

CHAPTER 500

FIRE SAFETY SYSTEMS

501. General Policy and Requirements.

501.1 Fire Lanes.

- A. The City shall designate fire lands on public streets and private property used for townhouse, multi-family, commercial, institutional and industrial developments.
- B. The purpose of the fire lanes shall be to prevent parking and standing adjacent to fire hydrants and also to provide clear access to buildings and fire protection equipment.

501.2 **Water Supply Systems.** Water supply systems shall be provided in accordance with Section 600 of this manual.

501.3 **Fire Protection Lines.** All fire protection lines shall be privately owned and maintained.

502. Fire Safety System – Planning and Design.

502.1 Fire Lanes.

- A. Fire lanes in residential, commercial, institutional and industrial developments shall be designated by the City and shall be a minimum of 18 feet in width. This dimension shall be measured perpendicularly from the painted curb or perimeter line.
- B. A minimum of two (2) signs shall designate fire lanes, one at each end of the lane. Additional signs shall be provided at minimum intervals of 200 feet. Fire lanes may be painted in parking areas where no curb and gutter exists and where posting of a metal sign is not feasible. See construction standards for fire lanes in this manual.

502.2 Emergency Access in General.

- A. Emergency access shall have an all weather surface capable of supporting heavy equipment.
- B. Emergency access driveways, excluding parking, shall be a minimum of twenty (20) feet wide. The minimum turning radii shall be thirty-two (32) feet.

- C. Reasonable accessibility shall be provided to and around all buildings for fire fighting equipment, including ladder trucks on multiple-story buildings. A minimum of twenty feet on all sides of buildings and a radius of 50 feet at all building corners shall be maintained.
- D. Where the number of dwelling units in a project exceeds 100, there shall be two (2) entrances to the project where road frontage is adequate for two (2) entrances, as determined by the Rules and Regulations for the Control and Protection of State Highway rights-of-way.
- E. Accessibility for fire fighting equipment shall be maintained throughout all stages of construction and occupancy.

502.3 Emergency Access to the Front of Buildings.

- A. An unobstructed emergency space of at least nine (9) feet in width shall be provided in front of the main entrance of buildings where vehicle parking is adjacent to the building and not separated by a fire lane.
- B. A series of nine (9) foot wide unobstructed emergency spaces shall be provided in front of a strip shopping center where parking is adjacent to the building and not separated from it by a fire lane. The spaces shall be provided at 100-foot intervals along the front of the building.

502.4 Emergency Access to the Rear and Side of Buildings. Each building with a rear dimension exceeding 100 feet in length shall have an access capable of handling emergency equipment if the building is not accessible from a street, driveway, service area, or parking area. The access used exclusively for emergency purposes shall be a minimum of 20 feet wide.

502.5 Emergency Access Limits.

- A. Emergency access limits are defined as the maximum distance between a building and the closest point of emergency vehicle access. These limits shall be measured from the main building entrance to the edge of pavement, curb line or emergency access point. An emergency access point is defined as the closest point to the main entrance of a building that an emergency vehicle can reach on all weather surface capable of supporting such a vehicle.
- B. In townhouse developments, the maximum distance from the curb line (or the emergency access point) to the building entrance may not exceed 75 feet.
- C. In multi-family developments, the maximum distance from the curb line (or the emergency access point) to the building entrance shall be 50 feet.

- D. In buildings over three (3) stories in height, the maximum distance from the curb (or the emergency access point) shall conform to the guidelines listed in Table 5-1. For purposes of this section, the building height measured in feet is the distance between the lowest level of fire department access to the finish floor level of the topmost habitable floor.

**TABLE 5-1
BUILDING HEIGHT DISTANCE FROM THE
CURB OR EMERGENCY ACCESS POINT**

Building Height (feet)	Distance (feet)
30 to 45	50
40 to 60	40
61 to 75	30
Greater than 75	20

502.6 Fire Main Size.

- A. Single family. Single-family residential developments shall use a minimum of six (6) inch mains; larger size mains dependent on demand, fire flow requirements and the City’s Master Water Plan.
- B. Multi-family. Multi-family residential developments shall use a minimum of eight (8) inch mains.
- C. Commercial areas with less than 200,000 square feet shall use fire mains a minimum of eight (8) inches in size.
- D. Large shopping centers, strip-malls, etc. shall use fire mains a minimum of eight (8) inches in size.
- E. Motels, light industrial & schools shall use fire mains a minimum of eight (8) inches in size.
- F. Heavy industry, warehouses and office buildings greater than 200,000 square feet shall use fire mains a minimum of ten (10) inches in size.
- G. The City or its designated representative shall have the authority to waive the above minimum fire main sizes provided the following conditions have been met:
 - 1. Note on Plans: “I have designed the water service installation for this facility in accordance with all applicable City water specifications in regards to fire flows and these conditions have been met”. This note is to be signed and stamped by the engineer providing the calculations.

2. Provide the City with the calculations stamped and certified as required in Section 500.3(A) of this manual.

503. Fire Hydrants.

- A. All fire hydrants shall be designed and manufactured to comply with the latest specifications of the AWWA. They shall be designed for 150 pounds working pressure. The hydrants shall be of simple design, easy to operate, effectively and positively drained and protected from damage by freezing and convenient for repairing and replacing parts.
- B. Hydrants shall be equipped with one 4 ½-inch diameter pumper nozzle and two 2 ½-inch diameter hose connections. The hydrants shall have threads meeting the latest requirements of the State Fire Insurance Commission. Hydrants shall also have a safety flange on the barrel and a safety coupling on the valve stem, to prevent damage to barrel and stem in case of traffic accident. Hydrants shall be either Mueller Company's Centurion Traffic Model, or M & H Style 129 Traffic Model.

503.1 Fire Hydrant Locations.

- A. The 4 ½-inch pumper connection on the hydrant shall face the street, travel lane or service drive.
- B. The bottom of the 4 ½-inch nozzle shall be 24 inches above the elevation of the edge of the shoulder on streets without curb and gutter and 24 inches above the elevation of the curb on streets with curb and gutter.
- C. The 2 ½-inch hose connections shall have a minimum of four (4) feet of clearance on all sides.
- D. No fire hydrant shall be obscured from view by plantings, fences, etc.

503.2 Spacing. Fire hydrants shall be spaced as follows:

- A. Single family. Fire hydrants shall be spaced not more than 300 feet apart. Fire hydrants shall be located at all intersections and shall be located at the end of the line of all cul-de-sacs.
- B. Multi-family, condominiums & townhouses. Fire hydrants shall be spaced at the Fire Department's discretion.
- C. Shopping centers, malls, etc. Fire hydrants shall be spaced at the Fire Department's discretion.

- D. Motels, light industry and schools. Fire hydrants shall be spaced at the Fire Department's discretion.
- E. Heavy Industry/Tall buildings. Fire hydrants shall be spaced at the Fire Department's discretion.

503.2 Fire Hydrants in Relation to Streets and Parking Lots.

- A. Fire hydrants shall be located along the right-of-way at street intersections and at intermediate locations where necessary, as determined by the City Fire Chief or his designee in cooperation with the Director of the Water & Wastewater Department. All distance measurements are to be made along with the centerline of streets, travelways or other unobstructed path that may be used by the Fire Department.
- B. In areas with curb and gutter, the center of the fire hydrant shall be located no less than 18 inches nor more than 36 inches from the face of the curb. No part of a fire hydrant shall conflict with or overhand a sidewalk, trail or vehicular travelway.
- C. On streets without curb and gutter, fire hydrants shall be located behind the ditch.
- D. Traffic bollards or other protective measures shall be provided in areas, such as parking lots where the proposed site improvements will not provide adequate protection of the fire hydrant from vehicles.
- E. When installed in parking areas, clear access shall be provided to the front of the hydrant (that portion with the large pumper connection at the center) and 15 feet to each side. This clear access area shall be marked as fire lane.
- F. Plantings and other obstructions shall be kept clear of fire hydrants for a minimum of 4 ½ feet around the hydrant.

503.3 Fire Hydrants in Relation to Buildings.

- A. Fire hydrants shall be located to serve remote areas of buildings. Those hydrants used to meet fire flow requirements shall be located within 500 feet of the building to be protected.
- B. Fire hydrants shall be required along the perimeter of the building for use groups in accordance with Table 5-2. The remote distance shall be measured to the most remote distance the hydrant will serve.

**TABLE 5-2
USE GROUP AND FIRE HYDRANT REMOTE DISTANCE**

Use Group	Remote Distance (feet)
Heavy industrial & warehouse buildings	250
School & institutional buildings	300
Commercial, church & office buildings	300
Motels, multi-family, condominium & townhouse buildings	250
Single-family detached dwellings	400

C. Fire hydrants shall be a minimum of 50 feet away from all buildings, except single-family dwellings.

503.4 **Fire Hydrants in Relation to Sprinklers/Standpipes.** Fire hydrants shall be located within 100 feet of any Fire Department sprinkler connection or standpipes where those systems are required/provided in buildings.

503.5 **Sprinkler/Standpipe Fire Department Connections.**

A. Fire Department connections shall be located to be visible from a street. If a visible location from a street is not possible, the Fire Chief or his designee shall approve alternate locations. Such connections shall be located to provide immediate access to the Fire Department. Generally, walls, fences, trees, shrubs and other obstructions shall not be placed to prevent access.

B. Fire Department connections shall be arranged to allow the use of any one water sprinkler connection to serve all the sprinklers within the building and to allow the use of any one standpipe connection to serve all the standpipes within the building.

C. Fire Department connections shall not be less than 18 inches nor more than 42 inches in elevation measured from ground level to the centerline of the inlets.

D. In buildings classified as high-rise by the building code, the Fire Department connections shall be located a minimum of 50 feet from the building. The Fire Chief or his designee and the Director of Water & Wastewater shall approve the location of this yard connection.

504. Fire Flow Requirements.

504.1 Flow Requirements.

- A. Water systems shall be designed to provide fire flows in accordance with Table 5-3, plus the domestic demand required by the Department of Water & Wastewater. A residual pressure of not less than 20 pounds per square inch (psi) to at least one point within 500 feet of each building proposed to be served shall be provided.
- B. The fire flows in Table 5-3 apply to new development. Where the size and the scope of the development exceed these requirements, additional flow shall be provided in accordance with Insurance Services office (ISO) requirements.
- C. Fire flow requirements may be met in single-family residential and two-family developments with a single hydrant within 500 feet of a structure in accordance with Table 5-3.
- D. In areas of multi-use development, the higher flow rates listed in Table 5-3 shall be provided for each hydrant.
- E. Other residential (i.e., multi-family, condominium, townhouse), commercial, institutional, and industrial developments shall provide a fire flow of 2500 gallons per minutes.

**TABLE 5-3
FIRE FLOW REQUIREMENTS FOR
SINGLE-FAMILY DETACHED
AND TWO-FAMILY DWELLINGS**

Unit to Unit Exposure Distance (feet)	Flow Requirements per Hydrant (gpm)	Flow Requirements for a Hydrant within 500 feet of a Structure (gpm)
0 to 10	1,500	2,000
10 to 30	1,000	1,500
Greater than 30	1,000	1,000

504.2 Fire Flow Calculations.

- A. Fire flow calculations shall include assumptions about the existing system. The calculations shall indicate available flows at the proposed hydrants and the pressure throughout the proposed system.

- B. Fire flow calculations for projects to be developed in sections or phases shall indicate the available fire flows during each section or phase of the project.
- C. For small sites that propose no major waterline extensions, an evaluation of the existing fire flow available may be substituted for existing fire flow calculations.
- D. In the event that minimum fire flows cannot be achieved, the developer of a property shall design additional fire protection measures into every building not covered by adequate flows. Any deviation from the minimum fire flow requirements shall require a site development plan waiver application, for condition fire flow requirements. See site development plan requirements in this manual.
- E. Flow calculations shall be prepared using a program that is acceptable to the City, such as the “K Pipe” program developed by the University of Kentucky.
- F. Flow calculations shall utilize a pipe roughness factor, $c=120$ for pipes that are 12 inches in diameter and greater. For pipes smaller than 12 inches a roughness factor of $c=100$ shall be utilized. Since a conservation “c” factor is utilized in the calculations, no allowance is required for the losses in valves and other fittings.
- G. The line velocity shall not exceed ten (10) feet per second under any flow condition. Consideration shall be given to the line size used in areas where a domestic service line extends from a dead end line. In this instance, the line velocity may be permitted to exceed ten (10) feet per second to avoid stale water problems.

504.3 **Water Storage Systems.** Water storage systems utilized to maintain fire flow shall have capacity to sustain the required flow for a minimum of four (4) hours in duration.

505. **Fire Safety Systems – Plan Submission Requirements.**

505.1 **Plan Elements in General.** The site development and subdivision plans shall include the following:

- A. Fire lanes.
- B. Emergency access.
- C. Existing and proposed fire hydrants.
- D. Fire protection lines.

E. Water storage supplies, where applicable.

505.2 Fire Flow Calculations.

- A. Fire flow calculations shall be included with the site and subdivision development plans.
- B. Deviations from the minimum fire flow requirements in Section 504.2(D) of this manual shall require a conditional fire flow waiver with the site and subdivision development plan application. The waiver shall address current fire flow available and provide a system analysis to determine measures for bringing deficiencies up to minimum standards.
- C. The Department of Water & Wastewater, after coordinating with the Fire Chief and Fire Marshal, shall approve additional fire protection measures proposed for every building not covered by adequate fire flows, prior to the approval of the site and subdivision development plans.

506. Fire Line Ordinance.

506.1 Purpose. The purpose of this ordinance is to require the installation of an underwriter approved detector meter or a factory mutual fire meter on all unmetered fire service systems having fire hydrant(s), hand hose connection(s), or sprinkler head(s) on private property.

506.2 Effective Date.

- A. Upon adoption of this ordinance, all persons making applications for new fire service connections with private fire hydrant(s), hand hose connection(s), or sprinkler head(s) attached thereto shall be required to have an underwriter approved detector meter or factory mutual fire line meter. However, if consumption of unmetered water from fire service systems is discovered, the two (2) year grace period will be forfeited and immediate installation of an approved detector meter or factor mutual fire line meter will be required.
- B. Within two (2) years after adoption of this ordinance, all existing unmetered fire service systems with private fire hydrant(s), hand hose connection(s), or sprinkler head(s) attached thereto shall be required to have an underwriter approved detector meter or factory mutual fire line meter. However, if consumption of unmetered water from fire service systems is discovered, the two (2)-year grace period will be forfeited and immediate installation of an approved detector meter or factory mutual fire line meter will be required.
- C. When unauthorized water is used through a detector meter in three or more billing periods in one calendar year, it shall be replaced with a factory mutual

fire line meter. Unauthorized use of water is defined as non-fire fighting water and/or water use without prior notification and approval of the City.

D. All domestic water supply must be metered with a proper meter.

506.3 Other Items.

- A. Work to be performed by Developer. Installation of detector meters or factory mutual billing periods in one calendar year it shall be handled by the developer under supervision of the City's inspectors. The cost of installation will be at a rate established for each individual site.
- B. The City shall have the authority to cut off water service to buildings whose owners refuse to comply with the provisions of this ordinance upon proper notification of 60 days.
- C. The regular monthly fire service standby charge shall be continued for fire service installation having a detector or mutual fire line meter. The water that is measured by the detector meter will be billed at five (5) times normal water charge. If the services of legal council are required to collect bills, the cost of council shall be added to the billing.

507. Fire Safety Systems – Construction Standards.

507.1 Fire Lane Signs and Painting.

- A. Fire lane signs shall be constructed of metal with a dimension of approximately 12 inches by 15 inches.
- B. The sign shall be painted with red letters on a white background with a 3/8 inch red trim strip around the entire outer edge of the sign. The lettering on the sign shall read, "NO PARKING OR STANDING FIRE LANE", which shall be spaced on the sign face uniformly. Solid arrows shall be painted on the signs to point to and indicate the designated fire lane. The lettering and arrow on the sign shall be in accordance with Table 5-4.
- C. Signs for fire lanes shall be posted at intervals of 100 feet with the bottom of the sign no less than six (6) feet from the ground, and the top no more than eight (8) feet from the ground, unless otherwise directed by the Fire Chief or his designee.
- D. Letters at least two (2) feet in height may be painted on the pavement where a fire lane runs through a parking area without curbing adjacent to the fire lane, and where the posting of a metal sign(s) is impractical. The lettering shall read "NO PARKING OR STANDING FIRE LANE."

**TABLE 5-4
FIRE LANE SIGN LETTERING SIGN**

Lettering (words)	Letter Height (inches)
NO PARKING	2
OR	1
STANDING	2
FIRE LANE	2 ½
Arrows	1

- E. When curbing is provided adjacent to the fire lane, it shall be painted yellow within the limits of the fire lane.
- F. When curbing is not provided adjacent to the fire lane, a yellow line shall be painted on the pavement along the perimeter and within the limits of the fire lane with two (2)-foot long intersecting lines and painted at three (3)-foot intervals on the fire lane side of the perimeter.

507.1 Fire Lane Signs and Painting.

- A. All fire hydrants shall be designed and manufactured to comply with the latest specifications of the AWWA. They shall be designed for 150 pounds working pressure. The hydrants shall be of simple design, easy to operate, effectively and positively drained and protected from damage by freezing and convenient for repairing and replacing parts.
- B. Hydrants shall be equipped with one 4 ½-inch diameter pumper nozzle and two 2 ½-inch diameter hose connections. The hydrants shall have threads meeting the latest requirements of the State Fire Insurance Commission. Hydrants shall also have a safety flange on the barrel and a safety coupling on the valve stem, to prevent damage to barrel and stem in case of traffic accident. Hydrants shall be either Mueller Company's Centurion Traffic Model, or M & H Style 129 Traffic Model.
- C. The construction to the main line shall be with mechanical joint locked hydrant tee equal to American Cast Iron Pipe Company A-10180. Wherever possible the fire hydrant shall be connected to the gate valve by using a locked hydrant adapter equal to American A-10895. The connection at the base of the hydrant shall be mechanical joint with ductile iron retainer gland, for Class 150, centrifugally case, six (6)-inch ductile iron pipe. The valve opening shall meet the requirements of the AWWA Specifications for 5 ¼-inch hydrants. The valve, valve seat and inner working parts shall be easily accessible. The distance from the ground to the hose nozzle shall not be less than 24 inches. Each hydrant shall be neatly painted with a red reflecting paint.

- D. Each hydrant shall be tested to 200 psi. The first test shall be made with the valve closed. The second test shall be made with the main valve open but all nozzles closed. While this test is being carried on, the hydrant shall be subjected to a hammer test. Any hydrant showing defects by leakage, sweating or otherwise shall be rejected. The barrel and all parts shall withstand these tests. These tests shall be made in the field after the hydrants are installed.

507.2 Setting Fire Hydrants.

1. Fire hydrants shall be placed at the locations shown on the plans or as directed by the design professional. Gate valves for fire hydrants shall be connected directly to the main by means of a Locked Hydrant Tee. All other connections between the main and the fire hydrant shall be mechanical joint with ductile iron retainer glands with setscrews. Fittings shall be restrained by a locked hydrant adapter whenever the fire hydrant is located close enough to the main to allow their use. Care shall be exercised that setscrews and retainer glands are tightened sufficiently to secure the hydrants before pressure is put on the main. Not less than four (4) cubic feet of coarse, broken stone shall be placed around the base of the hydrants, as shown in the Standard Detail Drawings. Before placing the hydrants, care shall be taken to see that all foreign material is removed from within the body. The stuffing boxes shall be tightened and the hydrant valve opened and closed to see that all parts are in first class working condition. All hydrant openings shall be kept capped, except when hydrant is being worked on.
2. When a fire hydrant has been constructed but is not yet placed in service, the contractor shall provide and attach to the fire hydrant, flags or collars indicating that the fire hydrant is not in service. Said flags or collars shall remain on the fire hydrant until it is put into service.
3. Whenever an existing fire hydrant is taken out of service, whether temporarily or permanently, it shall be equipped with a flag or collar indicating that it is not in service. The contractor shall provide and install flags or collars as required and shall notify the City Fire Department whenever the operating status of any fire hydrant changes.
4. FIRE HYDRANTS SHALL NOT BE OPERATED WITH ANY TOOL EXCEPT A SPECIFICALLY DESIGNED FIRE HYDRANT WRENCH. If the contractor observes any other contractor or person operating a fire hydrant with an unapproved fire hydrant wrench, he shall report that fact to the City Fire Department or Water & Wastewater Department immediately. It is the contractor's

responsibility to insure that all new facilities are maintained in new condition until final completion of the project and acceptance by the City. Fire hydrants with damaged operating nuts shall not be accepted.

507.3 Fire Detection Check Valves.

1. Approved detection check valves shall be required on all fire service mains in buildings served by a “wet pipe” type sprinkler system.
2. The detection check valve shall be equipped with a bypass meter assembly. An appropriately sized gate valve shall be installed on either side of the check valve.
3. The vault housing the detector check valve should be sized in accordance with the Standard Details Drawings in this manual.

507.4 Sprinkler Standpipe Connections. All Fire Department connections shall be fitted with National Standard threads.