

**Moreno Valley Fire Department  
Fire Prevention Bureau**

**Underground Fire Service Mains**



Approved and Authorized By:

Doug Bloom, Fire Marshal

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# Underground Fire Service Mains

## PURPOSE

This guideline has been prepared to assist those responsible for the design, installation, testing, and inspection of underground fire service mains to comply with 2019 NFPA 24, 2022 NFPA 13, 2022 California Fire and the Moreno Valley Municipal Code.

## SCOPE

This guideline applies to any private underground fire service mains for buildings. This guideline defines the requirements to obtain a permit for any new or existing private fire service mains for plan submittal requirements, testing, and Fire Department notes required to be applied onto plan.

## SUBMITTAL REQUIREMENTS

Submit your digital plans through the City of Moreno Valley's [SimpliCITY](#) portal. Plans shall be scaled, complete technical data sheets/manufacturer's specifications, and a copy of the manufacturers' design and installation requirements. Fees are based on the number of fire sprinkler system connections. These plans shall contain the following information and items:

1. **Scope of work** for the project.
2. **Business/ Contractor Information** shall be provided and include job site name, address, owner's contact name, owner's phone number; submitting company's name, address, contact name and number.
3. **Plan Design Statement** shall state: These plans have been designed in accordance with NFPA 24 (2019 edition) NFPA 13 (2022 edition), 2022 California Fire Code, Moreno Valley Municipal Code, and the manufacturers design and installation requirements.
4. **Contractors License and Certifications** shall be provided and include a current contractor's C-16, C-34, and/or General Class A license and signature on the plans
5. **Material Listings** shall be met per NFPA 24, NFPA 13, and any other manufacturer literature requirements.
6. **Off-Site Plans** shall be provided along with private fire main submittal to verify off-site improvements, size and location of points of connection. Off-site plans shall be approved by local water purveyor.
7. **Site Plan** shall be provided and indicate fire sprinkler riser points of connection location(s), fire department connections, post indicator valves, system mains, laterals, fire hydrant locations, vehicle impact protection, blue reflective pavement markers, location of methods of restraint (thrust block or mechanical restraints), changes of elevation, and node point identification as referenced in hydraulic calculations. All symbols used on site plan shall be in accordance with NFPA 170. If fire mains serve several buildings, building permit numbers shall be applied onto site plan accordingly.

8. **Equipment Legend** for each system component shall be identified to be reflected on site plan. Legend shall include fire hydrants, fire sprinkler system riser points of connection, fire department connection(s), post indicator valves, and underground fire main point(s) of connection.
9. **Two Points of Connection** to fire service main shall be provided for projects that require a fire flow that exceeds 2000 gpm and/or if fire main exceeds 6 or more appurtenances.
10. **Fire Hydrants** shall be sized a minimum super (6"X4"X21/2"X21/2") or super enhanced (6"X4"X4"X21/2") wet barrel type with NHS/NST connection threads. Fire hydrants shall be distributed in accordance with Appendix C of the California Fire Code and measured along structure's approved fire apparatus access road (as the hose is laid.) Hydrant's lowest connection is to be installed 18" to 36" from finish floor. Underground connections to fire hydrants shall be a minimum of 6" diameter piping and equipped with a underground control valve installed no more than 20' from fire hydrant(s.) Break away bolts or break away spools shall be proposed on details.
11. **Backflow Preventer Detail** showing size and type of assembly proposed in accordance with Water Purveyor's approved off-site improvement plans.
12. **Fire Sprinkler Riser Sweep Detail** showing a cross section with installation details to include size of pipe, listed sweep details, thrust block, minimum clearance distances from building footing and distance from interior wall. Fire riser sweeps shall be provided with proper annular space based on interior pipe size in accordance with NFPA 24/13.
13. **Fire Department Connection Detail** (if applicable) shall be provided. Connection's inlet height shall be no less than 18" or more than 48" above grade. FDC also be installed within 20' to 100' from an approved fire hydrant. Connection(s) shall be provided and sized in accordance with NFPA 13. Refer to Moreno Valley Fire Sprinkler Guideline for riser/wall mounted fire department connections.
14. **Post Indicator Valve Detail** shall be provided with installation requirements and valve components in accordance with NFPA 24. PIV assemblies shall be installed 32" to 40" from finish floor.
15. **Sectional Control Valves** shall be provided on fire mains to avoid no more than 5 appurtenances be affected by the shut down of any single point of the fire main. Each fire hydrant, fire sprinkler system riser, and standpipe shall be considered a separate appurtenance. Control valves shall be aboveground indicating valves and be shown on site plan.
16. **Water Supply Information** from applicable fire flow test used for system design indicating static, residual, and flow values on water purveyor's letter. All water supply testing and documents are to be no more than 6 months from time of submittal for fire sprinkler underground design and not longer than certified by local water purveyor (whichever is less.) No more than 90% of the available water supply shall be used for any fire sprinkler system's design.
17. **Thrust Block Calculations and Details** shall be provided on plan for installation and inspection reference. Plans shall include locations and sizing of thrust blocks based on pipe sizes proposed. Thrust blocks shall be placed between undisturbed earth and the fitting to be restrained and shall be such bearing as to ensure adequate resistance to the thrust to be encountered. In general, thrust blocks shall be so placed that the joints will be accessible for inspection and repair per Chapter 10. Thrust block Tables to be provided and calculated based on 200psi water pressure and 1500psf soil bearing

pressures. If a registered soils engineer provides a stamped soils report that states the soil is of a less restrictive pressure than 1500psf, the figure provided shall be acceptable for the calculations. For proposed project's changes of elevation, gravity thrust blocks and details shall be calculated and designed separately from bearing area thrust blocks in accordance with NFPA 24.

18. **Mechanical Restrain Details** (if proposed) are an alternative to thrust blocks for underground pipe restraint. Adequate engineering justification shall be provided for the distribution of restraints throughout fire service main (i.e., Every joint and every 40' thereafter)
19. **Hydraulic Calculations** shall be prepared for fire main's hydrants to meet the required fire flow for the project and necessary design flow(s) for other water-based fire protection system(s). System shall be designed to accommodate the most remote fire hydrant to flow a minimum 1750 gpm. Each set of calculations shall include a summary sheet, graph sheet, water supply analysis, node analysis, and detailed worksheet. Outside house demands in accordance with NFPA 13 shall also be applied onto fire sprinkler system calculations.
20. **Data Specification Sheets** indicating required listings in accordance with NFPA 24 shall be provided for all piping, joints, hydrants, control valves, fire department connections, and backflow prevention assemblies shall be provided for review. Pertinent flow information to determine validity of hydraulic calculations shall be provided for applicable components.

### **TESTING REQUIREMENTS**

1. **Rough Piping Inspection(s)** shall be performed to inspect the installation of fire service main piping and other system components. Piping nomenclature shall be positioned face-up to verify piping's listing(s) and size. Methods of piping restraint shall be inspected and measured per approved plans. If mechanical restraints are used, they shall be torqued at proper PSI as per manufacturer's specifications and means verification shall be made available on-site.
2. **Pre-Thrust Block Inspection** shall take place along for systems utilizing thrust blocks as the method of restraint with piping inspection(s) before the pouring of concrete takes place. Thrust blocks shall be formed against undisturbed soil and other approved means (i.e., sandbags) to avoid overpour of concrete.
3. **Hydrostatic Test** shall be conducted once piping installation and methods of restraint have been inspected and approved, fire service mains shall undergo a hydrostatic test at 200 psi or 50 psi above static operating pressure whichever is greater for a 2-hour duration. If during hydrostatic testing a pressure loss of 5 psi will result in a failed inspection. Concealment of any piping or system components shall not be permitted until system has undergone underground rough piping, hydrostatic testing, and other required testing by Fire Prevention Bureau Staff.
4. **Flush Test** of underground fire service mains shall be conducted before systems are considered live or connections to fire protection systems occur. Flushing of system(s) shall be performed at a rate of no less than 10' per second (measured by pitot gauge or other means of measuring fluid flow velocity) out of a compatible orifice size of each functional system connection.

5. **Final Inspection** shall be conducted once all required inspections and testing has taken place. All DDCA, PIV, and FDC assemblies shall be painted red and provided with address numbers in durable metal signage. Fire hydrants and fire department connections shall be equipped with appropriate caps. NFPA 24 Contractor's Materials and Test Certificate shall be provided to Fire Inspector.

### **FIRE DEPARTMENT INSPECTION AND TESTING NOTES**

Fire Department Notes for Fire Sprinkler Systems are required to be added to plans verbatim.

1. **Connection to Overhead System(s)** shall be allowed once underground piping has been flushed and witnessed by Fire Prevention Bureau Staff.
2. **System Testing** shall be performed in accordance with NFPA 13, NFPA 24, and Moreno Valley Fire Prevention Bureau Guideline requirements. Concealment of any construction or piping shall not be permitted until system has undergone overhead rough piping and other required testing by Fire Prevention Bureau Staff.
3. **Ferrous Metal System Components** shall be coated and wrapped with component's manufacturer listing requirements for protection against corrosion.
4. **Annular Space** shall be provided for all underground piping transitions through building footing lead-in piping as required by NFPA 13 as soon as piping is installed.
5. **Appurtenance Connection Orifices and Indicators** shall face the fire apparatus access roads at time of inspections and be free of landscaping or obstructions.
6. **Vehicle Impact Protection** shall be provided for all fire service main components subject to mechanical damage or installed a minimum of 3' behind curb.
7. **Address Identification of Appurtenances** shall be provided at all backflow preventer(s), PIV, and FDC assemblies.
8. **Electric Valve Supervision** shall be provided for all valves controlling water supply to sprinkler system by a listed fire alarm control unit to a UL listed central station. Proper conduit runs shall be in place before underground system is backfilled.
9. **Securing of Control Valves** – All valves controlling water supply to sprinkler system shall be secured in the open position by approved means.
10. **"As Built" or Revised Plans** shall be submitted and reviewed by the Moreno Valle Fire Prevention Bureau prior to Final Inspection according to field inspection changes and Fire Inspector's discretion.
11. **Contractor's Materials and Test Certificate** shall be completed by the installing contractor before system's final inspection is requested.

**For additional assistance please call Fire Prevention at (951) 413-3370 or Email us at [FirePlanCheck@Moval.org](mailto:FirePlanCheck@Moval.org)**

**To submit plans please use the [SimpliCITY](#) portal.**