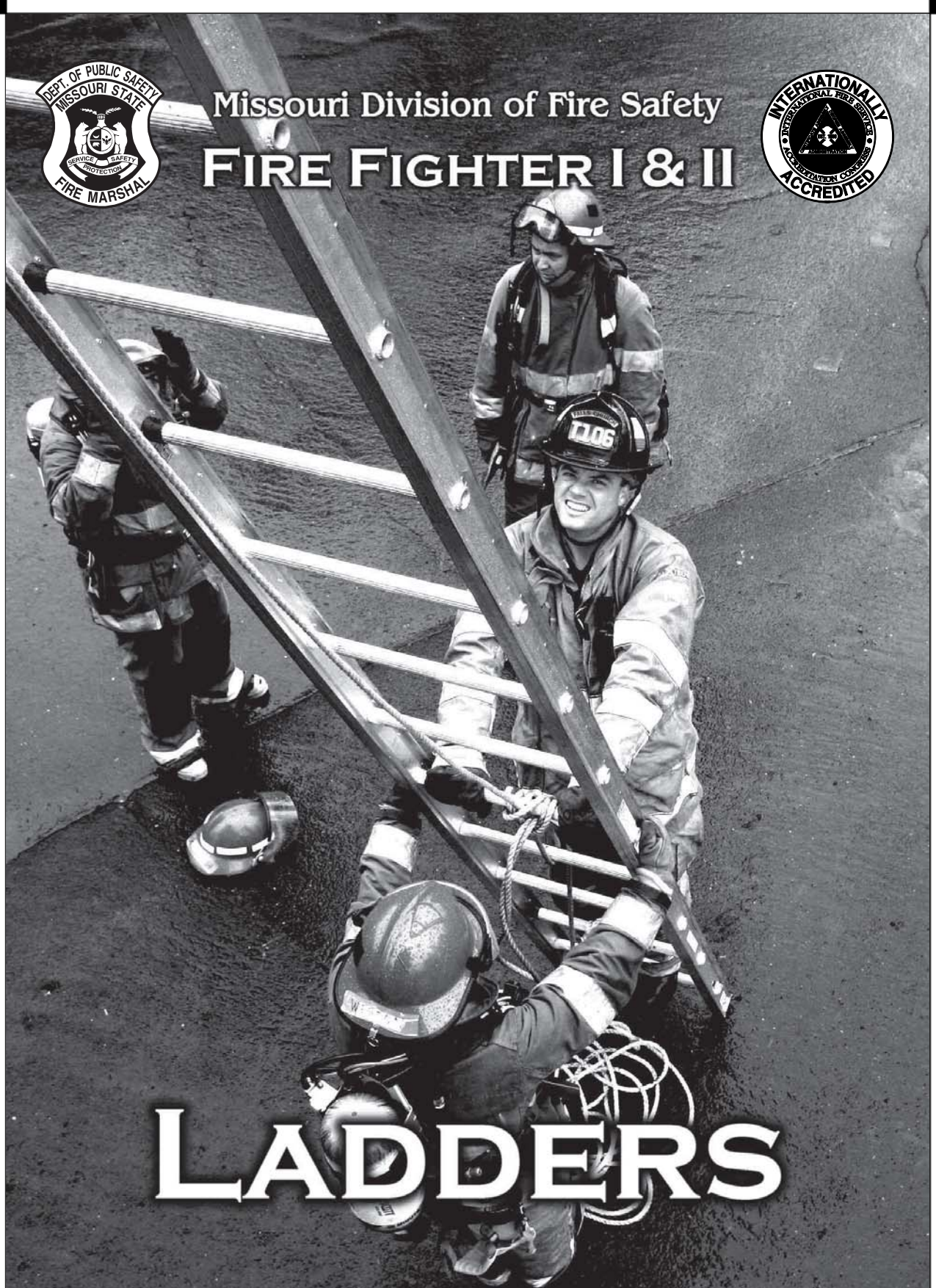




Missouri Division of Fire Safety  
**FIRE FIGHTER I & II**



# LADDERS





### UNIT OBJECTIVES

Upon completion of this unit of study, the student should be able to:

1. Identify the parts of fire service ground ladders.
2. Identify the use of the various types of fire service ladders.
3. Demonstrate how to carry, position, and raise fire service ground ladders.
4. Demonstrate how to climb the full length of fire service ladders while carrying a tool and while bringing down an injured person.
5. Demonstrate how to work from ladders with tools.
6. Demonstrate how to use a roof ladder on a pitched roof.
7. Identify the materials used in ladder construction.
8. Identify load capacities for ladders.
9. Demonstrate inspection, cleaning, and maintenance procedures for different types of ladders.



### NFPA STANDARDS

*Successful completion of the information in this section is necessary to fulfill the requirements of the following sections of NFPA 1001-2008:*

#### Fire Fighter I Standard

**5.3.6\*** Set up ground ladders, given single and extension ladders, an assignment, and team members if needed, so that hazards are assessed, the ladder is stable, the angle is correct for climbing, extension ladders are extended to the necessary height with the fly locked, the top is placed against a reliable structural component, and the assignment is accomplished.

**(A) Requisite Knowledge.** Parts of a ladder, hazards associated with setting up ladders, what constitutes a stable foundation for ladder placement, different angles for various tasks, safety limits to the degree of angulation, and what constitutes a reliable structural component for top placement.

**(B) Requisite Skills.** The ability to carry ladders, raise ladders, extend ladders and lock flies, determine that a wall and roof will support the ladder, judge extension ladder height requirements, and place the ladder to avoid obvious hazards.

**5.3.9\*** Conduct a search and rescue in a structure operating as a member of a team, given an assignment, obscured vision conditions, personal protective equipment, a flashlight, forcible entry tools, hose lines, and ladders when necessary, so that ladders are correctly placed when used, all assigned areas are searched, all victims are located and removed, team integrity is maintained, and team members' safety - including respiratory protection - is not compromised.

**(A) Requisite Knowledge.** Use of forcible entry tools during rescue operations, ladder operations for rescue, psychological effects of operating in obscured conditions and ways to manage them, methods to determine if an area is tenable, primary and secondary search techniques, team members' roles and goals, methods to use and indicators of finding victims, victim removal methods (including various carries), and considerations related to respiratory protection.

**(B)\* Requisite Skills.** The ability to use SCBA to exit through restricted passages, set up and use different types of ladders for various types of rescue operations, rescue a fire fighter with functioning respiratory protection, rescue a fire fighter whose respiratory protection is not functioning, rescue a person who has no respiratory protection, and assess areas to determine tenability.



### NFPA STANDARDS

**5.3.10\*** Attack an interior structure fire operating as a member of a team, given an attack line, ladders when needed, personal protective equipment, tools, and an assignment, so that team integrity is maintained, the attack line is deployed for advancement, ladders are correctly placed when used, access is gained into the fire area, effective water application practices are used, the fire is approached correctly, attack techniques facilitate suppression given the level of the fire, hidden fires are located and controlled, the correct body posture is maintained, hazards are recognized and managed, and the fire is brought under control.

**(A) Requisite Knowledge.** Principles of fire streams; types, design, operation, nozzle pressure effects, and flow capabilities of nozzles; precautions to be followed when advancing hose lines to a fire; observable results that a fire stream has been properly applied; dangerous building conditions created by fire; principles of exposure protection; potential long-term consequences of exposure to products of combustion; physical states of matter in which fuels are found; common types of accidents or injuries and their causes; and the application of each size and type of attack line, the role of the backup team in fire attack situations, attack and control techniques for grade level and above and below grade levels, and exposing hidden fires.

**(B) Requisite Skills.** The ability to prevent water hammers when shutting down nozzles; open, close, and adjust nozzle flow and patterns; apply water using direct, indirect, and combination attacks; advance charged and uncharged 38 mm (1½ in.) diameter or larger hose lines up ladders and up and down interior and exterior stairways; extend hose lines; replace burst hose sections; operate charged hose lines of 38 mm (1 in.) diameter or larger while secured to a ground ladder; couple and uncouple various handline connections; carry hose; attack fires at grade level and above and below grade levels; and locate and suppress interior wall and subfloor fires.

**5.3.12** Perform vertical ventilation on a structure as part of a team, given an assignment, personal protective equipment, ground and roof ladders, and tools, so that ladders are positioned for ventilation, a specified opening is created, all ventilation barriers are removed, structural integrity is not compromised, products of combustion are released from the structure, and the team retreats from the area when ventilation is accomplished.

**(A) Requisite Knowledge.** The methods of heat transfer; the principles of thermal layering within a structure on fire; the techniques and safety precautions for venting flat roofs, pitched roofs, and basements; basic indicators of potential collapse or roof failure; the effects of construction type and elapsed time under fire conditions on structural integrity; and the advantages and disadvantages of vertical and trench/strip ventilation.



### NFPA STANDARDS

**(B) Requisite Skills.** The ability to transport and operate ventilation tools and equipment; hoist ventilation tools to a roof; cut roofing and flooring materials to vent flat roofs, pitched roofs, and basements; sound a roof for integrity; clear an opening with hand tools; select, carry, deploy, and secure ground ladders for ventilation activities; deploy roof ladders on pitched roofs while secured to a ground ladder; and carry ventilation-related tools and equipment while ascending and descending ladders.

**5.5.1** Clean and check ladders, ventilation equipment, SCBA, ropes, salvage equipment, and hand tools, given cleaning tools, cleaning supplies, and an assignment, so that equipment is clean and maintained according to manufacturer's or departmental guidelines, maintenance is recorded, and equipment is placed in a ready state or reported otherwise.

**(A) Requisite Knowledge.** Types of cleaning methods for various tools and equipment, correct use of cleaning solvents, and manufacturer's or departmental guidelines for cleaning equipment and tools.

**(B) Requisite Skills.** The ability to select correct tools for various parts and pieces of equipment, follow guidelines, and complete recording and reporting procedures.



### NFPA STANDARDS

#### Fire Fighter II Standard

**6.3.2\*** Coordinate an interior attack line for a team's accomplishment of an assignment in a structure fire, given attack lines, personnel, personal protective equipment, and tools, so that crew integrity is established; attack techniques are selected for the given level of the fire (e.g., attic, grade level, upper levels, or basement); attack techniques are communicated to the attack teams; constant team coordination is maintained; fire growth and development is continuously evaluated; search, rescue, and ventilation requirements are communicated or managed; hazards are reported to the attack teams; and incident command is apprised of changing conditions.

**(A) Requisite Knowledge.** Selection of the nozzle and hose for fire attack, given different fire situations; selection of adapters and appliances to be used for specific fireground situations; dangerous building conditions created by fire and fire suppression activities; indicators of building collapse; the effects of fire and fire suppression activities on wood, masonry (brick, block, stone), cast iron, steel, reinforced concrete, gypsum wallboard, glass, and plaster on lath; search and rescue and ventilation procedures; indicators of structural instability; suppression approaches and practices for various types of structural fires; and the association between specific tools and special forcible entry needs.

**(B) Requisite Skills.** The ability to assemble a team, choose attack techniques for various levels of a fire (e.g., attic, grade level, upper levels, or basement), evaluate and forecast a fire's growth and development, select tools for forcible entry, incorporate search and rescue procedures and ventilation procedures in the completion of the attack team efforts, and determine developing hazardous building or fire conditions.



NOTES	STUDENT GUIDE
	<p><b>I. Fire Service Ladders</b></p> <p>A. Fire service ladders are essential in the performance of both saving human life and extinguishing fires</p> <p>B. Fire service ladders resemble any other ladder in shape, design, and purpose</p> <ol style="list-style-type: none"><li>1. The way they are used requires them to be constructed under rigid specifications</li><li>2. Their use under adverse conditions requires them to provide a margin of safety not usually expected of commercial ladders</li><li>3. Must meet the requirements of NFPA 1931, <i>Manufacturer's Design of Fire Department Ground Ladders</i></li></ol> <p><b>II. Basic Ladder Terminology</b> (<i>Essentials p. 472</i>)</p> <p>A. Beams:</p> <p>B. Bed section: the lower section of an extension ladder, also called main or base section</p> <p>C. Butt or heel:</p> <p>D. Butt spurs: metal plates, spikes, or cleats attached to the butt end of ground ladders to prevent slippage</p> <p>E. Fly section:</p> <p>F. Foot pads: swivel plates attached to the butt of the ladder, also known as shoes</p>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<p>G. Guides: wood or metal strips on an extension ladder which guide the fly section while being raised</p> <p>H. Halyard:</p> <p>I. Heat sensor label: label on each beam which changes color if the ladder is exposed to enough heat that it requires testing</p> <p>J. Hooks: curved, sharp, metal devices which fold outward from each beam at the top end of a roof ladder</p> <p>K. Pawls, dogs, or locks: metal devices used to hold the fly section in place after it has been extended</p> <p>L. Protection plates: metal strips attached to ladders at chafing points, such as the tip or areas the come into contact with apparatus mounts</p> <p>M. Pulley: a small grooved wheel through which the halyard is drawn</p> <p>N. Rails: the two lengthwise members of a trussed ladder beam which are separated by truss or separation blocks</p> <p>O. Rungs:</p> <ol style="list-style-type: none"><li>1. Not less than 1.25" in diameter</li><li>2. Spaced 14" apart</li></ol> <p>P. Spurs: metal points at lower end of tormentor poles</p> <p>Q. Staypoles or tormentor poles: the poles which are attached to long extension ladders</p> <p>R. Stops: wood or metal pieces which prevent the fly section from being extended too far</p>



NOTES	STUDENT GUIDE
	<p>S. Tip or top:</p> <p>T. Toggle: a device by which a tormentor pole is attached to a ladder</p> <p>U. Truss: an assembly of beam members so combined as to form a rigid framework</p> <p>V. Truss blocks: separation pieces between the rails of a trussed ladder</p> <p><b>III. Types of Ladders</b> (<i>Essentials p. 476</i>)</p> <p>A. Ground ladder: designates the difference between ladders raised on the ground and those raised from apparatus</p> <p>B. Single or straight ladders: a ladder of one section</p> <ol style="list-style-type: none"><li>1. Nonadjustable lengths</li><li>2. Lengths: 12, 14, 16, 18, and 24, 28 feet</li><li>3. Often used for quick access to windows or roofs of one and two story buildings</li></ol> <p>C. Roof ladders</p> <ol style="list-style-type: none"><li>1.</li><li>2. Nonadjustable lengths: 12-20 feet</li></ol> <p>D. Folding ladders or attic ladders</p> <ol style="list-style-type: none"><li>1. Single ladders often used for interior attic access</li><li>2. Hinged rungs allowing them to be collapsible</li></ol>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>3. Allows ladder collapse for carrying in narrow areas</li><li>4. Most common length is 10 feet</li><li>E. Extension ladder:<ul style="list-style-type: none"><li>1. Adjustable length with one or more fly sections</li><li>2. Lengths: 24 feet to 50 feet</li><li>3. Staypole or Bangor ladder<ul style="list-style-type: none"><li>a. An extension ladder of such length that requires poles attached to the top of the bed section for added leverage and stability when raising</li><li>b. Range from 35 to 65 feet</li><li>c. NFPA 1931 requires ladders over 40 feet to have staypoles</li></ul></li></ul></li><li>F. Combination ladder<ul style="list-style-type: none"><li>1. Adjustable length</li><li>2. Can be made into an self-supporting stepladder (A-frame ladder)</li><li>3. Lengths range from 8 to 14 feet</li><li>4. Must have a positive locking device to hold in the open position</li></ul></li><li>G. Pompier ladder<ul style="list-style-type: none"><li>1. Single beam ladder with a large metal "gooseneck" at the top for inserting into windows</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>2. Ranged from 10 to 20 feet</li><li>3. Not commonly used in the United States</li></ul> <p>H. Aerial ladders</p> <ul style="list-style-type: none"><li>1. Mounted on apparatus</li><li>2. Range from 50 to 135 feet</li></ul> <p>I. Construction Materials</p> <ul style="list-style-type: none"><li>1. Aluminum alloy<ul style="list-style-type: none"><li>a.</li><li>b. Easy to inspect</li><li>c. Conducts electricity, cold, and heat</li></ul></li><li>2. Wood<ul style="list-style-type: none"><li>a. Heavier than aluminum</li><li>b.</li><li>c. Highest cost</li><li>d. Retains strength when exposed to heat</li><li>e. Very durable</li></ul></li><li>3. Fiberglass<ul style="list-style-type: none"><li>a. Nonconductor of electricity</li><li>b. Relatively heavy</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>c. May chip or crack when struck or fail when overloaded</li><li>d. Can burn when exposed to flame</li></ul> <p>F. Load capacities</p> <ul style="list-style-type: none"><li>1. Folding ladder - 300 pounds</li><li>2. Single/roof ladder - 750 pounds</li><li>3. Extension ladder - 750 pounds</li><li>4. Combination ladder - 750 pounds</li></ul> <p><b>IV. Inspection, Care, and Maintenance of Ladders</b></p> <ul style="list-style-type: none"><li>A. Ladders meeting NFPA 1931 must have certification label attached by the manufacturer indicating that it meets the standard</li><li>B. All ground ladders should be tested before placed in service, annually, and after exposure to high heat or rough treatment</li><li>C. Maintenance of ladders<ul style="list-style-type: none"><li>1.</li><li>2. Halyard should be replaced if frayed</li><li>3. Do not store or rest ladders near vehicle exhaust or engine heat</li><li>4.</li></ul></li></ul>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<p>5. Do not paint ladders except for the top and bottom 18 inches of the beam for visibility</p> <p>D. Cleaning of ladders</p> <ol style="list-style-type: none"><li>1.</li><li>2. Tar, grease, or oil can be removed with a safety solvent according to manufacturer's recommendations</li><li>3. Pawl assemblies should be clean and lubricated according to manufacturer's instructions</li><li>4.</li><li>5. Candle wax can be used to lubricate slide areas on wooden ladders</li></ol> <p>E. Inspection of ladders</p> <ol style="list-style-type: none"><li>1.</li><li>2. Check for signs of physical damage (cracks, splintering, warping, discoloration, bending, dents, etc.)</li><li>3.</li><li>4. Check for bent beams and rungs</li><li>5.</li><li>6. Check halyard for snugness and freedom of movement</li><li>7. Check for free-turning pulleys</li></ol>



NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>8. Check heat sensor for signs of heat exposure</li><li>9. Check dogs or pawls for freedom of movement and operation</li><li>10. Check condition of guides and free movement of fly sections</li><li>11. Check rivets, welds, and bolted connections for tightness and defects</li><li>12.</li><li>13.</li><li>14. Mark and report all defects</li><li>15. If problems are found, the ladder should be removed from service until repaired and tested</li><li>16. Wooden ladders require closer inspection<ol style="list-style-type: none"><li>a. Trusses and beams may crack or splinter</li><li>b. Rungs may be damaged where in contact with locks</li></ol></li></ol> <p><b>V. Handling Ladders</b> (<i>Essentials p. 481</i>)</p> <ol style="list-style-type: none"><li>A. NFPA 1901, <i>Standard for Automotive Fire Apparatus</i>, sets the types and lengths of ground ladders to be carried on apparatus<ol style="list-style-type: none"><li>1. Pumper requirements:<ol style="list-style-type: none"><li>a. One straight ladder equipped with hooks</li><li>b. One extension ladder</li></ol></li></ol></li></ol>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>c. One attic ladder</li><li>2. Aerial apparatus<ul style="list-style-type: none"><li>a. One 10-foot or longer attic ladder</li><li>b. Two roof ladders at least 16 feet long</li><li>c. One combination ladder at least 14 feet long</li><li>d. One 24-foot or longer extension ladder</li><li>e. One 35-foot or longer extension ladder</li></ul></li><li>B. Ladder Safety<ul style="list-style-type: none"><li>1. Wear a full body harness with belay line when training on ladder</li><li>2. Choose proper ladder for the job</li><li>3. Always use full protective clothing</li><li>4.</li><li>5. Use the proper number of fire fighters for carries and raises</li><li>6. Always set ladder at proper angle and check the angle before climbing<ul style="list-style-type: none"><li>a.</li><li>b. The ladder should be placed so that climber is perpendicular to the ground</li></ul></li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>(1) Stand erect with toes against bottoms of ladder siderails</li><li>(2) Extend arms straight out</li><li>(3) Palms of hands should touch top of rung at shoulder level</li></ul> <p>7. Have a reasonably solid base for the butt</p> <p>8. Check locks and halyards</p> <p>9.</p> <p>10. Do not overload ladders</p> <p>11.</p> <p>12. Use ladders only for their intended purpose</p> <p>13. Inspect ladders for damage after each use</p> <p>C. Selecting the proper ladder for the job</p> <ul style="list-style-type: none"><li>1. Selecting the appropriate ladder requires judging distance</li><li>2. Correct distance from wall for height used<ul style="list-style-type: none"><li>a.</li><li>b. If 16 feet of a ladder is used, the base should be four feet from the building</li><li>c. Provides the proper angle of approximately 75° to the ground</li></ul></li></ul>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>3. Proper length of ladders for use<ol style="list-style-type: none"><li>a. First story roof: 16 to 20 feet</li><li>b. Second story window: 20 to 28 feet</li><li>c. Second story roof: 28 to 35 feet</li><li>d. Third story window or roof: 40 to 50 feet</li><li>e. Fourth story roof: over 50 feet</li></ol></li><li>4. Rules of thumb for ladder length<ol style="list-style-type: none"><li>a.</li><li>b. Place the tip of a ladder even with the top of a window and to the windward (upwind) side to gain access to a narrow window or for ventilation</li><li>c.</li><li>d. If a ladder is to be used to direct a fire stream into a window, the ladder tip should be on the wall above a window</li><li>e. If a ladder is to be used to support a smoke ejector to remove smoke after extinguishment, raise the ladder directly in front of the window with tip above the window opening</li></ol></li><li>5. Ladder reach is less than ladder length because ladders are set at <math>75^\circ</math> to the ground for climbing</li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>a. For ladders of 35 feet or less, reach is about 1 foot less than designated length</li><li>b. For ladders over 35 feet, reach is about 2 feet less than designated length</li></ul> <p>D. Removing and replacing ladders on apparatus</p> <ul style="list-style-type: none"><li>1. Ladders are mounted on apparatus in a variety of ways<ul style="list-style-type: none"><li>a. On edge at or above shoulder level on one side of the apparatus</li><li>b. Ladder storage may be hydraulically lowered on the side of apparatus</li><li>c. Ladders may be stored in a compartment and pulled outward</li><li>d. Departments must develop their procedures for removing and replacing ladders on apparatus because of these differences</li></ul></li><li>2. Before removing ladders from apparatus, fire fighters must know:<ul style="list-style-type: none"><li>a. What ladders are carried and where and how are they mounted?</li><li>b. Are ladders stored with the butt toward the front or rear of the apparatus?</li><li>c. How are the ladders nested together, can one be removed and leave the others in place?</li><li>d. In what order are they nested together?</li><li>e. How are the ladders secured?</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<p>f. What rungs go in or near the mounted brackets?</p> <p>3. Fire fighters must use proper lifting and lowering techniques when working with ladders</p> <ul style="list-style-type: none"><li>a. Adequate personnel must be available for the needed ladder</li><li>b. Lift with the legs, not the back</li><li>c. When two or more are lifting a ladder, they must lift in unison and on the command of a fire fighter at the butt of the ladder</li><li>d. Reverse the lifting procedure when placing a ladder on the ground</li></ul> <p><b>VI. Ladders Carries</b> (<i>Essentials p. 487</i>)</p> <p>A. Because of the many differences in how ladders are mounted on various types of fire apparatus, all of the ladder carries in this curriculum are demonstrated and to be performed from the ground</p> <p>Departments must develop their procedures for removing and replacing ladders on apparatus because of these differences</p> <p>B. Ladders should be carried with the forward end slightly lowered:</p> <ul style="list-style-type: none"><li>1. Provides better balance</li><li>2.</li><li>3. If the ladder strikes someone, the butt spurs will make contact with the body area instead of the head</li></ul>



NOTES	STUDENT GUIDE
	<p>C. One-fire fighter low-shoulder carry</p> <ol style="list-style-type: none"><li>1.</li><li>2. Involves resting the upper beam of the fire fighter's shoulder with the arm between two rungs</li><li>3. Picking up from ground<ol style="list-style-type: none"><li>a. Crouch next to ladder, facing tip and grab middle rung</li><li>b. Stand the ladder on edge</li><li>c. Stand and pivot into ladder, inserting other arm through rungs so upper beam rests on shoulder</li><li>d. Face the butt and slightly lowers it</li></ol></li></ol> <p>D. Two-fire fighter low-shoulder carry</p> <ol style="list-style-type: none"><li>1.</li><li>2. Allows for good ladder control</li><li>3. From ground<ol style="list-style-type: none"><li>a. Both fire fighters kneel on the same side of the ladder, one near tip, the other near the butt end</li><li>b. Both grasp a convenient rung with near hand</li><li>c. Stand the ladder on edge</li><li>d. Fire fighter at the heel gives command to "shoulder the ladder" and both stand, lifting with their legs</li></ol></li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>e. As ladder is lifted, the far beam is tilted outward and fire fighters pivot, placing other arm through rungs</li><li>f. Both place the upper beam on their shoulders</li><li>g. The fire fighter at the butt places the free hand over the upper butt spur to help prevent injury if someone is struck</li></ul> <p>E. Three-fire fighter flat-shoulder carry</p> <ul style="list-style-type: none"><li>1.</li><li>2. From ground<ul style="list-style-type: none"><li>a. While facing the tip, two fire fighters kneel on side at each end and the third fire fighters kneels on the opposite side near the middle of the ladder</li><li>b. Fire fighter at the heel gives command to "shoulder the ladder" and all three stand, lifting with their legs</li><li>c. All pivot toward the butt when the ladder is chest high</li><li>d. All place the beam onto their shoulders</li></ul></li></ul> <p>F. Four-fire fighter flat-shoulder carry</p> <ul style="list-style-type: none"><li>1. The same method is used for four fire fighters as for three</li><li>2. Two fire fighters are positioned at each end on opposite sides of the ladder</li></ul>



NOTES	STUDENT GUIDE
	<p>G. Carrying roof ladders</p> <ol style="list-style-type: none"><li>1. If a roof ladder is to be used to be placed on a sloped roof, it should be carried with the tip forward instead of the butt</li><li>2.</li><li>3. When at the base of a second raised ladder, the roof ladder is set down and the hooks opened before the roof ladder is to be raised</li></ol> <p>H. Ladder placement</p> <ol style="list-style-type: none"><li>1. Normally an officer determines where ladders will be placed for the task to be performed, however, the exact spot where the butt is placed is usually determined by personnel carrying the ladder</li><li>2. Ladders must be positioned for their intended use</li><li>3. The butt must be placed the proper distance from the building for safe climbing<ol style="list-style-type: none"><li>a.</li><li>b. Divide by four the used length of the ladder</li></ol></li><li>4. Ladders should be placed on different sides of a building for emergency egress</li><li>5. Look for strong points on the building when placing ladders</li></ol>



NOTES	STUDENT GUIDE
	<p>6. Avoid placing ladders:</p> <ul style="list-style-type: none"><li>a.</li><li>b. On uneven terrain or soft ground</li><li>c. On main paths of travel that fire fighters will use</li><li>d. Where they can contact burning surfaces</li><li>e.</li><li>f. Where they may contact overhead obstructions, such as limbs, wires, and signs</li><li>g. On top of sidewalk elevator doors or sidewalk deadlights</li></ul> <p><b>VII. Raising Ladders</b> (<i>Essentials p. 494</i>)</p> <p>A. General procedures</p> <ul style="list-style-type: none"><li>1. The transition from the carrying position to the raise of a ladder should be done in one smooth and continuous action</li><li>2. Always check for overhead obstructions before raising any ladder<ul style="list-style-type: none"><li>a.</li><li>b.</li><li>c.</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>3.</li><li>4. Wooden ladders are intended to be used with fly in toward the building</li><li>5. After a ladder has been raised and resting against a building and before it is climbed, the excess half-yard should be tied to the ladder<ol style="list-style-type: none"><li>a.</li><li>b. Prevents the fly section from slipping</li><li>c. Prevents anyone from tripping on the excess rope</li></ol></li></ol> <p>B. One-fire fighter raise</p> <ol style="list-style-type: none"><li>1.</li><li>2. Lower the butt to the ground with the butt spurs against the building</li><li>3. Raise ladder to vertical position by lifting hand-over-hand on the rungs</li><li>4. Bring the ladder upright until it rests against the building</li><li>5. Carefully move the ladder butt out from the building to the desired climbing angle</li><li>6. Check the climbing so that climber is perpendicular to the ground</li></ol>



NOTES	STUDENT GUIDE
	<p>C. Two-fire fighter raise</p> <ol style="list-style-type: none"><li>1. When two or more personnel raise a ladder, the fire fighter at the butt end (the heeler) is responsible for placing it in the desired location and giving commands during the operation</li><li>2. Flat raise procedures<ol style="list-style-type: none"><li>a. Heeler places butt end on ground at desired location while other fire fighter rests ladder on shoulder</li><li>b. Heeler heels ladder by placing both feet on bottom rung and crouches to grab a convenient rung and leans back</li><li>c. Fire fighter at tip steps under ladder and advances hand-over-hand toward the butt until ladder is vertical</li><li>d. Fire fighters face each other and heel ladder with their toes</li><li>e. Ladder is pivoted with fly away from building (fly toward building for wooden ladders)</li><li>f. Heeler raises fly with hand-over-hand motion until ladder reaches the desired height</li><li>g. Tip of ladder is lowered to building and proper angle checked</li><li>h. Halyard is tied</li></ol></li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>3. Beam raise procedures<ul style="list-style-type: none"><li>a. Heeler places beam on ground at desired location while other fire fighter rests ladder on shoulder</li><li>b. Heeler heels ladder by placing one foot on butt spur on bottom rung and grabs upper beam</li><li>c. Fire fighter at tip advances hand-over-hand down upper beam toward the butt until ladder is vertical</li><li>d. Fire fighters face each other and heel ladder with their toes</li><li>e. Ladder is pivoted with fly away from building (fly toward building for wooden ladders)</li><li>f. Heeler raises fly with hand-over-hand motion until ladder reaches the desired height</li><li>g. Tip of ladder is lowered to building and proper angle checked</li><li>h. Halyard is tied</li></ul></li><li>D. Three-fire fighter raise<ul style="list-style-type: none"><li>1. Heeler places butt end on ground at desired location while other fire fighters rest ladder on their shoulders</li><li>2. Heeler heels ladder by placing both feet on bottom rung and crouches to grab a convenient rung</li><li>3. Fire fighters at tip advance together with outside hands on beams and inside hands on rungs toward the butt until ladder is vertical</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>4. Fire fighters face each other and heel ladder with their toes</li><li>5. Ladder is pivoted with fly away from building (fly toward building for wooden ladders)</li><li>6. Heeler raises fly with hand-over-hand motion until ladder reaches the desired height</li><li>7. Tip of ladder is lowered to building and proper angle checked</li><li>8. Halyard is tied</li></ol> <p>E. Four-fire fighter flat raise</p> <ol style="list-style-type: none"><li>1. With larger and heavier ladders, four fire fighters can handle the ladder better than three</li><li>2. A flat raise is normally used and the procedures are similar to those for a three-fire fighter flat raise</li></ol> <p>F. Raising and positioning a roof ladder</p> <ol style="list-style-type: none"><li>1. One ladder is placed in the desired location against the building and extended three to five rungs above the edge of the roof</li><li>2. After carrying roof ladder to the ladder to be climbed, the roof ladder is placed on ground and the hooks opened</li><li>3. One fire fighter raises the roof ladder up so it rests against other ladder with hooks facing out</li><li>4. One fire fighter then climbs the main ladder until his or her shoulder is about two rungs above middle of roof ladder</li></ol>



NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>5. The fire fighter reaches through rungs of roof ladder and places it onto his or her shoulder</li><li>6. The fire fighter climbs to the top of the ladder and uses a leg lock or life safety harness to lock into ladder</li><li>7. The fire fighter takes the roof ladder off of the shoulder and uses hand-over-hand method to slide roof ladder onto roof with hooks facing down</li><li>8. The roof ladder is pushed up until hooks go over peak of roof</li><li>9. To remove, reverse procedure</li></ol> <p>G. Moving ground ladders</p> <ol style="list-style-type: none"><li>1. It may be necessary to move a ladder after it has been extended</li><li>2. If a ladder has been raised with the fly in the wrong position, it is necessary to pivot the ladder<ol style="list-style-type: none"><li>a. Two fire fighters raise the ladder to a vertical position while facing each other</li><li>b. Both personnel place a foot against the side of the beam on which the ladder will pivot</li><li>c. The ladder is tilted on the pivot beam</li><li>d. Both fire fighters pivot the ladder to the desired position and simultaneously adjust their positions as needed</li></ol></li><li>3. It may also be necessary to move a ladder while vertical</li></ol>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ol style="list-style-type: none"><li>4. One fire fighter can usually safely shift a single ladder that is less than 20 feet long<ol style="list-style-type: none"><li>a. The fire fighter faces the ladder and heels it</li><li>b. The beams are grasped and the ladder brought away from the building to a vertical position</li><li>c. The fire fighter grasps a convenient low rung with one hand, palm upward</li><li>d. A second convenient high rung is grasped with the other hand, palm down</li><li>e. The fire fighter turns slightly in the direction to be travelled and checks for overhead obstructions</li><li>f. The ladder is lifted and moved a short distance and then lowered into position</li></ol></li></ol> <p>H. Securing ladders</p> <ol style="list-style-type: none"><li>1. Ground ladders must be secured whenever climbed for safety<ol style="list-style-type: none"><li>a.</li><li>b. The halyard must be properly tied</li><li>c. Ladder movement must be prevented by heeling or tying in</li></ol></li><li>2. Heeling<ol style="list-style-type: none"><li>a.</li></ol></li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>b. Fire fighter stands under ladder, grabs both beams and pulls back to press ladder against building</li><li>c. Alternate method is to stand facing the ladder and place feet against butt and lean toward building</li></ul> <p>3.</p> <ul style="list-style-type: none"><li>a. Frees personnel from having to heel the ladder</li><li>b. A rope hose tool or safety strap can be used to tie the ladder to a fixed object at the top or bottom</li></ul> <p><b>VIII. Functioning on Ladders</b> (<i>Essentials p. 503</i>)</p> <p>A. Climbing ladders</p> <ul style="list-style-type: none"><li>1. Ladder climbing must be done smoothly and rhythmically</li><li>2.</li><li>3. The climber's eyes should be focused forward with an occasional look to the top</li><li>4.</li><li>5. Climber's back and arms should be kept straight</li><li>6. Some fire fighters find there is less bounce to the climb if the foot and hand are on the same side are raised together</li></ul>

# GROUND LADDERS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<p>B. Ascending with tools</p> <ol style="list-style-type: none"><li>1.</li><li>2. If hands are large enough, hand with tool should also be in contact with beam</li></ol> <p>C.</p> <ol style="list-style-type: none"><li>1. Using a leg lock<ol style="list-style-type: none"><li>a. Climb to desired height and advance one rung higher</li><li>b. Slide leg from opposite side from working side over and behind rung to be locked onto</li><li>c. Hook foot on rung or beam</li><li>d. Rest on thigh</li><li>e. Step down with opposite leg</li></ol></li><li>2. Using a life safety harness<ol style="list-style-type: none"><li>a.</li><li>b. Hook is returned to center when desired height is reached and attached to rung</li></ol></li></ol> <p>D. Assisting a victim down a ladder</p> <ol style="list-style-type: none"><li>1. When using a ground ladder for rescue, the ladder tip should be raised to just below the windowsill</li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>2. To bring victim down a ladder, four fire fighters are needed<ul style="list-style-type: none"><li>a. Two inside the building to lower the victim from the window onto the ladder</li><li>b. One on the ladder</li><li>c. One heeling the ladder</li></ul></li><li>3. Conscious victims<ul style="list-style-type: none"><li>a. Rescuers inside building, lower victim feet first on to ladder</li><li>b. Fire fighter on ladder supports victim and keeps both arms under the victim's arm with hands on the rungs, in case victim slips</li></ul></li><li>4. Unconscious victims<ul style="list-style-type: none"><li>a. Victim is held the same as conscious victim but rested on rescuer's knee</li><li>b. Place victim's feet outside beams</li><li>c. Victim may be turned around to face rescuer as resting on rescuer's knee</li><li>d. Victim's armpits are supported by rescuer's arms</li><li>e. Rescuer climbs down by sliding hands down beams</li><li>f. Rescuer can lean into victim for control</li><li>g. An unconscious victim who regains consciousness may panic and grab the ladder or the rescuer or fight the fire fighter</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<p>(1) May cause the fire fighter to lose his or her grip or footing</p> <p>(2) Fire fighters must watch the victim and be prepared if the victim regains consciousness</p> <p>5. Small children can be cradled across the rescuer's arms while the rescuer maintains contact with the ladder</p> <p><b>IX. Ground Ladders Summary</b></p> <p>A. Safely using ground ladders is an essential part of every fire fighter's duties</p> <p>B. Fire personnel must be familiar with:</p> <ol style="list-style-type: none"><li>1. The parts of ladders</li><li>2. The types of ladders available in a fire department</li><li>3. The capabilities and limitations of various ladders</li><li>4. The hazards associated with ladders</li><li>5. Proper angles for ladder applications</li><li>6. What constitutes a stable surface and reliable structural elements for ladder placement</li></ol>