

DESIGN PROCEDURE FOR NEW WATER SYSTEMS PIPING AND SERVICES

The following criteria have been established by Stanford University Utilities Division to guide consulting engineers in preparing studies, reports, and design documents for capital improvement and maintenance projects. Conformance to these Standards is required, and these criteria should be considered as minimum requirements.

Stanford University Utilities Division operates a domestic public water system and two non-potable water systems. These standards apply to the design and construction of the three systems.

Stanford University is regulated by the California Department of Health Services to operate a public water system under system license 4310013. The University uses on average 2.5 mgd of domestic water via approximately 1450 metered connections. Domestic treated water is supplied by SFPUC via three turn-outs, each serving one of three pressure zones. In addition to the SFPUC supplies, Stanford has two onsite currently operating storage reservoirs with approximate capacities of 6 MG and 2 MG respectively; a third reservoir is currently out of service. The three pressure zones are interconnected via automatic PRV stations to supply water between zones if a loss of pressure is detected. Stanford also has 5 groundwater wells, three of which are permitted that supply the domestic system in the event of a SFPUC water supply interruption.

The lake water system supplies approximately 1 million gallons per day (average annual) of irrigation water to Stanford Lands. The system is supplied from creek diversions and stored in Searsville and Felt Lake Reservoirs, and supplemented by groundwater from the above mentioned wells.

The recycled water system currently supplies treated industrial wastewater to 11 buildings on Campus for toilet and urinal flushing. The use of recycled water in buildings is regulated under the California Plumbing code.

General Requirements and Process

1. Project team's civil engineer shall schedule an initial meeting with Stanford Utilities to review project utility requirements and design guidelines prior to preparing and submitting plans for cost estimating or outside regulatory review.
2. Design shall comply with current AWWA standards, California Department of Health Services regulations, and Stanford Facility Design Guidelines (FDG).
3. The water system layout shall be approved Stanford Utilities. The fire hydrant layout shall be approved by the Stanford Fire Marshall's Office (SUFMO).
4. Minimum size water main shall be six inches in diameter, and sized for the design flow.

5. All water main, services and appurtenances shall be shown on the drawings and coordinated with all other proposed utilities, improvements (e.g., decorative walls, signage) and proposed landscaping. All water main piping and components and services shall be accessible for operation and maintenance and eventual replacement. Layout and locations of above ground structures (e.g., backflow preventers) shall be reviewed and approved the University Planning and Architect's Office and Stanford Utilities.
6. Calculations or computer modeling may be required for sizing more complicated water systems and for evaluating the impact on the existing systems, as determined by Stanford Utilities. Water mains shall be flushed, pressure tested and disinfected prior to connection to the University's system, conforming to Stanford's Technical Specifications.
7. Refer to the FDG for water conservation guidelines

Water Demand Projection

1. Prepare calculations of estimated domestic water demands for review and approval by Stanford Utilities. Calculations should include estimates for:
 - a. The Average Day, contact Stanford Utilities for typical water usage for type of facility under consideration.
 - b. Maximum Day Demand is equal to twice the Average Day Demand
 - c. Peak Hour Demand is equal to four times the Average Day Demand (twice the Maximum Day Demand).
2. Water demand for buildings in Santa Clara County (most of campus) will be subject to the County's Green Building Ordinance, and be required to be 25% below typical water use for that building/use type.

Fire Flow Requirement

1. Fire flow requirements are to be obtained from the SUFMO or determined per Uniform Fire Code (UFC) Appendix IIIA.
2. Submit request for hydrant flow testing to the SUFMO. Only Stanford Utilities conducts hydrant flow testing.
3. Reductions in the Fire flow requirement must be approved by the SUFMO.
4. Maximum allowable service pressure measured at a faucet is 80 psi; minimum service pressure shall be 35 psi.
5. Flow velocities shall be in the range of 4-7 fps, but in no case shall exceed 10 fps.
6. Fire flows shall have a minimum residual pressure of 20 psi.

7. Contact Stanford Utilities for estimates of static system water pressures in the vicinity of the project.

Alignment

1. Minimum clearances shall be 2 feet horizontal and 1 foot vertical clearance from any other underground pipe, and 10 feet horizontal clearance to sanitary sewer lines
2. Water mains shall be installed above sanitary sewers. Where this clearance is not practical, consult the California Administrative Code (Health Code) for separation standards and alternatives.
3. Minimum cover shall be 42" from finished grade to top of pipe, or 2' below subgrade, whichever is greater.
4. Gate or butterfly valves shall be installed to isolate each branch run from main supply run. Valves 14" and larger shall be Mueller butterfly valves and 12" and smaller shall be Mueller gate valves.
5. Tapping sleeve branch connections from existing mains shall be used only by prior approval of Stanford Utilities. No same line size tapping sleeves will be allowed.
6. Air release/ Vacuum relief valves will be installed at high points in water system profile.

Materials

1. Pipeline materials for mains shall be Ductile Iron or PVC conforming to Stanford's Technical Specifications.
2. Valves, burys and fittings shall be cast iron and fusion epoxy coated and lined, conforming to Stanford's Technical Specifications.

Cathodic Protection

1. All metallic water mains, fittings and services east of Lasuen Street/Mall shall have cathodic protection using a sacrificial anode system.
2. All metallic services connecting to non-metallic water mains shall have cathodic protection using a sacrificial anode system.
3. For water systems in other areas the soils shall be tested for corrosivity using the procedures described in Appendix "A" of AWWA C-105. Any soil having a soil-test evaluation of 10 points or more shall require the use of cathodic protection. Stanford Utilities will coordinate and conduct testing at the Project / owner expense.

Water Services

1. Separate water services and meters shall be installed in separate trenches for each building/leasehold property.
2. Carbon steel /galvanized building services are prohibited. Metallic building services entering the building/structure shall be copper or ductile iron.
3. Minimum service size shall be one inch.
4. Laboratory and special use buildings shall install dual water services to minimize domestic water interruptions due to periodic maintenance of meters and backflows.
5. Services 4-inches and larger shall be installed by the project using tee connections with isolation line valves on the main on both sides of the branch connection.
6. Tapping sleeve connections shall be used only by prior approval of Stanford Utilities. No same line size tapping sleeves will be allowed.
7. If the service pressure exceeds the maximum of 80 psi, an individual pressure regulator will be required on the service line after the meter and backflow.
8. Meter boxes shall be located where they are easily accessible to the meter reader, in the sidewalk or 18" behind and set parallel with the curb. Meters may not be closer than three feet to a driveway or parking spaces, in order to avoid being obscured by parked vehicles.
9. Services shall not be located closer than five feet from a sewer lateral, with a minimum of 30" of cover.
10. All meters, detector meters and radio read assemblies are to be supplied and installed by the home owner or Project owner.

Fire Protection Systems

1. Fire hydrants come in two (2) different styles depending on location and water main size, and shall be provided as approved by Stanford Utilities.
 - a. Domestic Water Hydrant: Clow 960 wet barrel – provided with two 2-1/2" and one 4-1/2" outlets, conforming to AWWA C502.
 - b. Lake Water Hydrants: Clow 76 wet barrel provided with two 2-1/2" and one 4-1/2" outlets, conforming to AWWA C503. Top of the hydrant shall be painted Red.
2. Location of fire hydrants must be approved by the SUFMO. Use the following criteria as a reference:
 - a. The minimum number of fire hydrants shall be in accordance with Appendix III-B of the California Fire Code.
 - b. A fire hydrant shall be located on the same side of the street at all Fire Department Connections (FDC) and within 50 linear feet.

3. Landscape materials shall be designed so that, when fully grown, they do not obscure the FDCs and fire hydrants (three foot minimum clearance required on all sides).
4. Fire protection systems downstream of the fire backflow device or PIV are under ownership of the SUFMO and permitted through the County of Santa Clara Fire Marshall's Office.

Buried Pipe Restraints

1. All new main line piping within the Campus Drive Loop shall be designed as self restrained against thrust forces. Refer to FDG standard specification 02510 Domestic and Lake Water Systems for acceptable materials.
2. Thrust blocks shall be designed for a minimum operating pressure of 250 psi, based on design soil bearing pressure as determined by the project geotechnical engineer.
3. Thrust blocks shall not bear on soil more than one foot above the pipe nor against soil with other utilities within five feet.

Backflow Prevention Assembly

1. All water supply services shall be provided with an approved backflow prevention device. Backflow prevention device shall be a Reduced Pressure Principal Backflow Prevention Assembly. Refer to FDG standard specification and details for current acceptable models.
2. The type of Backflow preventer assembly will be determined by Stanford Utilities depending on whether the building use is deemed to be a low hazard potential or whether dangerous or toxic substances are involved.
3. Backflow prevention assembly shall be approved by AWWA and shall bear the stamp of Underwriters Laboratories (U.L.).

Maintenance Requirements

1. Stanford Utilities will maintain water mains and services up to and including the domestic meter and backflow prevention assembly device.
2. The building owner/steward shall maintain water services downstream of the backflow prevention assemblies.

References

1. California Code of Regulations, Title 17 , Drinking Water Standards
2. California Plumbing Code latest edition.
3. California Fire Code, latest edition