

8. Design Requirements

**DIABLO WATER DISTRICT
STANDARD SPECIFICATIONS AND DRAWINGS**

DESIGN REQUIREMENTS

- I. Subdivision Water System Design Requirements and Plan Review Checklist
- II. DWD General Water Notes
- III. Cathodic Protection Number Format for Subdivision Plans
- IV. DHS Criteria for Separation of Water Mains and Sanitary Sewers (Revised October 16, 2003)
- V. System Pressures – Requirements for Individual Pressure Reducing Valves on Customer Services

Subdivision Water System Design Requirements And Plan Review Checklist

Design Engineer Responsibilities for Coordination with Other Entities

- Coordinate with joint trench designer.
 - Provide joint trench plans for review along with water system improvements.
 - Provide landscaping plans along with water system improvements to ensure that there are no conflicts between trees and water facilities.
- Coordinate with other utilities regarding water improvements, including but not limited to (as applicable):
 - Contra Costa County Public Works
 - City of Oakley
 - Contra Costa County Fire Protection District
 - East Contra Costa Irrigation District
 - Ironhouse Sanitary District
 - PG & E
 - Reclamation District 799
 - Bethel Island Municipal Improvement District
 - Others as applicable
- Verify consistency of water system information on plans with adjacent subdivisions' plans.
- Provide soils report for review along with improvement plans, if requested.

Water Mains – Sizing and Plan

- Minimum pipe size: 6-inch without fire hydrants and 8-inch with fire hydrants.
- Size water mains to provide adequate fire flows for planned development. Sizes of mains larger than 12-inches must conform to the DWD Facilities Plan.
- Avoid dead end mains if possible.
- Locate water lines so that they are 6-feet North or West of road centerline.
- When a center median exists in roadway, water main shall be centered 6-feet from face of curb.
- Label water line, including size, in a box on the water line.
- Confirm that polyvinyl chloride (PVC) pipe or ductile iron pipe (DIP) will accommodate the bending radius shown on drawings.
- Design connections to existing water lines to reflect planned future conditions (or as-built conditions, if known).
- Location of stubs to future subdivisions and adjoining properties must be based on approved tentative map (or map under review by City).

Water Mains – Profile

- Provide required pipe cover:
 - Minimum of 3-feet of cover for all mains and water services; 4-foot minimum cover for major roadways
 - Maximum of 6-feet of pipe cover
 - Provide adequate cover beneath curbs, where water line crosses over storm drain, and other crossing locations. If cover is not adequate at crossing, pipe encasement is required
- Design pipe slopes as follows:
 - Design pipe slopes at minimum of 0.1% (in non-residential areas), and maximum of 10%
 - Avoid flat pipe slopes
 - Use consistent (smooth) pipe slopes (avoid frequent or abrupt changes in slope)
- Use pipe elbows or offsets as a last resort, if the bending radius is too tight or if the pipe is too deep (deeper than 6 feet).
- Confirm that PVC or DIP pipes accommodate the bending radius shown on drawings.
- Label pipes with material, size and slope.
- Locate callouts for water line features below the water line (include leader lines, stationing and invert elevation).

Subdivision Water System Design Requirements And Plan Review Checklist

- Show size of crossing pipes in correct proportion (for example, an 8-inch pipe should appear smaller than a 24-inch pipe).
- Label elevation grids on both sides of profiles.

Existing Utilities

- Show existing utilities in plan view.
- Show crossings of existing utilities by waterline in profile.
- Show both existing and new utilities in cross sections.
- Label existing utilities with the type and size.

Separation of Water, Sewer, and Storm Drain

- Provide minimum horizontal clearance of 10 feet between water and sewer.
- Provide minimum 12-inch vertical separation between water and sewer at crossings, and in locations where less than 12-foot center to center horizontal separation exists between water and sewer.
- Provide minimum 12-inch vertical separation between water and storm drain if possible. A minimum of 6-inch vertical separation is required.
- Provide minimum 4-foot horizontal separation (clearance from outside to outside of pipes) between water and storm drain.
- Cross water and sewer pipes at right angles whenever possible.
- Comply with California Department of Health Services (CDHS) Guidance Criteria for the Separation of Water Mains and Non-Potable Pipelines (Revised October 2003 or most recent version). For special cases, the District may approve exceptions as allowed by the CDHS criteria.
- Fulfill CDHS requirements for pipe materials if separation is not met. Use DIP or Class 200 PVC when minimum horizontal separation cannot be maintained.

Fire Hydrants

- Locate fire hydrants every 500-feet for residential areas, and every 300-feet for commercial areas.
- Locate a fire hydrant at the end of cul-de-sacs and no more than 250-feet from the end of each cul-de-sac.
- Include a tee, 6-inch valve, and 6-inch lateral for each fire hydrant.
- Do not use reducing elbows.
- Locate fire hydrants so that they are 2-feet clear of the sidewalk.
- Locate fire hydrants so that they are 5-feet clear of the back of curb if there is no sidewalk.
- Provide adequate clearance at fire hydrant laterals that cross other utilities.

Valves

- Position valves approximately every 500 feet for residential streets.
- Position valves approximately every 700 to 1000-feet for non-residential streets.
- Provide each court with at least one valve located at the tee in the cross street.
- Locate valves so that a pipe break will not affect more than 20 residences (services).
- Use gate valves for pipe sizes up to and including 12-inches, and butterfly valves for pipes larger than 12-inches.
- Where gate valves (GVs) are installed on tees (or crosses) connecting water lines of differing sizes, locate reducers such that the reducer lies between the tee (or cross) and the GV, and the size of the GV matches the adjacent nominal pipe size.

Air-Release Valves

- Design pipes to minimize the need for air release valves, i.e., minimize high points. Use air release valves only when necessary.
- Locate air release valves at high points.
- Locate air release valves anywhere off the street and behind the sidewalk, as long as piping is sloped consistently upward.

Blowoffs

Subdivision Water System Design Requirements And Plan Review Checklist

- In cul-de-sacs and stubs to future development areas, use fire hydrants as an alternative to blowoffs wherever possible.
- If blowoffs are used:
 - o Use 2-inch blowoffs for pipe sizes up to an including 12-inches
 - o Use 4-inch blowoffs for pipe sizes larger than 12-inches
- Locate blowoffs within the subdivision, otherwise an easement is required.
- If applicable, a blind flange may be used at a tee or cross with a valve that will provide a future connection point. Locate the blind flange immediately adjacent to the valve.

Services

- Do not directly connect services to mains larger than 12-inches.
 - Separate water and sanitary sewer laterals by 5-feet for their entire lengths.
 - Use 1-inch service piping.
 - Call out stationing for each service.
 - Do not locate meter box in sidewalk or driveway.
 - Show meter box on typical cross sections.
 - Locate double check valves behind water main (if required).
 - If a fire hydrant is located at the end of a main, locate all services prior to reducers.
- Note: Services to future lots and adjoining properties will require payment of connection fees.

Cathodic Protection

- Include Cathodic Protection plans at the end of the plan set.
- List Cathodic Protection sheets in the sheet index.

Details/Cross Sections

- Include a note that thrust blocks shall be installed per DWD Standard Drawings 2 and 3, and provide the specific soil bearing pressure for the subdivision.
- Provide soils report, when available, and/or when requested by the District.
- If pipe encasement is required, include a note referring to DWD Standard Drawing 4 for reinforced pipeline cover section.
- Locate the joint trench underneath the sidewalk, and in front of fire hydrants.
- Position joint trench beneath all water lines.
- For cross sections with a joint trench, include a note stating that the joint trench shall be located under all water lines.

Right-of-Way and Easements

- Locate water mains, services and meters in the public right-of-way or public utility easement.
- Locate fire hydrants within the right-of-way.
- Locate off-site facilities within the right-of-way.
- In special cases subject to approval of DWD, locate water mains in a minimum 20-foot wide utility easement dedicated to DWD. Locate water mains 5-feet from either edge of an easement.
- Provide additional easements for water meters and other water facilities, if necessary.

General Requirements for Drawings

- Minimum drawing size of 22x34 inches.
- Include sign-off block for Diablo Water District on title sheet.
- Include sign-off block for developer's Geotechnical Engineer and statement of site conditions if subdivision is geotechnically sensitive (as designated by the District).
- List DWD General Water Notes as contained in these "Design Requirements".
- Use a unique symbol for each water system item.
- Show symbols in legend.
- List all abbreviations used for water facilities. Use the standard abbreviations below:
 - o ARV Air release valve
 - o BF Blind flange
 - o BFV Butterfly valve

Subdivision Water System Design Requirements And Plan Review Checklist

- BO Blowoff
- DIP Ductile iron pipe
- FH Fire hydrant
- GV Gate valve
- PVC Polyvinyl chloride pipe
- TBO Temporary blowoff
- W Water main
- WS Water service
- Label street names consistently.
- Show North arrows consistently in plan and index map.
- Indicate location of fire hydrants, air release valves, blowoffs, and valves on the index map.
- Show lot numbers on index map.
- Show lot numbers shown on key map.
- Show key map on each plan and profile sheet (for subdivisions with more than three plan & profile sheets). Highlight the street that is the subject of the sheet.
- Quantities Table:
 - Show at a minimum in table format: pipe, valve, fire hydrant, service, and blowoff quantities
 - For re-submittals, update water system quantities

DIABLO WATER DISTRICT

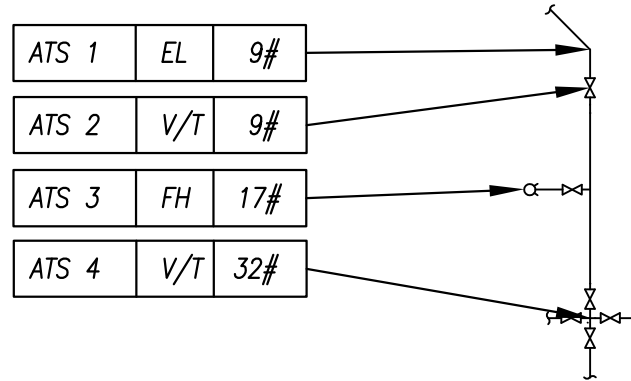
General Water Notes

1. Water system shall be installed in accordance with the standards and specifications of the Diablo Water District. Copies of the standards and specifications are available at the District office, 2107 Main Street, Oakley, CA. Phone: (925) 625-3798 and shall be on location at all times.
2. The owner shall submit to the District the soil corrosion analysis and design as required by the District's specifications after rough grading of the site has been completed. No work on the water system shall commence until the district has given its approval of the soil analysis and corrosion protection design.
3. All water mains shall be AWWA C900 Class 150 PVC unless otherwise noted on these plans. All plastic PVC water mains and services shall include a 12-gauge, single strand, blue insulated copper wire taped to the top of the pipe. Top of curb to be stamped with a "W" to mark location of water lateral.
4. Water lines shall have a minimum cover of 3 feet, and not more than 4.5 feet (unless pre-approved) from finish roadway and shall have continuous warning tape installed 18" above all water mains, service lines, hydrant lines and blow-off lines, unless otherwise noted. Warning tape shall be blue, 2" wide, plastic printed continuously with the words "caution buried water line below".
5. Basic separation requirements for water mains and sanitary sewers: For parallel construction, the minimum horizontal clearance between pressure water mains and sewers shall be 10 feet. For perpendicular construction (crossing), water mains shall be at least 1 foot (clear) above sanitary sewers where these lines must cross.
6. Special construction requirements for perpendicular water mains and sanitary sewers: where a sewer must cross anywhere over, or less than one foot under a water main, the crossing shall be perpendicular (if possible) and installation and materials shall conform to the State of California, Department of Health Services, criteria for separation of water mains and sanitary sewers.
7. Maintain 5.0" minimum separation between water services and sanitary sewer laterals.
8. Minimum vertical clearance between water main and storm drain lines shall be 6 inches.
9. Fire hydrants shall have 1-4½" & 2-2½" outlets, and each hydrant shall be isolated from the main line by a 6" gate valve, and shall receive two (2) coats of Yellow Pollard # P68205 paint.
10. Provide blue polyethylene sleeve on each copper service line and copper ARV piping.
11. Contractor shall install curb stops, meters and meter box acceptable to Diablo Water District at each lot immediately prior to jumper being removed. Contractor shall install tamper tag immediately following tie-in.

12. Use 304 stainless steel nuts and bolts for all bolt-ups as well as gate valve bonnet and stuffing box nuts and bolts.
13. The Contractor shall maintain water service to all residences at all times during construction.
14. No work shall commence until all submittals have been approved.
15. Work hours shall be Monday through Friday 8:00 a.m. to 4:30 p.m. except for District observed holidays. Any requests for working outside these times must be submitted to the District inspector at least 48 hours in advance. It is recommended that requests for Saturday work be made by the close of business the Wednesday prior. Requests for Saturday work may be approved or denied depending on inspector availability. Do not make requests for work during a District holiday.
16. All joint trench utilities shall cross underneath all water facilities.
17. All Butterfly Valves (BFVs) shall be epoxy lined and coated. Lining shall be factory certified to be holiday free.
18. All hot taps shall be performed by Tapmaster Inc. of Concord, California. Phone: 925-439-7975. Tapping sleeves shall be stainless steel type JCM 432, no equal.
19. Locator wire to be tested and test included in Cathodic Protection.

Cathodic Protection Numbering Format for Subdivision Plans

Example:



KEY

ABBREVIATION	DESCRIPTION
ARV	AIR RELEASE VALVE
ATS	ANODE TEST STATION
BO	BLOW OFF
CA	CASING
CATS	CASING TEST STATION
CTS	CORROSION TEST STATION (NO ANODE)
DIP	DUCTILE IRON PIPE LATERAL
EL	ELBOW
FH	FIRE HYDRANT, VALVE & TEE
FP	FOREIGN PIPELINE
FPTS	FOREIGN PIPELINE TEST STATION
FT	FITTING
IJ	INSULATING JOINT
IJTS	INSULATING JOINT TEST STATION
V/T	CROSS OR TEE W/VALVE(S)
#	SIZE OF ANODE IN POUNDS

Memorandum

Date: April 14, 2003 (**Revised Date: October 16, 2003**)

To: Regional and District Engineers

From: David P. Spath, Ph.D., Chief (*Original signed by Dave*)
Drinking Water and Environmental Management
601 North 7th Street, MS 216
Sacramento, CA 95814
(916) 322-2308

Subject: **GUIDANCE MEMO NO. 2003-02: GUIDANCE CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES**

The purpose of this memo is to update guidance dated April 5, 1983 for consistency with proposed 2003 regulations. Should there be any modification to the proposed Water Works Standards that may impact the content of this guidance, the guidance will be amended accordingly.

GUIDANCE: CRITERIA FOR THE SEPARATION OF WATER MAINS AND NON-POTABLE PIPELINES

BACKGROUND

When buried water mains are in close proximity to non-potable pipelines, the water mains are vulnerable to contamination that can pose a risk of waterborne disease outbreaks. For example, sewers (sanitary sewer mains and sewage force mains) frequently leak and saturate the surrounding soil with sewage due to structural failure, improperly constructed joints, and/or subsidence or upheaval of the soil encasing the sewer. If a nearby water main is depressurized and no pressure or negative pressure occurs, that situation is a public health hazard that is compounded if an existing sewer is broken during the installation or repair of the water main. Further, failure of a water main in close proximity to other pipelines may disturb their bedding and cause them to fail. In the event of an earthquake or other disaster, simultaneous failure of all pipelines could occur.

The most effective protection against this type of drinking water contamination is adequate construction and separation of non-potable pipelines and water mains. The Waterworks Standards (Title 22, Chapter 16, Section 64572) provide separation criteria for new construction. However, when these criteria cannot be met, the risk of contamination can be reduced by increasing the structural integrity of pipe materials and joints, and ensuring minimum separation requirements are met. Therefore, the following guidance details construction criteria for the installation of water mains and non-potable pipelines to minimize the risk of contamination of drinking water.



DEFINITIONS

- COMPRESSION JOINT - A push-on joint that seals by means of the compression of a rubber ring or gasket between the pipe and a bell or coupling.
- CONTINUOUS SLEEVE - A protective tube of high-density-polyethylene (HDPE) pipe with heat fusion joints or other non-potable metallic casing without joints into which a pipe is inserted.
- DISINFECTED TERTIARY RECYCLED WATER - Wastewater that has been filtered and subsequently disinfected in accordance with Section 60301.230, Chapter 3 (Water Recycling Criteria), Title 22, California Code of Regulations.
- HOUSE LATERAL - A sewer line connecting the building drain and the sanitary sewer main serving the street.
- SUPPLY LINE - Pipelines conveying raw water to be treated for drinking purposes in accordance with Section 64572 ©, **proposed** Water Works Standards.
- WATER MAIN – Means any pipeline, except for user service lines, within the distribution system in accordance with Section 64551.70, **proposed** Water Works Standards.
- RATED WORKING WATER PRESSURE - A pipe classification system based on internal working pressure of the fluid in the pipe, type of pipe material, and the thickness of the pipe wall.
- SANITARY SEWER MAIN - A gravity sewer conveying untreated municipal wastewater.
- SEWAGE FORCE MAIN - A pressurized sewer conveying untreated municipal wastewater.

APPLICABILITY

Note that the construction criteria presented in this document apply to house laterals that cross above a water main, but not to those house laterals that cross below a water main.

Water mains or non-potable pipelines that are 24-inches in diameter or larger may pose a higher degree of public health concern because of the large volumes of flow involved. Therefore, installation of water mains or non-potable pipelines 24-inches in diameter or larger should be reviewed and approved in writing by the Department on a case-by-case basis prior to construction.

In no case, should water mains and non-potable pipelines conveying sewage or other liquids be installed in the same trench.

REGULATORY REQUIREMENTS

Any new development project in which all the underground facilities are being constructed for the first time must comply with the following regulatory requirements:

Existing requirements:

Section 64630.(Title 22 CA Code of Regulations) Water Main Installation“

(c) Water mains shall be installed at least:

- (1) Ten feet (3 meters) horizontally from and 1 foot (0.3 meters) higher than sanitary sewer mains located parallel to the main.
- (2) One foot (0.3 meters) higher than sanitary sewer mains crossing the main.
- (3) Ten feet (3 meters), and preferably 25 feet (7.5 meters), horizontally from sewage leach fields, cesspools, seepage pits and septic tanks.

(d) Separation distances specified in (c) shall be measured from the nearest outside edges of the facilities.

(e) Where the requirements of (c) and (d) cannot be met due to topography, inadequate right-of-way easements, or conflicts with other provisions of these regulations, lesser separation is permissible if:

- (1) The water main and the sewer are located as far apart as feasible within the conditions listed above.
- (2) The water main and the sewer are not installed within the same trench.
- (3) The water main is appropriately constructed to prevent contamination of the water in the main by sewer leakage.

(f) Water mains shall be disinfected according to AWWA Standard C601-81 before being placed in service.

(g) Installation of water mains near the following sources of potential contamination shall be subject to written approval by the Department on a case-by-case basis:

- (1) Storage ponds or land disposal sites for wastewater or industrial process water containing toxic materials or pathogenic organisms.
- (2) Solid waste disposal sites.
- (3) Facilities such as storage tanks and pipe mains where malfunction of the facility would subject the water in the main to toxic or pathogenic contamination.

Although the following requirements have not yet been adopted, they should be within the next two years and should be used as guidance for future construction.

Proposed requirements as of the date of this document:

Section 64572. Water Main Separation

(a) New water mains and new supply lines shall not be installed in the same trench as, and shall be at least 10 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Untreated sewage,
- (2) Primary or secondary treated sewage,
- (3) Disinfected secondary-2.2 recycled water (defined in section 60301.220),
- (4) Disinfected secondary-23 recycled water (defined in section 60301.225), and
- (5) Hazardous fluids such as fuels, industrial wastes, and wastewater sludge.

(b) New water mains and new supply lines shall be installed at least 4 feet horizontally from, and one foot vertically above, any parallel pipeline conveying:

- (1) Disinfected tertiary recycled water (defined in section 60301.230), and
- (2) Storm drainage.

(c) New supply lines conveying raw water to be treated for drinking purposes shall be installed at least 4 feet horizontally from, and one foot vertically below, any water main.

(d) If crossing a pipeline conveying a fluid listed in subsection (a) or (b), a new water main shall be constructed perpendicular to and at least one foot above that pipeline. No connection joints shall be made in the water main within eight horizontal feet of fluid pipeline.

(e) The vertical separation specified in subsections (a), (b), and (c) is required only when the horizontal distance between a water main and pipeline is ten feet or less.

(f) New water mains shall not be installed within 100 horizontal feet of any sanitary landfill, wastewater disposal pond, or hazardous waste disposal site, or within 25 feet of any cesspool, septic tank, sewage leach field, seepage pit, or groundwater recharge project site.

(g) The minimum separation distances set forth in this section shall be measured from the nearest outside edge of each pipe barrel.

ALTERNATIVE CRITERIA FOR CONSTRUCTION

Water Mains, and Sewers and Other Non-potable Fluid-carrying Pipelines

When new water mains, new sanitary sewer mains, or other non-potable fluid-carrying pipelines are being installed in existing developed areas, local conditions (e.g., available space, limited slope, existing structures) may create a situation in which there is no alternative but to install water mains, sanitary sewer mains, or other non-potable pipelines at a distance less than that required by the regulations [existing Section 64630 (proposed Section 64572)]. In such cases, through permit action, the Department may approve

alternative construction criteria. The alternative approach is allowed under the proposed regulation Section 64551(c):

“A water system that proposes to use an alternative to the requirements in this chapter shall demonstrate to the Department how it will institute additional mitigation measures to ensure that the proposed alternative would not result in an increased risk to public health.”

Appropriate alternative construction criteria for two different cases in which the regulatory criteria for sanitary sewer main and water main separation cannot be met are shown in **Figures 1 and 2**.

- **Case 1** - New sanitary sewer main and a new or existing water main; alternative construction criteria apply to the sanitary sewer main.
- **Case 2** - New water main and an existing sanitary sewer main; alternative construction criteria may apply to either or both the water main and sanitary sewer main.

Case 1: New Sanitary Sewer Main Installation (Figures 1 and 2)

Zone Special Construction Required for Sanitary Sewer Main

- A Sanitary sewer mains parallel to water mains shall not be permitted in this zone without prior written approval from the Department and public water system.
- B If the water main paralleling the sanitary sewer main does not meet the Case 2 Zone B requirements, the sanitary sewer main should be constructed of one of the following:
1. High-density-polyethylene (HDPE) pipe with fusion welded joints (per AWWA C906-99);
 2. Spirally-reinforced HDPE pipe with gasketed joints (per ASTM F-894);
 3. Extra strength vitrified clay pipe with compression joints;
 4. Class 4000, Type II, asbestos-cement pipe with rubber gasket joints;
 5. PVC sewer pipe with rubber ring joints (per ASTM D3034) or equivalent;
 6. Cast or ductile iron pipe with compression joints; or
 7. Reinforced concrete pressure pipe with compression joints (per AWWA C302-95).

- C If the water main crossing below the sanitary sewer main does not meet the requirements for Case 2 Zone C, the sanitary sewer main should have no joints within ten feet from either side of the water main (in Zone C) and should be constructed of one of the following:
1. A continuous section of ductile iron pipe with hot dip bituminous coating; or
 2. One of the Zone D options 1, 3, 4, or 5 below.
- D If the water main crossing above the sanitary sewer main does not meet the Case 2 Zone D requirements, the sanitary sewer main should have no joints within four feet from either side of the water main (in Zone D) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating and mechanical joints (gasketed, bolted joints);
 3. A continuous section of Class 200 (DR 14 per AWWA C900-97) PVC pipe or equivalent, centered over the pipe being crossed;
 4. A continuous section of reinforced concrete pressure pipe (per AWWA C302-95) centered over the pipe being crossed; or
 5. Any sanitary sewer main within a continuous sleeve.

Case 2: New water mains Installation (Figures 1 and 2)

Zone Special Construction Required for Water Main

- A No water mains parallel to sanitary sewer mains shall be constructed without prior written approval from the Department.
- B If the sanitary sewer main paralleling the water main does not meet the Case 1 Zone B requirements, the water main should be constructed of one of the following:
1. HDPE pipe with fusion welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200, Type II, asbestos-cement pressure pipe;

5. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97) or equivalent; or
 6. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C302-99 or C303-95).
- C If the sanitary sewer main crossing above the water main does not meet the Case 1 Zone C requirements, the water main should have no joints within ten feet from either side of the sanitary sewer main (in Zone C) and be constructed of one of the following:
1. HDPE pipe with fusion-welded joints (per AWWA C906-99);
 2. Ductile iron pipe with hot dip bituminous coating;
 3. Dipped and wrapped one-fourth-inch-thick welded steel pipe;
 4. Class 200 pressure rated PVC water pipe (DR 14 per AWWA C900-97 & C905-97); or
 5. Reinforced concrete pressure pipe, steel cylinder type, per AWWA (C300-97 or C301-99 or C303-95).
- D If the sanitary sewer main crossing below the water main does not meet the requirements for Case 1 Zone D, the water main should have no joints within eight feet from either side of the sanitary sewer main (in Zone D) and should be constructed as for Zone C.

Water Mains and Pipelines Conveying Non-potable Fluids

When the basic separation criteria cannot be met between water mains and pipelines conveying non-potable fluids, the requirements described above for sanitary sewer mains should apply. This includes the requirements for selecting special construction materials and the separation requirements shown in Figures 1 and 2. Note that not all construction materials allowed for sanitary sewer mains will be appropriate for other non-potable fluid lines. For example, certain plastic lines may not be appropriate for the transport of some fuel products. The selection of compatible materials of construction for non-potable fluids is a decision to be made by the project engineer.

Water Mains and Sewage Force Mains

- Sewage force mains shall not be installed within ten feet (horizontally) of a water main.

- When a sewage force main must cross a water main, the crossing should be as close as practical to the perpendicular. The sewage force main should be at least one foot below the water main.
- When a new sewage force main crosses under an existing water main, and a one-foot vertical separation cannot be provided, all portions of the sewage force main within eight feet (horizontally) of the outside walls of the water main should be enclosed in a continuous sleeve. In these cases, a minimum vertical separation distance of 4 inches should be maintained between the outside edge of the bottom of the water main and the top of the continuous sleeve.
- When a new water main crosses over an existing sewage force main, the water main should be constructed of pipe materials with a minimum rated working pressure of 200 psig or the equivalent.

Water Mains and Tertiary Treated Recycled Water or Storm Drainage

The basic separation criteria for water mains and pipelines conveying tertiary treated recycled water or storm drainage lines are a 4-foot horizontal separation where lines are running parallel and a 1-foot vertical separation (water line above recycled or storm drainage) where the lines cross each other.

When these criteria cannot be met, the Zone A criteria apply where lines are running parallel, and the Zone C and Zone D criteria apply where the lines cross each other as shown on Figures 1 and 2. For these situations, the Zone "P" criteria are in effect and prohibit construction less than 1 foot in parallel installations and less than 4 inches in vertical (crossing) situations.

For tertiary treated recycled water and storm drainage lines, the Zone B criteria (requirements for special pipe) do not apply as the basic separation criteria is a four-foot horizontal separation criteria for parallel lines. The tertiary treated recycled water lines should be constructed in accordance with the color-coding, and labeling requirements per Section 116815, California Health and Safety Code of Regulations.

MISCELLANEOUS GUIDANCE

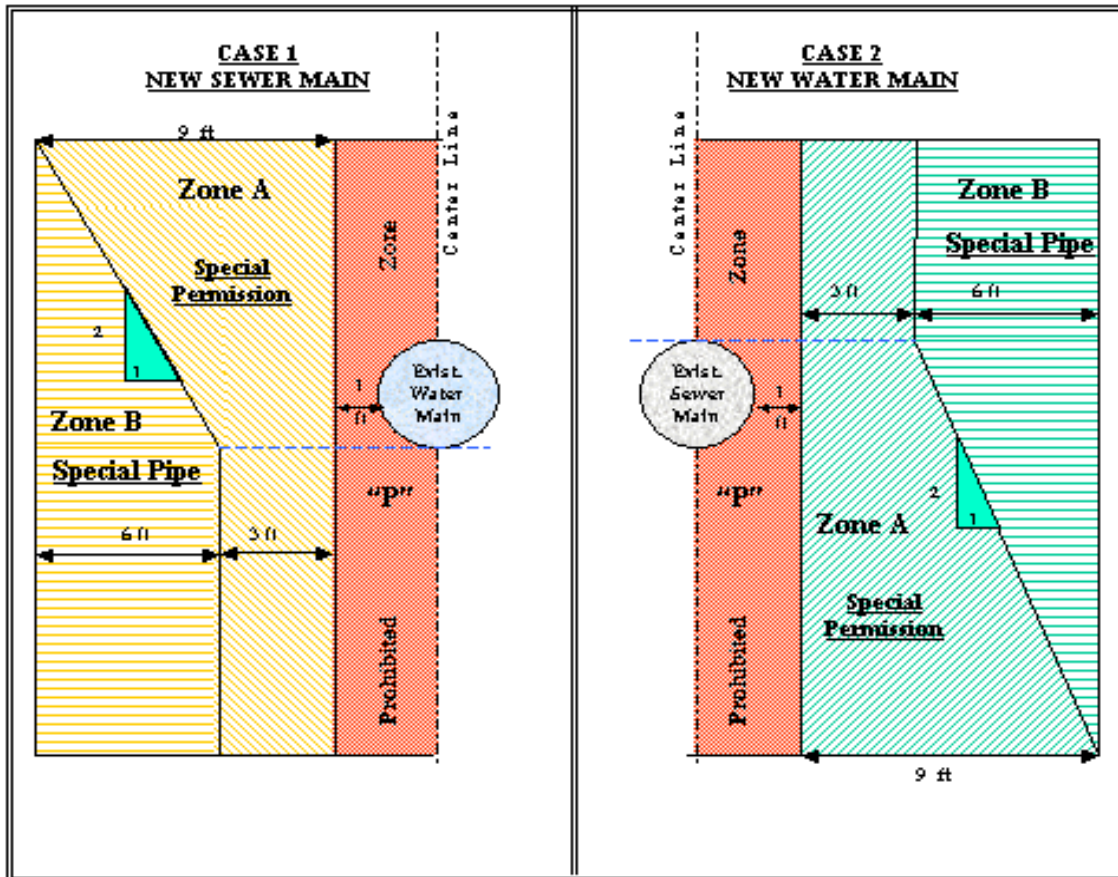
- More stringent requirements may be necessary if conditions such as high groundwater exist. HDPE or similar pipe may be required to provide flexibility to move without potential joint leaks.
- Sanitary sewer mains should not be installed within 25 feet horizontally of a low head (5 psig or less pressure) water main.
- New water mains and sanitary sewer mains should be pressure tested in accordance with manufacturer's specifications.

- When installing water mains, sewers, or other pipelines, measures should be taken to prevent or minimize disturbances of existing pipelines. Disturbance of the conduit's supporting base could eventually result in pipeline failure.
- Special consideration should be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit, such as a septic sewage producing corrosive hydrogen sulfide.

NOTE: Dimensions are from the outside of the water main to the outside of the other pipeline, manhole, or sleeve.

FIGURE 1 PARALLEL CONSTRUCTION

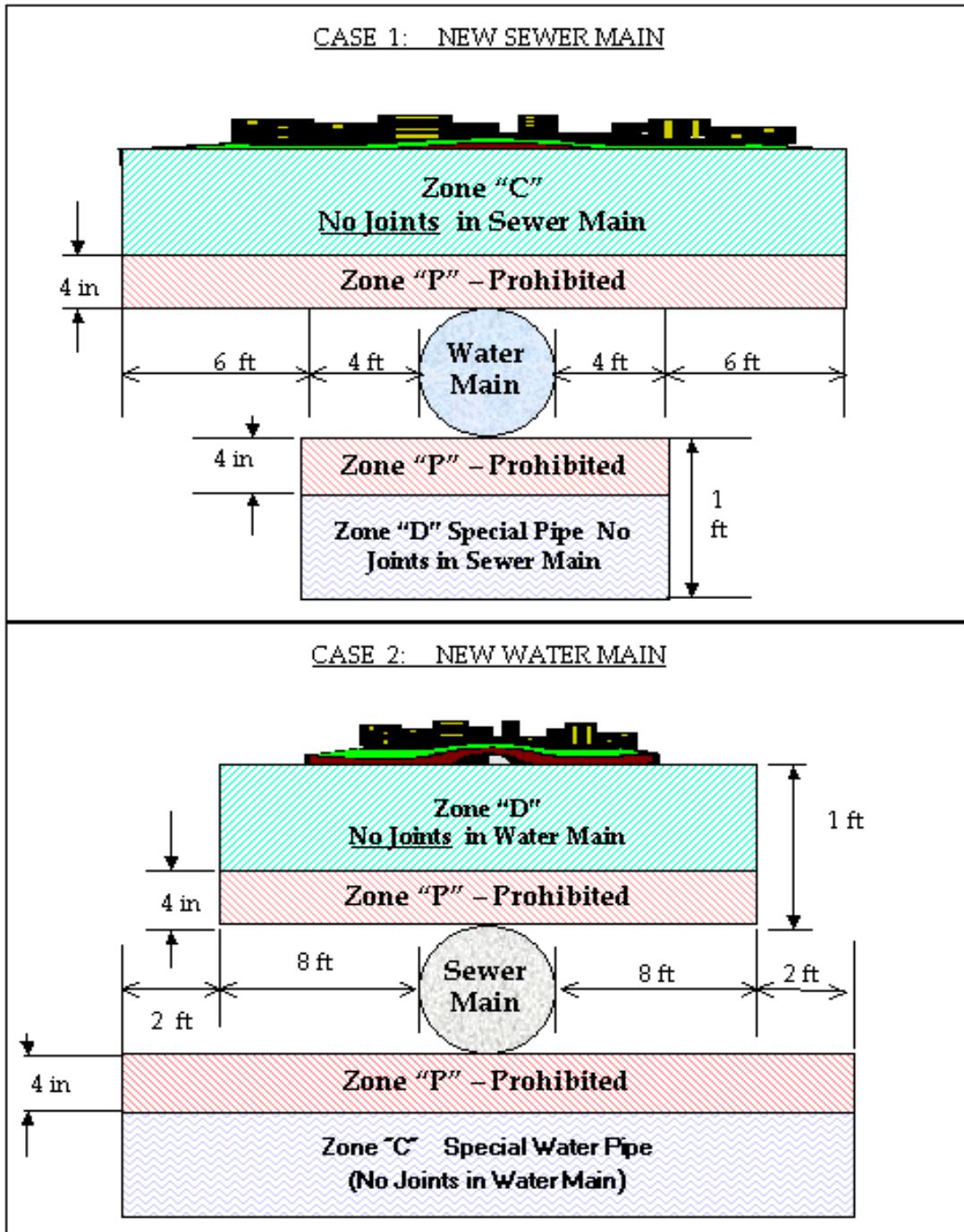
Not To Scale



Note: Zones identical on either side of center lines.

Zones "P" is a prohibited zone. Section 64630 (e) (2) California Code of Regulations, Title 22 (Current); or Section 64572 (a) California Code of Regulations, Title 22 (Proposed).

FIGURE 2 CROSSINGS
Not To Scale



**SYSTEM PRESSURES AND
REQUIREMENTS FOR INDIVIDUAL PRESSURE REDUCING VALVES
ON CUSTOMER SERVICES**

1.01 SYSTEM PRESSURES

Water pressures throughout Diablo Water district's system range from 40 psi to over 100 psi, and may reach up to 120 psi in some locations. Higher pressures are generally associated with lower ground elevations.

1.02 RESPONSIBILITY FOR PROTECTION AGAINST EXCESSIVE PRESSURES

The District has no pressure regulating devices in its system. Protection of individual domestic, commercial, and industrial units against excessive water pressure is the responsibility of the Applicant. The Uniform Plumbing Code requires pressure reducing valves on all new services where peak pressures exceed 80 psi.

1.03 DISTRICT DESIGNATION OF LOCATIONS FOR INDIVIDUAL PRV

Individual pressure reducing valves shall be required on all customer services at locations designated by the District, which are typically areas with ground elevations less than 15 feet above mean sea level.

1.04 REQUIREMENTS FOR LOCATIONS DESIGNATED BY DISTRICT

At low elevation locations as designated by the District, the applicant shall install a pressure reducing valve, approved by the District, at the water service entrance to every structure or facility that will receive water service from the District in order to minimize the effects of higher than normal pressure at the location of the development.

Applicant shall also be required to place a covenant which runs with the land in every deed evidencing the sale of each house in a development which places the owners of each house on notice of the responsibility to maintain the pressure reducing valves and that the District is not liable for any damage which may result due to water pressure. The form of the covenant shall be as designated by the District in its agreement with the Applicant. The covenant shall be in place prior to the commencement of water service.