FIRE SPRINKLER UNDERGROUND-COMMERCIAL
SUBMITTAL REQUIREMENTS AND DETAILS

These guidelines shall be followed when a business, facility or organization proposes to install an underground water supply serving an automatic fire sprinkler system, within the City of Keller.

All fire sprinkler system underground piping for the purposes of this guideline and any other guidelines or requirements of the Fire Department shall conform to the 2022 International Fire Code, as amended and adopted by the City of Keller and the most currently published Edition of NFPA 24: Standard for the Installation of Private Fire Service Mains and Their Appurtenances.

This guide does not replace, nor supersede any codes and/or ordinances adopted by the City of Keller, or determinations and positions of the Fire Marshal.

General Plan Requirements

1. All underground lines shall begin at the point of connection to the underground circulating public/private water main. A valve shall be provided at the point of connection such that the fire sprinkler underground service line can be isolated from public/private water distribution system.
2. All underground lines shall terminate at the top of the spigot piece no more than 10 ft. inside the building.
3. All ductile iron, retaining rods, and other non-plastic components shall be externally coated for corrosion and poly- wrapped.
4. Plan Review Application must accompany all submittals. Submittals will not be approved without an application.
5. All underground piping shall be a minimum of Class 200 / DR14 200 PSI rated pipe or equivalent.
6. Installation street address must be provided for each separate underground line being permitted and installed. Subdivision or development street corner will not be accepted.
7. The designer and company of record is responsible for the entire system to be installed.
8. Civil construction drawings approved by the City of Keller Engineering Department shall not constitute approval of the underground line(s).
9. **Piping and equipment shall NOT be installed PRIOR TO approval of plans and issuance of permit(s).**

Submittal Requirements

10. A “Wet” RME signature and stamp, as required by the 2022 IFC Section 106.2.1.
11. Provide drawings in PDF.
12. Project name.
13. Project address.
14. A scaled copy of the ***approved*** Site Plan that indicates the location of all fire hydrants and fire lanes servicing the building or site. The size and type of building shall be clearly indicated on the plan.
15. Size and location of all water supplies and/or water lines servicing the building or site.
16. Flow test data, shown on the plans.
17. Size and type of all piping identified on the plans.
18. Occupancy classification.
19. Construction type.

20. Location of all valves.
21. Location and size of all thrust blocks.
22. Thrust block details.
23. Detail of the spigot piece and/or and in-building riser turn.
24. Embedment detail.
25. Embedment material shall be No. 4 crushed stone.
26. Depth of bury. Minimum is 48 inches/4 feet, from top of pipe to grade.
27. Pit/vault/valve arrangement (if provided with a pit/vault).
28. Type of fittings/joints, methods of connection and rod size.
29. Location and type of Fire Department Connection (FDC), if installed. *Contact the Fire Department for additional embedment requirements with regard to yard-mount FDC's*.
30. Manufacturer's data sheets for all components used in the project including manufacturer's parameters and listing organizations approval.
31. Location and type of backflow prevention.
32. Provide information on the transition stability of different types of piping (eg. transition from PVC to ductile iron, retainer glands).

Backflow Prevention

33. All fire sprinkler systems are required to be provided with an approved method of backflow prevention (DCDA).
34. The City of Keller Public Works Engineering Department shall determine the final location of the backflow assembly. As a general rule, if the fire service lead-in is less than 100 ft. in total length, then the assembly may be located within the riser room. If the fire service lead-in is over 100 ft in total length, then the assembly must be located in a vault adjacent to the tap, in an easement. Contact the Engineering Department for requirements pertaining to backflow assembly location when not located inside the building.
35. A reduced pressure zone backflow prevention device is required on antifreeze systems.
36. Assemblies shall be listed for fire protection use.
37. Assemblies must be capable of being electronically or mechanically monitored.
38. Assemblies must be provided with a bypass valve.
39. All installations shall be inspected and tested. Testing documentation shall be provided upon request.
40. The City of Keller Water Department shall be notified of all new installations by calling 817-743-4206.

General Requirements

41. Each submittal shall have a completed:
42. Keller Fire-Rescue Plan Review/Permit Application
43. Copy of the signed contract for the scope of the work.
44. Signed Checklist.
45. Copy of Contractors Texas Department of Insurance License and TX Drivers License
46. Completed Keller Fire-Rescue Contractor Documentation Form ($50.00 annual fee)
47. Plans approved by the Keller Fire-Rescue, Fire Marshal's Office give authorization for construction and/or operation. Final approvals are subject to field verification. Any approval issued by the Fire Marshal's Office does not release the contractor or property owner from the responsibility of full compliance with all applicable codes and ordinances relating to the construction project.
48. Installation, fabrication or otherwise construction of the system is prohibited without approved plans and permit.
49. All installations and/or operations must concur with the approved plans. Any deviation from the approved plans requires a re-submittal to the Fire Marshal's Office.
50. All fire department inspection forms and permits shall be kept in a permit packet on the job site until final inspection.
51. Submittals that do not conform to the minimum above requirements will not be approved.
52. The installing contractor shall be responsible for the following:

(1) Notifying the AHJ and the owner's representative of the time and date testing is to be performed

(2) Performing all required acceptance tests

(3) Completing and signing the contractor's material and test certificate(s).

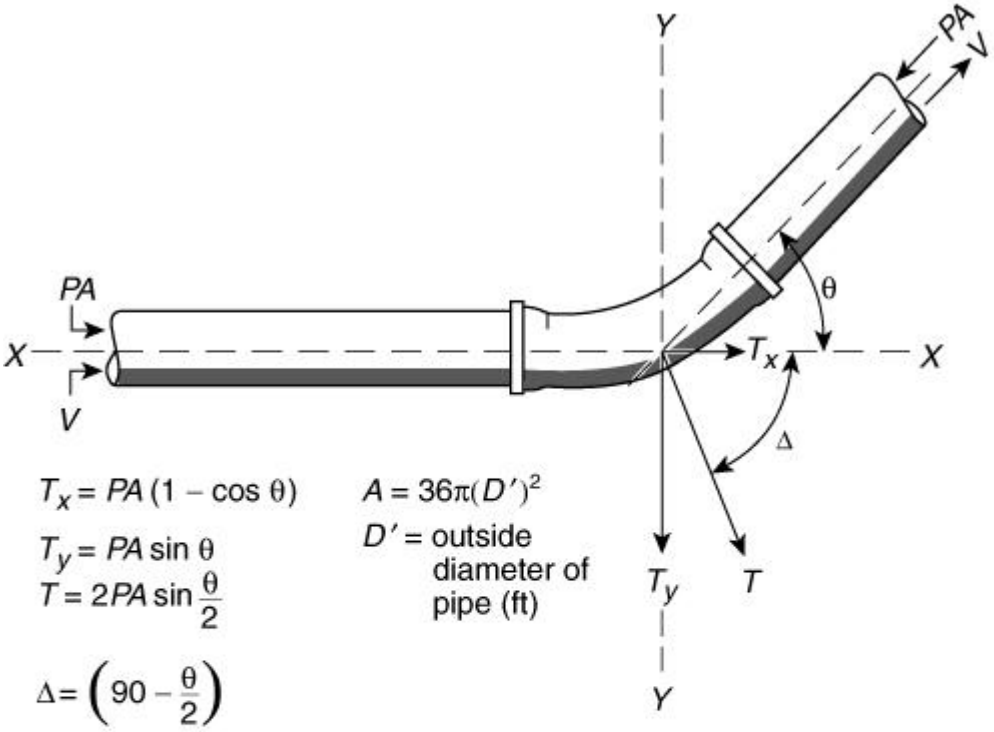
Important Inspection Information

53. Visual inspection of the installation shall be performed **PRIOR TO** cover. If the piping and joints are covered prior to installation, you will be required to uncover the piping for inspection, regardless of cover. NO EXCEPTIONS.
54. All underground piping shall be thoroughly flushed **PRIOR TO** connecting to the system risers or other aboveground piping system(s). If the underground piping is connected to the system riser, "stacked", both the overhead and underground piping are required to be flushed in accordance with the requirements of NFPA 13 and NFPA 24.
55. Hydrostatic test of the fire sprinkler underground lines shall be required at the same time the visual inspection is performed. **NO EXCEPTIONS**. The piping will be allowed to be center loaded to prevent pipe movement.
56. See Fire Sprinkler Underground Inspection Guidelines for detailed criteria.
57. Fire service mains shall not run under buildings further than 10 feet as measured from outside of the building, under the building to the riser location.
58. Minimum distance the riser stub can be from the proposed finished walls is eighteen (18") inches.

Standard Details

59. See attached pages for standard detail sets.
60. All standard details shall be provided in PDF file format for incorporation into your submittal drawings.
61. With the exception of the Embedment Detail, all details provided are for guidance only. Actual site conditions and NFPA 24 will determine the necessary details to be provided to indicate the construction of the underground pipe.

Standard
Details Thrust
Block Details



$T_x = PA\,(1 - \cos\theta)$

$T_y = PA \sin\theta$

$T = 2PA \sin\frac{\theta}{2}$

$\Delta = \left(90 - \frac{\theta}{2}\right)$

$A = 36\pi(D')^2$

D' = outside diameter of pipe (ft)

T = thrust force resulting from change in direction of flow (lbf)

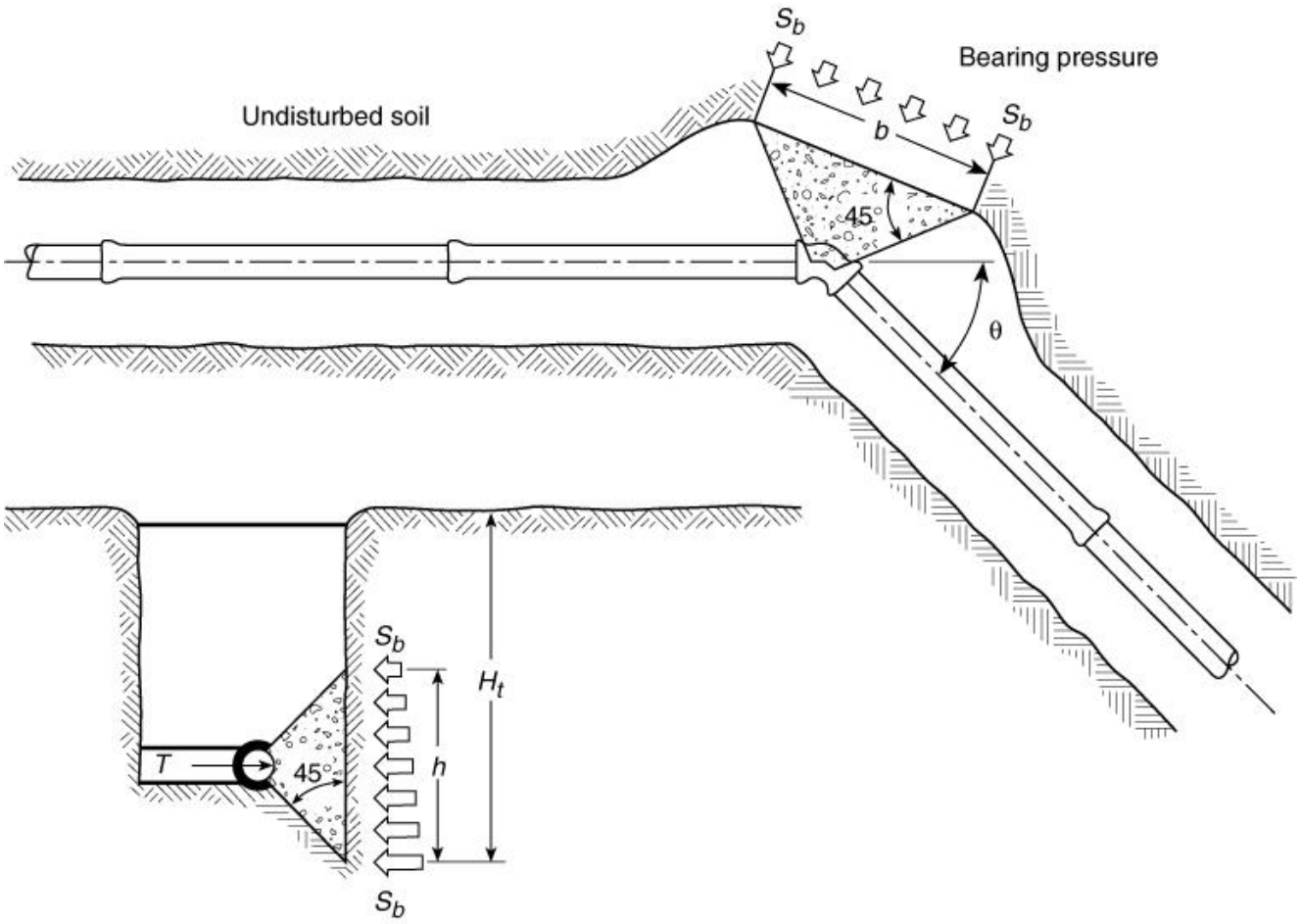
T_x = component of thrust force acting parallel to original direction of flow (lbf)

T_y = component of thrust force acting perpendicular to original direction of flow (lbf)

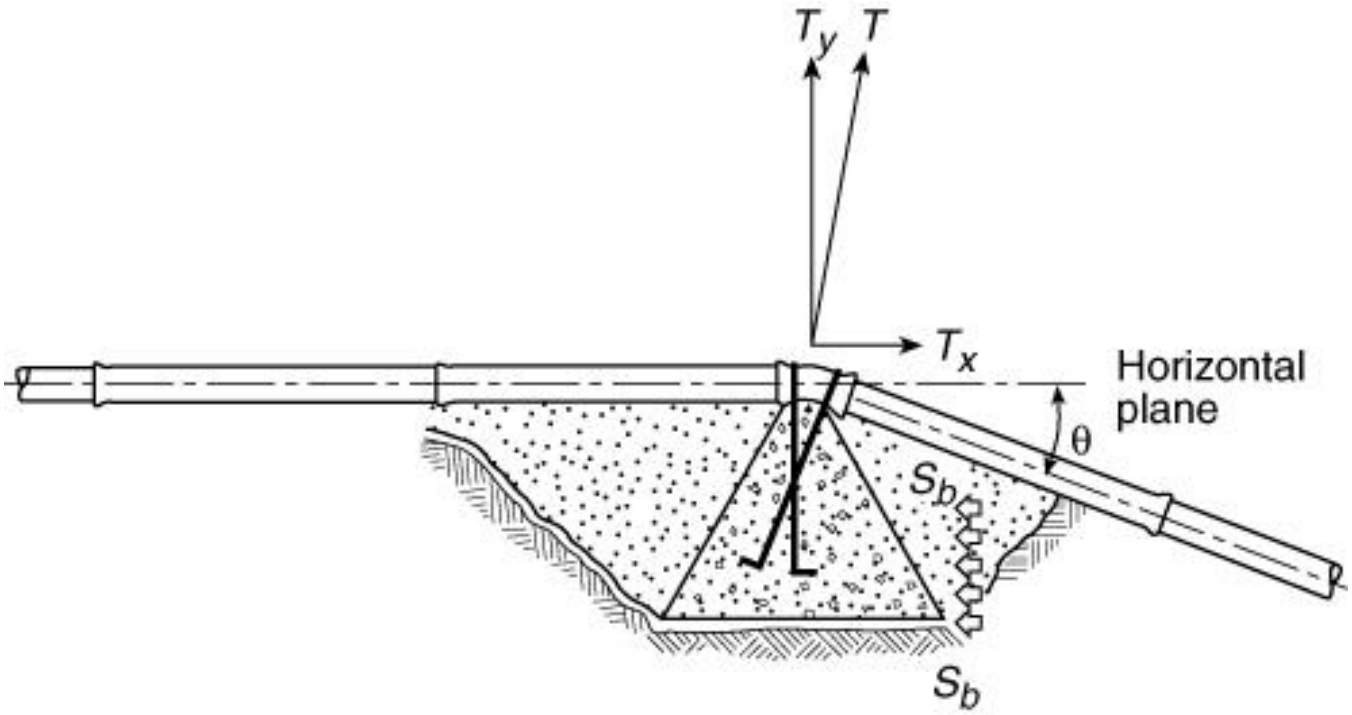
P = water pressure (psi^2)

A = cross-sectional area of pipe based on outside diameter ($in.^2$)

V = velocity in direction of flow



T = thrust force resulting from change in direction of flow
S_b = horizontal bearing strength of soil
h = block height
H_t = total depth to bottom of block



T = thrust force resulting from change of direction of flow
T_x = horizontal component of thrust force
T_y = vertical component of thrust force
S_b = horizontal bearing strength of soil