UNDERGROUND FIRE SERVICE UTILITY REQUIREMENTS

SCOPE:

1. This standard is applicable to all private underground piping for fire hydrants, fire sprinkler supply lines, and/or other underground fire and life safety appurtenances within the City of Chula Vista. This standard is not applicable to underground piping in the public right-of-way and for utilities serving fire sprinkler systems designed in accordance with NFPA 13D. The codes and standards listed herein provide the minimum requirements for the design, installation, testing, and inspection of Underground Fire Service Utility Systems in the City of Chula Vista:
    a. City of Chula Vista Fire Prevention Details
    b. California Fire Code, 2025 Edition
    c. California Building Code, 2025 Edition
    d. NFPA 13/NFPA 13R, 2025 Edition
    e. NFPA 14, 2024 Edition
    f. NFPA 24, 2025 Edition
    g. Water District Having Jurisdiction requirements
    h. San Diego Water Agency Standards (WAS)
    i. American Water Works Association (AWWA)

PERMITS:

2. Underground Fire Service Utilities are required to be submitted to the City of Chula Vista as:
    a. Development Services Department (DSD) Private Improvement Permit Plans, or
    b. Chula Vista Fire Department Underground Fire Service Utility Permit Plans.

    Exception: Emergency repair of an existing Underground Fire Service Utility System, replacing like for like appurtenances, may start immediately. Permit plans are submitted only to the Chula Vista Fire Department (CVFD) within 48 hours from the start of the repair work.

3. Note: If an applicant includes Underground Fire Service Utilities as part of a DSD Private Improvement Permit, a Fire Safety Engineering Permit is also required. City staff will create this permit and charge fees in accordance with the City of Chula Vista's Master Fee Schedule. These fees are required to be paid in addition to the DSD Private Improvement Permit fees, at the time of application.

4. Complete plans for underground piping and components shall be submitted for approval in advance of installation.

DESIGNER & INSTALLER:

7. Underground fire protection plans shall be designed by a licensed contractor (i.e., A, C-16, C-34 or C-36) or by a registered professional engineer (e.g., Fire Protection Engineer), licensed by the State of California (Board of Professional Engineers). All copies and sheets of the plans shall be stamped and signed by the licensed individuals.

8. Class A, C-16, C-34, and C-36 contractors can only design underground fire service utility projects if their staff performs the entire installation without subcontracting installation work.

9. All design professionals and installing contractors shall also have and demonstrate proof of a City of Chula Vista Business License.

PLANS:

Plans must include the following information:

10. Legend.

11. Applicable codes and standards used for the system design.

12. Project Name.

13. Owner Name.

14. Design professional name, telephone number, address, and CA State registered professional engineer number.

15. Contractor's name, telephone number, address, and CA State contractor's license number and classification (if known/applicable).

16. Vicinity map indicating major cross streets adjacent to project.

17. Legal address of all buildings.

18. Curb lines, sidewalks, alleys, driveways, walls, fences, property lines, vehicle parking layouts (indicate whether or not parking is covered or uncovered), power poles, adjacent structures, all on site buildings, any other items which are pertinent to Fire Hydrant, Post Indicating Valve (PIV), and Fire Department Connection (FDC) placement.

19. Point of compass.

20. Size and location of all water supplies and all public Fire Hydrants within 500 feet of the site.

21. Respective Water Authority Pressure Zones.

22. The following items that pertain to private fire service mains:
    a. Size
    b. Length
    c. Stationing
    d. Weight
    e. Material
    f. Pressure class
    g. Point of connection to public main
    h. Sizes, types, and locations of fittings, valves, valve indicators, regulators, and meters
    i. Depth at which the top of the pipe is laid below grade
    j. Sectional view of typical trench
    k. Method/type of pipe/appurtenance restraint

23. The plan submittal shall include the manufacturer's installation instructions for any specially listed equipment, including descriptions, applications, and limitations for any devices, piping, or fittings.

24. Project Data. Project Date table shall include:
    a. Required fire flow provided by CVFD
    b. Total square footage per building
    c. CBC construction type per building
    d. CBC occupancy type per building
    e. Building heights
    f. Number of stories
    g. Type of sprinkler system provided, and if any reductions in fire flow are being used (25% max.)
    h. Number of hydrants installed

25. Provide a summary pipe length data table for Underground Fire Service Utility piping on the top sheet.

26. Complete listings and manufacturers technical data sheets for all system materials shall be included with all Underground Fire Service Utility submittals. All system materials shall be U.L./F.M. listed for fire service and approved by the Fire Prevention Division prior to installation.

HYDRAULIC ANALYSIS:

27. A hydraulic water flow analysis shall accompany the plans. This analysis shall show the actual flow and pressure for all Fire Hydrants. The Hazen Williams Formula shall be used in the determination of these flows and pressures. The analysis shall show that the required fire flow is available at the Fire Hydrants.

28. The system shall be designed and sized such that the maximum velocity in the pipe shall not exceed the velocity allowed by the pipe type listing.

29. Calculations shall extend to the point at which the water supply data was determined.

30. Water supply data is required to accompany hydraulic water flow analysis. An official water flow letter can be obtained from the respective water authority. The water flow requirements shall be based upon the currently adopted California Fire Code. The date of the water flow test shall be no older than twelve (12) months from the time of the plan submittal. Per CVFD Ordinance, the maximum fire flow reduction for an approved automatic fire sprinkler system is 25%.

RESTRAINT METHOD:

31. Underground Fire Service Utilities shall be restrained against movement at changes in direction and as required in other locations. The two approved methods are Thrust Blocks or Mechanical Restraint, which shall be designed and installed in accordance with NFPA 24, manufactures recommendations, and product listings. Additional requirements related to Thrust Blocks and Mechanical Restraints are listed below.

THRUST BLOCK RESTRAINT:

32. Calculations shall be submitted, and the resulting dimensions of thrust blocks shall be shown on the plans. Soil bearing strength shall be substantiated, via a geotechnical report, and shall be noted within the calculations. The Chula Vista Fire Department's Thrust Block example calculations can be used if the design Engineer substantiates that the example Thrust Blocks are more conservative based upon known soil bearing capacity.

33. Thrust blocks shall be installed on unrestrained pressure pipelines at all tees, wyes, reducers, horizontal bends, ascending vertical bends, and dead-ends, and shall bear directly against fittings and firm, wetted, undisturbed soil. Thrust blocks shall be located so that bearing areas on both fittings and soil are centered along the direction of thrust. For tees and wyes, the direction of thrust is along a line directly opposite the side outlet. For bends, the direction of thrust is along a line bisecting the outside angle formed by the adjacent pipe segments. For reducers, the direction of thrust is along the pipeline from the large end to the small end of the reducer. For dead-ends, including in-line valves, the direction of thrust is along the pipeline.

34. Anchor blocks shall be located at all unrestrained descending vertical bends. Thrust blocks are not suited for such applications because excavation necessarily disturbs soil in the direction of thrust. Anchor blocks rely on the weight of the concrete used to restrain thrust. Anchor blocks must include as a minimum two (2) number four (#4) steel reinforcing bars with 2-inch minimum concrete embedment as directed design Engineer.

35. Results of calculations for all Thrust Blocks and Anchor Blocks shall be individually noted in the plan presented in the form of a clear and complete "Thrust/Anchor Block Table." Thrust Block and Anchor Block information shall include pipe station, type of block, test pressure, total thrust, assumed or tested soil capacity, and area or volume of block(s) required.

36. All applications shall use a minimum of Class 560-C-3250 concrete (Cast-in-place piles), unless otherwise directed by the design Engineer.

37. When determining thrust at fittings, in the calculation of concrete blocks, a thrust pressure of 200psi shall be used.

MECHANICAL RESTRAINT:
38. When utilizing Restrained Joint Systems, one of the following shall be used: (1) Locking mechanical or push-on joints, (2) Mechanical joints utilizing setscrew retainer glans, (3) Bolted flange joints, (4) Pipe clamps and tie rods, or (5) Other approved methods or devices.

FIRE DEPARTMENT CONNECTIONS/POST INDICATING VALVES/BACKFLOWS:
39. The Chula Vista Fire Department requires separate free-standing PIVs and FDCs for all structures protected by fire sprinkler systems. *Exception: CVFD allows the configurations below, based upon the specific project restrictions.* Please consult with your Fire Department Inspector / Plan Reviewer for additional details and approvals.

a. Multi-building residential projects, protected by residential fire sprinkler systems, where real estate is limited and PIVs and FDCs are considered impractical:

i. A separate PIV and FDC is not required.
ii. FDC is allowed to be located on the building.
iii. When the FDC is located on the building, the PIV shall be eliminated and replaced by a control and check valve on the sprinkler riser.

b. Single-building commercial projects, protected by commercial fire sprinkler systems, where there are no on-site Fire Hydrants and/or other appurtenances served:

i. A separate PIV and FDC is not required.
ii. FDC may be located as either part of the Backflow Assembly or on the building.
iii. When the FDC is located on the Backflow Assembly or building, the PIV shall be eliminated and replaced by a control and check valve on the sprinkler riser.

40. Notwithstanding the above, FDCs shall not be located on any Backflow Assembly or building unless approved by the Fire Marshal.

41. FDCs shall be equipped with listed caps. All protective caps shall be of breakable cast iron. Plastic caps are not permitted.

42. When PIVs and FDCs are provided in accordance with CVFD's standard detail an additional Check Valve per sprinkler lateral is required. The Check Valve shall be located at either: (1) the piping between the Post Indicator Valve and the Fire Department Connection, or (2) the supply piping serving the Post Indicating Valve. See FDC/PIV and Riser Sweep Detail.

43. PIVs and FDCs shall be physically secured to an underground concrete anchor block via restraining rods, approved mechanical restraints or restrained back to the next fitting.

44. PIVs and FDCs shall be painted red: Rust-oleum safety red #2163 or equivalent.

45. PIVs and FDCs shall be set so that the top of each is 36 in to 44 in above final grade.

46. PIVs and FDCs shall incorporate a concrete pad.

47. PIVs and FDCs shall have a sign to indicate what buildings they serve.

48. PIVs and Backflow Devices shall be provided with a breakaway security lock. Keys shall be kept in the Knox Box/Vault.

49. PIVs and Backflow Devices shall be installed with a supervisory switch, which sounds a supervisory alarm at a U.L. listed central receiving station (central station monitoring for certified system and central station remote service for non-certified monitoring systems).

FIRE HYDRANTS:
50. Fire Hydrants shall not be under the control of PIVs controlling Automatic Fire Sprinkler Systems.

51. Fire Hydrants shall not be subject to pressure supplied by way of a FDC.

52. Fire Hydrant sizes:
    a. Residential and Commercial: One (1) – four inch (4") x Two (2) - two and one half inch (2 1/2")
    b. Industrial: Two (2) – four-inch (4") x One (1) - two and one half inch (2 1/2")

53. Wet-barrel Fire Hydrants shall generally be used for pressures up to two hundred (200) psi. System pressures up to and including one hundred fifty (150) psi require standard Wet-barrel Fire Hydrants, and pressures up to two hundred (200) psi require high-pressure Wet-barrel Fire Hydrants.

54. Fire Hydrant number and spacing shall be derived from CFC Table C102.1, Required Number and Spacing for Fire Hydrants.

55. Fire Hydrants require breakaway spools, which shall be set within the concrete pad. Break off grove, maximum of two, shall terminate above the pad.

56. Fire Hydrant gate valves shall be provided on the lateral in a road box at ten (10) feet from the Fire Hydrant.

57. Blue reflective markers shall be installed to identify location of Fire Hydrants. These markers shall be visible from both directions of vehicle travel. On undivided roads, markers will be placed one foot from centerline in the direction of the fire appliance.

ADDITIONAL REQUIREMENTS:

58. Regardless of hydraulic calculations, two points of connections to the public main are required when the system serves three (3) or more Fire Hydrants. Distribution must be configured to provide at least 50 percent of the required fire flow in case of a single break.

59. Underground lateral supplies for Fire Sprinkler Systems shall be a minimum of 4 inches.

Exception: Underground fire sprinkler laterals serving NFPA 13R systems shall comply with one of the following designs based upon the parameters described.

a. The system lateral design shall comply with this document's requirements when:
    i. Serving more than four group R-2 buildings and/or
    ii. The FDC is located between the city supply and sprinkler riser check valve.

b. The system lateral design shall comply with NFPA 13R, and the California Plumbing Code (CPC) or NFPA 24 when:
    i. Serving four or less group R2 buildings, and
    ii. The FDC is located downstream of the sprinkler system riser check valve, and
    iii. There are no fire hydrants served by the same system lateral.

60. Fire Sprinkler System laterals shall terminate inside of the building. Consult with your Fire Inspector / Plan Reviewer for exceptions.

61. Automatic Fire Sprinkler System lateral transition fittings installed under the building shall be a UL listed one-piece solid sweep In-Building Riser.

62. Underground lateral supplies for Fire Hydrants shall be a minimum of 6 inches.

63. All underground piping shall be per AWWA C900-16; in addition, piping shall be a minimum of DR18/Pressure Class 235 or have a dimension ratio/higher pressure class per the design Engineer.

64. When public water supply pressure exceeds 150psi (static), a pressure reducing device shall be added to the backflow prevention device and set/adjusted to 150psi. Check with Water Authority Having Jurisdiction for specific requirements.

65. Tracer Wire is required for all Underground Fire Service Utilities.
    a. Wire shall be #14 AWG solid copper UF B type wire with cross-linked polyethylene insulation.

b. The insulation shall be white or yellow in color.
c. Wire splices shall be accomplished using a direct bury silicone-filled capsule tube with standard wire nut or silicone-filled wire nut connectors of the appropriate size.
d. Tracer Wires shall run continuously along the entire pipe length and be secured to the pipe at 6' intervals with plastic adhesive tape (or alternate).
e. Tracer Wire access port shall be provided with the concrete splash pad of all Fire Hydrants and at the Fire Sprinkler System Riser.
f. Wire shall extend into the access port and shall terminate with a coiled 24" length of wire.

66. Warning/Identification Tape is required for all Underground Fire Service Utilities.
a. Tape's printed message shall be, Caution: Waterline Buried Below (in black ink).
b. Tape color shall be Blue.
c. Tape shall be a minimum of 6" wide and 0.004" thick.
d. Tape shall be inert, non-metallic plastic film that is non degrading and puncture resistant.
e. Tape shall be placed 12" inches above the pipe with the printed side up.

67. On site Fire Hydrants, PIVs, and FDCs shall be located no less than 3 feet behind the face of a compliant curb and no further than 5 feet behind the face of curb. When no curb is provided, Bollards shall be provided.

68. The design Engineer shall confirm piping wall thickness where there are unusual external/internal conditions. If applicable, trench loads shall consider both prism and live loads.

69. Chula Vista Fire Department maintains up-to-date policies, construction details, and fee schedules. Use the link below to access additional relevant Underground Fire Service Utility items:
https://www.chulavistaca.gov/departments/fire-department/about-cvfd/fire-prevention/forms-details

INSPECTIONS:
70. The City of Chula Vista Fire Prevention Division will require the following inspections and tests at a minimum *(some inspections may be combined)*:
a. Components
b. Thrust block pre-pour/mechanical restraint
c. Trench and backfill
d. Tracer wire and continuity test
e. Underground hydrostatic test
f. Underground flush
g. Underground final

71. CVFD Field Inspection Record shall be kept on the project site at all times.

72. A completed "Contractors Material & Test Certificate for Underground Piping" is required at the time of Underground Fire Service Utility Final Inspection. Underground systems will not pass the Final Inspection until the Fire Prevention Division receives this completed certificate.