Design Standard
Utilities

Purpose

SSFUSD's utilities design standard is intended to achieve utilities that are uniform in placement and materials. The overall design and function of the utilities shall be consistent throughout the District to provide ease in operation and maintenance. Only items of concern to the District have been included. Items not referenced here are left to the architect and/or the engineer to resolve. Existing utilities may or may not achieve the stated performance criteria; connection to existing utilities that do not meet stated performance criteria does not relieve design professional of achieving stated performance criteria on newly designed and installed sections of the utilities.

Design Standard

A. General

This design standard is intended to introduce architects and or engineers working on District projects to the standard requirements of the District with regards to civil/mechanical/electrical engineering related items. Items not referenced here are left to the architect and or engineer to resolve, with ultimate approval by SSFUSD. The design and construction of District projects shall comply with the latest adopted laws, rules, regulations, codes and ordinances of the Sate of California and the jurisdictions. It is the consultants' responsibility, as the architect and or engineer to see that the project is designed properly to meet the specific needs of the District as described in the program or project scope. As a consultant, you become an agent for the district, and as such, you are expected to exercise your professional judgment in all matters in behalf of the District as the owner.

The District will work to provide the design professional with information concerning existing conditions as well as consult on and approve the design professional's recommendations for new infrastructure.

B. Potential Authorities Having Jurisdiction

1. Division of the State Architect (DSA)
2. Local Fire Marshal
3. State Water Resource Quality Control Board
4. County of San Mateo
5. Samtrans

6. Local water provider
7. Local sanitary district
8. Caltrans
9. BAAQMD

C. Sanitary Sewer Systems

- For all new and renovation work, Civil Engineer shall design a complete outside, underground sanitary sewer system, complete, ready for operation, including all gravity flow lines, manholes, cleanouts, frames, covers, structures, appurtenances, and connections to building and structure, service lines, existing sanitary sewer lines, and existing sanitary structures, and all other incidentals.

1. Applicable Publications:
    a. All work shall conform to latest edition of the California Plumbing Code
2. Design Criteria
    a. Piping
        i. Gravity Flow Lines:
            1. Pipe slope to be based upon a minimum flow velocity 2.5 feet per second of and a maximum velocity of 15 feet per second.
            2. Maintain minimum 3-foot cover.
        ii. Pipe Sizing is to be based upon capacity. Laterals up to 6-inches in diameter shall be designed to flow a maximum ¾ full. Mains shall be designed to flow a maximum of ½ full.
    b. Manholes:
        i. 48-inch inside diameter manholes spaced at not more than 300-feet center to center.
        ii. Manholes shall be placed at each angular change of direction above 15 degrees each, change in pipe size or having a drop of 0.10 feet across the base.
        iii. Manholes shall be used for pipe 6-inches and larger.
    c. Cleanouts:
        i. Clean-outs shall be included at the building connection and spaced not more than 100-foot center.
        ii. Clean-outs shall be used for pipe up to 6-inches in diameter.
    d. Connections to Existing Manholes:
        i. Specify that Contractor shall maintain continued sanitary sewer service to all buildings and users upstream during construction. The Contractor shall provide, install, and maintain all pumping, conveyance system, dams, weirs, etc. required to maintain the continuous flow of sewage. All temporary measures required to

meet this requirement shall be subject to the review of the Civil Engineer.

ii. Core existing structure, install pipe at the design invert. Install an elastomeric gasket around the pipe, and grout the interstitial space between the pipe and the core.

iii. The bench of the manhole shall be cleaned and reshaped to provide a smooth flowline for all pipes connected to the manhole.

iv. Connections and alterations to existing manholes shall be constructed so that finished work conforms as nearly as practicable to the applicable requirements specified for new manholes, including concrete and masonry work, cutting and shaping.

e. Pipe Separation:

i. Horizontal Separation - Water Mains and Sewers:

1. Existing and proposed water mains shall be at least 10 feet horizontally from any proposed gravity flow and pressure (force main) sanitary sewer or sewer service connection.
2. Gravity flow mains and pressure (force) mains may be located closer than 10 feet but not closer than 6 feet to a water main when:
    a. Local conditions prevent a lateral separation of ten feet; and
    b. The water main invert is at least 18 inches above the crown of the gravity sewer or 24 inches above the crown of the pressure (force) main; and
    c. The water main is in a separate trench separated by undisturbed earth.
3. When it is impossible to meet (1) or (2) above, both the water main and sanitary sewer main shall be constructed of push-on or mechanical joint ductile iron pipe. The pipe for the sanitary sewer main shall comply with the specifications for pressure (force) mains. The sewer shall be pressure tested as specified for pressure (force) mains before backfilling.

ii. Vertical Separation - Water Mains and Sewers at Crossings:

1. Water mains shall be separated from sewer mains so that the invert of the water main is a minimum of 24 inches above the crown of gravity flow sewer or 48 inches above the crown of pressure (force) mains. The vertical separation shall be maintained within 10 feet horizontally of the sewer and water crossing. When

these vertical separations are met, no additional protection is required.

2. In no case shall pressure (force) sanitary main cross above, or within 24 inches of water lines.
3. When it is impossible to meet (1) above, the gravity flow sewer may be installed 450 mm (18 inches) above or 12 inches below the water main, provided that both the water main and sewer shall be constructed of push-on or mechanical ductile pipe. Pressure (Force) sewers may be installed 24 inches below the water line provided both the water line and sewer line are constructed of ductile iron pipe. The pipe for the sewer shall conform to the requirements for pressure sewers specified herein.
4. The required vertical separation between the sewer and the water main shall extend on each side of the crossing until the perpendicular distance from the water main to the sewer line is at least 10 feet.

E. Storm Sewer Systems

- For all new and renovation work, Civil Engineer shall design a complete outside, underground storm sewer systems, complete, ready for operation, including all drainage structures, frames, grate and covers, connections to new buildings, structure service lines, existing storm sewer lines and existing drainage structures and all required incidentals. Storm drainage practices at the Colleges do not presently fall under local requirements for quantity and quality; but C.3 (Storm Water Pollution Control Requirements) should be considered for all new and renovation work.
  1. Applicable Publications:
     a. All work shall conform to latest edition of the California Plumbing Code.
     b. All applicable work shall conform to the latest publication of the American Society for Testing and Materials (ASTM) as of the date of project advertisement.
     c. All work shall conform to the latest publication of the American Association of State Highway and Transportation Officials (AASHTO) as of the date of project advertisement.
     d. All work shall comply with the latest publication of the California Department of Transportation (CDT) Standard Specifications as of the date of project advertisement.
     e. Storm drain design shall be performed to comply with the following minimum standards and agencies.
        i. Regional Water Quality Control Board
        ii. Division of the State Architect
  2. Design Criteria

a. Piping:
   i. Gravity Lines:
      1. Pipe shall be sloped such that the full flow velocity is 2-feet per second or greater.
      2. Minimum cover shall be no less than 2-feet.
      3. Maintain minimum clearance of 12-inches a all crossings or as required by other utility.
   ii. Pipe sizing shall be based upon capacity. A 10-year storm event shall be used as the basis of design.
b. Manholes and Catch Basins:
      1. Catch basins or 48" inside diameter manholes shall be spaced not more than 300 feet.
      2. Catch basins or manholes shall be used at each angular change of direction above 15 degrees each, on pipes 8-inches in diameter or greater and at changes in pipe size. For pipe 6-inches in diameter or smaller a clean-out can be used for angular change in direction.
      3. The minimum allowable cover over the top of the pipe shall be 2.5 feet to finish grade.
      4. All manholes and catch basins within vehicle access lanes shall be rated for H-2O loading or better.
      5. Clean outs shall be spaced at 100 feet maximum per laterals and mains.

F. Water Systems (Domestic, Fire and Irrigation)

- For all new and renovation work, Civil Engineer shall design a complete underground water distribution system complete, ready for operation, including all appurtenant structures, and connections to both new building service lines and to existing water supply.
  1. Applicable Publications:
     a. All work shall conform to latest edition of the California Plumbing Code and National Fire Protection requirements.
     b. Installation of the water system shall be done to meet or exceed State Department of Health standards
  2. Design Criteria
     a. Pressure Lines:
        i. All water lines shall be sized for adequate pressure, flow and not exceeding a maximum velocity of 5 feet per second per domestic water; 15 feet per second fire water.
        ii. System design pressure: All components of water system shall be designed for a 200 psi working pressure. Thrust blocks and mechanical joints shall be designed to withstand the forces exerted by a 200 psi working pressure utilizing 2000 pounds per square

foot soil bearing pressure unless soil conditions dictate less in the best judgment of the design engineer. Where soils engineering has been performed on the site, the soil bearing pressure indicated within the soils report shall be used.

b. Piping:
    i. Maintain minimum 3-foot cover.
    ii. All lines supplying fire hydrants shall not be smaller than 6-inch in diameter.
c. Valves:
    i. All tees crossing and connections to water mains shall have valves installed on all branches.
    ii. Specify the installation of gate, check and isolation valves as required for optimal college operations.
    iii. Specify the installation of PIVs in accordance with local fire marshal requirements.
d. Fire Hydrants and Fire Department Connections:
    i. Hydrants and FDC's shall be placed such that fire protection is adequate for buildings. The local Fire Marshal shall be consulted for minimum distance requirements.
e. Backflow Preventers:
    i. Backflow prevention devices shall be installed on those lines which pose a threat of backsiphonage into a potable water system including irrigation and fire water lines.
    ii. Potable water lines not less than 3-inches in diameter shall have a backflow prevention device at the main or loop connection.
    iii. Back flow devices shall be double check RPPA type devices. No single checks shall be used.
f. Pipe Separation:
    i. Horizontal Separation-Water Mains and Sewers:
        1. Water mains shall be located at least 10 feet horizontally from any proposed drain, storm sewer, sanitary or sewer service connection.
        2. Water mains may be located closer than 10 feet to a sewer line when:
            a. Local conditions prevent a lateral separation of 10 feet; and
            b. The water main invert is at least 18 inches above the crown of the sewer; and
            c. The water main is either in a separate trench or in the same trench on an undisturbed earth shelf located one side of the sewer.
        3. When it is impossible to meet (1) or (2) above, both the water main and drain or sewer shall be constructed of mechanical joint ductile iron pipe. Ductile iron pipe shall

comply with the requirements listed in this specification section. The drain or sewer shall be pressure tested to the maximum expected surcharge head before back filling.

ii. Vertical Separation - Water Mains and Sewers at Crossings:
   1. A water main shall be separated from a sewer so that its invert is a minimum of 450 mm (18 inches) above the crown of the drain or sewer whenever water mains cross storm sewers, sanitary sewers or sewer service connections. The vertical separation shall be maintained for that portion of the wear main located within 10 feet horizontally of any sewer or drain crossed. A length of water main pipe shall be centered over the sewer to be crossed with joints equidistant from the sewer or drain.
   2. Both the water main and sewer shall be constructed of slip-on or mechanical joint ductile iron pipe or PVC pipe equivalent to water main standards of construction when:
      a. It is impossible to obtain the proper vertical separations described in (1) above; or
      b. The water main passes under a sewer or drain.
   3. A vertical separation of 450 mm (18 inches) between the invert of the sewer or drain and the crown of the water main shall be maintained where a water main crosses under a sewer. Support the sewer or drain lines to prevent settling and breaking the water main.
   4. Construction shall extend on each side of the crossing until the perpendicular distance from the water main t012210o the sewer or drain line is at least 3 m (10 feet).

G. Natural Gas Systems

- For new gas pipe installations, specify Polyethylene or Epoxy-coated schedule 40 black steel.
- Depth of cover shall be 30 inches minimum.
- Pipe shall have 12 gauge copper tracer wire.
- Pipe trench shall have a “warning” detection tape 12 inches above the pipe.
- Pipe will be bedded and surrounded by a minimum of 6-inch of sand.

Substitutes Allowed?

- N/A

Associated Design Standards

- N/A

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