Positioning Apparatus

Courtesy of Bob Esposito.

Chapter Contents

chapter 4

Key Terms

NFPA® Job Performance Requirements

This chapter provides information that addresses the following job performance requirements of NFPA® 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications (2014)*.

5.2.1

5.2.2

5.2.4

Positioning Apparatus

Learning Objectives

After reading this chapter, students will be able to:

1. Describe positioning of pumpers for fire attack. (5.2.1, 5.2.2, 5.2.4)
2. Describe positioning water source supply pumpers. (5.2.1, 5.2.2, 5.2.4)
3. Summarize apparatus positioning considerations for wildland fire attack.
4. Identify considerations for special positioning situations. (5.2.1, 5.2.2, 5.2.4)
5. Position pumper and make large diameter intake hose connections. (5.2.1, 5.2.2, 5.2.4; Skill Sheet 4-1)
6. Position pumper and connect to 2½-inch (65 mm) hydrant outlets. (5.2.1, 5.2.2, 5.2.4; Skill Sheet 4-2)
7. Position pumper and make multiple intake connections. (5.2.1, 5.2.2, 5.2.4; Skill Sheet 4-3)
8. Position pumper and make connections for a dual pumping operation. (5.2.1, 5.2.2, 5.2.4; Skill Sheet 4-4)
9. Position pumper and make connections for a tandem pumping operation. (5.2.1, 5.2.2, 5.2.4; Skill Sheet 4-5)

Chapter 4
Positioning Apparatus

Case History

Just before midnight, firefighters responded to a report of a fire in an auto body shop located on a narrow dead-end street in an older section of the city. The driver/operator of the first-arriving engine company had several factors to consider when positioning the apparatus.

No smoke or fire was evident until the apparatus rolled up to the scene. At that time, the company officer noticed smoke coming from the rear of the building. The driver/operator knew that the engine company must be positioned properly on the narrow dead-end street in order for the first-arriving ladder company to have access for its aerial device. Furthermore, the second-arriving engine would need to approach from the same direction with a 5-inch (125 mm) LDH supply line.

To accommodate access for the aerial device, the driver/operator sized up the available options and positioned the apparatus well past the building. With the ladder truck in position, the engine completing a forward lay for water supply would be blocked out a significant distance from the attack pumper. Realizing this, the driver/operator and another firefighter back-stretched supply hose from the attack pumper's hose bed to a point just past the rear of the ladder truck, making it easier to complete the hose lay.

Driver/operators must always apply size-up skills when positioning their vehicle. They must consider the immediate task of their apparatus as well as the needs of other units responding to the incident. Once a pumper is in position with hoselines stretched and operating, it is nearly impossible to reposition the apparatus.

Driver/operators should position their apparatus for the safest and most advantageous use of the features of the apparatus. Driver/operators must be well trained and knowledgeable in local policies and procedures in order to efficiently execute any maneuvers and tasks that the Incident Commander (IC) or the IAP may require. This chapter describes proper positioning for pumping apparatus based on several common functions, including fire attack and water supply. It will also describe positioning for wildland operations and special situations.

NOTE: The reader will find information concerning the positioning of pumpers for relay pumping operations and during water shuttle operations in Chapters 12 and 13 respectively.

Positioning Fire Department Pumpers

A fire department pumper's primary function on the fireground is to provide water directly for fire streams or to support other pumpers or aerial apparatus **(Figure 4.1)**. Driver/operators must know how to properly position apparatus in many different scenarios including fire attacks and water supply operations.

Fire Attack Pumpers

Local policies, the company officer, and the driver/operator will determine the best placement for the first-arriving and later-arriving pumpers on the fireground. **Preincident planning** and district familiarization will assist the driver/operator to make informed decisions regarding apparatus positioning. The following sections address considerations that may help determine proper positioning for fire attack, supporting aerial apparatus, and supporting fire department connections.

Preincident Planning — Act of preparing to manage an incident at a particular location or a particular type of incident before an incident occurs.

Figure 4.1 This pumper is positioned on the fireground for support operations. *Courtesy of Ron Jeffers.*

Positioning for Fire Attack

Incident scene **size-up** determines the most advantageous position for the attack pumper. The driver/operator and company officer of the first-arriving apparatus must observe conditions and determine the best apparatus position based on initial attack strategy and department policy. The position of the initial company, along with local operating guidelines and orders from the **Incident Commander (IC)**, will set the scene for later-arriving apparatus to support. When fire conditions are evident upon arrival, the driver/operator should place the apparatus in a safe position that offers the best tactical advantage. This includes an exit route for the apparatus should a withdrawal become necessary. A variety of size-up factors and local guidelines influence this decision. When positioning the apparatus, the driver/operator should:

Size-Up — Ongoing evaluation of influential factors at the scene of an incident.

Incident Commander (IC) — Person in charge of the Incident Command System and responsible for the management of all incident operations during an emergency.

- Pull the apparatus past the front of the building, if feasible, when arriving at an incident where no fire is evident (investigation mode). This position allows personnel on the apparatus to view three sides of the building.

- Consider the best access point for personnel and equipment entering the occupancy when parking the apparatus. This will allow personnel efficient access to the building to begin an investigation.
- Remain with the apparatus (based on local policy) in the event connections for water supply or fire department connections need to be made or to assist in pulling attack hoselines and operating the pump.

In cases where circumstances prohibit standard apparatus placement, incoming apparatus must be notified of the situation and changes made to accommodate the particulars of the incident. The following text describes proper placement for numerous situations that may occur.

NOTE: IFSTA's **Pumping and Aerial Apparatus Driver/Operator Handbook 3rd edition,** Chapters 16-20, contains further information on deploying aerial devices.

Rescue situations. Life safety is the first tactical priority at any incident. If there is an indication of an obvious rescue situation, position the apparatus to facilitate the most efficient deployment of ground ladders (or aerial device if so equipped).

Exposures. Position the apparatus so that fire streams can be deployed to protect the exposures if the fire has the potential to threaten exposures. When positioning for exposure protection, consider the apparatus as a potential exposure. Avoid placing the apparatus in a location that may subject it to high levels of radiant heat, falling embers, or other products of combustion.

Water supply. Establishing water supply is a primary concern of the driver/operator and company officer in the placement of the pumper. If a confirmed fire is located in an area of limited access, such as a narrow driveway or alley, the personnel of the first-arriving pumper should consider laying their own supply line. The driver/operator should also be aware that supply lines, especially LDH, may block the access of later-arriving apparatus. Guidelines based on local conditions and resources should be in place to minimize this occurrence. Supply lines should be laid where they are accessible to later-arriving apparatus.

Only after a proper size-up confirms the location and extent of the fire can a pumper's onboard tank be considered for water supply. If additional water may be required, the company officer and driver/operator must consider this factor in the placement of the apparatus. If the first-arriving pumper is located in an area that is difficult for other apparatus to access, such as a narrow driveway or alley, a supply line may be laid to the scene as the first apparatus moves into position.

Method of attack. Determine the positioning of the apparatus. If handlines or portable master streams are to be used, the pumper must be positioned in close proximity to the building or incident scene to allow effective water supply. If a fixed appliance is to be operated, the apparatus must be positioned in a safe location close enough for the fire stream to reach its intended target, but with consideration for the collapse potential of the structure.

Hoseline deployment. Position pumpers to better support the deployment of hoselines for fire attack or supply lines to fire department connections. Also consider the accessibility of water supply to the pumper.

Wind direction. Attempt to position the apparatus upwind of an incident whenever possible **(Figure 4.2)**. This positioning may negate the need for the driver/operator to wear protective breathing apparatus while operating the vehicle and reduce the possibility of the apparatus becoming an exposure if fire conditions worsen.

Terrain. Park apparatus on hard surfaces whenever practical. This will eliminate the chance of getting stuck in an unpaved area. In cold weather climates, a buildup of ice and snow before or during an incident should be considered relevant to apparatus safety. When operating at an incident involving hazardous or flammable liquids, an uphill position eliminates the chance of a hazardous liquid flowing underneath the apparatus. Similarly, at vehicle fires, an uphill position will protect the apparatus from burning fuel that may leak from the vehicle. One exception to the uphill rule involves wildland fires. Apparatus and personnel should be downhill of the main body of fire as wildland fires move uphill faster than on flat terrain or downhill.

Roadway response. Position the apparatus in a manner or location that will be safe from the hazards of the incident and protect personnel from oncoming traffic. Block lanes of the road where firefighters are operating as well as an additional lane for a safety zone.

When laying supply hose into the fire scene, lay the hose to the side of the street if at all possible **(Figure 4.3)**. Large diameter hose is almost impossible to move once charged with water, and later-arriving apparatus may be unable to drive over the hose without causing damage

Structural collapse. Another important consideration when determining the proper position for an attack pumper is the potential for structural collapse. Buildings with extensive fire involvement or those in poor condition before an incident may be more likely to suddenly collapse. Apparatus and personnel should maintain a collapse zone of at least one and a half times the height of any building determined likely to collapse **(Figure 4.4)**. When practical, the corners of a building may be advantageous positions for apparatus placement, especially aerial apparatus operating master streams. The corners of a structure are generally considered the safest position should a collapse occur.

Figure 4.2 Apparatus should be positioned upwind of an incident.

Figure 4.3 Lay supply hose to the side of the street from hydrant to pumper.

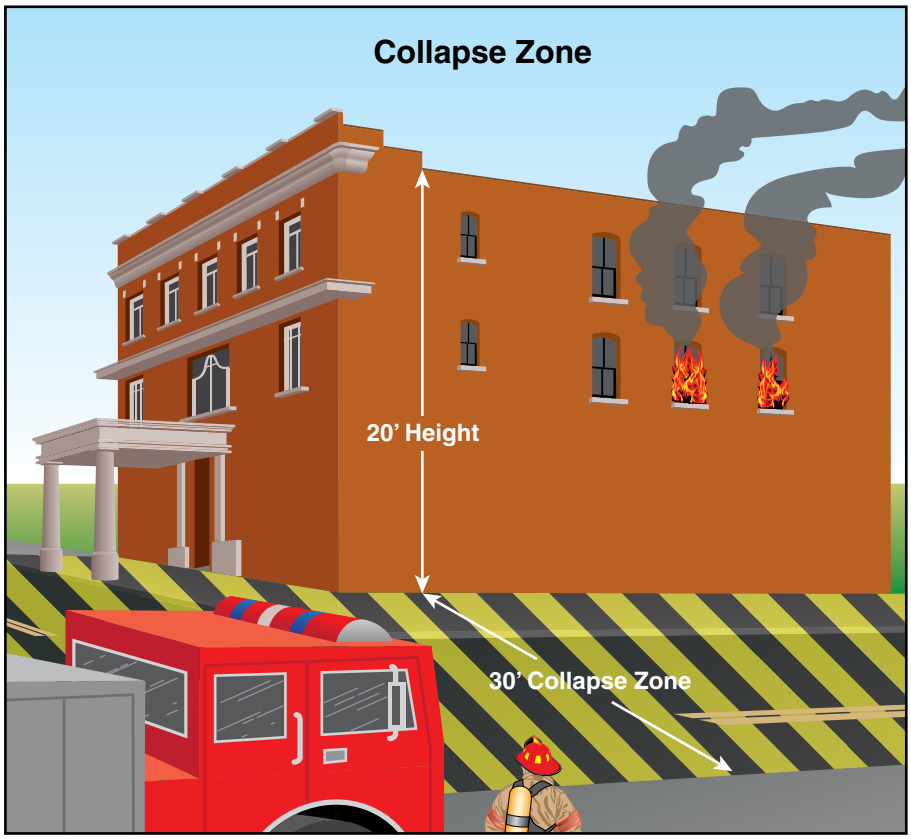


Figure 4.4 Position the apparatus outside of the collapse zone.

Preincident planning. Buildings that are old or poorly maintained may pose a higher risk even before a fire or other catastrophic incident. Preincident planning aids in identifying buildings with a high potential for collapse. Indicators that factor into the Incident Commander's decision to withdraw firefighters and apparatus from an area or building include buildings with reinforcement rods which may be identified by ornamental stars or bolts, those with bulging walls, traveling exterior cracks, and falling bricks. Those indicators, plus interior collapses, are all signs that a large-scale structural collapse may occur and a collapse zone should be established.

Figure 4.5 Parking a pumper directly below a large number of utility lines may be dangerous, especially if fire or weather conditions cause them to fall. *Courtesy of Ron Jeffers.*

Overhead utility lines. Other factors, such as the location of overhead utility lines, dictate the position of apparatus on the fireground **(Figure 4.5)**. Positioning apparatus directly below these lines may be dangerous, especially if fire or weather conditions are likely to cause them to fall. Other factors, such as large fires or fires that have the potential to spread to exposures, dictate that apparatus be positioned farther away with an open route to withdraw.

Falling debris. Falling debris from buildings, especially during high-rise fires, can be extremely dangerous to firefighters and damaging to apparatus and hoselines in the vicinity of the building. Depending on the incident, apparatus, equipment, and personnel operating within 200 feet (60 m) of the base of a high-rise fire may need to be protected from falling glass and debris.

The driver/operator should also consider the ability to remove portable equipment from the apparatus. Therefore, park in a position where compartment doors may be fully opened and ground ladders or other portable equipment may be removed safely and efficiently from the apparatus.

Positioning to Support Aerial Apparatus

In many cases, pumpers may arrive before the first aerial apparatus. Pumping apparatus driver/operators must seek a position of best advantage for their apparatus while keeping in mind the needs of aerial apparatus that have yet to arrive. Blocking access for aerial apparatus can seriously jeopardize the outcome of an incident.

Many jurisdictions' guidelines require that pumpers yield an optimum position close to a building for aerial apparatus. The aerial device, with its fixed length ladder or boom, is of no use positioned beyond its maximum reach. Most pumping apparatus carry a considerable length of various hose diameters. If an incident is beyond the reach of a preconnected handline, additional hose may be added to extend its reach.

In certain instances, the "inside/outside" method of apparatus placement may be used to position aerial and pumping apparatus at a fire scene **(Figures 4.6 a and b).** If a building is less than five floors tall, the attack pumper(s) is (are) positioned on the side of the street closest to the building and aerial apparatus are placed outboard of the pumper(s). The assumption is that the aerial device is long enough to reach over the pumper if necessary to reach the roof of a building of this height. In cases where the fire building is greater than five floors, the attack pumper(s) take(s) the outside position to allow the aerial apparatus maximum reach to the building. Additional considerations for driver/operators of both apparatus are the spread of the stabilizing system of the aerial apparatus and the placement of its complement of ground ladders. Apparatus with rear-loaded ladders must maintain enough clear space behind the vehicle to allow for removal of the longest ladder

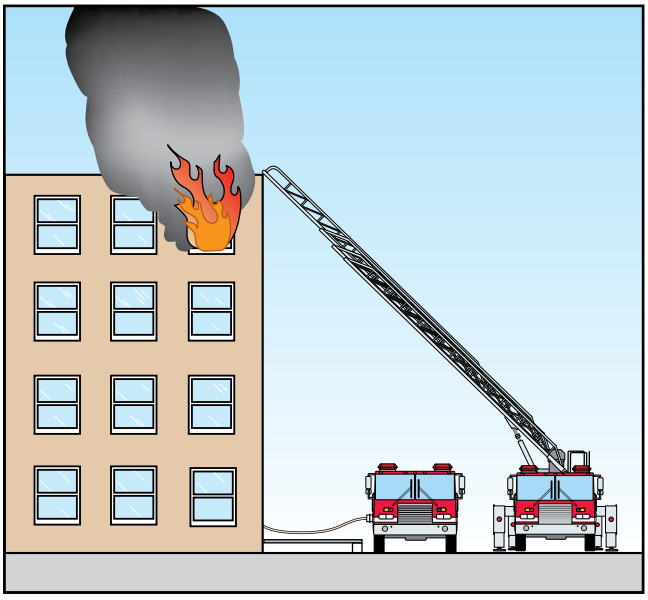


Figure 4.6a The aerial is positioned outside the pumper because the building is less than five stories tall.

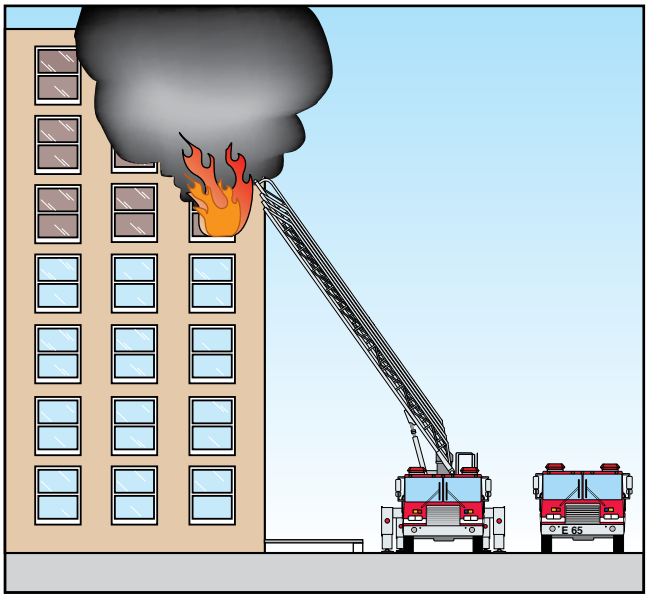


Figure 4.6b The aerial is positioned inside the pumper because the building is more than five stories tall.

Driver/operators should position pumpers providing water supply for elevated stream operations as closely to the aerial apparatus as practical. Friction loss due to distance and elevation are major considerations when supporting elevated streams. Position pumping apparatus equipped with elevated master stream devices in the same manner as aerial apparatus providing fire suppression.

Some cities may contain re-designed urban living or shopping districts that have been renovated to make pedestrian use more appealing. However, prior to construction, fire prevention planners should have reviewed these designs because they may hamper apparatus access.

Positioning to Support Fire Department Connections

In order to supply a fire department connection most efficiently, a pumper should position as closely as possible to the water source. This location is best determined through preincident planning. In some fire departments, the first-arriving pumper supports the **fire department connection (FDC)**; however, other jurisdictions may provide different guidelines.

In many locations, a fire hydrant is located in close proximity to the FDC. This allows the pumper to connect to the FDC and achieve water supply from the hydrant with relative ease. On some occasions, as when a static water supply is in use, the pumper may need to locate at the source. If the distance is great, a **relay** or water shuttle may be necessary to achieve support to the sprinkler or standpipe system.

Fire Department Connection (FDC) — Point at which the fire department can connect into a sprinkler or standpipe system to boost the water pressure and flow in the system. This connection consists of a clappered siamese with two or more 2½-inch (65 mm) intakes or one large-diameter (4-inch [100 mm] or larger) intake.

Relay — To shuttle water between a source and an emergency scene using mobile water supply apparatus.

CAUTION

Driver/operators should not cross-contaminate a nonpotable (nondrinkable) water source and a potable water supply.

Water Source Supply Pumpers

Not all pumpers are positioned at the incident scene to pump water into attack lines. In some cases, a pumper may need to position at a distant water source and pump water to the apparatus at the fire scene. The following sections discuss considerations for apparatus pumping from the location of static and pressurized water sources.

Drafting Operations

Drafting operations are required when a pumper must be supplied from a **static water supply** source such as a dry hydrant, storage tank, lake, or stream. Drafting pumpers may supply apparatus at the fireground directly or may serve as source pumpers for relay or water shuttle operations **(Figure 4.7, p. 142)**. These operations are common in rural areas, but they may occasionally be needed in urban areas as well. Relay and water shuttle operations are discussed in Chapters 12 and 13.

During preincident planning, fire departments should identify suitable drafting sites in their response district and record their location, approximate volume, and how to access them. This information will help driver/operators

Drafting —Process of acquiring water from a static source and transferring it into a pump that is above the source's level; atmospheric pressure on the water surface forces the water into the pump where a partial vacuum was created.

Static Water Supply — Supply of water at rest that does not provide a pressure head for fire suppression but may be employed as a suction source for fire pumps; for example, water in a reservoir, pond, or cistern.

Figure 4.7 A pumping apparatus set up for a drafting operation from a static water supply.

plan their water supply operation. Preference should be given to drafting locations that are accessible from a hard surface and require a minimum length of hard intake hose or lift. Limiting lift is of critical importance in achieving the best possible discharge capabilities. Some bridges and boat ramps make good drafting locations.

Driver/operators must be wary of drafting from locations that are off hard surfaces. These areas may become soft when wet and cause the apparatus to sink into the ground or become stuck when attempting to drive off. Surfaces near the banks of waterways may become unstable and collapse into the water injuring firefighters and creating a tipping hazard for apparatus. Conduct a risk/benefit analysis when considering any questionable location.

CAUTION

Any personnel working near the edge of bodies of water are required to wear a personal flotation device (PFD).

Dry Hydrant — Permanently installed pipe that has pumper suction connections installed at static water sources to speed drafting operations.

Upon identifying suitable drafting locations, many rural jurisdictions install **dry hydrants** at these sites **(Figure 4.8)**. A dry hydrant consists of an intake hose connection on the shore and a length of pipe extended into the water with a strainer on the end. This allows intake hose from the pumper to be quickly connected to the water supply source when a drafting operation is required. These hydrants should be flow tested by the AHJ in order to determine their capabilities. Chapter 10 of this text contains specific information about operating a pumper from draft.

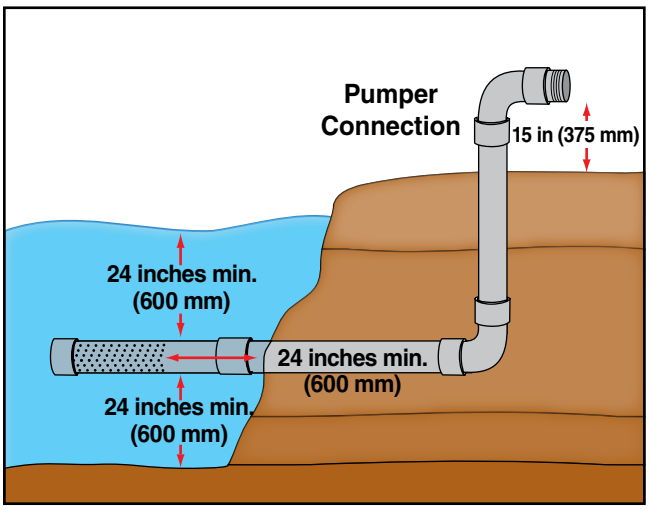


Figure 4.8 A dry hydrant installation.

Hydrant Operations

In many jurisdictions, the most common source of water is a fire hydrant. A pumper may be connected to a fire hydrant in a number of ways. The following sections detail information concerning each method.

Some departments have used hard intake hose to connect a pumper to a hydrant. However, driver/operators should be aware that hard intake hose is designed to withstand the vacuum associated with drafting operations. Some are not designed or intended to be used under positive pressure conditions. There have been instances of hard intake hose coupling failure or hose rupture when connected to hydrants with very high static pressure.

CAUTION

Only hard intake hose that has been designated to withstand positive pressure should be connected to a fire hydrant.

The procedures for many fire departments require that driver/operators place gate valves on the small diameter discharges of dry barrel hydrants before connecting to the large diameter discharge. Additional hoselines are then connected to the hydrant later without having to shut down the hydrant.

Large diameter intake hose connections. The preferred type of hose for hydrant connection is large diameter **intake hose**. This hose is common in 100 foot (30 m) lengths. Shorter sections of 10 to 50 feet (3 to 15 m) are also available for use when the pumper is in close proximity to a hydrant. In order to properly position the apparatus, the driver/operator must know the position of the intake hose on the side of his or her vehicle **(Figure 4.9)**. Through practice, the driver/operator will learn to judge the proper distance to place the apparatus from the hydrant. This distance must be judged from the hydrant rather than the curb line because hydrants are located different distances from the curb. **Skill Sheet 4-1** explains how to position the pumper to make large diameter intake hose connections.

Intake Hose — Hose used to connect a fire department pumper or a portable pump to a nearby water source; may be soft sleeve or hard suction hose.

Side intake connections. To avoid blocking the street with the apparatus, the driver/operator must stop close to the curb with the pump intake a few feet short of being in line with the hydrant **(Figure 4.10)**.

Figure 4.10 The pumper is close to the curb and in proper position to make a hydrant connection.

Figure 4.9 This driver/operator is using a short section of LDH to connect the pumper and hydrant.

Stopping short of the hydrant allows the intake hose to curve slightly, preventing kinks that can drastically restrict flow.

A good way to minimize the chance of the intake hose kinking is to put a counterclockwise twist in the hose when making the connection between the hydrant and pumper. These twists help prevent the formation of kinks and do not restrict water flow. Practice with the hose is required in order to become proficient and to determine the number of twists needed for a given length of hose. When opening hydrants, it is advantageous to stand behind the hydrant to prevent injury should a coupling disconnect or fail.

Front and rear intake connections. Use similar precautions and judgment when positioning pumpers with front and rear intakes. The driver/operator should stop the apparatus either a few feet short or a few feet beyond the hydrant to allow the intake hose to curve. Take care not to block access for later-arriving apparatus. The only way to achieve proficiency with these operations is to practice with your assigned vehicle.

Connection to 2½-inch (65 mm) hydrant outlets. When the maximum flow from a hydrant is not required or large diameter intake hose is not available, connection to a hydrant may be made using one or two of the hydrant's 2½ inch (65 mm) outlets **(Figure 4.11)**. This is accomplished by connecting one or more sections of 2½ or 3-inch hose (65 or 77 mm) from the hydrant to the pump intake. **Skill Sheet 4-2** describes how to connect the pumper and supply water with a minimum of delay.

Figure 4.11 An apparatus connected to a hydrant using two 2½ inch (65 mm) hoselines.

Multiple intake connections. Occasionally, a pumper will be required to use a large diameter intake (sometimes called a *steamer intake*) and smaller hoselines from an exceptionally well-pressurized (strong) hydrant. **Skill Sheet 4-3** provides the steps for making multiple intake connections.

Dual Pumping — Operation where a strong hydrant is used to supply two pumpers by connecting the pumpers intake-to-intake. The second pumper receives the excess water not being pumped by the first pumper, which is directly connected to the water supply source.

Tandem Pumping — Short relay operation in which the pumper taking water from the supply source pumps into the intake of the second pumper; the second pumper then boosts the pressure of the water even higher. This method is used when pressures higher than the capability of a single pump are required.

Dual Pumping Operations

With **dual pumping**, one strong hydrant is used to supply two pumpers. Generally, the pumpers are in close proximity to each other as both of them are being used as attack pumpers at the same incident. **Skill Sheet 4-4** outlines the steps for a dual pumping connection **(Figure 4.12).**

Tandem Pumping Operations

Tandem pumping operations are actually a form of relay pumping with the pumpers positioned close together rather than evenly spaced in the supply hose layout. Tandem pumping may be needed when pressures higher than a single engine is capable of supplying are required. A tandem pumping operation may be required when it is necessary to supply a high-rise sprinkler or standpipe

system. Tandem pumping operations may also be used in situations where the attack pumper is located a relatively short distance from the water source, but a great distance from the fire. A second pumper can connect directly to the hydrant to supply water to the attack pumper at pressures greater than the hydrant is capable of supplying. In tandem pumping operations apparatus may be located up to 300 feet (90 m) apart. The pumper directly connected to the water source pumps water through its discharge outlet(s) to the intake(s) of the second engine **(Figure 4.13).** This enables the second engine to discharge water at a much higher pressure than it could generate on its own. The higher

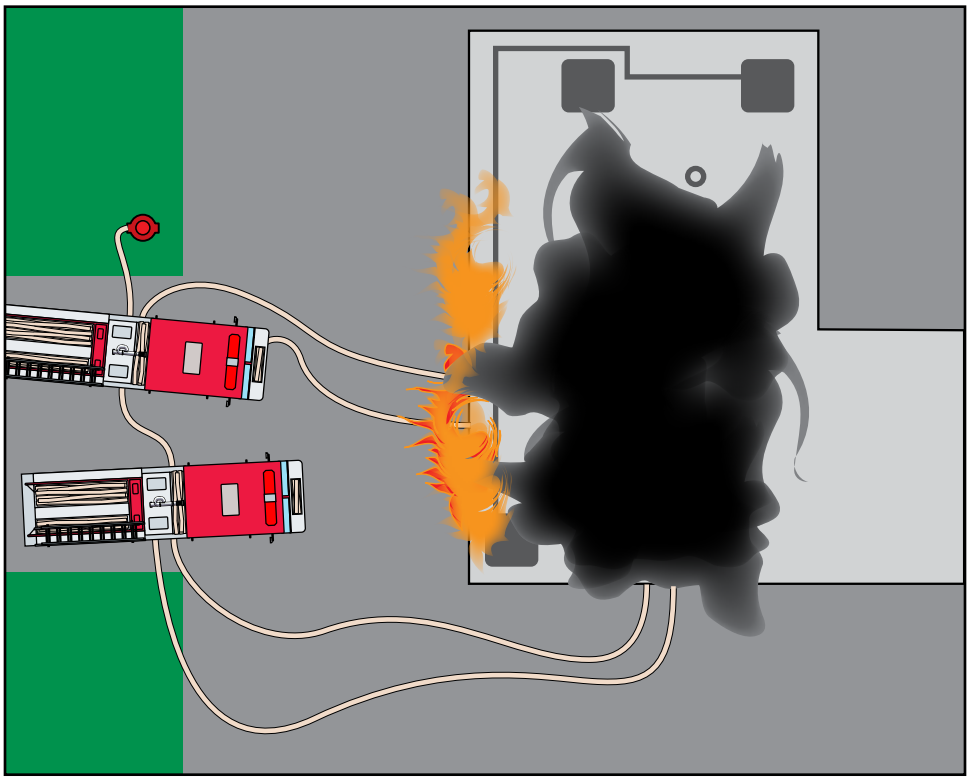


Figure 4.12 Dual pumping operations.

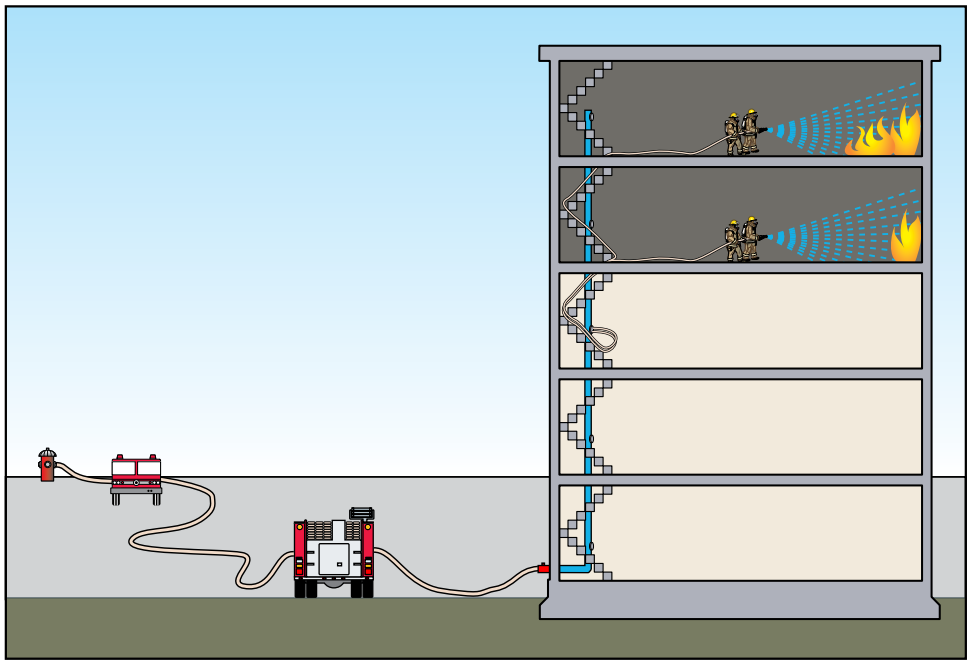


Figure 4.13 Tandem pumping operations.

pressure is a result of the two pumpers acting in series. Relay pumping is generally used to increase the volume of water available at a fire scene, while tandem pumping (another form of relay) is most often undertaken to increase water pressure. **Skill Sheet 4-5** explains how to position the pumper and make connections for a tandem pumping operation. Chapter 12 explains the specifics of relay pumping operations.

NOTE: A tandem pumping operation may be capable of pumping water at a greater pressure than fire hose and adapters can withstand. Pressure supplied to fire hose should not exceed that at which the hose is annually tested. NFPA® 1962, *Standard for the Inspection, Care, and Use of Fire Hose, Couplings, Nozzles, and the Service Testing of Fire Hose,* contains test pressures for various types of fire hose.

Positioning Wildland Fire Apparatus

Positioning apparatus for fighting wildland fires differs greatly from structural fire fighting considerations. Due to the dynamic nature of wildfires, apparatus are seldom positioned in the same location for the duration of an incident. Changing conditions may cause apparatus to reposition many times. Some wildland fire apparatus are capable of conducting mobile (pump and roll) attack operations **(Figure 4.14)**. Therefore, guidelines for positioning and operation must be more flexible than those for structural fire apparatus. Structural fire pumpers may serve in several ways to assist wildland firefighting operations. In addition to operating as water resupply sources for brush trucks, pumpers may provide direct fire attack and protection of structures. The following sections describe important considerations for some of these operations.

Structure Protection

Wildland/Urban Interface — Line, area, or zone where an undeveloped wildland area meets a human development area.

Second only to life safety is the protection of property (structures) during fire fighting operations. The boundary between wildland and structural development, often referred to as the ***wildland/urban interface***, is a challenging environment for fire fighting operations.

Many of the structures threatened by wildfires are on rural lanes, at the end of long narrow driveways and may be surrounded by dry vegetation **(Figure 4.15)**. These access points are made more hazardous to traverse

Figure 4.14 A wildland fire apparatus using pump and roll attack operations.

Figure 4.15 Structures in rural areas and surrounded by dry vegetation may be threatened by wildfires.

when obscured by smoke. Driver/operators should back the apparatus into position from the last known turnaround point and note the location of landmarks along the route.

Once the apparatus arrives at the structure it is assigned to protect, position it according to the following guidelines for safety and efficiency:

- Park the apparatus off the roadway (if conditions permit) to avoid blocking other apparatus or evacuating civilians.
- Clear away any nearby brush that may serve as fuel for a fire.
- Position the apparatus on the leeward side of the structure to minimize exposure to heat and blowing embers.
- Place the apparatus at a nearby but safe distance from the structure in order to keep hoselines short.
- Keep doors and windows closed to keep out burning material.
- Place the vehicles air conditioning on recirculation mode to avoid drawing in smoke from the outside.
- Do not position apparatus in close proximity to power lines, large trees, LPG tanks or other pressure vessels, and exposed structures

Wildland Fire Attack

Apparatus used in wildland fire attacks generally operate from several different positions during the course of an operation. The driver/operator must constantly be aware of the location and direction of spread to keep the apparatus and personnel out of a dangerous position. Any fire attack should begin with the apparatus positioned in an **anchor point** — a natural or man-made barrier that will prevent the fire from encircling the vehicle and crew. Typical anchors are roads, lakes, ponds, or previously burned areas.

Anchor Point — Point from which a fire line is begun; usually a natural or man-made barrier that prevents fire spread and the possibility of the crew being "flanked" while constructing the fire line. Examples include lakes, ponds, streams, roads, earlier burns, rockslides, and cliffs.

Brush, vegetation, and smoke may limit the driver/operators ability to see during wildland operations. When driving the vehicle under conditions of reduced visibility, speed must be reduced appropriately. A spotter may be needed to walk ahead of the apparatus to help avoid obstacles such as logs, stumps, rocks, ditches, and low hanging branches. Spotters must be equipped with hand lights, wear high visibility clothing, and remain within the driver/operator's field of view at all times **(Figure 4.16)**.

When the apparatus is operated in a stationary position, it should be placed in an area that affords maximum protection from heat and flames. Natural or man-made anchor points may be used. Consideration should be given to falling trees, incoming air drops, as well as access points for other

Figure 4.16 When vision is limited, a spotter may be used to alert the driver/operator of upcoming obstacles.

equipment in the area. A short attack line should be deployed and charged for protection of the apparatus. The vehicle should be positioned facing the direction of an exit path, with its front wheels straight and always parked with its wheels chocked and the emergency brake engaged.

Fording — Ability of an apparatus to traverse a body of standing water. Apparatus specifications should list the specific water depths through which trucks must be able to drive.

Apparatus driven on steep hillsides or on loose or unstable ground surfaces may slide or overturn, leaving it stuck and vulnerable to being overrun by fire. Vehicles should not be driven over bridges unless the weight of the apparatus is known to be within the capacity of the structure **(Figure 4.17)**. Driver/operators should not attempt to **ford** streams with a vehicle unless it has been specifically designed to operate in such conditions.

Driving apparatus along the shoulders of railroad beds may be a dangerous tactic as the coarse rock that makes up most railroad beds may cause tire damage or sliding and rollovers. In addition, this is a vulnerable and dangerous position unless it can be confirmed from the railroad operator that train traffic has been halted.

Mop-Up — (1) Overhaul of a fire or hazardous material scene. (2) In wildland fire fighting, the act of making a fire safe after it is controlled by extinguishing or removing burning material along or near the control line, felling dead trees (snags), and trenching logs to prevent rolling.

For apparatus capable of mounting mobile fire attack, during these operations hoselines should be kept short in order to facilitate movement. A portion of the onboard water tank should be kept for the protection of the vehicle and its crew. When progressing along the edge of the fire, a crew should be sure to completely extinguish the fire. This may be accomplished with multiple apparatus working in tandem. Additional personnel and apparatus may be used to **mop up** after the initial fire attack and patrol the fire line to ensure that extinguishment is complete. Experience using pumping apparatus in the wildland environment has resulted in the following apparatus operation safety guidelines:

- Position apparatus in a safe area and do not leave apparatus unattended.
- Communicate with the entire fireground organization for safe and efficient operations.
- Keep headlights on whenever the engine is running.
- Back apparatus into a position facing an escape route.

Figure 4.17 The driver/operator must know the weight of the apparatus before driving over a bridge.

- Close all windows and doors to prevent burning embers from entering the cab.
- Establish an anchor point before beginning fire attack.
- Draw apparatus and crews to the flanks of the fire rather than attempting a frontal attack if the fire is spreading rapidly upslope.
- Position apparatus to maximize protection from heat and fire, taking into consideration overhead power lines, heavy fuel load areas, and incoming air drops.
- Keep a charged line ready for apparatus protection.
- Do not drive apparatus into unburned fuels higher than the vehicle's underside clearance.
- Position apparatus using previously burned areas whenever possible **(Figure 4.18)**. Attacks made from the unburned side must allow sufficient distances to accommodate loss of water supply or mechanical failure.
- Consider the location of operating crews when moving apparatus. Do not drive into smoke near the location of other crews. Whenever driving through smoke, proceed very slowly, sounding the horn or siren intermittently.

NOTE: IFSTA's **Wildland Fire Fighting for Structural Firefighters** manual offers additional information about operating fire apparatus at wildland fires.

Special Positioning Situations

There are many other incidents and scenarios where the positioning of pumping apparatus is crucial. Considerations for safe and efficient placement for staging, highway operations, hazardous materials incidents, control zones, operations near railroads, and emergency medical incidents are explained in the following sections.

Figure 4.18 Wildland apparatus operating from previously burned areas.

Staging

Locally developed apparatus staging policies govern the general placement of apparatus at an incident scene. These policies allow for orderly placement of vehicles and enable the IC to maximize the potential of each piece of apparatus.

Many fire departments use two different **staging** protocols. Level I Staging is applied to the initial response of more than one fire department unit. Level II Staging is enacted when a large number of units are responding to an incident. This level is initiated by the IC or Operations Section Officer when requesting additional resources.

Staging — Standardized process or procedure by which available resources responding to a fire or other emergency incident are held in reserve at a location away from the incident while awaiting assignment.

Level I

Level I Staging is often used on any multiunit response of two or more units. If the first arriving unit has no immediate orders for later-arriving apparatus, the officer may call for Level I Staging to be implemented while the incident is investigated. Upon transmittal of this order, other units stop (stage) approximately one block away from the scene in their direction of travel and await further instructions. Engine companies in this scenario typically stage near a hydrant or water source. While staged, driver/operators should not allow their position to be blocked.

Level I Staging — Used on all multiple-company emergency responses. The first-arriving vehicles of each type proceed directly to the scene, and the others stand by a block or two from the scene and await orders. Units usually stage at the last intersection on their route of travel before reaching the reported incident location.

Level II

Level II Staging is implemented when numerous units are responding to operate at the same incident, particularly those that require mutual aid or result in the transmittal of multiple alarms. One or more apparatus staging areas may be designated by the Operations Section Officer from which the IC can draw additional resources. Units responding to the incident are advised of the staging area location when dispatched and they respond directly to that location. A parking lot or other large open area such as a field may be designated for use as a staging area so long as it can be secured and is free of civilian traffic. The company officer of the first unit to arrive in staging may become the initial Staging Area Manger. As an incident develops, this officer may be replaced by a Chief Officer. The **Staging Area Manager** advises the Planning Section or IC as to the status of resource availability. Upon arrival at Staging, the Company Officer of the incoming unit should report to the Staging Area Manager. Apparatus in staging should shut off its emergency warning lights but maintain readiness to deploy rapidly when requested.

Level II Staging — Used on large-scale incidents where a larger number of fire and emergency services companies are responding; these companies are sent to a specified remote location to await assignment.

Staging Area Manager — Company officer of the first-arriving company at the staging who takes command of the area and is responsible for communicating available resources and resource needs to the operations section chief.

Base

Base may be established as an area from which large numbers of personnel and quantities of equipment may be deployed. This area serves as the primary point outside the incident area to which responding units report and receive initial orders for action.

Base — Location at which the primary Incident Management Logistics functions are coordinated and administered; the Incident Command Post may be co-located with the Base. There is only one Base per incident.

Highway Operations

Firefighters face dangerous situations when operating on highways or other busy roadways. There are numerous challenges relative to apparatus placement in order to provide safety to responders and operational effectiveness. The most common incidents on roadways are traffic accidents and/or vehicle fires. Some of these incidents may involve multiple injuries or hazardous materials.

Problems associated with response are commonplace on limited access highways where there are long distances between interchanges. In some cases, apparatus must travel a considerable distance in the opposite direction of the incident before a turnaround or interchange is available that allows a reversal of direction. Apparatus should not travel opposing the normal flow of traffic on highways or ramps unless the police have closed the road to traffic. In some cases, aerial devices or ground ladders may be needed for operations on incidents involving bridges.

Water supply issues are also common during operations on limited access urban highways and rural roadways. Long hose lays or water shuttle operations may be required when hydrants are not available or are spread at wide intervals. Some jurisdictions have established a policy that calls for an additional pumper to respond to the nearest over/underpass during a highway incident. This unit will assist the pumper on the highway by establishing water supply with an off-highway source. It may also be necessary to stretch hoselines via ground ladder or aerial device to supply water to the level of the highway. Some highway systems are equipped with dry standpipe risers. These risers require one pumper that is off the highway to establish water supply and pump the standpipe inlet. The pumper on the highway can use the standpipe discharge to receive a steady flow of water for fire fighting.

Driver/operators must use their judgment when responding on a highway or turnpike. Many fire apparatus are incapable of traveling as fast as the normal flow of traffic on these roads. The use of warning devices under these conditions may only cause confusion for civilians drivers and serve to slow the actual response of the apparatus. Use sirens only to clear slow moving traffic. *The U.S. Department of Transportation Manual of Uniform Traffic Control Devices (MUTCD*) advises that emergency vehicle warning lights should be used as necessary to reach the incident, but once on scene their use should be reduced as much as possible. Warn drivers in advance of the incident by the use of warning signs and traffic control devices. The MUTCD further states that consideration should be given to reducing the amount of forward facing lights displayed (including headlights) to reduce interference with oncoming drivers. Driver/operators must be knowledgeable concerning their jurisdictions' policies regarding the display of emergency lights while responding to and positioned at incident scenes.

Cooperation between fire departments and law enforcement agencies is critical during operations on any roadway. To protect personnel and victims, a safe zone must be established around a roadway incident. There are numerous ways to re-direct and control traffic around an incident scene. Fire apparatus are often placed to act as a shield between oncoming traffic and firefighters working in the roadway **(Figure 4.19, p. 152)**. There are other traffic control devices that may be used in conjunction with apparatus or police vehicles; including traffic cones and signs. Driver/operators should be aware of local policies regarding positioning of apparatus and traffic control measures for incidents along roadways. All firefighters must exercise extreme caution when exiting the apparatus. Firefighters of the first-arriving apparatus may be in a dangerous position with traffic continuing to flow as they step off the vehicle. Similarly, the driver/operator must exercise care when stepping beyond the protection offered by the tailboard of a properly placed apparatus. Some juris-

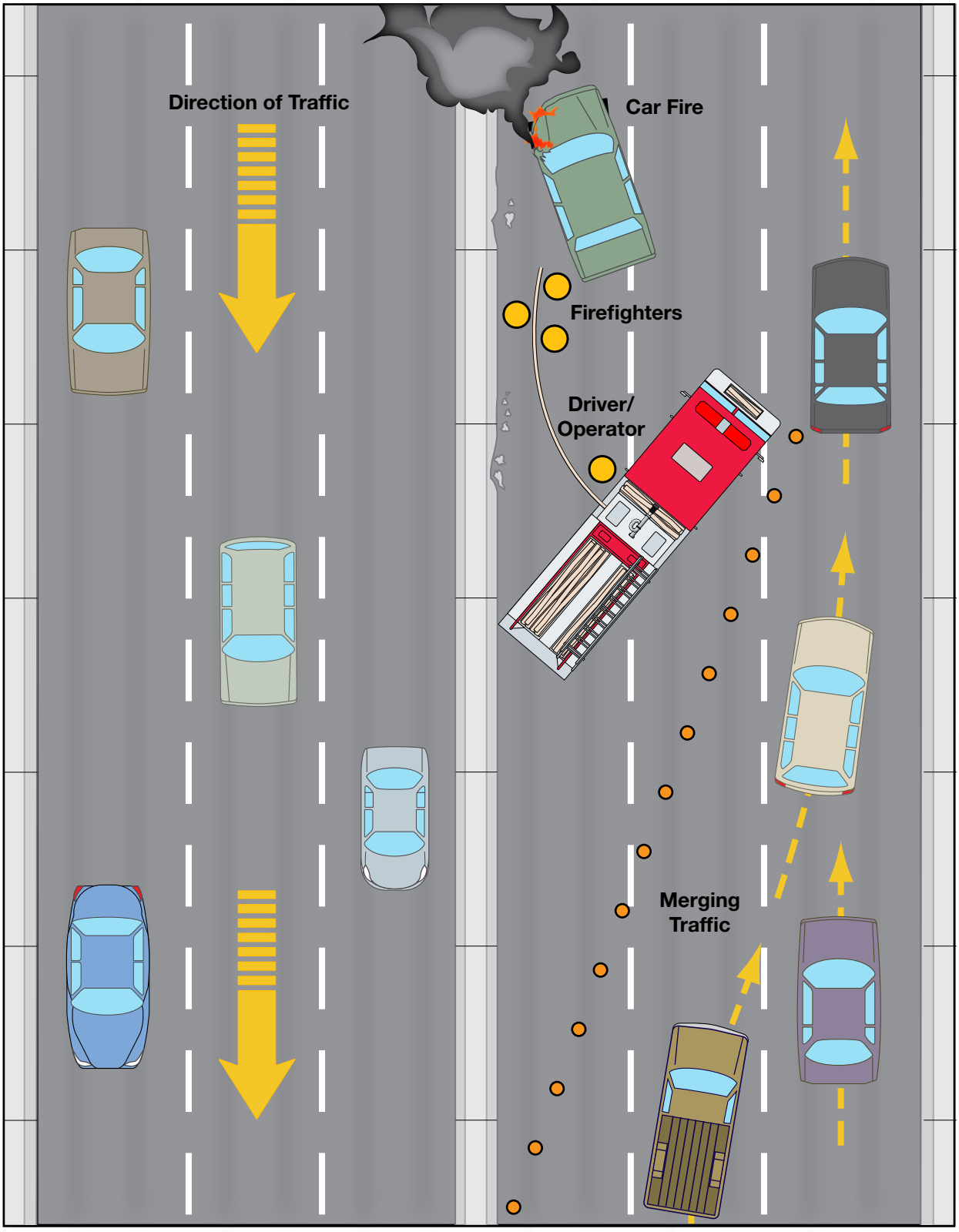


Figure 4.19 The placement of the apparatus shields the firefighters from oncoming traffic.

dictions specify the use of top mounted pump panels for units that respond to numerous highway incidents. Apparatus equipped with side mounted pump panels should position facing the incident scene, if at all possible, so that the driver/operator at the pump panel controls has a view of the incident scene.

Hazardous Materials Incidents

Hazardous materials responses are becoming ever more common in the fire service. Incidents involving the potential release of hazardous materials may occur at a fixed facility or during transport. The possibility for haz mat involvement should be considered during every response to a transportation incident. IFSTA's **Hazardous Materials for First Responders** manual discusses the subject of response to these incidents in detail. However, the following guidelines are basic principles the driver/operator must consider when responding to any potential hazardous materials incident.

- Obtain information regarding wind speed and direction from the dispatcher or by direct observation.
- Approach from upwind and uphill.
- Do not drive the apparatus directly to the scene until the material involved can be identified.
- Position apparatus and personnel well short of the scene until the nature of the hazard can be determined.

Hazard-Control Zones — System of barriers surrounding designated areas at emergency scenes, intended to limit the number of persons exposed to a hazard and to facilitate its mitigation. A major incident has three zones:Restricted (Hot) Zone, Limited Access (Warm) Zone, and Support (Cold) Zone.

Control Zones

Once on scene, a series of **hazard-control zones** may be established to organize the incident. These zones assist in regulating the movement of response personnel for safety reasons and prevent unauthorized entry. Control zones may be expanded or contracted with the changing dynamics of an incident. The most common terminology divides the zones into hot, warm, and cold with corresponding levels of hazard **(Figure 4.20)**.

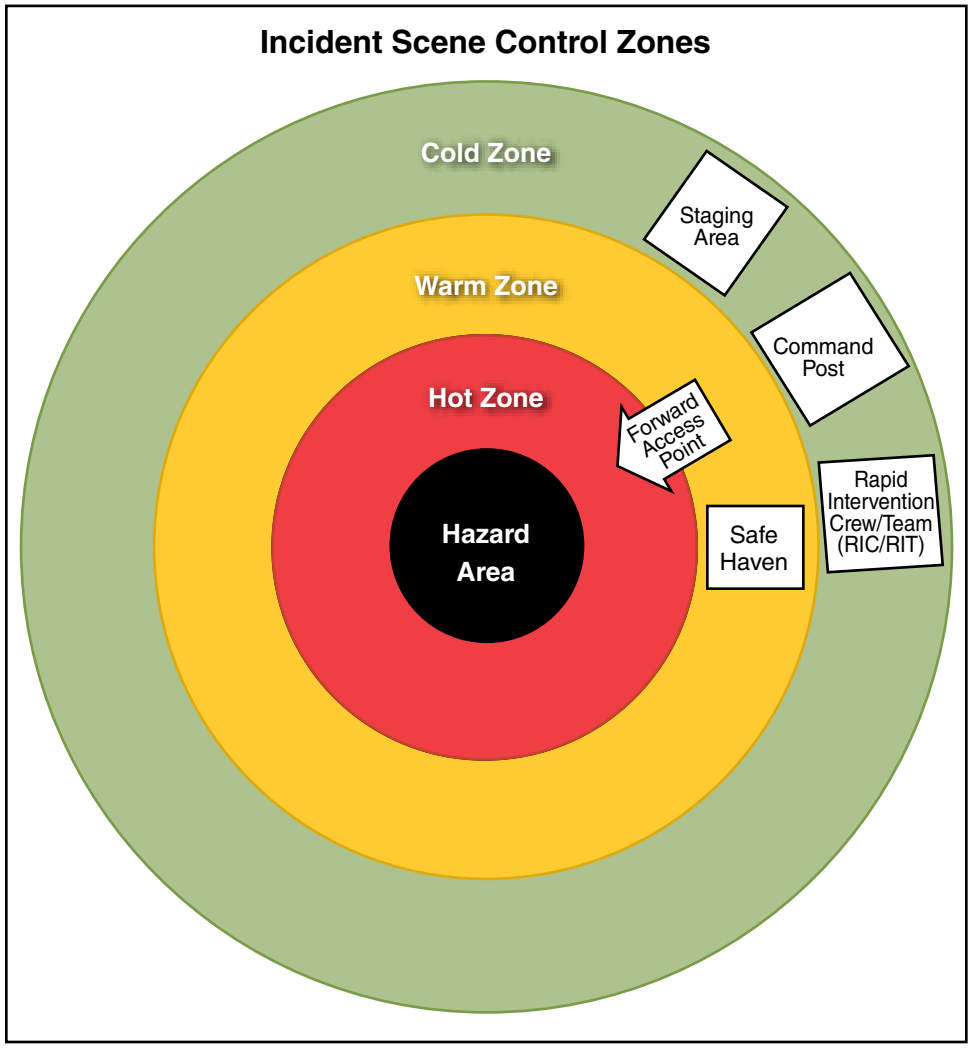


Figure 4.20 Control zones help organize an incident scene.

Hot Zone — Potentially hazardous area immediately surrounding the incident site; requires appropriate protective clothing and equipment and other safety precautions for entry. Typically limited to technician-level personnel.

Warm Zone — Area between the hot and cold zones that usually contains the decontamination corridor; typically requires a lesser degree of personal protective equipment than the hot zone.

Cold Zone — Safe area outside of the warm zone where equipment and personnel are not expected to become contaminated and special protective clothing is not required; the Incident Command Post and other support functions are typically located in this zone.

Hot Zone

The **hot zone** (also called *restricted*, *exclusion,* or *red zone*) is the area closest to the release of material. This area is exposed to gases, vapors, dust, or runoff of the hazardous substance. The perimeter of the hot zone must extend far enough to prevent people from suffering from the effects of the release.

Warm Zone

The **warm zone** (also called the *limited access zone* or *yellow zone*) is the area abutting the hot zone and extending to the border of the cold zone. It may be considered safe for personnel to enter briefly without special protective clothing, unless assigned a task requiring special protection. The warm zone is used to provide support for operations in the hot zone and to decontaminate personnel and equipment exiting the hot zone. The decontamination process usually takes place within the decon corridor located in the warm zone.

Cold Zone

The **cold zone** (also called the *support* or *green zone*) surrounds the warm zone and is the area where all incident support functions are conducted. Personnel in the cold zone are not required to wear special PPE because this area is considered safe. The Command Post, Staging Area, and Triage/ Treatment area are located in the cold zone. It is likely that driver/operators will stage their apparatus in the cold zone.

Operating Near Railroads

When incidents occur on or near railroad tracks, driver/operators must understand the specific hazards posed by rail operations and take steps to minimize the danger for personnel and apparatus. Fire department personnel must consider all railroad tracks "live." Because it is not always possible to stop the flow of trains on a track during emergency operations and it may require one to two miles (1.5 to 3 km) for a fully loaded train to make a complete stop, fire apparatus should never position on railroad tracks. Use the following guidelines when operating near a railroad:

- Take care not to position the apparatus close enough to a track where a passing train may contact the vehicle.
- Cross railroad tracks only at designated crossing points in order to avoid the possibility of becoming stuck on the tracks due to the ground clearance of the apparatus and the height of the track bed.
- Park on the same side of the track as the incident in order to avoid stretching hoselines across the track and to keep firefighters from making repeated crossings of the track.
- Notify the rail company to confirm that rail traffic has been halted along the section in question if stretching a hoseline across a track is absolutely necessary. If this is not possible, the hose may be run underneath the rails or an aerial apparatus may be used to provide access for a hoseline over the top of a track location.
- Use consideration for railroads that operate using high voltage overhead wires.

CAUTION

Apparatus should maintain a clear zone of at least 30 feet (9 m) from railroad tracks to prevent contact with objects on the railroad cars.

Emergency Medical Incidents

The majority of incidents to which many fire departments respond are emergency medical calls. The driver/operator and the fire apparatus itself can have a major impact on the safety of these incidents by choosing the best position for personnel safety as well as tactical deployment. An important consideration when positioning the fire apparatus is to leave the ambulance enough room for patient loading and protection of the firefighters who may be working on a street or highway.

The policy of some jurisdictions require that fire apparatus and EMS vehicles park off the street or highway whenever possible, shutting off all emergency warning lights. Where practical, this practice virtually eliminates hazards from oncoming traffic. When attempting to position the apparatus in a driveway, lot, or yard, make sure that the surface is stable enough to support the weight of the vehicle.

When an incident requires the driver/operator to position the apparatus in a street or highway, use the vehicle as a shield between the work area and oncoming traffic. Place larger apparatus (pumpers) between the flow of traffic and smaller vehicles (ambulances). Use traffic cones or other traffic control devices when possible to warn drivers of the incident before they drive upon it. The proximity of the exhaust discharge from parked apparatus should be considered relative to the location of patients being extricated or treated nearby.

Chapter Summary

Whether responding to an incident along a limited-access highway, city street, rural road, or urban/wildland interface, apparatus must be positioned for maximum safety and efficiency. In order to accomplish this goal, the driver/operator must understand the role of the apparatus in the overall IAP. This understanding will be based on preincident planning, knowledge of department policies, and communication from the IC.

The driver/operator must also position the apparatus in such a way as to support the safety of firefighters and civilians. This is accomplished by placing the vehicle in different locations based on the type of incident, terrain, and potential exposures.

Review Questions

1. What size-up factors affect positioning of the apparatus at an incident? (pp. 136-141)
2. What situations may require tandem pumping operations? (pp. 144-145)
3. What safety guidelines should be followed when positioning pumping apparatus in wildland fire attack? (pp. 148-149)
4. What is the difference between Level I Staging and Level II Staging? (p. 150)
5. What basic principles should be considered when responding to any potential hazardous materials incident? (pp. 153-154)

NOTE: This skill sheet provides general steps for positioning a pumper to make large diameter intake hose connections. Always follow the SOPs of the jurisdiction.

Side Intake

Step 1: Position apparatus a few feet (meters) short of hydrant. Chock wheels.

Step 2: Connect LDH to hydrant and lay hose to street, folding approx 3 feet (1 m) back onto itself (place two full counterclockwise twists in the hose if sexless couplings are not used).

Step 3: Connect LDH to intake.

Step 4: Charge LDH and bleed air if required.

Step 5: Place apparatus into pump gear.

Front or Rear Intake

Step 1: Position apparatus a few feet (meters) short of hydrant (for front intake) or a few feet (meters) beyond the hydrant (for rear intake).

Step 2: Connect LDH to hydrant (place two full counterclockwise twists in the hose if sexless couplings are not used). Connect 2 ½ inch (65 mm) gate valves to unused outlets on a dry barrel hydrant, in case more water is needed.

Step 3: Connect LDH to intake.

Step 4: Charge LDH.

Step 5: Place apparatus into pump gear.

Step 1: Position apparatus as close to the hydrant as possible. Chock wheels.

Step 2: Lay out needed amount of 2½- or 3-inch (65 or 77 mm) hose, as required.

Step 3: Attach 2½-inch (65 mm) gate valves to hydrant.

Step 4: Connect 2½- or 3-inch (65 or 77 mm) hoselines to the gate valves.

Step 5: Connect 2½- or 3-inch (65 or 77 mm) hoselines to the apparatus intake.

Step 6: Charge supply lines, bleeding air as necessary.

NOTE: This skill sheet provides general steps for positioning a pumper and making multiple intake connections. Always follow the SOPs of the jurisdiction.

Step 1: Properly position apparatus in relation to fire hydrant. Chock wheels.

Step 2: Connect LDH and a 2½-inch (65 mm) gate valve to the hydrant. Lay hose to street, folding approx 3 feet (1 m) back onto itself (place two full counterclockwise twists in the hose if sexless couplings are not used).

Step 3: Connect LDH to intake.

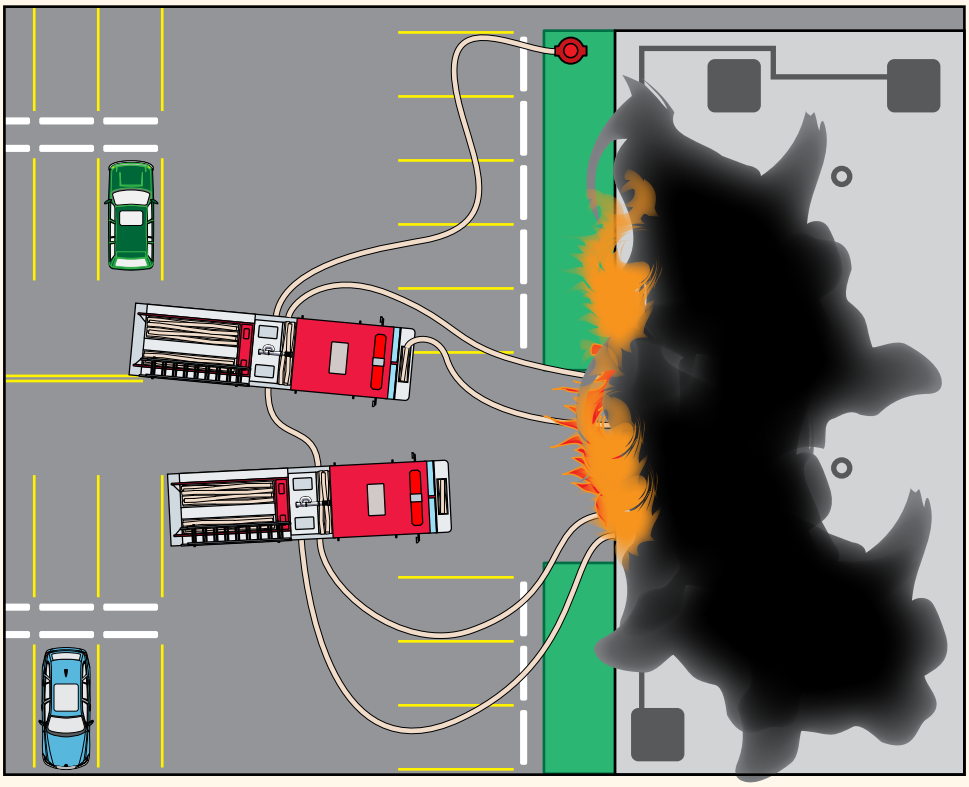
Step 4: Charge LDH and bleed air.

Step 5: Connect additional 2½- or 3-inch (65 or 77 mm) lines to gate valve and apparatus.

Step 6: Charge additional hoselines.

Step 7: Place apparatus into pump gear.

NOTE: This skill sheet provides general steps for positioning the pumper and making connections for a dual pumping operation. Always follow the SOPs of the jurisdiction.



Step 1: First-Arriving Pumper: Make a large diameter hookup to the hydrant.

Step 2: First-Arriving Pumper. Begin supplying flow as required.

a. Minimize residual pressure to 0-5 psi (0-35 kPa) by equalizing the flow pressure with the intake pressure. This allows the unused apparatus steamer cap to be removed.

b. If the unused steamer has been replaced with some type of valve, the residual does not have to be reduced.

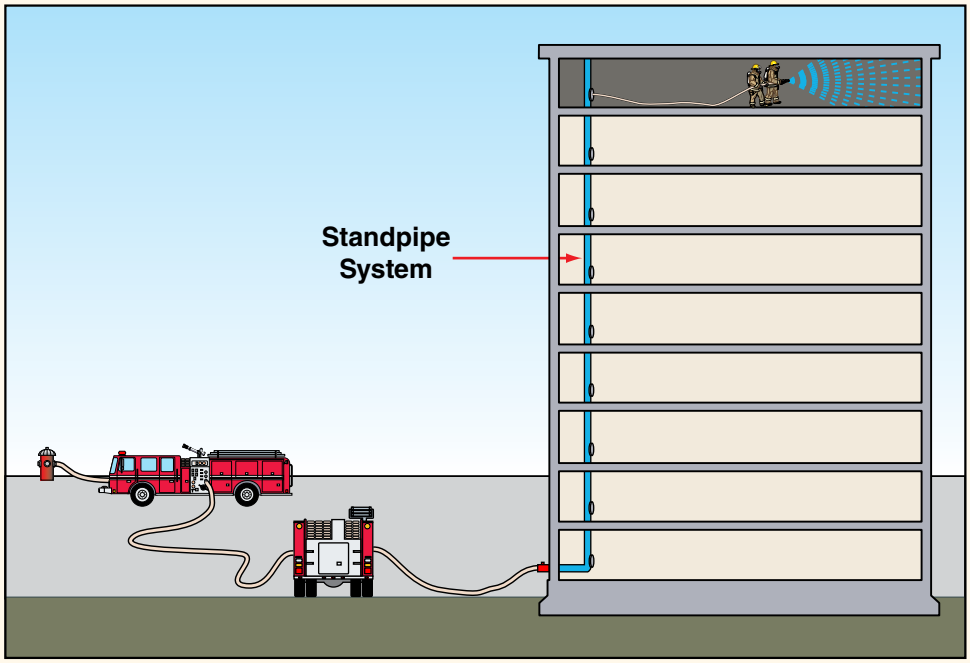
Step 3: Second-Arriving Pumper: Take a position and make an LDH connection from the open intake on the operating pumper to the open intake on the second pumper.

Step 4: Second-Arriving Pumper: Begin supplying flow as required.

Step 5: Both pumpers will have to adjust throttles to maintain required flows.

Step 6: If the residual pressure coming in to the second pumper falls off too sharply (approaches or drops below 20 psi [140 kPa]), a second supply line should be connected from the hydrant's 2½-inch (65 mm) outlet to a gated LDH or pony suction connection on the second engine.

NOTE: The instructor will provide students with information on positioning the pumper. The instructor may choose to provide details of an incident scenario.



Attack Pumper

Step 1: Position at the scene according to the needs of the incident.

Step 2: Supply attack lines, elevated master streams, or FDC. Complete hookups per local SOPs.

Step 3: After the supply pumper has reverse laid toward the hydrant, connect the supply hose to the appropriate intake.

Step 4: Switch from onboard to external water supply when supply hoses are charged.

Supply Pumper

Step 5: Reverse lay supply hose from the attack pumper to the hydrant.

Step 6: Put the pump in gear and prepare to flow water.

Step 7: Establish a water supply.

Step 8: Connect supply hose to the appropriate pump discharge.

Step 9: Discharge water through the supply hose to the attack pumper.

Step 10: Coordinate pressure with the attack pumper driver/operator.