



UNDERGROUND FIRE SERVICE LINES DESIGN, INSTALLATION AND PLAN SUBMITTAL REQUIREMENTS

Effective Date: July 1, 2012

Underground fire service plans **MUST** be submitted prior to commencement of combustible construction. Combustible construction in excess of 100 feet from the street shall **not** commence until the underground and temporary or permanent on-site hydrants are in service and have been tested, flushed and approved by the Fire Department. In addition, all weather driving surface access roads shall be installed and made serviceable prior to building construction.

1.0 PERMITS

- 1.1 To acquire an installation permit for the automatic sprinkler system, submit the following to the San Jose Fire Department's Bureau of Fire Prevention (BFP) located at 200 E. Santa Clara Street, 2nd Floor Tower, San Jose, California:
 - 1.1.1 A completed **permit application** – on the space marked DBA, write or type-in the business name (e.g., ABC Company) or if the project is speculative, write or type-in "SPEC." followed by the anticipated occupancy (e.g., SPEC OFFICE, SPEC. WAREHOUSE, ETC.). Check and make sure the permit card (last carbon copy page) is legible; otherwise the permit application may be denied.
 - 1.1.2 A copy of the **San Jose Fire Department Plan Check Comments** – this may be obtained from the general contractor or architect.
 - 1.1.3 A copy of any **approved variance** that is relevant to the project – this may be obtained from the general contractor or architect.
 - 1.1.4 A minimum of three sets of **shop quality plans** and **calculations** for the proposed underground piping system – One set of plans and calculations shall be retained by the BFP.
- 1.2 One plan review is provided as covered by the permit fees. Additional plan reviews shall be billed by the amount of time required. Overtime plan reviews may be available (depending on Departmental approval and the plan reviewer's personal time availability) and will be subject to additional fees. **Plans will be disapproved if the criteria stated herein is not followed and depicted in the submittal.**



- 1.3 Normal review time for plans is approximately one month unless the contractor schedules an **Express Plan Review**. There are no additional fees required for these services; however, the cost for missed appointments (one-hour) will be billed to the contractor unless proper notice is given. Cancellations require a 24-hour notice.
- 1.3.1 **Express Plan Review** service is available for small projects. Call (408) 535-7750 to schedule an appointment.
- 1.4 Permits are required for all new life safety and any alteration to or addition to a life safety system. Permits are not required for system maintenance unless requested by the owner. No charge is required for maintenance permits (i.e., when repairing existing systems with material of equal or better quality due to damage, etc.). Fees are based on length of pipe. See current fee schedule.
- 1.5 **All permit fees will be collected when plans are submitted. Permit fees are non-refundable.**
- 1.6 All installing contractors shall have a California Contractor's License, a valid Worker's Compensation certificate, and a San Jose Business License. The said license and certificate numbers shall be indicated on the permit application prior to submittal of an installation permit.
- NOTE:*** Only the following California contractor's license classifications are acceptable:
- (a) General Engineering Contractors (A).
 - (b) Fire Protection Contractors (C-16).
 - (c) Pipeline Contractors (C-34).
 - (d) Plumbing Contractors (C-36).
- 1.7 Equipment and piping shall not be installed prior to approval of plans and issuance of permits.
- 1.8 The permit card and a San Jose Fire Department (SJFD) approved set of plans must be kept at the project site until final approval of the permit, after which they shall remain in the possession of the owner.

2.0 PLANS

- 2.1 Equipment and piping shall not be installed prior to approval of plans and issuance of permits.
- 2.2 The front sheet of all plans shall contain the following information:
- a) Project Name
 - b) Applicant/Owner
 - c) Street Address, including suite or space number
 - d) City
 - e) Project Type
 - f) Total Building Area
 - g) Number of Stories
 - h) Area per Floor
 - i) Type of Construction
 - j) Occupancy Classification
 - k) Point of Compass
 - l) A graphical representation of the scale
 - m) Contractor's name, telephone number, address, California Contractor's and/or PE license
 - n) The owner's name, address and telephone number

- 2.3 Prior to submittal of plans for an installation permit, approval for the location of fire hydrants which serve the site, to be installed and/or existing, is required. In addition, the fire flow available for the site shall be approved as adequate. These approvals shall be obtained from the SJFD Planning Department liaison.
- 2.4 The plans shall be wet stamped and signed by the designer of record (installing contractor or Fire Protection Engineer [FPE]). The designer's name shall be clearly printed in the plans (no pseudonyms, acronyms, or aliases). Installation work shall be done by licensed, fully experienced, and responsible persons.
- 2.5 The designer of record is responsible for the entire system being worked on.
- 2.6 Plans shall be drawn to limit one building per page or one system per page. Minimum scale for underground plans is 1" = 60'. Scale shall be suitable to provide legible drawings. Plans shall be fully dimensioned.
- 2.7 A legend shall be provided and the symbols used shall match the legend. Strike out any "typical" symbols and/or details that do not pertain.

NOTE: *Civil drawings are not construed as shop drawings and will not be accepted.*

- 2.8 Plans and all revisions to the plans shall be dated. If utilizing an existing drawing or a portion of a drawing, the area of work shall be highlighted and clouded with an appropriate revision symbol Δ (Delta). Provide a revision list with symbol, date, description and initials.
- 2.9 A key plan of the building and/or complex indicating the street location and the area of work shall be provided. If the work to be performed is a revision to a previous submittal, the area of work shall be revised to indicate the area of work for the current submittal. For systems where the drawing shows the street(s) and building(s), no key plan is required.
- 2.10 All equipment and devices shall be noted on the plans and shall be listed by a nationally recognized testing agency.

NOTE: *The Fire Department reserves the right to disallow any listed product due to past performance.*

- 2.11 The locations of all existing and proposed connections, piping, valve boxes, and valves and hydrants providing service to the site shall be shown on the plans. Equipment data sheets and calculations (if any) are required to be submitted with the plans.
- 2.12 Provide a note on the plans stating the installation complies with NFPA 24 (2010 edition), NFPA 13 (2010 edition), and SJFD Standards. In addition, indicate which water supply company service (i.e., San Jose Water Co., San Jose Municipal, or Great Oaks) is being connected to and note that the installation complies with the appropriate water department's specifications and details.
- 2.13 All plans shall include fire-flow test data verified within six months of the submittal date. Water-flow data may be obtained from the San Jose Water Company, San Jose Muni and Great Oaks Water. If San Jose Water Company does not supply service to the area of your installation, contact the SJFD at (408) 535-7750. A minimum 3 hour fee will be assessed by the SJFD to perform a water-flow test and provide the water-flow data.
- 2.14 Indicate the type, C-Factor, and size of the City main.
- 2.15 Indicate the type, C-Factor, and size of the proposed piping.

- 2.16 Show to scale the location of underground piping from the City connection to all hydrants and/or sprinkler riser(s).
- NOTE:** *A minimum 6" supply main is required to pumper (FDC) pit.*
- 2.17 Indicate location and type of all valves.
- 2.18 Indicate depth and method of lay and bury. Trench excavation, bedding and backfill shall comply with City of San Jose, Department of Public Works, Standard Specification Section 1301. A minimum top of pipe bury depth of 36" is required under areas subject to traffic loads.
- 2.19 Show details of the method being used to change from a horizontal lay of pipe to a vertical rise (i.e., base of riser or base of hydrant). Provide a flat stone or concrete pad twice the size of the fitting under the vertical rise.
- 2.20 If technical expertise is unavailable within the Fire Department because of new technology, process, products, facilities, materials and uses attending the design, operation or use of a building or premises, the Fire Department may require the applicant to provide, without charge to the Fire Department, a technical opinion and report, or plan review. The opinion and report or plan review shall be prepared by a qualified engineer, specialist, laboratory or fire-safety specialty organization acceptable to the Fire Department and the applicant and shall analyze the design, operation or use of the building or premises as it relates to required codes and ordinances.

3.0 DESIGN

- 3.1 Each system shall have its own dedicated underground supply line. Where multiple systems are required per NFPA 13 (2010 edition), Section 8.2, the arrangement of the fire service underground and valves must be approved by the SJFD.
- 3.2 Pipe shall not be subjected to building foundation loads. When using plastic pipe, a transition to ductile iron shall be made prior to extending aboveground. The entire vertical run shall be ductile with suitable supports. Joint restraints are required. Show method of pipe protection when run under the foundation.
- NOTE:** *Pipe shall not be installed under a building except when approved by the AHJ for short distances. One length of pipe maximum.*
- 3.3 All sprinkler systems shall have indicating type control valves and fire department connections. The location shall be approved by the Fire Department. As general guidelines, the Indicating Valve (PIV/BFP) and Fire Department Connection (FDC) should be located a minimum of 40 feet away from the building (where possible) and within 100 feet of a fire hydrant. High rise buildings shall have the requirements reviewed on a case by case basis. The hydrant should be located so that hoses can be laid directly to the fire department connection without crossing a road or driveway. The PIV/BFP and FDC shall be located near a main access point for the building.
- EXCEPTION:** *PIV may be omitted for cause upon approval of the SJFD. See SJFD "Fire Sprinkler Systems Design, Installation, and Plan Submittal Requirements" handout.*
- 3.4 Corrosion protection shall be installed per Water Department requirements and NFPA 24, Sections 10.8.3.5, and A-10.8.3.5.
- 3.5 Tracer wire shall be installed on all non-metallic water lines. Wire shall be type R.H.W., #10 A.W.G. stranded. Wire shall be securely fastened to top of water line and shall be placed along the outside of valve box risers with one foot of slack placed inside of valve box. Wire shall terminate in each box in the direction of the valve controls and be extended into blow-off boxes.

3.6 Clearances

- One-foot minimum vertical clearance between water main and other facilities.
- Nine-feet minimum horizontal clearance between water main and sanitary main.
- Seven-feet minimum horizontal clearance between water main and storm main.
- Five-feet minimum horizontal clearance between water service and sewer laterals.
- Five-feet minimum horizontal clearance between water service and street trees.

3.7 Permanent blue reflective street buttons (Refer to: Caltrans Standard Specifications Section 85) shall be located at the midsection of the access roads, directly in front of the hydrant(s) being added.

3.8 Fire sprinkler system risers or other controls shall not be located in electrical rooms.

4.0 FIRE FLOW

4.1 The required fire flow shall be calculated (See item 4.6 of this handout) in accordance with Appendix B, 2010 California Fire Code, as modified by San Jose City Ordinance.

4.2 In general, a 50% - 25% - 0% reduction in fire flow will be given for sprinklered buildings of Light – Ordinary – Extra hazard Classifications, respectively..

4.3 Should sufficient fire flow not be available from public or private water mains, alternate means (e.g., on-site water tank, well water, pond, etc.) have to be proposed/approved through a Variance process.

4.4 If the building is not otherwise required to be provided with an automatic fire sprinkler system, and the fire flow, as determined by construction type and building size, is not available, additional built-in protection shall be required. This may include, but is not necessarily limited to automatic fire sprinkler systems (as stated above, area separation walls and/or a more substantial construction classification), subject to approval of Variance by Fire Marshal.

4.5 See item 2.13 of this handout for fire flow test data requirements.

4.6 The design water-flow data (See item 2.13 of this handout) shall be used to hydraulically calculate the on-site fire flow, when required. The on-site fire flow shall be at least one-half of the total required fire flow. The minimum single hydrant required flow is 1,000 gpm at 20 psi. Hydraulic calculations shall be provided to show the required pressure needed at the point of connection to the public water supply to produce one-half the required fire flow on site remotely. The total fire flow shall be shown to exist on a graph of the public water supply by straight line interpolation at the pressure required to deliver the on-site water.

4.7 A hand drawn or graphic quality water supply curve shall be provided with hydraulic calculation submittals.

4.7 Submit a plot plan showing all exposures and a copy of the Planning Department Comments so that the water supply calculations can be verified.

4.8 Hydraulically calculated pipe shall be of sufficient size as to deliver the required flow while not exceeding a flow velocity of 15 feet per second in accordance with the water department requirements. In addition, the required flow shall not reduce the City main pressure to less than 20 psi.

5.0 BACK FLOW

- 5.1 Back flow prevention shall be installed as required by the appropriate water purveyor and NFPA Standards 13, 14 and 24.
- 5.2 When exposed to possible vehicular damage due to proximity to alleys, driveways, roadways, or parking areas, aboveground back flow preventer assemblies for fire suppression systems, shall be suitably protected.

NOTE: *Guard posts are suitable means of preventing vehicular damage to the above assemblies. When guard posts are installed, the posts shall be:*

- a) *Constructed of steel not less than four inches in diameter and concrete filled.*
- b) *Spaced not more than four feet between posts on center.*
- c) *Set no less than three feet deep in a concrete footing of not less than 15-inch diameter.*
- d) *Set with the top of the posts not less than three feet above ground.*
- e) *3 feet clearance shall be maintained around BFP at all times.*
- f) *The color of the guard posts shall contrast with the immediate surroundings.*

6.0 HYDRANTS

- 6.1 There shall be provided on, or immediately adjacent to the property, a sufficient number of accessible hydrants for use by the Fire Department for extinguishing structure and contents fires, and for use in providing exposure protection. The number and location of hydrants shall be determined by the applicant and approved by the Fire Department in accordance with the 2007 CFC, Appendix C, based on the fire flow (without any reduction for required flow).
- 6.2 Fire hydrants shall have a minimum of two 2½" outlets with National Standard Hose threads (NSHT) and one 4-inch outlet NSHT. The hydrant shall be located on a flange at a height providing at least 2½" of clearance from final grade to the bottom of the connection flange. The centerline of the 4" connection shall always be located between 18" and 24" above final grade.
- 6.3 On-site hydrants shall be located so that they are within two feet of the curb and so that suction lines will reach from the hydrant to the fire engine (4" pumper connection facing the street or as otherwise directed by the San Jose Fire Department's Inspector).
- 6.4 All hydrants shall be located at least 40 feet from buildings and 10 feet away from the return of a driveway.
- 6.5 The shut-off valve for the hydrant shall be located at least 10 feet away from the hydrant and a minimum 3 feet clearance shall be maintained around and to the hydrant at all times.
- 6.6 All hydrants (and bollards/guard posts if needed) shall be painted "chrome yellow".
- 6.7 When exposed to possible vehicular damage, hydrants shall be suitably protected (See item 5.2 of this handout).
- 6.8 Horizontal standpipe outlets may be required by a variance when the building(s) are located in excess of 150' from the street and the building(s) are not code compliant. Consult the SJFD, BFP if you are unsure about the existence of a Variance for the project.
- 6.9 Horizontal standpipe shall consist of two 2½" indicating valves with fixed hose outlets equipped with caps of frangible metal or brass chained in place. The standpipe shall be capable of four-hour

duration while supplying 500 gallons per minute with both outlets flowing. The outlets shall be located at a height of 18 to 24 inches aboveground.

- 6.10 Fire hydrants shall not be under the control of valves controlling fire sprinkler and/or standpipe systems.
- 6.11 Fire hydrants shall not be subject to pressure supplied by way of a FDC.
- 6.12 Any private fire hydrant located such that an above ground valve (e.g. backflow preventer) can shut it off shall be permanently marked "**VALVE(S) LOCATED AT LOCATION CONTROL(S) THIS HYDRANT.**"
- 6.13 Hydrants shall be purchased at the SJFD, BFP for public service. For private service, the installation contractor may purchase the hydrant(s) from any appropriate vendor. Private Service hydrants shall be dry-barrel design (self-oiling) with a 4" pumper nozzle and two 2½" hose nozzles. Preferred equipment is the "Mueller Super Centurion 250" model A-423 fire hydrant. An approved equal may be substituted for private hydrants only.

7.0 FIRE DEPARTMENT CONNECTIONS

- 7.1 All sprinkler systems shall have FDC(s) located as required by item 3.3 of this handout.
***EXCEPTION:** The FDC may be located within 40 feet of the building, for cause, upon approval of the SJFD. If the SJFD allows the closer location of the FDC, it shall be located at the exterior of the building where no frangible or glazing materials are located above or within 5 feet on either side of the FDC.*
***Note:** All fire equipment must be accessible for maintenance/use. Should it be determined that the FDC may be located in/on/at the building, Items requiring maintenance, such as the check valve must be available for use in testing and for maintenance in the future.*
- 7.2 Show standard pumper (FDC) pit detail in accordance with NFPA 13 (2010 edition), Section A-8.15.1.1.4, if utilized.
- 7.3 The FDC shall be branded on top in accordance with NFPA 13. In addition, the FDC shall be provided with a permanent sign, made of durable material, indicating the address(es) of the system and type of system it supplies (e.g., "**THIS FDC SUPPLIES THE BUILDING SPRINKLER RISER(S)/STANDPIPE(S) FOR NAME & ADDRESS OF BUILDING/COMPLEX.**").
***NOTE:** Manual wet standpipes shall be designated as "PRIMED DRY STANDPIPE(S)".*
- 7.4 The FDC(s) shall be provided with tamper proof caps, which must be in place immediately after installation.
- 7.5 All FDC(s) shall have a minimum of two 2½" inlets with female National Standard Hose threads; all inlets shall be equipped with individual check valves (e.g. clappers). The FDC inlets shall be located at a height of 30 to 36" aboveground.
- 7.6 To determine the number of inlets for the FDC, it shall be assumed that each 2½" FDC inlet will accept 250 gpm. The combined hose requirement (NFPA 13, Table 11.2.3.1.2) plus sprinkler demand for a calculated system or the maximum acceptable base of riser flow (NFPA 13, Table 11.2.2.1) for a pipe schedule system shall be used to determine the required number of FDC inlets.
- 7.7 The color of the FDC shall be RED.

EXCEPTIONS:

a) When a FDC is located on the backflow preventer it shall be painted "chrome-yellow" with the backflow preventer painted red. The FDC outlets shall be facing the street or as otherwise directed by the SJFD Inspector.

- 7.8 When exposed to possible vehicular damage, FDC(s) shall be suitably protected (See item 5.2 of this handout).

8.0 VALVES

- 8.1 All sprinkler systems shall have PIV(s) located as required by item 3.3 of this handout.
EXCEPTION: *The PIV may be omitted for cause upon approval of the SJFD. If the SJFD allows the omission of the PIV, the sprinkler riser control valve(s) shall be located on the exterior of the building where no frangible or glazing materials are located above or within 5 feet on either side of the valves.*
- 8.2 All valves located underground, except for post indicator or street key wrench valves with a curb box, shall be located in a pit in accordance with NFPA 24, Section 6.4.
- 8.3 All fire suppression system control valves shall be supervised with a supervisory switch and also be locked unless underground. Valves in a pit are not considered underground.
- 8.4 Provide a flat stone or concrete pad 1.5 times the size of the valve under each valve that does not extend above ground.
- 8.5 Provide a flat stone or concrete pad twice the size of the fitting under any vertical rise (PIV, etc.).
- 8.6 The color of the PIV shall be RED.
- 8.7 The PIV shall be supervised with a supervisory switch and also be locked. The sprinkler company shall arrange for installation of underground conduit for tamper switch wiring to be buried with the underground piping and properly protected to avoid damage prior to the installation of wiring.
- 8.8 All sprinkler system control valves shall have permanent identification signs and hydraulic data plate.
- 8.9 The PIV(s) shall be provided with a permanent sign, made of durable material, indicating the address(es) of the system it supplies (e.g., "**THIS PIV SUPPLIES THE BUILDING SPRINKLER SYSTEM FOR NAME & ADDRESS OF BUILDING/COMPLEX**").

9.0 RESTRAINTS

- 9.1 Indicate the location, size and detail of all thrust blocks and/or other means of restraint.
- 9.2 Submit thrust force and soil-bearing calculations in accordance with NFPA 24, Section 10.8.2 and A-10.8.2.
- 9.3 Provide the following information obtained from the owner's soils report:
 - a) Lateral bearing capacity of the soil three-feet below grade or at the level on the system piping.
 - b) Corrosive characteristics of the soil in the areas of the system installation.
 - c) Settlement properties of the soil in the areas of the system installation.
 - d) Source of this information.

NOTE: *If the owner chooses not to have a soils consultant produce this information, the installing contractor shall inform the owner, in writing, that the standard criteria listed in NFPA 24, Table A-10.8.2(b) for soft clay (1000#/square foot) will apply to the soil's condition, and that the owner takes full responsibility for soil's condition.*

10.0 INSPECTIONS

- 10.1 Field inspections may be scheduled only after a permit has been issued. All tests and inspections shall be **scheduled by the installing contractor only.** For inspection scheduling or for general information, please call (408) 535-7750. **Allow at least two weeks notice when requesting any inspection.**

NOTE:

- a) *When scheduling an inspection it is the contractor's responsibility to request sufficient time to complete a thorough inspection of the work performed. Inspections are booked in increments of one hour. This time includes travel and completion of the Record of Inspection form.*
 - b) *Missed inspections or inspections canceled within 24 hours shall be billed as an inspection for the amount of time booked.*
 - c) *Two inspections are provided as covered by the permit fees. These two inspections are always the first two inspections performed. Additional inspections shall be billed by the amount of time required.*
- 10.2 All underground fire lines and hydrants shall be flushed per NFPA 24. The contractor shall have sufficient tools and equipment and manpower on-site throughout the inspection to complete a flush of all piping and hydrants in a timely manner. Provisions shall be made to properly dispose of test water. Sufficient 2½" fire hose shall be provided to reach or exceed the distance to the drain point. Typical drain points are storm drains, sewers, gutters, or water tanker(s), etc. The contractor may choose any drain point appropriate within 100 feet. In the case of multiple hydrants and/or fire sprinkler risers, a minimum of two hydrants and/or risers shall be connected and ready to flush. All outlets are required to be flushed. Sufficient burlap sacks and baling wire shall be on site.

- 10.3 It is the contractor's responsibility to make provisions to dispose of the flush test water properly. The system shall be flushed until proven to be free of foreign objects such as rocks, leaves, etc.
- 10.4 Initial flushing shall be at full flow through two 2½" hoses for a minimum of 1 minute for every ten feet of pipe being tested, but, not less than 5 minutes.
- 10.5 A hydrostatic test of 200 psi for two hours is required to be witnessed by the Fire Department **prior to covering the pipe.**
- 10.6 All system joints shall be fully exposed for inspection.
- 10.7 As-built drawings are to be submitted at the time of final inspection when there are deviations from the approved plans.

11.0 DOCUMENT REVISIONS

- 11.1 This document is subject to revisions. For general information and to verify that you have the most current document, please call 408-535-7750, and request the current version date.