

WATER AGENCIES' STANDARDS

Design Guidelines for Water, and Sewer Facilities

SECTION 12.6

Temporary Above Ground Piping – Water

12.6.1 PURPOSE

The purpose of this section is to provide general guidelines for temporary above ground pressure pipeline design. These design criteria should be considered in the appropriate stage of the design submittals for a pipeline project.

12.6.2 STANDARD TERMS AND DEFINITIONS

Wherever technical terms occur in these guidelines or in related documents, the intent and meaning shall be interpreted as described in Standard Terms and Definitions.

12.6.3 GENERAL

It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document. The Engineer of Work may not deviate from the criteria presented in this section without prior written approval of the Agency's Engineer.

12.6.4 GUIDELINES

This section covers general design parameters for temporary above ground pipelines. It is understood that high grade aluminum pipe with restraint type of joints is the primary material of consideration. The design engineer should consult with the Agency Engineer when a variance in materials is necessary.

- A. To the extent possible, distribution and transmission pipelines shall be laid out in the public right-of-way, and away from the road drive lanes or travel way.
- B. Pipeline design plans and specifications shall reference WAS Standard Drawings and Standard Specifications where appropriate.
- C. Pipeline plans shall be prepared in digital format, in accordance with Section 1.2 or Section 1.3.
- D. Pipelines shall be designed in accordance with the requirements of the California Safe Drinking Water Act and the California Water Works Standards, Title 22 of the California Code of Regulations "Blue Book".
- E. Pipeline plans shall conform to the latest standards of the State of California, Department of Health Services, "Criteria for the Separation of Water Mains and Sanitary Sewers".
- F. Pipeline crossing driveways or roadway shall be protected from damage of pipe being run over. Pipeline shall be installed in a shallow trench and/or with a steel bridge, that is rated for H2O loading or better, over the pipeline. In addition, the pipeline that be protected from the environment or inclement weather (e.g. freezing, extreme heat) and vandalism.

- G. The pipeline shall be installed in such a manner that it will not present a hazard to traffic and will not interfere with access to homes and driveways along its route.
- H. Valves shall be installed at 200 feet intervals or as directed by the Agency. The use of pressure reducing valves (PRV) may be required as directed by the Agency.
- I. Temporary above ground pipelines are normally utilized to provide temporary water services during the shut down and repair or replacement of a water main.
- J. The temporary above ground pipeline may or may not require a permit depending upon the approving Governmental Agency's requirements. Each Governmental Agency's application process for applying for a permit differs to some degree. The engineer should verify what process is required and refer to Section 4.7, Other Agency Permits, for contact information for various Agencies.

12.6.5 PIPELINE LAYOUT

- A. For new development the designer must consult with the respective water agency as well as the local City and County government, utility companies (e.g., SDG&E, Cable TV, SBC) to determine the standard location of the temporary pipeline to insure its protection from damage during the project.
- B. For existing development the designer must research existing utility information by reviewing available record drawings from local City and County government, utility companies (e.g.; SDG&E, Cable TV, PacBell, County Water Authority), and other governmental agencies with jurisdiction within the pipeline alignment. The designer shall contact all utility companies and municipal agencies to request record drawings of existing and future planned utilities and verify ownership of facilities.
- C. Obtain and review right-of-way and road boundaries. Verify right-of-way or easement acquisition requirements.
- D. With the above information, plot existing utilities and right-of-ways on base maps. Identify potential utility, driveway, and road conflicts.
- E. Designer shall calculate required diameter of the temporary pipeline to insure appropriate capacity upon installation.
- F. There will be a minimum vertical separation of six inches between pipelines and other utilities e.g., SDG&E utilities and storm drains. The Design Engineer shall consult with the respective utilities should occur for larger size pipelines and utilities as they may require these separations be expanded.
- G. Provide final right-of-way requirements for permanent and/or temporary easements to the Agency Engineer as noted in Section 1.5.
- H. Perform a final field check of the alignment to determine if any field changes have occurred since the previous check. Update plans to reflect field conditions.
- K. Horizontal and vertical curves for aluminum pipelines shall follow the manufacturer's recommendations.

12.6.6 PLAN AND PROFILE

- A. Complete a preliminary alignment with horizontal control data (when necessary), using the available information from the Design Report or SAMP and as obtained during the record drawing reviews and field investigations.

- B. Confirm point of connection (POC) with the respective Agency. Pothole data should be obtained as necessary for utility mains, conduits, and service laterals that are six inch (6") and larger, that cross or are parallel to the proposed pipeline. Pothole data should include depth to top of pipe, pipe diameter, pipe material, and length to nearest point.
- C. Plot pothole data on the plan and profile drawings.
- D. Check the proposed alignment for conflicts and make revisions as required.
- E. Add stationing and horizontal control data to the pipeline plan and profile views in accordance with Section 1.1.
- F. Accurately detail and locate tie-in connections and appurtenances. Provide coordinates and vertical control data to provide precise locations of tie-ins, valves, blow-offs, air valves, vaults, fire hydrants and etcetera. Review location and layout of appurtenances to determine accessibility for operations and maintenance personnel and ensure constructability.
- G. The Engineer of Work shall arrange for the preliminary alignment centerline (P-line) to be marked-out in the field by a land surveying crew. Mark-out of the P-line shall consist of spray paint within paved or developed area or wood lath and flagging for undeveloped areas. The Engineer of Work and the Agency Engineer (when applicable) shall field check the P-line layout for constructability issues.
- H. Identify conflicts between existing utilities and appurtenant facilities. Revise design to address utility conflicts.

12.6.7 PIPELINE MATERIALS

- A. General: The material for temporary above ground pressure pipelines shall be in accordance with the WAS. Ductile iron, steel, or PVC pipe shall be used where aluminum pipe is inappropriate.

The Engineer of Work should consider the following factors in determining the appropriate material:

- Fabrication and installation costs
- Flow conditions (e.g., higher velocity flows or periods of dry pipe conditions)
- Potential conflicts with existing utilities, driveways, and roadway
- Safety and security of the pipeline
- Maintenance during operation

- B. PVC Pipe: PVC pipes shall have glued fusion bonded joints or with grooved ends designed for above ground installations. PVC pipe two inches (2") shall be Schedule 80. PVC pipe four inches (4") through twelve inches (12") in diameter shall conform to AWWA C900 (*AWWA Standard for Polyvinyl Chloride Pressure (PVC) Pressure Pipe, 4 In. through 12 In., for Water Distribution*). The dimension ratio (DR=O.D./t) for PVC pressure pipe shall not exceed DR18. DR is used to standardize the specification of PVC pipe. Dimension ratios provide a method of specifying product dimensions to maintain mechanical properties regardless of size. For a given dimension ratio, pressure capacity and pipe stiffness remain constant for all pipe sizes.

PVC pipe fourteen inches (14") through thirty inches (30") in diameter used for transmission purposes shall conform to AWWA C905 (*AWWA Standard for Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters 14 In. through 36 In.*).

- C. Steel Pipe: Steel pipe shall be designed per "*AWWA Manual of Water Supply Practices, Steel Pipe - A Guide for Design and Installation, M-11.*" Minimum pipe wall thickness for distribution and transmission mains shall be one quarter inch ($\frac{1}{4}$ ") unless otherwise directed by the Agency Engineer. Minimum pipe wall thickness for pump station, pressure reducing valve station, and all above ground pipe applications shall be one quarter inch ($\frac{1}{4}$ "). Non-Welded (push-on joints) steel pipe shall not be allowed.
- D. Ductile Iron Pipe: Minimum thickness design shall conform to AWWA C150 (*American National Standard for Thickness Design for Ductile Iron Pipe*) and AWWA C151 (*American National Standard for Ductile Iron Pipe, Centrifugally Cast, for Water and Other*). Ductile iron fittings are not allowed for use on aboveground installations.
- E. Aluminum Pipe: Lightweight aluminum grooved end pipe and coupler system from 2" to 12" in diameter. Minimum pipe wall thickness shall be per manufacturer recommendations unless otherwise directed by the Agency Engineer. Pipe alloy shall have minimum yield strength of 23,000 psi safety factor. Pipe shall be compatible with Vitaulic style fittings and leak proof couplings.
- E. Other material: For pipeline material designed for other than those listed above the designer must be submit a request to the Agency Engineer for approval.

12.6.8 BURIED/COVERED TEMPORARY PIPELINE DESIGN AT DRIVEWAY OR ROAD CROSSINGS

- A. General:
 - 1. The Engineer of Work must perform calculations to determine the appropriate wall thickness of a pipeline crossing driveways and roadway, internal conditions (e.g., surge pressure), and/or use of steel or ductile iron pipe.
 - 2. Due to the possibility of the temporary pipeline installed in a shallow trench crossing driveways or on the surface of the travel way, the Engineer of Work shall recognize that live loads must be considered.
 - 3. For temporary above ground piping installed by Contractor, the Contractor is responsible for the immediate respond and repair to any damage associated with the temporary above ground piping. The Agency will require the information of the Contractor's field representative in case of emergencies.
- B. Live Loads:
 - 1. Live loads shall be calculated using standard H20 highway loading for pipe depths of up to eight feet (8').
 - 2. For depths greater than eight feet (8'), live loads can be assumed to be negligible when compared to dead loads.
- C. Internal Pressure:
 - 1. Operating Pressure
 - 2. Field Testing Pressure
 - 3. Surge Pressure
- D. Assumptions for Pipeline Installation:

The Engineer of Work shall assume that the contractor of work installing pipelines will follow the WAS for methods related to trench preparation, backfill material, and methods.

12.6.9 REFERENCE

- A. Should the reader have any suggestions or questions concerning the material in this section, contact one of the member agencies listed.
- B. The publications listed below form a part of this section to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said publications unless otherwise called for. The following list of publications, as directly referenced within the body of this document, has been provided for the users convenience. It is the responsibility of the user of these documents to make reference to and/or utilize industry standards not otherwise directly referenced within this document.
 - 1. Water Agencies' Standards (WAS):
 - a. Design Guidelines:
 - 1. Section 1.1, Drafting Guidelines
 - 2. Section 1.2, AutoCAD Guidelines
 - 3. Section 1.3, MicroStation Guidelines
 - 4. Section 1.5, Easements and Encroachments
 - 5. Section 5.1, Pressure Pipeline Design
 - b. Standard Specifications:
Section 15000, 15074, 15099, 15100, 15102, 15108;
 - c. Standard Drawings:
WI, WP, and WT Series
 - d. Approved Materials List for Water Facilities
 - 2. American Water Works Association (AWWA):
 - a. AWWA Manual M11, Steel Pipe; A Guide for Design and Installation
 - b. AWWA Manual M23, PVC Pipe; Design and Installation
 - c. AWWA C105, Standard for Polyethylene Encasement for Ductile Iron Pipe
 - d. AWWA C110, Standard for Ductile Iron and Gray Iron Fittings 3" through 48"
 - e. AWWA C150, Standard for Thickness Design of Ductile Iron Pipe
 - f. AWWA C151, Standard for Ductile Iron Pipe, Centrifugally Cast, for Water
 - g. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings 4" through 12" for Water Distribution
 - h. AWWA C905, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings 14" through 48" for Water Transmission and Distribution

END OF SECTION