The three major objectives of fire ground operations are Rescue, Fire Control, and Property Conservation. In order to obtain these objectives, firefighters must perform a variety of tasks using a variety of tools. Ladders, when used correctly, are a valuable and necessary fire ground tool.

This ladder section has been developed to provide personnel with a step-by-step procedure for learning standardized ladder operations.

To obtain terminology, types of ladders, and general ladder data, refer to the most recent edition of IFSTA “Fire Service Ground Ladder Practices”. IFSTA text is referenced for many of the sections in this training manual.

It is the responsibility of all personnel to know the capabilities of all Department ladders, and maintain a high level of training and efficiency when using Department ladders.

**Parts of Ladders**

Firefighters should become familiar with generally accepted terms used in this section. To help firefighters identify and use these terms, the following explanations are offered to help make ladder terms more easily understood.

**Anchor** - part used to attach halyard to the ladder.

**Base Section** (Bed Section) - the lower section of an extension ladder, also called the main ladder.

**Beam** - The principal structural member of a ladder in which rungs are inserted.

**Butt (Heel)** - The bottom of a ground ladder.

**Butting** - The operation of butting a fire department ladder when it is to be raised so that the bottom of the ladder will not move or slide from position.

**Butt-firefighter** - One who holds the ladder in position at the bottom or the one giving orders.

**Center Section** - The middle section of an extension ladder with three sections.

**Dogs** - See Pawls.

**Extension Ladder** - A ladder built in two or more sections.

**Fly** - The top section of an extension ladder.

**Footing Ladder** - The operation of holding the bottom of a ladder so that it will not move during climbing.

**Ground Ladder** - A ladder raised on the ground as opposed to being raised from an apparatus.

**Guides** - Slots, channels, or strips on an extension ladder which guide the fly section.
while being raised.

**Halyard** - A rope or cable used for hoisting fly sections.

**Hooks** - A pair of curved devices which fold outward from each beam at the top of a roof ladder. Usually used to hook over the peak of a roof.

**Locks** - See Pawls.

**Pawls** - Spring loaded hooks used to secure fly sections in extended position.

**Pulley** - A grooved wheel through which the halyard is drawn.

**Rails** - The two lengthwise members of a trussed ladder beam which are separated by truss blocks.

**Roof Ladder** - A single section ladder with hooks attached to the top of each beam.

**Shoes** - Rubber plates attached to the heel of a ground ladder, usually mounted on a swivel.

**Spurs** - Metal points at the end of tormentor poles.

**Stops** - Metal pieces which prevent the fly section from being extended too far.

**Tie Rod** - Metal rods running from one beam to the other. Usually through the top and bottom rung of each section.

**Toggles** - Devices which attach tormentor poles to a ladder.

**Top (Tip)** - The top of a ladder.

**Tormentor Poles** - The poles which are attached to long extension ladders to assist in raising and steadying the ladder.

**Truss Blocks** - Separation pieces between the rails of a trussed ladder. Sometimes used to support rungs.

**Types of Ladders**

**Straight Ladder** - A ladder built in one section.

**Extension Ladder** - A ladder built in two or more sections.

**Roof Ladder** - A straight ladder with hooks attached at the top.

**Collapsible or Attic Ladder** - A ten-foot ladder with the rungs pivoted in such a manner that the beams will fold together and when folded will occupy very little space.

**Main Ladder** - The lowest section of an extension ladder.

**Center Ladder** - The center section of an extension ladder. **Fly Ladder** - The upper section of an extension ladder.

**Articulating - Aerial Platform** - Consists of two or more booms or sections with a platform
attached to the top boom. The platform provides a stable base to carry out fire and rescue operations.

**Aerial Ladder** - A ladder, usually made up of several sections, which is permanently attached to an apparatus.

**Combination Ladder** - A ladder that built in multiple sections that has the ability to be changed into different positions (i.e. Straight, A-Frame, Bridge).

**Ladder Construction and Markings**

The two major components of ladders are the beams and rungs. Beams may be of the solid beam or truss beam design. Both types must meet the same specifications (NFPA 1931).

The rungs shall be 14 inches on center and be of a ribbed non-skid surface.

The butt end of the ladder shall be of a design to reduce ladder slippage. This may be done with spurs or shoes.

The top end of each beam shall be rounded to allow the ladder to slide on irregular surfaces without catching or snagging during placement.

The hooks on roof ladders are made of plow steel. They are capable of 180-degree rotation.

Extension ladders over sixteen feet and designed for exterior use shall be equipped with a halyard and pulley. Escondido halyards are made of 1/2-inch rope.

**Lock pawls** shall be of a positive mechanical type and engage on the rungs as near the rails as possible.

Metal ladders are usually built with a heat treated aluminum alloy. The advantages of aluminum are: Strength, light weight, and ease of inspection. The main disadvantage is the electrical conductivity of aluminum.

**NFPA 1901** requires an engine company to carry:

- 14-foot roof ladder with folding hooks
- 24-foot extension ladder
- 10-foot attic ladder

**NFPA 1901** requires a ladder truck to carry:

- One folding (Collapsible)
- Two straight ladders (with folding roof hooks)
- Two extension ladders

**Ladders will be marked with the following:**

- A red stripe to denote the balance point.
- Length will be marked on the beam.
Introduction

Marks for mounting bracket positions.
- CAUTION - CONDUCTOR OF ELECTRICITY.
- White marking material at top.

Escondido Ladder Complement

1371
- 1 35 - foot two section extension ladder
- 1 28- foot extension ladder
- 2 16-foot straight roof ladders
- 2 10-foot collapsible attic ladder (folding)
- 1 10 foot A Frame ladder (Little Giant)

1372
- 2 35 foot three section extension ladders
- 1 28-foot extension ladder
- 1 16-foot straight roof ladder
- 1 14-foot straight roof ladder
- 1 10-foot collapsible attic ladder
- 1 10 foot A Frame ladder

All Engines
- 1 24-foot extension ladder
- 1 14-foot straight roof ladder
- 1 10-foot collapsible attic ladder

Brush Engines
- 1 10/12-foot extension ladder
- Patrol 1365 does not carry a ladder
- Ladders on brush engines may vary on manufacturer and height.

Care and Maintenance

As with all equipment used in the fire service, ladders should be inspected frequently and maintained properly.

Cleaning is more than just a matter of appearance. Dirt may collect and harden to a point where a section may become inoperable. Ladders should be cleaned after every use. Wash ladder with soapy water and a brush. Solvent may be used to remove any oil or grease. After rinsing the ladder, wipe it off then let it air dry. (On ladders with manila halyards, be careful to leave extension ladders in their bedded position as the halyard may shrink when after it gets wet and when it dries. This may cause the ladder not to be able to reach its bedded position until the halyard stretches back out.)
During the cleaning period, firefighters should make their inspection of the ladder. Metal ladders are not subject to many of the problems other ladders have. Metal ladders do, however, require a thorough inspection. All braces, slides, stops, locks, halyards, rivets, pulleys and other moving parts should be inspected. Further inspection shall include, but not be limited to:

- Rungs, for tightness.
- Bolts and rivets for tightness.
- Welds for apparent defects.
- Beams for cracks, gouges, or deformities.
- Halyards for abrasion, fraying, discoloration, dirt, mildew, kinks or rot.

When the ladder is completely dry, lightly lubricate the pawls and pulley with a few drops of oil. The guides should be lubricated with paraffin wax to help assure that the fly sections operate smoothly and easily.

**Selecting The Proper Ladder for The Job**

The designated lengths of ground ladders are based on the maximum usable length.

Selecting the proper ladder requires the firefighter to be a good judge of distance. Usually a residential story will average 10 feet. A commercial story will average 12 feet. In addition, the distance from the floor to the window sill will average 3 feet for residential and 4 feet for commercial:

An easy guide to ladder selection is as follows:

- First story roof: 16-20 feet
- Second story window: 20-28 feet
- Second story roof: 24-35 feet
- Third story window or roof: 35-40 feet

A ladder should extend 1 to 2 rungs into a window, at least 3 rungs above a roof, and when used for rescue from a window, it should be placed just below the window sill.

**Ladder Placement Discussion**

Where to place a ladder is affected by many variables and each circumstance is different. Generally, and ideally, the firefighter should choose locations that:

- are level.
- are upwind.
- are as close as possible to the objective.
- allow four points of contact.
- that are not over windows or doors.
- allows for placement on the windward side of the opening.

**Rescue - Window**

The tip of the ladder should be placed based on function. For rescue the ladder should be
placed in the center of the opening with the tip at the bottom window sill. The purpose for this placement is to give two firefighters the maximum opening to pass a victim over the window sill to awaiting firefighters on the ladder.

Non-Rescue - Window

For non-rescue purposes the ladder is usually placed through the window to one side or the other. The reasoning for this is to give firefighters something to hold onto while entering and exiting the opening. It also serves to give visual reference firefighters inside. In some cases, the opening isn’t large enough to allow a firefighter with a breathing apparatus to enter around a ladder through the same opening. In these cases one can look for a different opening or the firefighter can lower the tip of the ladder using the halyard and place the tip closer to the bottom sill.

If clearing the glass from the window is necessary the ladder should be placed to the side of the window with the tip about one foot above the top sill, windward side. Clear the window with either an axe or 6 ft. Pike Pole. The order of clearing should be top, nearside, far side, bottom. After the window is clear, reposition the ladder for the function it is needed.

When laddering balconies, the ladder should be placed on the side that offers the most stability. This location is often on a side that allows one side of the ladder to be placed next to a wall. This position offers protection against lateral kick out. When this placement isn’t possible, the ladder should be tied off. Tying off the ladder shouldn’t delay advancing a hose line and attacking the fire unless absolutely necessary for firefighter safety but should occur as soon as possible.

Roof

A proper size up and pre-planning of the roof line is important for successful ladder placement. Much can be determined from a ground level view. Scupper holes usually show low points. These low points in the roof contour are designed for drainage and indicate areas where the parapet will be at its highest point. Choosing areas in between scuppers offers the lowest parapet to roof heights.

A collapsible or straight ladder should be used on the roof side of the parapet when the distance from the top of the parapet to the roof line is higher than the firefighter's chest while standing on the roof. The intent of this is to make sure a firefighter can make it over the parapet with a full kit and fatigued. When a ladder is used on the roof side of the parapet the angle will need to be adjusted to keep the ladder stable.

When accessing the roof for laddering the firefighter should endeavor to get as many rungs over the roof line or parapet as possible. Care must be taken to not compromise the balance and stability of the ladder; keep the balance point well below the contact point. There should be an awareness of overhead power lines as there are buildings with less than 20ft. of clearance between the lines and the roof. Power lines can also pass through trees and be difficult to see. When in doubt, stop, use lights as needed, and thoroughly check before proceeding.

On roofs, structural strong points are hips and valleys of residences and purlin/beam tie
ins to exterior walls of commercial buildings. Accessing cutting points on pitched roofs should be done from the low point when possible rather than approaching from the peak and moving down.

**Ladder Shoe Position**

The position of the ladder shoes should be placed into the proper position before removing from the apparatus whenever possible. In gravel and dirt areas the spur portion of the shoes should be used. On concrete or asphalt the flat or rubber portion of the shoe should be used.