Aerial Apparatus Positioning

Midship Aerial Tower

Tractor Drawn Tiller Truck

Rear-mount Ladder Truck

Rear-mount Aerial Tower

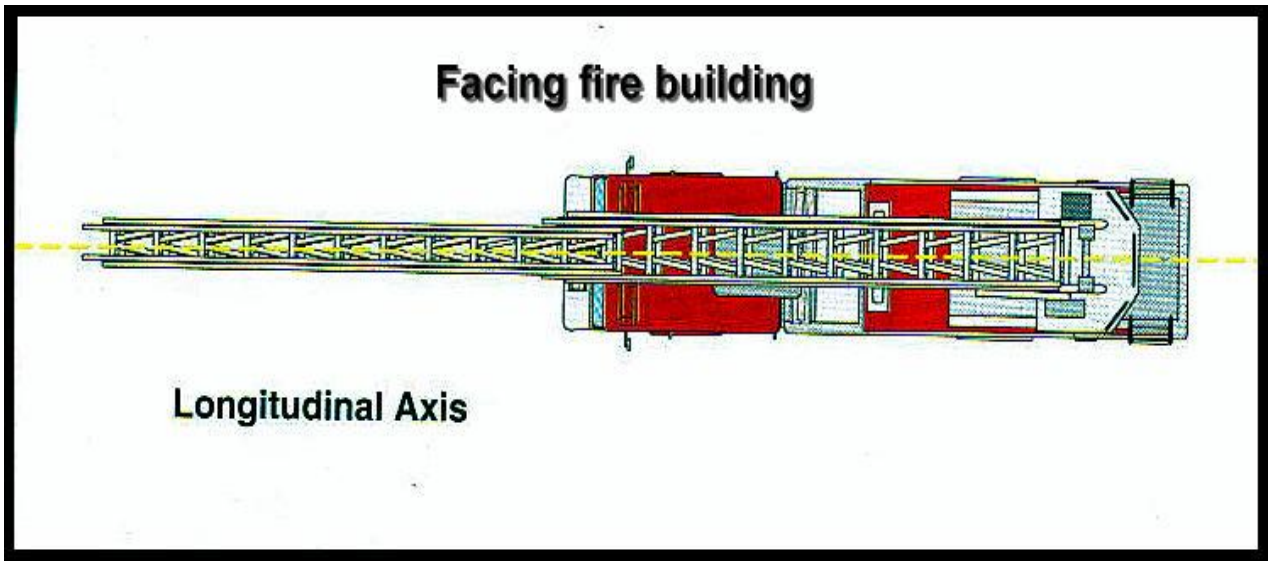
Considerations for positioning Rearmount & Midship Tower Ladders & Ladder Trucks

- Rescue is the 1st priority on the fireground. You must determine what your unit will be used for based on the dispatch information and the conditions observed upon arrival.
- An aerial unit must be positioned very close to a structure if the aerial device is to be deployed.
- Since the aerial device has a fixed length, it is imperative to get within reach of the target. That means, taking a few moments to get around obstacles or getting them moved will go a long way.
- Most electrical cord reels on trucks are between 200-300 feet. So the unit must be positioned within this range or portable generators will have to be used.

Pulling into a structure vs. backing-in or paralleling

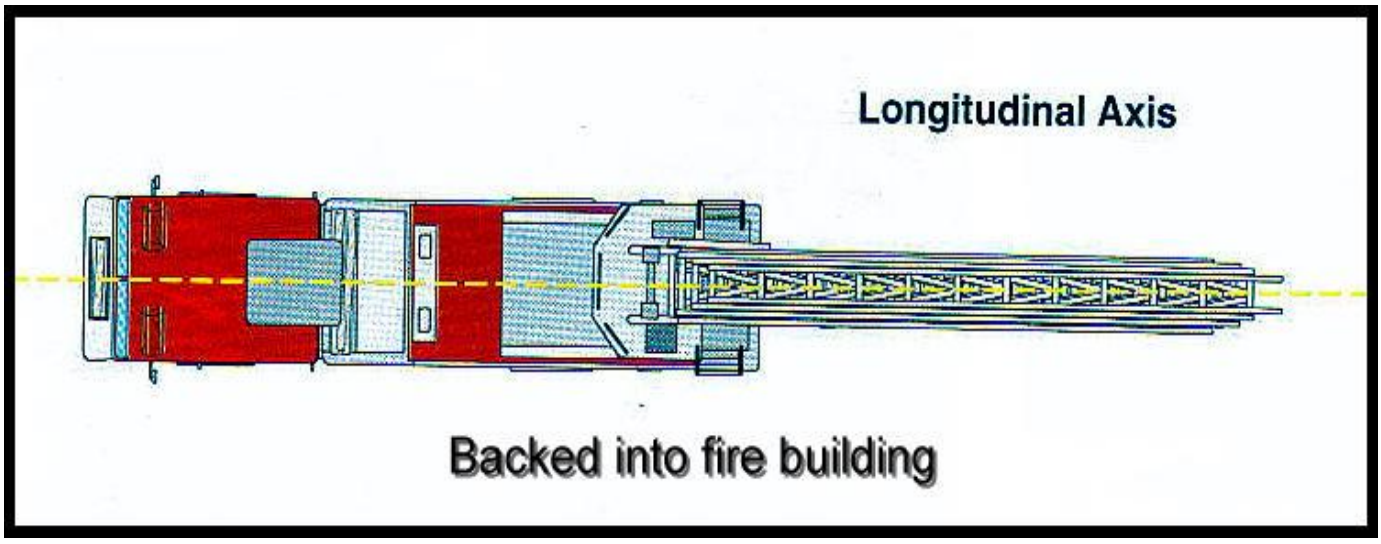
Drivers must know the pros and cons of pulling into, backing, or paralleling a structure.

Pulling/Nosing- Is when the front of the unit faces the structure as it is parked or positioned. At this position, the aerial will be in use over the cab and unit. Aerial reach may be lost due to the aerial device extending over the vehicle before it reaches a target. This is the most stable aerial position.

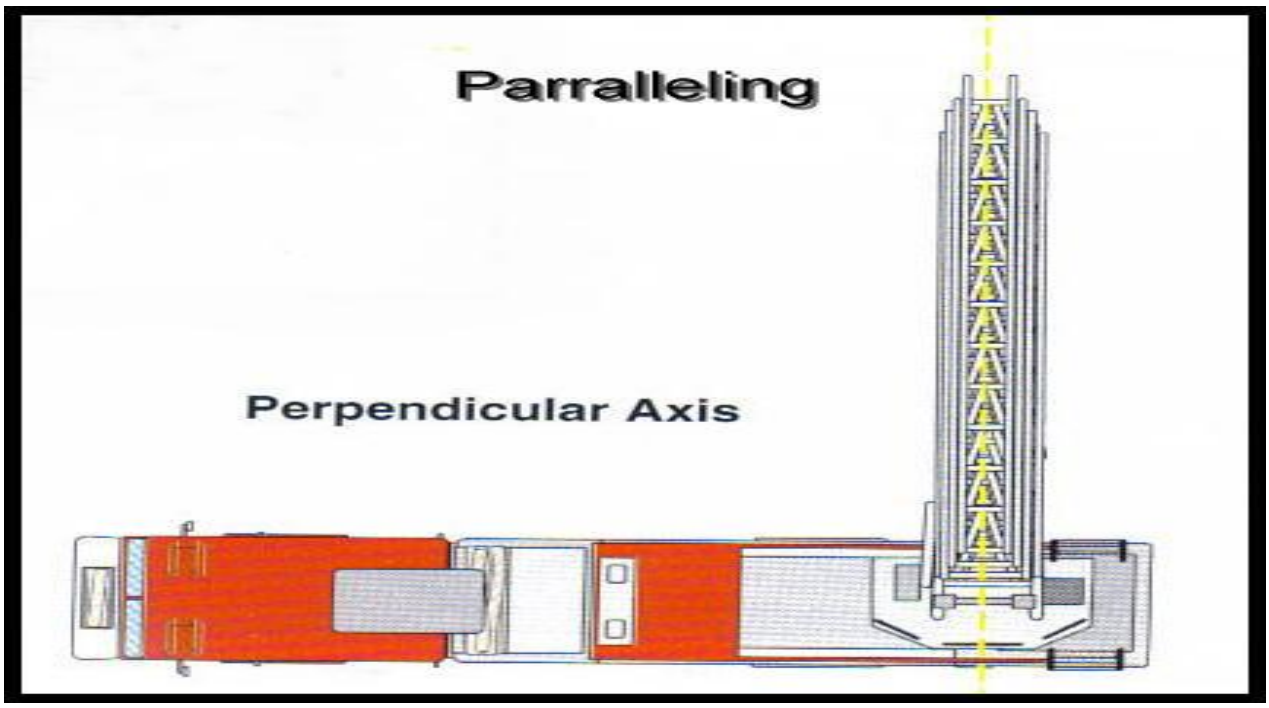


Backing- Is when the rear of the vehicle is closest to the building. On rear

mount aerials, the turntable is closer to the structure than the cab and provides for maximum aerial reach and very good stability.



Paralleling- Is when the side of a vehicle is parallel to a side of a building. This is the most common of positioning choices. Midship towers must position in this fashion if master streams are to be used at grade (ground level) or below grade.



- Rear mount trucks and towers should be backed into buildings when the height of the building is more than 3 stories, or the choice of positioning is keeps the turntable more than 35 feet away.

- Operating the aerial device off the side of the vehicle is a good option when pulling in or backing in are not valid options.
- Positioning the aerial device parallel with a building still affords the operator the opportunity to get the turn table close enough to the building for the maximum reach.
- Operators of midship towers should position these units parallel to buildings 3 stories or less in case the master stream device is needed at or slightly above street level.

"Scrub Area"

A Scrub area is an area of a building or object in which the tip of the aerial ladder or platform will reach.

- Drivers and unit officers must maximize the Scrub Area whenever the aerial device is being considered.
- A Scrub Area for a tower ladder or platform should be considered from the ground floor on up.
- A Scrub area for ladder trucks should be considered from the second or third floor on up.

Using an aerial ladder or platform for Rescue

In situations that require using aerial apparatus for rescue, the main objective is to reach as many victims as possible with the minimum number of aerial movements. Remove victims in the following order of priority:

Rescue priority considerations

- Most severely threatened by current fire conditions
- Largest number or groups of people
- Remainder of people in the fire area
- People in exposed areas

Rescue Priorities

- Rescues should be attempted (if possible) on the upwind side (windward) of a window or door to maximize visibility in heavy smoke conditions and to minimize possible heat exposure.
- If the possibility of rescue lies in buildings with windows on multiple sides, corner positioning may be the best position.

Raising the Aerial Device to a Victim

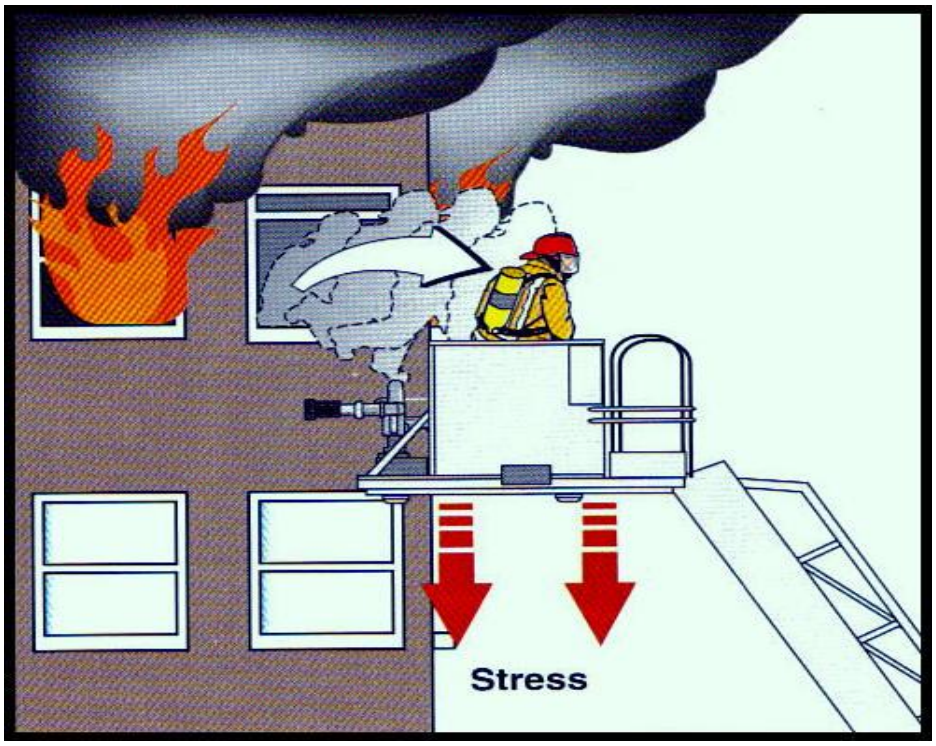
When the aerial device is deployed out of the cradle of the apparatus, it must be used in the following order or sequence while being moved to a target:

- Raise (out of cradle)
- Rotate
- Extend
- Lower (into object or target)

It is very important <u>not</u> to extend the aerial ladder or platform up to a victim

requiring rescue from below. This action may cause the victim to jump onto the aerial device.

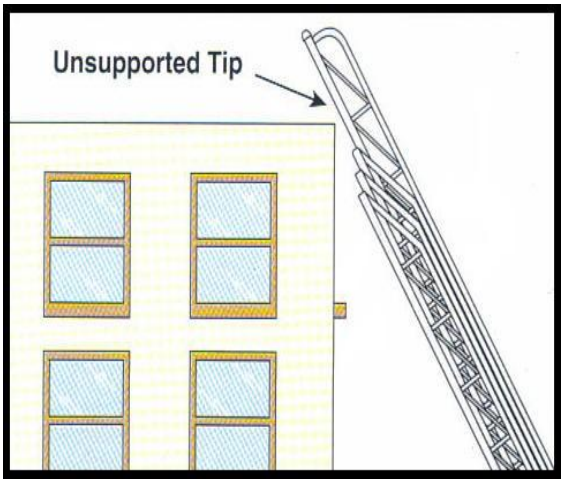
Fire fighters or victims jumping down onto a platform or aerial ladder could cause tremendous stress resulting in damage and/or failure!

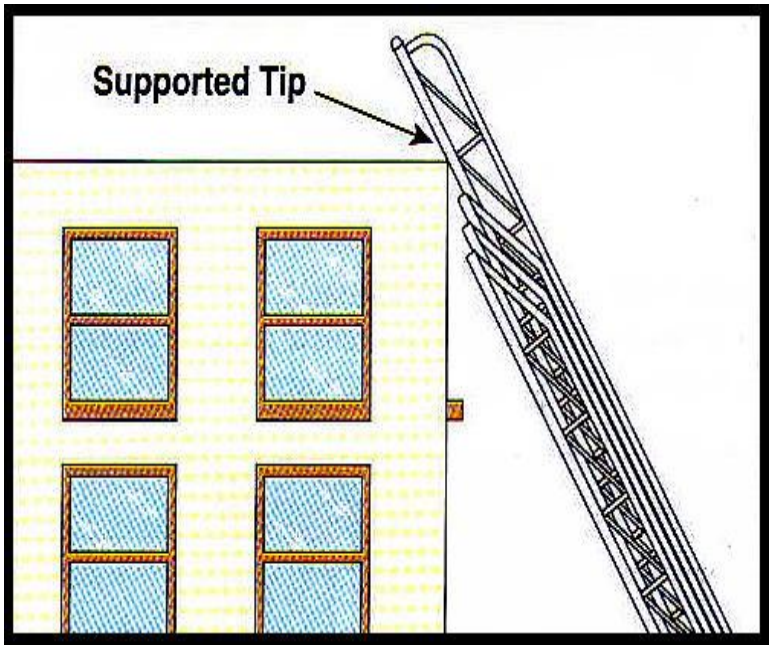


In all situations, the best position is one in which the aerial device is perpendicular to an object or target (window sill, door opening, roof line, balcony, etc.). This is when both beams are spaced evenly above the target line. Placing only one beam in contact with a target could cause the ladder to twist when load is applied, damaging it!

If an aerial ladder or platform is designed to be used in the unsupported position, place the tip 4 to 6 inches above the target. This allows the ladder or platform to contact the building as people climb or descend without placing unusual stress on the device.

Supported and unsupported aerial ladder tip positioned on a roof top





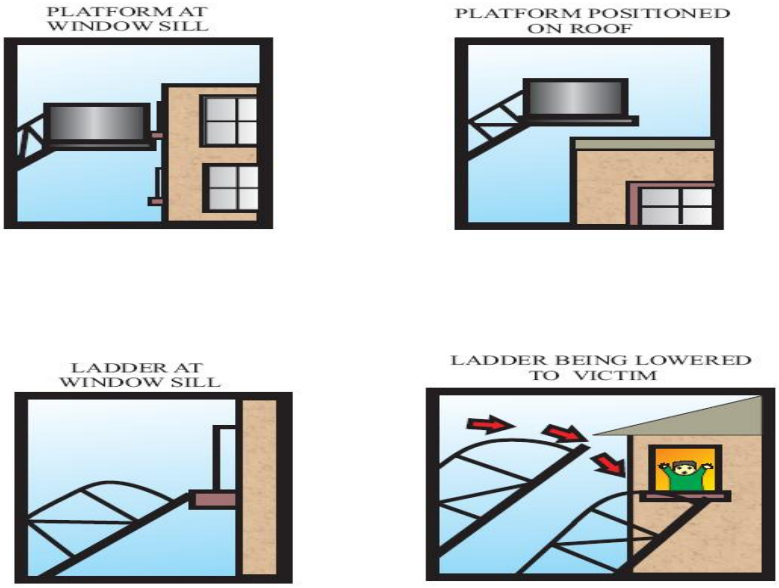
Remember, a ladder placed at a window for rescue should be positioned at or below the sill. If an opening is large enough or there is enough room for a victim or firefighter to climb over or around the ladder rails, the ladder could be placed inside a window or over a railing system.

It is also important to remember, if an aerial ladder is equipped with manual ladder locks not to get the ladder wedged under a sill when trying to extend the ladder while disengaging the ladder locks. The ladder must be extended first before the locks can be disengaged.

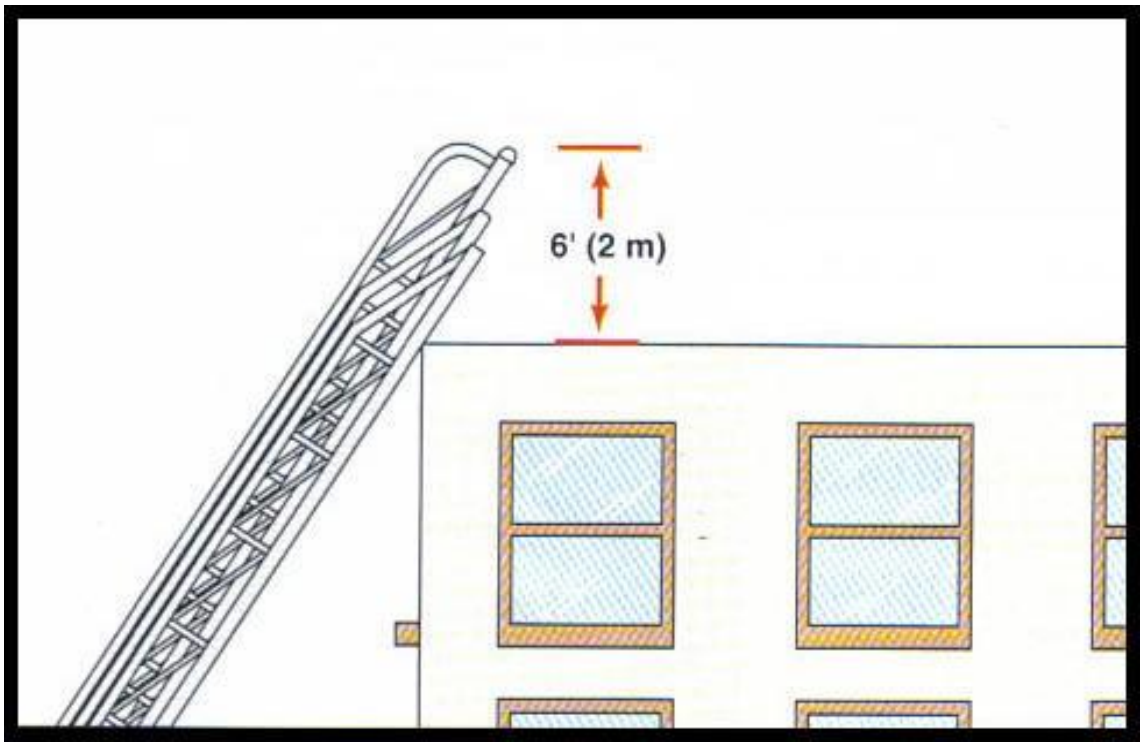
When positioning an aerial ladder on a roof for rescue, the tip of the ladder should be extended 6 feet above the roof line, if possible.

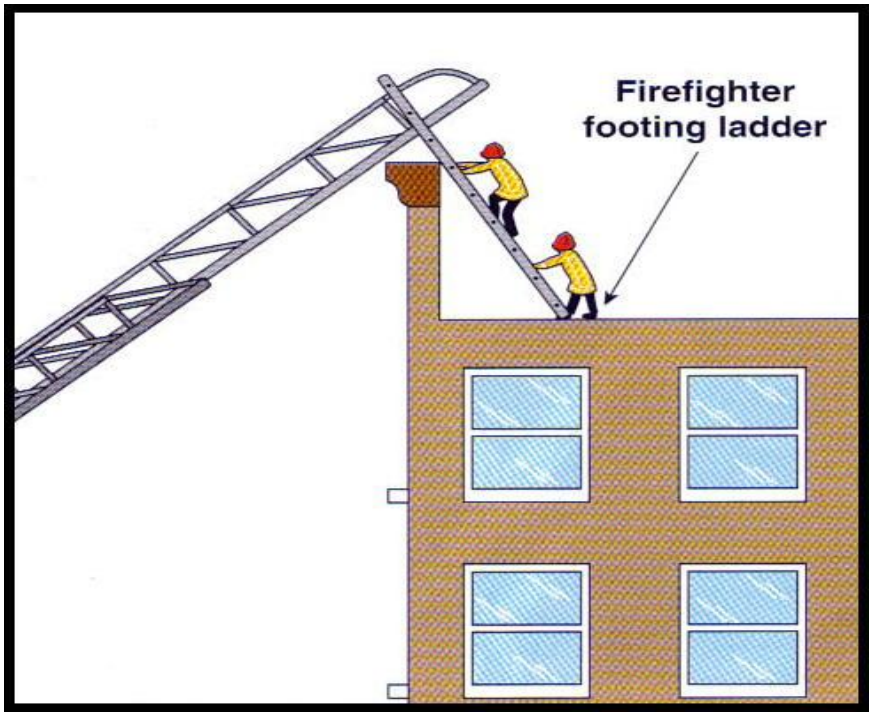
When positioning a platform or bucket on a roofline for rescue, the floor of it should be placed over the roof line overlapping it, or even with the roofline.

Platform and ladder positioning at windows or roof:



Extend the ladder tip 6 feet above the roof edge. This provides a handhold for firefighters and victims.





Placing the top railing of a platform at a window sill, door, or balcony railing is also an option when affecting a rescue. This allows the victim to be lowered into the platform. Use caution while performing this technique, shock loading the aerial device could result if the victim jumps down into the platform or is lowered to quickly.

Positioning for use on upper floors

Aerial apparatus should take preference over other apparatus on building fires. Engine driver/operators have been taught to leave room for the trucks and towers mainly by pulling past or just short of fire buildings. This option may not always be available to incoming or first arriving engine companies. Because of sidewalks, parked cars, tight parking areas, and other roadside obstacles, other positioning alternatives must be considered.

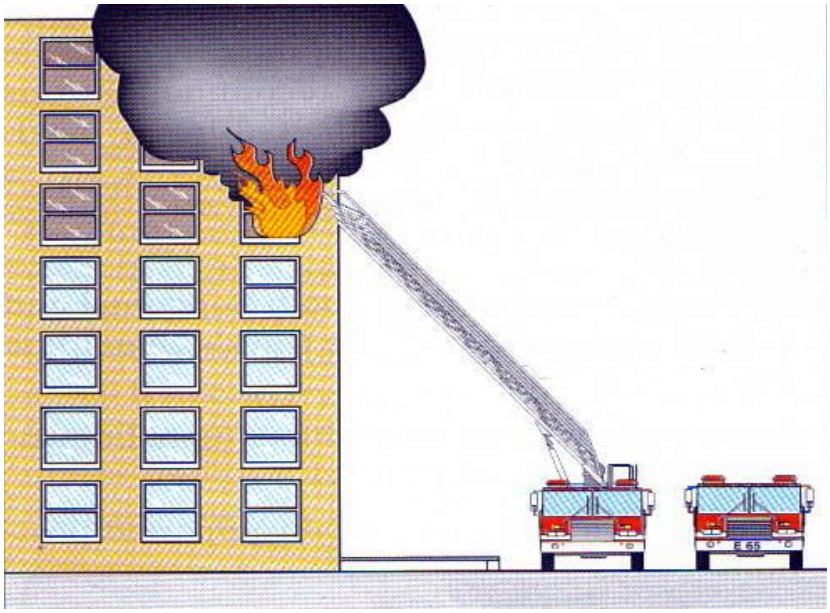
Tactical considerations affecting aerial apparatus positioning.

The following are considerations only and not department policy.

- If the fire is located on upper floors of a building that is less than five stories, the aerial apparatus may be positioned outside of the engine company.
- If the building is greater than five stories, the aerial apparatus should be positioned inside the engine company.

*If fire is located on the lower levels of this building, this tactic is not recommended for Aerial Towers. The engine company might prevent the tower from sweeping low while the master stream is in use.

If the building is greater than five stories, the aerial apparatus should be positioned inside the engine company.



Operating near overhead obstructions and electrical wires

Aerial driver/operators must always be aware of overhead power lines and obstructions.

If possible, avoid spotting the apparatus in positions that require a lot of maneuvering around obstructions. This cannot always be avoided, so use extreme caution.

- The goal is always to maintain a distance of at least 10 feet between the aerial device and overhead electrical lines.
- Caution must be exercised around other types of overhead lines such as telephone and cable TV lines.
- Other obstructions such as trees, poles, vehicles, overhangs, and other building parts should also be avoided.

Maintain a ten feet distance between the aerial device and electrical lines:

Caution must be exercised when operating around other types of overhead obstructions such as telephone and cable lines:

Warning!

If it becomes necessary to exit an apparatus in contact with electrical lines, personnel need to jump clear of the energized apparatus to reduce the risk of being electrocuted. At no time should they be in contact with the truck and the ground at the same time.

If it becomes necessary to exit a potentially energized aerial device, the firefighters should jump clear of the apparatus.

Warning!

Before you decide to jump clear of an energized apparatus, make sure that you will not be jumping into standing water or high moisture areas which may be in contact with the downed power lines or apparatus and could be energized!

Off-road positioning "Lawning"

Positioning aerial apparatus off-road is necessary at times but extreme caution must be exercised if it has to be considered. Positioning off road does not necessarily mean that the apparatus will have to be positioned on a soft surface but in many cases it does.

If aerial apparatus needs to be positioned off-road or on a soft surface, the following should be considered:

- The manufacturer's recommendations (does the manufacturer endorse setting up on these surfaces?)
- The type of surface; glass lawns (rain saturated or hard due to freezing), hot pavement (thin, basketball or tennis courts, or parking areas, etc.), muddy fields
- Is the surface hard enough to support the weight of the apparatus?
- Has there been any precipitation lately?
- Is the grade or topography too steep to stabilize the apparatus according to the manufacturer's recommendations?

Warning!

If the aerial unit has to be "Lawned" or stabilized on a soft surface, it should remain supported on its stabilizers until it is ready to be relocated back onto a hard surface. This action will prevent (in most cases) the unit from sinking into the ground up to the axles causing it to get stuck!

Wind and weather considerations

Windy conditions can have adverse affects on aerial apparatus. You must be aware of the manufacturer's recommendations regarding when to use an aerial device in these conditions. Many manufacturers recommend not using the aerial when the wind speed exceeds 35 mph. You must know what the limitations are of your apparatus!

Operating in icy conditions can also have adverse affects on the apparatus and operators. Stabilizing aerial apparatus on compacted snow or even ice can be very dangerous, as the snow or ice can melt away after stabilization has been completed causing the apparatus to settle and potentially become unstable. This is not always avoidable but must be continually monitored by the operator and crew.

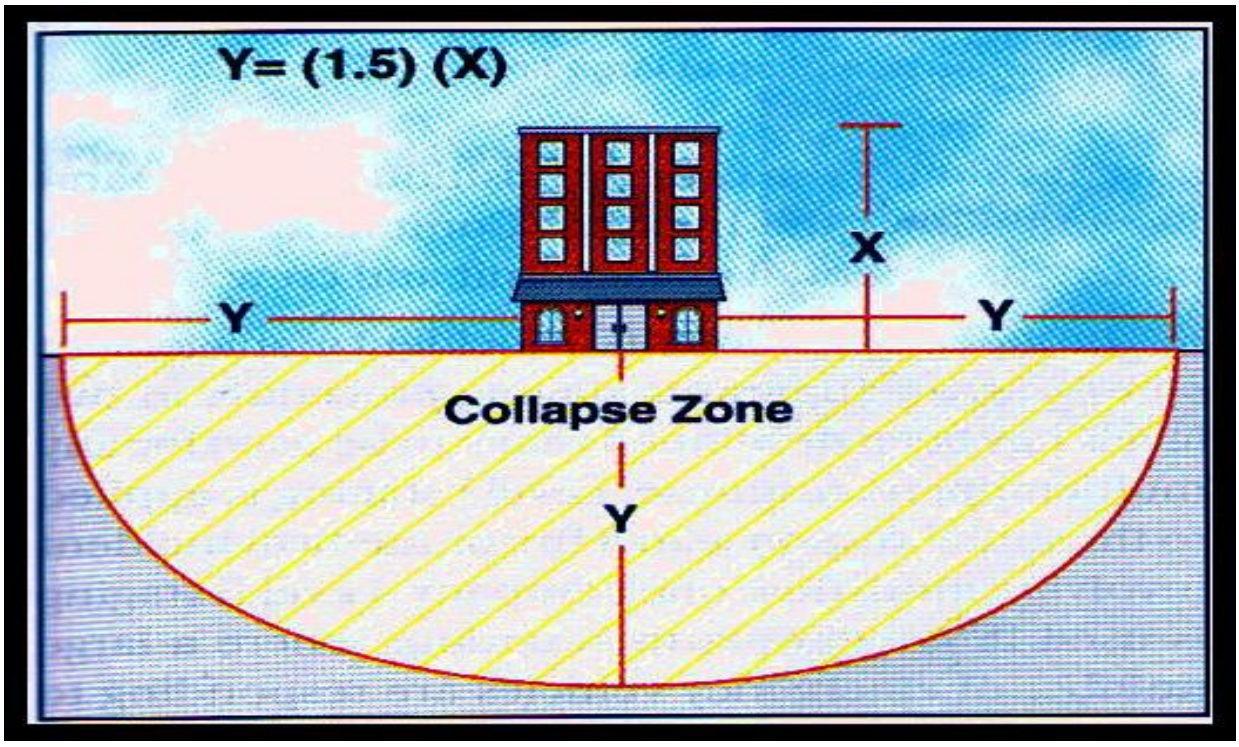
- Ice accumulations on an aerial device can add weight to it reducing the rated capacity. So be aware!
- Refer to the user's manual regarding deicing procedures for your apparatus.
- Most often keeping the aerial ladder greased according to the manufacturer's specs is the best remedy.

Collapse Zone

Collapse Zone

The condition of the fire building, as well as other building-related concerns, must be considered when positioning the apparatus. Buildings that have been subjected to extensive fire damage or buildings in poor condition before the incidence of fire may be subject to sudden collapse.

Apparatus should be parked far enough away from these types of fire buildings so they will not be in the collapse zone should a collapse occur! The collapse zone should be at least equal to one and one-half times the height of the building.



Operating near Railroad Tracks

****NEVER OPERATE APPARATUS ON TRACKS****

- TRY TO PARK APPARATUS ON THE SAME SIDE OF THE TRACKS AS THE INCIDENT
- KEEP APPARATUS AT LEAST 25 FEET AWAY FROM TRACKS
- KEEP AERIAL DEVICES AT LEAST 25 FEET ABOVE THE LEVEL OF THE RAILS

Aerial Positioning

Aerial positioning is dependent on many factors such as access, type of structure, primary objectives, hazards, obstructions and most importantly the reach of the aerial ladder. The effective reach of an aerial ladder or tower will depend on the configuration of the apparatus i.e., is the vehicle a rear mount, mid-ship or tractor drawn aerial or tower.

Regardless of the type of aerial apparatus you are operating, the key consideration when using an aerial ladder or tower is the position of the turn table in relation to objectives. To further illustrate this point we must understand how the turntable position affects the usable reach of an aerial device. The greater the distance the turntable is away from the target area, the less height and reach will be available.

The Pythagorean Theorem

"To understand the importance of reach and height of a ladder, consider a right triangle. The length of the hypotenuse (longest side of a triangle) equals the square root of the sum of the other two sides. When an aerial ladder is elevated, the ladder is the hypotenuse of a triangle of which the ground and the vertical wall of the building at the point to be reached represent the other two sides. Thus, the distance a given length of ladder will reach depends upon the other two sides of the triangle". (Fire Officers Guide to Operating Aerial Apparatus, 1974)

The square of the length of the hypotenuse of a right triangle equals the sum of the squares of the lengths of the other two sides. $A^2 + B^2 = C^2$

In this illustration, "A" equals the height of the building (use 12 feet per floor for commercial and multi-family structures), "B' equals the distance from the building to the turntable and "C" is the required distance to reach the building.

Example 1:

A^2 (36x36) + B^2 (50x50) = C^2
1296 + 2500 =3796
(Calculate the square root of C^2)
The square root of 3796 is 62.
In this example the required reach is 62 feet.

Example 2:

A^2 (75x75) + B^2 (25x25) = C^2
5625 + 625 = 6250
(Calculate the square root of C^2)
The square root of 6250 is 79.
In this example the required reach is 79feet.

The significance of this is for the aerial operator to recognize the importance of turntable positioning in relation to the targeted objectives.