIPAL ASSEMBLY OR DOUBLE CHECK/DETECTOR ASSEMBLY) SHALL BE DETERMINED BY THE AGENCY.
4) BACK FLOW DEVICE SHALL BE PROTECTED BY BOLLARDS, CURBS, LARGE ROCKS, OR OTHER AGENCY APPROVED EQUIVALENT.
5) THE CUSTOMER SHALL OWN & MAINTAIN THE BACK FLOW DEVICE AND ALL PIPING FROM CUSTOMER METER.
6) INITIAL INSTALLATION, TESTING, ANY ADDITIONAL RE-TESTING AND ANNUAL TESTING TO BE THE RESPONSIBILITY OF THE CUSTOMER.

NO CONNECTIONS ALLOWED. DISTANCE SHALL BE AS SHORT AS POSSIBLE.

AWA MAINTENANCE RESPONSIBILITY

CUSTOMER MAINTENANCE RESPONSIBILITY

TYPICAL METER INSTALLATION CHECK VALVE NOT REQUIRED

BACK OF SIDEWALK

PLAN VIEW

18" MIN. 36" MAX.

1/2" MIN. CLEARANCE ON TEST COCK SIDE

UNION BALL VALVE

BACK FLOW PREVENTION DEVICE

BRASS PIPE & FITTINGS

ABOVE GROUND INSULATED ENCLOSURES REQUIRED IN AREAS SUBJECT TO FREEZING. DEVICE SHALL BE EASILY ACCESSIBLE FOR TESTING.

ELEVATION

BACK FLOW PREVENTION ASSEMBLY

DRAWN BY: B.M.C. DRAWING NO.: SW016
SCALE: N.T.S. REV.: 9/30/19
APPROVED: E.M.C. 2/26/06
AMADOR WATER AGENCY
NOTES:
1. All permanent blow offs shall be fire hydrants as per DWG. SW006/SW007, unless otherwise noted.
2. All pipe and fittings shall be 2” bronze, type k soft copper or brass.
3. Box to be bes C-24 or christy B-24 w/ extension or approved equal, with 12” concrete collar, with 2-#4 rebar hoops. Where vehicle traffic may occur, box shall be traffic rated.
4. Bedding & back fill along blow off shall be per standard DWG. SW002.
5. Blow off hydrant shall be mainguard no. 78 or approved equal.

**TEMPORARY BLOW OFF AT LOW POINT**

- 36” min.
- Service saddle
- Corporation stop
- Locating wire required
- 45’

**TEMPORARY BLOW OFF AT END OF LINE**

- 36” min.
- Locating wire required
- Full length of pipe
- Cap tapped for 2” i.p.t. for end of line blow off
- End of line 2” blow off other plumbing similar to temporary blow off at low point, as shown above
- Corporation stop
- Thrust block per schedule on standard DWG. SW013

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2” copper pipe</td>
</tr>
<tr>
<td>2</td>
<td>90° elbow</td>
</tr>
<tr>
<td>3</td>
<td>2” brass pipe</td>
</tr>
<tr>
<td>4</td>
<td>2” gate valve</td>
</tr>
<tr>
<td>5</td>
<td>MJ end cap</td>
</tr>
</tbody>
</table>
FLANGED TEE

PERMANENT THRUST BLOCK W/ REBAR CROSS.

TEMPORARY THRUST BLOCK TO BE REMOVED AT TIME OF LINE EXTENSION. (CARE IS TO BE TAKEN TO NOT COVER FLANGE BOLTS W/ CONCRETE.)

F.C.A. (RESTRAINED)

STANDARD HYDRANT PLACED FOR BLOW OFF / FLUSHING ACTIVITIES. REFER TO STANDARD DETAIL SW006.

INSTALL BLIND FLANGE (TO BE WRAPPED IN PLASTIC FOR REMOVAL AT TIME OF LINE EXTENSION.)

PLAN
NOTES:
1. PRESSURE REDUCING STATION DETAIL IS INTENDED TO ILLUSTRATE A TYPICAL LAYOUT OF REQUIRED EQUIPMENT & CLEARANCES. THIS DETAIL IS NOT INTENDED FOR CONSTRUCTION PURPOSES. DIFFERENT PIPING SIZES WILL REQUIRE A SLIGHTLY DIFFERENT LAYOUT. PRV STATION DESIGN SUBJECT TO AWA APPROVAL.
2. PIT SUMP SHALL DRAIN TO DAYLIGHT THROUGH A 4" DIA. DRAIN PIPE OR HAVE SOME OTHER POSITIVE MEANS OF DRAINAGE SUCH AS A SUMP PUMP OR EDUCTOR.
3. IN LINE ISOLATION VALVES SHALL BE LOCATED WITHIN 20' AND ON BOTH SIDES OF THE PRV STATION.
4. OUTSIDE OF VAULT USE 45 DEGREE BENDS AS NEEDED TO TRANSITION TO PROPER COVER DEPTHS.
5. ALL PIPE AND FITTINGS SHALL BE FULLY RESTRAINED DUCTILE IRON PIPE RATED FOR 350 PSI, COATED WITH 8 MIL EPOXY PAINT. VAULT AND ALL PIPING SHALL BE SECURED FROM FREEZING.

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**PRESSURE REDUCING STATION LAYOUT**

**ITEM** | **DESCRIPTION**
--- | ---
1 | WALL PENETRATION SEAL—THUNDER LINE LINK SEAL OR EQUAL.
2 | TEE & 1/2" HOSE BIB
3 | UNION
4 | PRESSURE INDICATOR
5 | FLANGE COUPLING ADAPTER
6 | HAND WHEEL OPERATED FLANGED GATE VALVE
7 | SADDLE AND 1/2" BALL VALVE
8 | SADDLE, 2" BALL VALVE & CAP

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**DRAWN BY:** K.J.K.  **SCALE:** N.T.S.  **DRAWING NO.:** SW019  **REV.:** 1/1/20

**APPROVED:** E.M.C.  **DATE:** 3/15/04

AMADOR WATER AGENCY
1. LOCATION OF MARKER SHALL BE APPROVED BY AGENCY ENGINEER BEFORE PLACEMENT
2. USE ALL STAINLESS STEEL BOLTS, NUTS AND WASHERS FOR ATTACHMENT
3. ALL LETTERS SHALL BE STENCILED IN BLACK

NOTE: 12” X 18” ALUMINUM TARGET PLATE WITH WHITE BACKGROUND AND BLACK LETTERING

NO TRESPASSING

TAMPERING WITH THIS FACILITY IS A FEDERAL OFFENSE

42 U.S. CODE § 300i-1

AMADOR WATER AGENCY