UNDERGROUND FIRE SERVICE: DESIGN, INSTALLATION AND PLAN SUBMITTAL REQUIREMENTS

Effective Date: January 1, 2020

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 We will no longer accept paper plans. Plans are to be submitted using the SJePlans system. Uploaded files must be correctly named. See "**Fire SJePlans File Naming Convention"**. 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):

1.1.1 To apply for fire and hazardous materials systems permits, please schedule an appointment and complete your application submittal using SJePlans.

1.1.2 A completed Fire Protection and Special Systems Installation Permit form (permit application) – for project/facility business name, if the project is speculative, type-in "SPEC." followed by the anticipated occupancy (e.g., SPEC OFFICE, SPEC. WAREHOUSE, ETC.). Email the permit form to Fire_HazmatSystemsPermits@sanjoseca.gov

1.1.3 The San Jose Fire Department Plan Check Comments (Plan Check Directives) – this may be obtained from the general contractor or architect.

1.1.4 All approved variances or alternate means or methods of constructions that are relevant to the project – these may be obtained from the general contractor or architect.

1.1.5 Shop quality plans, calculations and supporting documents for the proposed underground piping system

1.2 Initial permit fees will be collected when plans are submitted. Permit fees are non-refundable. See current Fee Schedule.

1.3 **Regular plan review** time is approximately one month unless the contractor schedules an **express plan review** (over-the-counter). The fee for express plan review is 1.5 times the hourly plan check rate. Missed appointments or cancellations within 24 hours of the scheduled plan review time shall be billed to the contractor by the amount of time scheduled.

Express plan review service is for projects that will require less than 1 hour to review. See "**Express Review Requirements for Fire Suppression Systems**" for further instructions.

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 (e.g., when repairing existing systems with

material of equal or better quality due to damage, etc.). Fees are based on number of appurtenances. See current fee schedule.
Exception: *Emergency repair of an existing system may start immediately, with plans being submitted to the authority having jurisdiction within 96 hours from the start of the repair work if deviations from the original system are required to accomplish the repair.*

1.5 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).

1.6 Equipment and piping shall not be installed prior to approval of plans and issuance of permits.

1.7 The permit and a San Jose Fire Department 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 All plans shall show the relevant data listed in 2019 NFPA 13, Chapter 27.

2.2 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.

2.3 The plans shall be stamped and signed by the designer of record (installing contractor or professional engineer). The designer's name shall be clearly printed on the plans – no pseudonyms, acronyms, and/ or aliases. Licensed, fully experienced, and responsible persons shall perform the installation work.

2.4 The designer of record is responsible for the entire system being worked on.

2.5 A key plan of the building and/or complex indicating the street location and the area of work within the building shall be provided. For systems where the drawing shows the street(s) and building(s), no key plan is required.

2.6 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 a symbol, date, description, and initials.

2.7 Plans shall be limited to one building or one system per page. The minimum scale for underground plans is 1" = 60'. Scale shall be suitable to provide legible drawings. Plans shall be fully dimensioned.

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

2.8 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.

2.9 All equipment and devices shall be indicated on the plan 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.*

2.10 The locations of all existing and proposed connections, piping, valve boxes, 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.

2.11 Provide a note on the plans stating the installation complies with 2019 edition NFPA 24 & NFPA 13, and SJFD ordinances. In addition, indicate which water purveyor (e.g., San Jose Water Company, San Jose Municipal Water System, or Great Oaks Water Company) is servicing and note that the installation complies with the appropriate water purveyor's specifications and details.

2.12 All plans shall include fire flow test data verified within six months of the submittal date. Fire flow data may be obtained from the water purveyor servicing the site.

2.13 Indicate the type, C-Factor, and size of the City main.

2.14 Indicate the type, C-Factor, and size of the proposed piping.

2.15 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.*

2.16 Indicate location and type of all valves.

2.17 Indicate depth and method of lay and bury. Trench excavation, bedding, and backfill shall comply with item 3.7 herein. A minimum top of pipe bury depth of 36" is required under areas subject to traffic loads.

2.18 Show details of the method being used to change from a horizontal lay of pipe to a vertical rise (e.g., base of riser or base of hydrant). Provide a flat stone or concrete pad twice the size of the fitting under the vertical rise.

2.19 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 2019 NFPA 13, Section 4.5, 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 joints shall not be located under foundation footings. Pipe under the building or building foundation shall not contain mechanical joints.*

Exceptions:

1. *Where allowed in accordance with 2019 NFPA 13 section 6.4.3.2.*
2. *Alternate designs may be utilized where designed by a registered professional engineer and approved by the enforcing agency.*

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 purveyor requirements and 2019 NFPA 13, Sections 6.6.2.5, and A.6.6.2.5.

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 Backfill shall be well tamped in layers or puddled under and around pipes to prevent settlement or lateral movement. Backfill shall consist of clean fill sand or pea gravel (round rock) to a minimum 6" below and to a minimum of 12" above the pipe, and shall contain no ashes, cinders, refuse, organic matter, or other corrosive materials. Other backfill materials and methods are permitted where designed by a registered professional engineer and approved by SJFD.

3.8 Permanent blue reflective street buttons shall be located at the midsection of the access roads, directly in front of the hydrant(s) being added. See "**Fire Hydrant Pavement Blue Dot Marking Locations".**

3.9 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, 2019 California Fire Code, as modified by San Jose City Ordinance. See "**San Jose Fire Flow and Hydrant Policy"** and **"Fire Flow Requirements with Mixed Construction"**

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 San Jose Fire Department.

4.5 See item 2.12 of this handout for fire flow test data requirements.

4.6 The fire flow data (See item 2.12 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 in order 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 water supply curve shall be provided with hydraulic calculation submittals.

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 BACKFLOW PREVENTION DEVICES

5.1 Backflow prevention shall be installed as required by the appropriate water purveyor and 2019 NFPA Standards 13, 14 and 24.

5.2 **Backflow Prevention Devices Retroactive Installation** – When backflow prevention devices are to be retroactively installed on existing fire sprinkler systems, a thorough hydraulic analysis, including revised hydraulic calculations, new fire flow data, and all necessary system modifications to accommodate the additional friction loss, shall be completed as a part of the installation. New backflow prevention devices or changes to existing backflow prevention devices shall not be installed without Fire Department approval.

5.3 When exposed to possible vehicular damage due to proximity to alleys, driveways, roadways, or parking areas, aboveground backflow prevention devices 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 2019 CFC Appendix B and Appendix C based on the fire flow (without any reduction for required flow).

6.2 Fire hydrants shall be purchased through the utility company for public service. For private service, the installation contractor may purchase the hydrant(s) from any appropriate vendor.

6.2.1 Private Service hydrants shall be dry-barrel design (self-oiling) with one 4" National Standard Hose threads (NSHT) pumper nozzle and two 2½" NSHT hose nozzles. Acceptable equipment is the "Mueller Super Centurion 250" model A-421 or A-423 fire hydrant.

Note*: An approved equal may be substituted for private hydrants.*

6.3 Hydrants 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.

6.4 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).

6.5 All hydrants shall be located at least 40 feet from buildings and 10 feet away from the return of a driveway.

6.6 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.

6.7 All hydrants (and bollards/guard posts if needed) shall be painted Bright Yellow.

6.8 When exposed to possible vehicular damage, hydrants shall be suitably protected (See item 5.4 of this handout).

6.9 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.

6.10 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.

6.11 Fire hydrants shall not be under the control of valves controlling fire sprinkler and/or standpipe systems.

6.12 Fire hydrants shall not be subject to pressure supplied by way of an FDC.

6.13 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."**

7.0 FIRE DEPARTMENT CONNECTIONS

7.1 All sprinkler systems shall have FDC(s) located as required by item 3.3 of this handout. Fire department connections shall be preferably on the street side of buildings and as approved by SJFD.

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 A minimum of one fire department connection shall be required. At least two fire department connections shall be provided, located either on opposite corners of the buildings where fire department apparatus access is provided or, where not possible, physically separated to the greatest extent possible for the following:

7.2.1 High-rise buildings.
7.2.2 Buildings or multiple attached buildings exceeding 900 feet perimeter distance.
7.2.3 Buildings in excess of 200 feet long.

Building size and site conditions may require additional FDCs as determined by the SJFD.

FDC locations shall be approved during plan check by San Jose Fire Department and shall be depicted on the riser key plan(s).

7.3 Show standard pumper (FDC) pit detail in accordance with 2019 NFPA 13, Section A-16.9.6, if utilized.

7.4 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 **"STANDPIPE(S)"**.*

7.5 The FDC(s) shall be provided with tamper proof caps, which must be in place immediately after installation.

7.6 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.

7.7 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 (2019 NFPA 13, Table 19.3.3.1.2) plus sprinkler demand for a calculated system or the maximum acceptable base of riser flow (2019 NFPA 13, Table 19.3.2.1) for a pipe schedule system shall be used to determine the required number of FDC inlets.

7.8 The color of the FDC shall be RED.

Exception: *When a FDC is located on the backflow preventer it shall be painted bright-yellow with the backflow preventer pained red. The FDC outlets shall be facing the street or as otherwise directed by the SJFD Inspector.*

7.9 When exposed to possible vehicular damage, FDC(s) shall be suitably protected (See item 5.3 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 CFC modifies 2019 NFPA 13 *16.9.13.1.1* through *16.9.13.1.4* as follows:

16.9.13.1.1 Sectional control valves are not required when the fire service main system serves less than six fire appurtenances.

16.9.13.1.2 Sectional control valves shall be indicating valves in accordance with Section 16.9.3.2.

16.9.13.1.3 Sectional control valves shall be located so that no more than five fire appurtenances are affected by shut-down of any single portion of the fire service main. Each fire hydrant, fire sprinkler system riser, and standpipe riser shall be considered a separate fire appurtenance. In-rack sprinkler systems shall not be considered as a separate appurtenance.

16.9.13.1.4 The number of fire appurtenances between sectional control valves is allowed to be modified by the authority having jurisdiction.

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. In addition to being electrically supervised, PIVs shall be locked and Backflow Preventer indicating control valves (OS&Ys) shall be chain and locked.

8.4 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 2019 NFPA 24, Section 6.4.

8.5 Provide a flat stone or concrete pad 1.5 times the size of the valve under each valve that does not extend above ground.

8.6 Provide a flat stone or concrete pad twice the size of the fitting under any vertical rise (e.g., PIV, etc.).

8.7 The color of the PIV shall be RED.

8.8 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.

8.9 All sprinkler system control valves shall have permanent identification signs and hydraulic data plate.

8.10 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 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.2019 NFPA 13, Section 6.6.1 and A-6.6.1

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 2019 NFPA 13, Table A-6.6.1(c) 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 can be scheduled only after a permit has been issued. Only the installing contractor shall schedule all tests and inspections. To schedule an inspection, call (408) 535-3555 at least 3 days before the desired inspection date.

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 cancelled less than 48 hours before the scheduled date shall be billed as an inspection for the amount of time booked.

c) Inspections are provided as covered by the permit fees. Additional inspections shall be billed by the amount of time required.

10.2 Have approved Plans and Permit available for all inspections.

10.3 A hydrostatic test of 200 psi for two hours is required to be witnessed by the Fire Department prior to covering the pipe. Pipe may be center loaded but otherwise exposed for inspection.

10.4 All system joints shall be fully exposed for inspection. Lay must be as indicated on plans. Shade, fill and compaction are the responsibility of the contractor and do not require additional inspection unless otherwise noted on record of initial inspection. See items 2.18 & 3.7 herein.

10.5 Tracer wire shall be installed for inspection.

10.6 All thrust blocks and/or vertical rise pads shall be in place and sufficiently exposed for inspection.

10.7 An additional inspection may be required to witness corrosion protection if installed in such a manner as to cover the joints or not complete.

10.8 All underground fire lines and hydrants shall be flushed per NFPA 24.

10.9 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. 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.

10.10 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.

10.11 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. If debris is found in the burlap bag, additional flushing shall be performed at intervals of 1 minute for every 20 feet of pipe, but not less than 2½ minutes. Flushing intervals shall continue until no debris is found.

10.12 Final inspection and permit completion will be after all painting, signage, and electronic monitoring are complete along with any other punch list items noted on the Record(s) of Inspection.

10.13 If the time lag between inspections is more than 180 days, the city database will automatically expire the permit. It is the contractor's responsibility to call the permit specialist to input an activity notice to the database to keep the permit from expiring. Failure to do so will result in additional fees to reactivate, or after 360 days, reissue the permit.

10.14 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

This document is subject to revisions. For general information and to verify that you have the most current document, see SJFD development website, or call (408) 535-7750 and request the current version date.