

**NFPA<sup>®</sup>**

# 1451

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**Standard for  
a Fire and Emergency  
Service Vehicle Operations  
Training Program**

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**2018**



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## NFPA® 1451

### Standard for a

## Fire and Emergency Service Vehicle Operations Training Program

### 2018 Edition

This edition of NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program*, was prepared by the Technical Committee on Fire Service Training. It was issued by the Standards Council on November 10, 2017, with an effective date of November 30, 2017, and supersedes all previous editions.

This edition of NFPA 1451 was approved as an American National Standard on November 30, 2017.

### Origin and Development of NFPA 1451

In response to a request by the National Transportation Safety Board (NTSB) in 1991, the Technical Committee on Fire Service Training started work on a new standard for a training program for fire service vehicle operations. The NTSB specifically requested NFPA “. . . emphasize that the safe arrival of the apparatus at the scene of the emergency is the first priority.”

The committee also wanted to produce an NFPA standard to meet the intent of NFPA 1500, *Standard on Fire Department Occupational and Health Program*, where it states in the chapter on Vehicles, Drivers, and Equipment: “Fire department vehicles shall be operated only by members who have successfully completed an approved driver training program.”

An *NFPA Journal* article, “1995 Fire Fighter Fatalities,” added further importance to the subject when it reported that “. . . 23.9 percent of those who died last year, died in motor vehicle accidents.”

The committee’s intent was to create a document outlining a training program that produces drivers who are able to prevent vehicle accidents.

The first edition of NFPA 1451 was issued in 1997. Subsequently, the committee appointed a task group to review the 1997 edition content and make recommendations to the committee concerning its functionality. As a result of that review, a general updating was suggested.

In the 2002 edition, some of the general updating included revisions representing an evolution of knowledge about vehicle operations. The application of the standard was expanded to include private industrial and contract fire departments and industrial fire brigades that respond off site. New terminology included the use of the word “crash” to replace the word “accident.” The term “accident” was perceived by some to mean an unavoidable or chance occurrence beyond the influence of training. Crashes can indeed be avoided and prevented by training.

The numbering of the chapters and the paragraphs of the 2002 edition differed from the previous edition as a result of changes associated with the 2000 edition of the *Manual of Style for NFPA Technical Committee Documents*. The 2007 edition featured mainly editorial changes.

In the 2013 edition, the document scope was expanded to include other emergency vehicles. Also included in this edition was a new section that provides requirements for conducting safe operations at highway incidents and a new subsection that focuses on hazard prevention training, with an accompanying hazard avoidance checklist in Annex B.

The 2018 edition contains editorial and grammatical changes, additional safety requirements, and a new annex. The new annex makes recommendations for the layout, design, and safety of driver training simulators.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

**Committee Scope:** This Committee shall have primary responsibility for all fire service training techniques, operations, and procedures to develop maximum efficiency and proper utilization of available personnel. Such activities can include training guides for fire prevention, fire suppression, and other missions for which the fire service has responsibility.

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## NFPA 1451

## Standard for a

## Fire and Emergency Service Vehicle Operations Training Program

2018 Edition

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**NOTICE:** An asterisk (\*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex D. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex D.

## Chapter 1 Administration

## 1.1 Scope.

**1.1.1** This standard shall contain the minimum requirements for a fire and emergency service organization (FESO) vehicle operations training program.

**1.1.2** This standard shall outline the development of a written FESO vehicle training program, which includes the organizational procedures for training personnel, maintaining vehicles, and identifying equipment deficiencies; design; financing; and other areas.

**1.1.3** The knowledge and skills required of safety, training, maintenance, and administrative officers charged with developing and implementing the FESO vehicle operations training program shall also be outlined within this standard.

## 1.2 Purpose.

**1.2.1\*** The purpose of this standard shall be to specify the minimum requirements for a FESO vehicle operations training program, including procedures for those members that drive or occupy FESO vehicles, respond in private vehicles or unconventional means of transportation, and provide traffic control at the scene of an emergency.

**1.2.2\*** The objective of this standard shall be to help prevent crashes, injuries, and fatalities involving FESO vehicles.

## 1.3 Application.

**1.3.1** These requirements shall apply to organizations providing fire suppression, fire and rescue training, and other emergency services, including public fire brigades and departments, private industrial and contract fire departments, emergency medical vehicles, and industrial fire brigades that respond off site.

**1.3.2** This standard shall apply to any FESO vehicle used by any member of the fire department or industrial fire brigade when responding off site.

**1.3.3** This document shall not apply to aircraft, watercraft, or law enforcement vehicles.

**1.4 Equivalency.** Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

**1.4.1** Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

**1.4.2** The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

## Chapter 2 Referenced Publications

**2.1 General.** The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

**2.2 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 414, *Standard for Aircraft Rescue and Fire-Fighting Vehicles*, 2017 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2017 edition.

NFPA 1003, *Standard for Airport Fire Fighter Professional Qualifications*, 2015 edition.

NFPA 1041, *Standard for Fire Service Instructor Professional Qualifications*, 2012 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2018 edition.

NFPA 1521, *Standard for Fire Department Safety Officer Professional Qualifications*, 2015 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition.

NFPA 1906, *Standard for Wildland Fire Apparatus*, 2016 edition.

NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Emergency Vehicles*, 2017 edition.

NFPA 1917, *Standard for Automotive Ambulances*, 2016 edition.

## 2.3 Other Publications.

**N 2.3.1 FAMA Publications.** Fire Apparatus Manufacturers Association, P.O. Box 397, Lynnfield, MA 01940.

*Fire Apparatus Safety Guide*, 2017 edition.

**2.3.2 U.S. Government Publications.** U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401-0001.

Title 49, Code of Federal Regulations, Part 383, “Commercial Motor Vehicle Safety Act,” 2003.

U.S. General Service Administration KKK-A-1822-F, “Star of Life Ambulance Specifications,” August 2007.

## 2.3.3 Other Publications.

*Merriam-Webster’s Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

## 2.4 References for Extracts in Mandatory Sections.

NFPA 600, *Standard on Facility Fire Brigades*, 2015 edition.

NFPA 921, *Guide for Fire and Explosion Investigations*, 2017 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2017 edition.

NFPA 1201, *Standard for Providing Fire and Emergency Services to the Public*, 2015 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety, Health, and Wellness Program*, 2018 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 edition.

## Chapter 3 Definitions

**3.1 General.** The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster’s Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

## 3.2 NFPA Official Definitions.

**3.2.1\* Approved.** Acceptable to the authority having jurisdiction.

**3.2.2\* Authority Having Jurisdiction (AHJ).** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

**3.2.3 Shall.** Indicates a mandatory requirement.

**3.2.4 Should.** Indicates a recommendation or that which is advised but not required.

**3.2.5 Standard.** An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase

“standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

## 3.3 General Definitions.

**3.3.1 FESO Vehicle.** Any vehicle operated by an FESO.

**3.3.2 Fire and Emergency Service Organization (FESO).** Any public, private, governmental, or military organization that provides emergency response, fire suppression, and related activities, whether for profit or government owned and operated. [1201, 2015]

**3.3.3 Fire Apparatus.** A vehicle designed to be used under emergency conditions to transport personnel and equipment, and to support the suppression of fires and mitigation of other hazardous situations. [1901, 2016]

**3.3.4 Fire Apparatus Driver/Operator.** A fire department member who is authorized by the authority having jurisdiction to drive, operate, or both drive and operate fire department vehicles.

**3.3.5 Fire Department.** An organization providing rescue, fire suppression, and related activities, including any public, governmental, private, industrial, or military organization engaging in this type of activity. [1002, 2017]

**3.3.6\* Hazard.** Any arrangement of materials that presents the potential for harm. [921, 2017]

**3.3.7 Industrial Fire Brigade.** An organized group of employees within an industrial occupancy who are knowledgeable, trained, and skilled in at least basic fire-fighting operations, and whose full-time occupation might or might not be the provision of fire suppression and related activities for their employer. [600, 2015]

**3.3.8 Instructor.** An individual deemed qualified by the authority having jurisdiction to deliver training in the operation of fire service vehicles.

**3.3.9\* Member.** A person involved in performing the duties and responsibilities of a FESO, under the auspices of the organization. [1500, 2018]

**3.3.10 Member Assistance Program (MAP).** A generic term used to describe the various methods used in the FESO for the control of alcohol and other substance abuse, stress, and personal problems that adversely affect member performance. [1500, 2018]

**3.3.11 Qualified Person.** A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems related to the subject matter, the work, or the project.

**3.3.12 Risk.** A measure of the probability and severity of adverse effects that result from exposure to a hazard.

**3.3.13 Unconventional Means of Transportation.** Can include, but are not limited to, bicycles, motorcycles, scooters, skateboards, and rollerblades.



## Chapter 4 General Rules and Considerations

### 4.1 General.

**4.1.1** All FESO vehicles shall meet the minimum safety standards outlined in NFPA 414 and NFPA 1901 for fire apparatus; U.S. General Service Administration KKK-A-1822-F, “Star of Life Ambulance Specifications,” and NFPA 1917 for ambulance specifications; and U.S. Department of Transportation (DOT) regulations as applicable on the date of construction.

▲ **4.1.2** The intent of this standard shall be to meet all requirements of NFPA 1500 regarding the training and education of fire department drivers and the operation of fire department vehicles.

▲ **4.1.3** The intent of this standard shall be to meet all of the applicable requirements of NFPA 1002 and NFPA 1003 regarding the training and education of fire apparatus drivers/operators.

**4.1.4\*** The fire apparatus driver/operator shall be subject to periodic medical evaluations, as required by NFPA 1500 and DOT medical requirements if applicable, to determine whether the driver/operator is medically fit to perform the duties of an operator of fire department vehicles.

**4.1.5\*** The FESO shall institute a program of post-crash drug and alcohol testing for the drivers of vehicles involved in crashes.

### 4.2 Operations Training Program.

**4.2.1\*** The FESO shall adopt an official written risk management plan dealing with FESO vehicles.

**4.2.1.1** The FESO vehicle risk management plan shall cover administration, facilities, training, vehicle operations, protective clothing and equipment, operations at emergency incidents, operations at non-emergency incidents, and other related activities.

**4.2.1.2\*** The risk management plan shall include at least the following components:

- (1)\* Risk identification
- (2)\* Risk evaluation
- (3)\* Risk control techniques
- (4)\* Risk management monitoring

**4.2.2** The FESO shall incorporate the provisions of this standard into the vehicle operations training program.

**4.2.3** The FESO shall evaluate the effectiveness of its vehicle operations training program at least once every 3 years.

**4.2.4** An audit report of the findings shall be submitted to the chief and to the members of the occupational safety and health committee.

**4.2.5\*** The operations training program shall address all types of FESO vehicles from a broad perspective, including risk determination, design, training, maintenance, and record keeping.

### 4.3 Coordinated Administrative Policies.

**4.3.1** The FESO shall establish and enforce rules, regulations, and standard operating procedures to reach the objectives of this standard.

**4.3.2\*** The FESO shall establish written policies for variations from standard operations.

**4.3.3** The FESO shall establish written standard operating procedures for safely driving, riding within, and operating FESO vehicles during an emergency response.

**4.3.4** The FESO shall provide members, including junior members, with hazard awareness training that includes unique hazards that can be encountered when responding to alarms in privately owned vehicles or unconventional means of transportation.

**4.3.5\*** The FESO shall develop, implement, and enforce a policy that requires the use of approved personal protective equipment (PPE) including helmets and appropriate clothing when using unconventional means of transportation.

**4.3.6** Procedures for emergency response shall emphasize the safe arrival of FESO vehicles and occupants at the destination as the first priority.

**4.3.7** The FESO shall establish written standard operating procedures for driving and operating FESO vehicles during a non-emergency response.

**4.3.8** The FESO shall establish written standard operating procedures for driving and operating personally owned vehicles addressing emergency response and non-emergency activities.

**4.3.9\*** The FESO shall establish written standard operating procedures for a traffic incident management system (TIMS) to enhance responder safety at roadside emergency scenes.

**4.3.10** Members shall be trained to operate specific vehicles or classes of vehicles before being authorized to drive or operate such vehicles.

**4.3.10.1** Members shall not be expected to or permitted to drive or operate any vehicles for which they have not received training.

**4.3.10.2** Members shall be reauthorized annually for all vehicles they are expected to operate.

**4.3.11\*** The authority having jurisdiction shall ensure that all vehicle drivers/operators possess a valid vehicle operator's license for the vehicle being driven.

**4.3.12\*** Drivers/operators of FESO vehicles shall be required to notify the authority having jurisdiction of any changes that can affect their driving privileges.

## Chapter 5 Training and Education

### 5.1 General.

**5.1.1** The FESO shall establish and maintain a driver training and education program with the goal of preventing vehicular crashes, deaths, and injuries to members, employees, and the public.

**5.1.2** The FESO shall provide all members with driver training and education commensurate with the duties and functions members are expected to perform, in order to ensure that they are able to perform their assigned duties in a manner that does not pose a hazard to themselves, other members, or the general public.

**5.1.3\*** Members shall be provided with driver training and education appropriate for their duties and responsibilities before being permitted to operate FESO vehicles or apparatus.

## **5.2 Training Frequency.**

**5.2.1\*** Driver training shall be provided for all members as often as necessary to meet the applicable requirements of this chapter but not less than twice each year.

**5.2.2** Annual driver training shall include hands-on exercises using the actual FESO vehicles that they are expected to drive.

**5.2.3** Whenever changes in driving procedures or technology are introduced in the work environment, training and education shall be provided for all affected members.

**5.2.4** Whenever new or unfamiliar vehicles are placed into service, training and education relating to those vehicles shall be provided for all affected members before operating the vehicle.

**5.2.5** New vehicle training shall identify vehicle limitations, manufacturers' operating recommendations, and any differences between new vehicles and vehicles previously operated by the affected members.

## **5.3 Basic Training and Education Requirements.**

**5.3.1\*** All members shall be trained in and shall exercise the applicable principles of defensive driving techniques under both emergency and non-emergency conditions.

▲ **5.3.2\*** All members who drive fire service vehicles shall meet the objectives specified in Chapter 4 of NFPA 1002.

▲ **5.3.3\*** Fire apparatus drivers/operators shall meet the requirements of Chapters 4 through 10 of NFPA 1002 and Section 4.2 of NFPA 1500 prior to being assigned as an FESO apparatus driver/operator.

**5.3.4\*** FESO vehicle drivers/operators shall be familiar with the requirements of 49 CFR 383, "Commercial Motor Vehicle Safety Act," and its relevance to state requirements for obtaining a commercial driver's license (CDL) and to the requirements of the authority having jurisdiction.

**5.3.5\*** FESO vehicle drivers/operators shall be trained to perform the routine tests, inspections, and servicing functions specified in Section 10.2.

**5.3.6** Members who are authorized to respond or proceed to the scene of emergencies under non-emergency procedures, but for the purpose of official business, shall be required to complete a training class that shall, at a minimum, state the FESO's procedures, limits, and applicable local, state, and federal regulations regarding non-emergency response to incidents.

**5.3.7\*** The FESO driver training program shall include information on the potential hazards of off-road driving and shall develop written standard operating procedures listing conditions that justify driving on other than paved or hard surface roads.

**5.3.8\*** The FESO driver training program shall include information on the potential hazards of driving unconventional or specialized units and shall develop written standard operating procedures listing conditions that justify responding to the scene of an emergency.

**5.3.9** FESOs shall train operators for inclement weather driving conditions, with emphasis on handling of vehicles, particularly where auxiliary braking devices are to be used.

**5.3.10** Where applicable, the FESO driver training program shall include information on the potential hazards of retarders, such as engines, transmissions, driveline retarders, antilock braking system (ABS) brakes, vehicle stability system, and traction control systems, and shall develop written standard operating procedures pertaining to the use of such devices.

**5.3.11\*** Where applicable, the FESO driver training program shall include information on the proper use and limitations of the electronics provided.

**5.3.12** Where applicable, the FESO driver training program shall include information on the engine regeneration process specific to the vehicle.

■ **5.3.13** Where applicable, the FESO driver training program shall include instruction on all auxiliary systems installed on the emergency vehicle(s), including, but not limited to, power take off (PTO) equipment, hydraulic pumps, and electric generators.

**5.3.14\*** The training program shall include a review and critique of FESO vehicle crash scenarios, both local and national, to serve as an objective learning experience.

■ **5.3.15** All personnel authorized to drive or operate fire apparatus shall be trained on the content of the FAMA *Fire Apparatus Safety Guide*.

## **5.4 Instructor Qualifications.**

**5.4.1\*** The authority having jurisdiction shall be responsible for ensuring that only qualified persons are assigned as instructors in the driver training program.

▲ **5.4.2\*** Fire department training instructors shall, at a minimum, meet the qualifications for Instructor I as specified in NFPA 1041.

## **5.5 Training Program Safety.**

**5.5.1** The FESO safety officer shall monitor the driver training program to ensure the enforcement of departmental safety rules.

**5.5.2** The FESO safety officer or designee shall review all driver training activities, including the lesson plan and field training area, prior to the exercise.

**5.5.3** The FESO safety officer or designee shall monitor the use of all safety equipment during training exercises.

**5.5.4** The FESO safety officer or designee shall notify the lead instructor of any situations that could be unsafe.

**5.5.5** The FESO safety officer or designee shall have the authority to stop operations immediately where an event or condition poses an imminent threat of crash or injury.

**5.5.6** All field exercises shall be conducted under the supervision of a qualified driving instructor meeting the requirements set forth in Section 5.4.

**5.5.7** One instructor shall be assigned to each vehicle during the field exercises.

**5.5.8\*** The field exercise training area shall be designed for the maximum safety of all participating personnel, apparatus, and bystanders.

**5.5.8.1** Safety procedures shall be established to address the following:

- (1) Segregation of vehicles on the training course during multiple vehicle use
- (2) Backing practices and standard hand signals
- (3) Control of personnel and vehicles in the driver training area
- (4) Number of supervisory personnel present during training and testing activities
- (5) Pre-trip safety inspections prior to moving vehicles

**5.5.8.2** Vehicles not participating in the training session shall be restricted from the training area.

**5.5.8.3** All field exercises shall be conducted in an area that is secure.

**5.5.8.4** Only those personnel involved in the exercise shall be permitted in the field exercise area, and all other participants and observers shall be restricted to a designated safe area.

**5.6\* Training Records.** Individual driver training records that indicate dates, subjects covered, satisfactory completion, and any certificates achieved shall be maintained.

**5.6.1** Individual driver training records shall include a list of vehicles that the driver is qualified to operate.

**5.6.2\*** The individual driver's activity operating each vehicle shall be documented.

## Chapter 6 Laws and Liabilities

### 6.1 General.

**6.1.1\*** FESO vehicle drivers/operators shall have a knowledge of applicable federal, state, provincial, and local regulations governing the operation of FESO vehicles.

**6.1.2\*** FESO vehicle drivers/operators shall become familiar with all applicable U.S. Department of Transportation (DOT) regulations.

**6.1.3\*** The FESO shall maintain a written policy informing all FESO personnel of the permitted limits governing the operation of FESO vehicles.

**6.1.4** Members who are under the influence of alcohol or drugs shall not drive or operate FESO vehicles under any circumstances.

### 6.2 Financial Protection.

**6.2.1\*** The authority having jurisdiction shall have in place financial protection to ensure against potential losses from crashes that can occur during training or actual operations, or both.

**6.2.2\*** All FESO vehicle drivers/operators or their personal representatives shall be informed in writing of the conditions and limitations of their personal and civil liability and to what degree the authority having jurisdiction extends protection for personal liability for crashes involving FESO vehicles.

**Δ 6.3 Member Assistance Program.** A member assistance program shall be available to render assistance and treatment to all FESO vehicle drivers/operators as required in NFPA 1500.

## Chapter 7 Emergency Response

### 7.1 General.

**7.1.1\*** The authority having jurisdiction shall have written policies governing speed and the limitations to be observed during inclement weather and under various road and traffic conditions.

**7.1.2** At no time shall driving regulations be less restrictive than state motor vehicle laws.

**7.1.3\*** The driver/operator of an FESO vehicle encountering any of the following situations shall bring the vehicle to a complete stop and shall not proceed until it is confirmed that it is safe to do so:

- (1) Any "stop" signal (i.e., sign, light, or traffic officer)
- (2) Blind intersections
- (3) Intersections where the operator cannot see all lanes of traffic
- (4) Stopped school bus with red flashing warning lights, as required by state law

**7.1.4\*** FESO vehicles shall stop at all unguarded railroad crossings to ensure that a safe crossing can be made even when responding to emergencies.

**7.1.4.1** The FESO driver/operator shall obey all railroad crossing signals even when responding to emergencies.

**7.1.4.2** FESO vehicles shall not be driven around railroad crossing gates.

**7.1.4.3** FESO vehicles shall not be parked on railroad tracks, unless rail traffic has been suspended.

**7.1.5\*** The driver/operator shall maintain a distance in front of the vehicle that is at least equal to the minimum travel distance necessary to stop the vehicle without contacting another object.

**7.1.6\*** FESO vehicles and apparatus following each other in queue shall maintain an adequate distance to avoid rear-end collisions.

**7.1.7\*** Overtaking and passing other vehicles during emergency response shall be accomplished with extreme caution.

**7.1.8** While en route to move-ups or to fill an empty station, apparatus shall be operated in a non-emergency mode, and the driver/operator shall obey all traffic laws.

**7.1.9\*** The FESO shall identify the types of responses that will be made in a non-emergency mode.

### 7.2 Emergency Response Considerations.

**7.2.1** The authority having jurisdiction shall establish emergency response procedures to minimize travel times, optimize response safety, and minimize the chances of emergency vehicles meeting at traffic intersections.

**7.2.2** When multiple FESO vehicles are responding to an emergency incident from different locations, the vehicle operators shall coordinate their intended response routes to prevent the response vehicles from colliding at road intersections.

**7.2.3** In jurisdictions where an automated traffic control system provides a green light and therefore intersection right-of-way to emergency vehicles, both initial and annual retraining shall be provided to all vehicle operators on the system's operating features and limitations.

## Chapter 8 Crash and Injury Prevention

### 8.1 General.

**8.1.1** Unsafe FESO vehicle conditions shall be corrected immediately by the identifying personnel or shall be reported immediately to personnel having the capability and responsibility of correcting or assessing the condition.

**8.1.1.1** The FESO shall have a procedure in place for implementing the corrective action.

**8.1.1.2** Documentation shall be established to record the following:

- (1) Date and time that the risk was discovered
- (2) Brief description of the risk found
- (3) Any action taken at the time the risk was discovered
- (4) Date and time that the corrective action was taken

**8.1.1.3** Copies of all risk-related correspondence and documentation shall be forwarded to the FESO safety officer.

**8.1.2\*** Whenever possible, FESO vehicles shall not be operated in reverse.

**8.1.3** The FESO shall develop written standard operating procedures requiring drivers/operators to discontinue the use of manual brake limiting valves, frequently labeled "wet/dry road switch," and requiring that the valve/switch remain in the "dry road" position, where provided on vehicles.

**8.1.4\*** Helmets and eye protection shall be provided for the use of members riding in cabs or tiller seats that are not enclosed on at least three sides and at the top.

**8.1.5** No member shall be allowed to stand on the tail step, side steps, running boards, or any other location on the apparatus while the apparatus is in motion, except when loading hose provided all provisions of 8.1.6 have been met.

**8.1.6** Hose-loading procedures shall be specified in written standard operating procedures that include at least the safety conditions stated in 8.1.6.1 and 8.1.6.2.

**8.1.6.1** All members involved in the hose-loading procedures shall have been trained in these procedures.

**8.1.6.2** Hose-loading operations shall be permitted to be performed on moving fire apparatus only where all of the conditions in 8.1.6.2.1 through 8.1.6.2.3 are met.

**8.1.6.2.1** A member, other than those members loading hose, shall be assigned as a safety observer.

**8.1.6.2.2** The safety observer shall have an unobstructed view of the hose-loading operation and shall be in visual and voice contact with the apparatus driver/operator.

**8.1.6.2.3** Vehicular traffic other than FESO vehicles shall be excluded from the area or shall be under the control of authorized traffic control persons.

**8.1.6.3** The FESO apparatus shall be driven only in a forward direction at a speed of 5 mph (8 kph) or less.

**8.1.6.4** Members shall be permitted to be in the hose bed but shall not be permitted to stand while the apparatus is in motion.

**8.1.6.5** Prior to the beginning of each hose-loading operation, the situation shall be evaluated to ensure compliance with all provisions of the standard operating procedure.

**8.1.6.6** Where compliance with the standard operating procedure is not possible, or where there is any question as to the safety of the operation for the specific situation, the hose shall not be loaded onto the moving fire apparatus.

**Δ 8.1.7\*** Hearing protection shall be utilized wherever noise levels exceed those specified in NFPA 1500.

**8.1.8 Hazard Prevention Training.** All personnel assigned to operate FESO vehicles shall be trained in hazards associated with the vehicles they are expected to use. (*See Annex B.*)

### 8.2 FESO Vehicle Drivers'/Operators' Responsibility.

**8.2.1** FESO vehicles shall be operated only by members who have successfully completed an approved driver training program or by student drivers who are under the direct supervision of a qualified driver.

**8.2.2\*** The driver/operator of an FESO vehicle shall be directly responsible for the safe and prudent operation of the vehicle under all conditions.

**8.2.3\*** Where the driver/operator is under the direct supervision of an officer, that officer is responsible for the operation of the vehicle.

**8.2.4** During non-emergency travel, drivers/operators of FESO vehicles shall obey all traffic control signals and signs and all the laws and rules of the road in the jurisdiction for the operation of motor vehicles.

**8.2.5\*** During non-emergency travel, emergency warning lights shall not be used.

**8.2.5.1** During non-emergency travel, traffic control devices shall not be used.

**8.2.6\*** All FESO vehicle drivers/operators shall adhere to FESO rules, regulations, orders, and standard operating procedures of the authority having jurisdiction, even where operating in a jurisdiction other than their own.

**8.2.7** Drivers/operators shall not move FESO vehicles until all persons on the vehicle are seated and secured with seat belts in approved riding positions, other than as specifically allowed in 8.3.3.

**8.2.8\* Mirror Adjustment.** The driver/operator shall be trained in how to adjust the mirrors to provide the optimal field of vision and work with a partner to identify the remaining blind spots.

**8.2.9\* Burning Embers.** Personnel shall be trained to recognize where the air intake opening is located, under what conditions burning embers could be ingested into the engine air



intake, and how to position and operate the vehicle in a manner that reduces the risk of engine fire caused by burning embers.

#### **8.2.10 Pinch and Crush Hazards.**

**8.2.10.1\*** Personnel shall be trained to inspect and identify pinch or crush points.

**8.2.10.2** Personnel assigned to each vehicle shall be trained to recognize each pinch or crush point.

**8.2.10.3** Work procedures and operational methods shall be developed to enable personnel to perform their functions while staying clear of all pinch and crush points on the vehicle.

**8.2.10.4** Personnel authorized to operate or climb a ladder-style device shall be trained to recognize and avoid the danger of climbing or standing on the ladder while it is being extended or retracted.

**8.2.10.5** All personnel shall be kept clear of ladder rungs during extension or retraction of a ladder-style device.

**8.2.11 Wheel Chocks.** Operators of FESO vehicles other than passenger cars and light trucks shall be trained to always chock the wheels of the vehicle after applying the parking brake.

**8.2.12\* Auxiliary Brakes.** Drivers of vehicles equipped with auxiliary braking systems shall be trained on when and how to use an auxiliary braking device during slippery conditions.

**8.2.13\* Engine Operation Around Fuel Vapors.** Drivers of diesel engine-equipped vehicles shall be trained in the hazard of operating the vehicle around fuel vapors.

#### **8.2.14 Hose Storage Covers and Restraints.**

▲ **8.2.14.1** Personnel shall be trained in how to use and adjust hose restraint devices in compliance with the vehicle manufacturer's operator manual, NFPA 1901 and NFPA 1906.

**8.2.14.2** If the apparatus does not include hose restraints, personnel shall be trained to pack and secure hose in a manner that eliminates the possibility that the hose can come out of the storage area during transport.

**8.2.14.3** Personnel shall be trained in the hazards of solid hose storage covers in windy conditions.

**8.2.15 Inlet and Discharge Caps.** Personnel assigned to operate pumping apparatus shall be trained on methods to eliminate pressure in the lines before removing inlet and discharge caps.

**8.2.16 Aerial Device Operation.** Personnel assigned to an aerial apparatus shall be trained on the safe operation of the device using the instructions provided for the vehicle and the device manufacturer's operator manual.

### **8.3 Responsibility of Persons Riding in or on FESO Vehicles.**

**8.3.1\*** All persons riding in or on an FESO vehicle or apparatus shall be seated in approved riding positions and shall be secured to the vehicle by seat belts whenever the vehicle is in motion.

**8.3.1.1** Riding on tail steps, side steps, running boards, or in any other exposed position shall be specifically prohibited. (*See 8.1.5.*)

**8.3.1.2** Standing while the vehicle is in motion shall be specifically prohibited.

**8.3.2** The number of members riding on a piece of apparatus shall be limited by the number of seats and seat belts that are provided in approved locations.

**8.3.3\*** Members actively performing necessary emergency medical care while the vehicle is in motion shall be secured to the vehicle by a seat belt, or by a safety harness designed for occupant restraint, to the extent consistent with the efficient provision of such emergency care.

**8.3.4** All persons in the vehicle, other than those covered in 8.3.3, shall be seated and belted in approved riding positions while the FESO vehicle is in motion.

**8.3.5** Members riding in an FESO vehicle shall remain seated and secured until the vehicle comes to a complete stop.

**8.3.6** While the vehicle is in motion, the donning or doffing of equipment and personal protective clothing that requires removal of any restraining belt or other device shall be prohibited.

**8.3.7 Vehicle Access.** Personnel shall be trained in safe methods of entering and exiting the cab and ascending and descending access stairs, steps, and ladders on the vehicle by always facing the vehicle and maintaining three points of contact at all times.

### **8.4 Apparatus Prone to Rollover.**

**8.4.1\*** The FESO shall provide specialized training to operators of vehicles with a high center of gravity, such as tenders, that are prone to rollover during both emergency and non-emergency responses.

**8.4.2** The FESO shall develop specific standard operating procedures dealing with safe operation of vehicles with a high center of gravity during both emergency and non-emergency vehicle movements.

**8.4.3** FESO apparatus operators shall follow departmental standard operating procedures dealing with the safe operation of vehicles with a high center of gravity at all times.

### **8.5 Safe Operations at Highway Incidents.**

**8.5.1\*** The authority having jurisdiction shall develop a standard operating procedure for safe positioning of FESO apparatus while operating in or near moving traffic.

**8.5.1.1** This standard operating procedure shall include, as a minimum, the following procedures to establish a temporary traffic control work zone at a roadway incident to provide a safe work area for emergency responders at the incident:

- (1) Operate in the temporary traffic control work zone at a roadway incident with due regard for moving traffic and the assigned tasks that are performed in a protected work area.
- (2) Position apparatus to provide an initial block at a roadway incident to create a protected work area for responders and systems and so equipment on the apparatus can be accessed with minimal exposure to personnel.
- (3) Deploy temporary traffic and scene control devices to provide advanced warning to drivers approaching apparatus positioned at a roadway incident.

- (4) Conduct an initial size-up at a roadway incident to identify potential hazards, and ensure that the location of the incident is communicated to responders and dispatch, initial response apparatus is positioned to protect the incident scene, and the time required for incident mitigation is estimated.
- (5) Develop an initial action plan, and deploy resources to control the incident and maximize safety for on-scene responders.
- (6) Implement an action plan for a roadway incident, and deploy resources to maximize personnel safety and to mitigate the incident.
- (7) Implement a scene safety plan so that personnel operate in protected zones, use an accountability system, and utilize all appropriate personal protective equipment.
- (8) Conduct ongoing size-up of the roadway incident so that the impact of the incident on traffic flow, the safety of responders operating at the scene, existing temporary traffic control measures, and requirements for additional resources are continuously assessed to ensure incident scene safety.
- (9) Develop a temporary traffic control plan for an intermediate or major roadway incident that will be active for more than 30 minutes, so that a temporary traffic control zone is created for the incident and adequate resources to safely implement the plan are requested.
- (10) Implement the temporary traffic control measures for an intermediate or major roadway incident that will require emergency operations for more than 30 minutes, so that responders assigned to the incident are provided with a safe work zone, traffic is moved through or around the incident safely and expeditiously, and the likelihood of secondary crashes is reduced.
- (11) Assess the effectiveness of temporary traffic control measures that have been implemented at a roadway incident, so that modifications to the temporary traffic control zone for the incident can be made to improve safety and traffic flow when necessary.
- (12) Ensure that work is accomplished within a unified incident command structure at a roadway incident, so that the assignment is accomplished safely and responding agencies are coordinated throughout the roadway incident.
- (13) Coordinate the demobilization of temporary traffic control measures implemented at a roadway incident, so that traffic is allowed to flow at normal capacity as the emergency operations are completed and responding units are released.
- (14) Conduct a post incident analysis of roadway incident operations, so that improvements are made to existing agency standard operating procedures that are based on experience gained from these incidents.

**8.5.2** All FESO members shall receive initial and annual training on departmental standard operating procedures relating to operations in or near moving traffic.

**8.5.3** All FESO members shall follow departmental standard operating procedures while conducting operations in or near moving traffic.

**8.5.4\*** Where an FESO vehicle acts as a block at a nighttime incident, sources of vision impairment to approaching motorists, such as headlights and spotlights, shall be turned off. The FESO vehicle's warning lights that do not create a source of

vision impairment shall remain on to warn oncoming traffic of emergency scene operations.

## **8.6 Ambulance Operation.**

### **8.6.1 Primary Patient Care Position.**

**8.6.1.1** The primary patient care position shall be identified for any ambulance, and personnel shall be trained to use this position in a manner that will accommodate care-giving while allowing the operator the best opportunity to remain in a seated and belted condition.

**8.6.1.2** Personnel shall be trained in methods to maximize the amount of time they are seated and belted while the vehicle is in motion.

**8.6.1.3** Personnel shall be trained in the importance of restraining themselves and others in the ambulance to minimize the risk of death or injury during a crash.

### **8.6.2 Child Seating Restraints.**

**8.6.2.1** Seating positions in the ambulance that are most appropriate for transporting infants and children shall be identified.

**8.6.2.2** Personnel shall be trained in the correct methods of securing infant and child seats.

**8.6.2.3** Personnel shall avoid transporting infants in a side facing orientation, in seating positions that would be subject to flying objects in the event of a crash, and in seats in locations with air bags.

**8.6.2.4 Cot Retention.** Personnel shall be trained in the correct methods of securing patients onto the cot prior to transport.

## **Chapter 9 Crash Review**

### **9.1 General.**

**9.1.1** The authority having jurisdiction shall be responsible for developing and implementing a crash investigation procedure.

**9.1.2\*** All crashes, injuries, fatalities, near misses, and violations of rules, regulations, laws, and orders involving FESO vehicles shall be investigated, the root causes shall be determined, and full documentation shall be provided.

**9.1.3** The authority having jurisdiction shall take whatever corrective action is necessary to avoid repetitive occurrences of incidents identified in 9.1.2.

**9.1.4\*** The training program shall include a review and critique of crash scenarios, both local and national, to serve as an objective learning experience.

### **9.2 Crash and Injury Reports and Records.**

**▲ 9.2.1** The authority having jurisdiction shall establish a data collection system and shall maintain permanent records of all on-duty crashes and injuries involving fire service vehicles in accordance with NFPA 1500.

**▲ 9.2.2** The safety officer shall manage the collection and analysis of this information as specified in NFPA 1521.



**9.2.3\*** The data collection system also shall maintain individual employee records of all on-duty crashes and injuries involving motor vehicles, service vehicles, and fire apparatus.

**9.2.3.1** Individual employee records shall include, but not be limited to, the following:

- (1) On-duty motor vehicle crash history
- (2) Preventable versus nonpreventable crashes
- (3) Remedial training recommended/received as a result of previous crashes
- (4) Safety/crash review committee recommendations
- (5) All investigative/review committee reports of crashes
- (6) Transcripts of state driver's license records

**9.2.4** Reports shall be issued to the chief on a recurring basis to summarize the status, disposition, and subsequent corrective actions relative to on-duty crashes and injuries involving vehicles owned or leased by the FESO, fire apparatus or heavy equipment, and personal vehicles that are used to transport members.

**Δ 9.2.5** Records shall be maintained on all crash and injury prevention recommendations made and actions taken to correct unsafe conditions or practices involving the usage or operation of fire department vehicles or apparatus as specified in NFPA 1521.

## Chapter 10 Vehicle and Apparatus Care

### 10.1 FESO and Aircraft Rescue/Fire-Fighting Vehicles and Apparatus.

**10.1.1** The FESO shall consider the safety and health of vehicle occupants as primary concerns in the specification, design, construction, acquisition, operation, maintenance, inspection, and repair of all FESO vehicles.

**10.1.2** All new FESO vehicles shall be specified and ordered in accordance with the FESO vehicle standards specified in Section 4.1.

**Δ 10.1.3** Where tools, equipment, or self-contained breathing apparatus (SCBA) are stored within enclosed seating areas of FESO vehicles, such items shall be secured in accordance with the applicable requirements of NFPA 1901, NFPA 1906, NFPA 414, or NFPA 1917.

**10.1.4** The means of holding the items in place or the compartment shall be designed to minimize injury, during travel, to persons in the enclosed area of the vehicle resulting from loose equipment that moves in the event of a crash, a rapid deceleration, or a rapid acceleration.

### 10.2 Inspection, Maintenance, and Repair of Vehicles.

**10.2.1\*** A member assigned by the authority having jurisdiction shall be responsible for the readiness of the vehicle prior to operation of the vehicle.

**10.2.2\*** To identify and correct unsafe conditions, FESO apparatus shall be inspected at least weekly and within 24 hours after being used in emergency response.

**10.2.2.1** If repairs are required, the apparatus shall be placed out of service until repairs are completed.

**10.2.2.2** The apparatus shall be re-inspected prior to being placed in emergency service.

**10.2.3\*** A preventive maintenance program shall be established, and records shall be maintained as specified in Section 10.3.

**10.2.3.1** Maintenance, inspections, and repairs shall be performed by qualified persons in accordance with the manufacturer's instructions.

**10.2.3.2** Operating and maintenance instructions and manuals shall be provided and maintained for those performing routine tests, inspections, and servicing functions.

**10.2.4** The authority having jurisdiction shall establish a procedure to remove unsafe vehicles from service.

**10.2.4.1\*** This procedure shall include a list of defects considered unsafe by the authority having jurisdiction and the individual with the responsibility and authority to remove a unit from service.

**10.2.4.2** Any FESO vehicle found to be unsafe shall be taken out of service immediately until repaired.

**Δ 10.2.5** All aerial devices shall be inspected and service tested in accordance with the applicable requirements of NFPA 1911.

### 10.3 Vehicle Records.

**10.3.1** A complete inspection, maintenance, and repair record of every vehicle used by the authority having jurisdiction shall be maintained by a responsible person or persons.

**10.3.2** The record shall include the date and description of all maintenance, repairs, and state, provincial, or local inspections performed on the vehicle.

## Annex A Explanatory Material

*Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.*

**A.1.2.1** Unconventional means of transportation include bicycles, motorcycles, motor scooters, and so forth.

**A.1.2.2** Compliance should help to reduce the cost of replacement, repairs, and out-of-service time of vehicles. Compliance can also reduce insurance premiums and civil liability and can enhance public relations.

**A.3.2.1 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

**A.3.2.2 Authority Having Jurisdiction (AHJ).** The phrase “authority having jurisdiction,” or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**A.3.3.6 Hazard.** Hazards include the characteristics of facilities, equipment systems, property, hardware, or other objects and the actions and inactions of people who create such hazards.

**A.3.3.9 Member.** A FESO member can be a full-time or part-time employee or a paid or unpaid volunteer, can occupy any position or rank within the FESO, and might or might not engage in emergency operations. [1500,2018]

**A.4.1.4** Although the frequency of the medical evaluation is not specified, it is recommended that the medical evaluation be made at least annually.

**A.4.1.5** The program should include, as a minimum, drug and alcohol testing in any crash involving an injury or fatality. Additional testing criteria should be considered for all incidents where property damage has occurred or when FESO vehicles sustain a set minimum cost to repair. The department should also consult with risk management resources and consider state law requirements in setting program criteria.

Δ **A.4.2.1** Section 4.2 of NFPA 1500 requires that the fire department adopt an official written risk management plan that addresses all fire department policies and procedures, including those pertaining to vehicle operations.

**A.4.2.1.2** Essentially, a risk management plan serves as documentation that risks have been identified and evaluated and that a reasonable control plan has been implemented and followed.

**A.4.2.1.2(1)** For every aspect of the operation of the FESO, a list of potential problems should be compiled in the identification of risks. The following are examples of sources of information that can be useful in this process:

- (1) A list of risks to which the members are or can be exposed
- (2) Records of previous crashes, illnesses, and injuries, both locally and nationally
- (3) Information from sources such as facility and apparatus surveys and inspections

**A.4.2.1.2(2)** Each item specified in the risk identification process should be evaluated using the following two questions, which can help to set priorities in the control plan:

- (1) What is the potential frequency of occurrence?
- (2) What is the potential severity and expense of occurrence?

Some sources of information that can be useful include the following:

- (1) Safety audits and inspection reports
- (2) Prior crash, illness, and injury statistics
- (3) Application of national data to the local circumstances
- (4) Professional judgment in evaluating risks unique to the jurisdiction

Δ **A.4.2.1.2(3)** Once risks are identified and evaluated, a control for each should be implemented and documented. The two primary methods of controlling risk, in order of preference, are as follows:

- (1) Wherever possible, the risk or the activity that presents the risk should be totally eliminated or avoided. For example, if falling on the ice is the risk, members should not be permitted outside when icy conditions are present.
- (2) Where it is not possible or practical to avoid or eliminate the risk, steps should be taken to control it. For the example in A.4.2.1.2(3)(1), some methods of control would include sand or salt procedures and the use of proper footwear. Other methods of control to consider are the following:
  - (a) Safety program development, adoption, and enforcement
  - (b) Standard operating procedures development, dissemination, and enforcement
  - (c) Training
  - (d) Inspections

**A.4.2.1.2(4)** As with any program, it is important to evaluate whether the plan is working. Periodic evaluations should be made and, if the program elements are not working satisfactorily, modifications should be made.

**A.4.2.5** FESOs with unique vehicles such as, but not limited to, the following should ensure that all risks are reviewed:

- (1) Amphibious vehicles
- (2) Bulldozers
- (3) Buses
- (4) Cranes
- (5) Graders
- (6) Mobile water supply apparatus
- (7) Off-road vehicles
- (8) Tractors
- (9) Tractor trailers
- (10) Rescues
- (11) Staff and command vehicles
- (12) Utility vehicles

**A.4.3.2** Situations requiring such variations can include, but are not limited to, responding in congested areas, driving in adverse weather conditions, natural disasters, and civil unrest or disorders.

**A.4.3.5** Examples include bikes, all-terrain vehicles, motorcycles, personal transportation machines (i.e., Segways), snowmobiles, and similar vehicles.

**A.4.3.9** See NFPA 1500 and Section 8.5 for additional guidance.

**A.4.3.11** All FESOs should encourage all vehicle drivers/operators to obtain the appropriate CDL operator's license with the appropriate endorsements as required by the federal government for commercial vehicle drivers.

**A.4.3.12** Such changes might include revocation or suspension of driver's license or other driving restriction, the development of a medical condition, or changes in eyesight. The authority having jurisdiction might also consider an accumulation of "points" to be sufficient to re-evaluate the driver status.

**A.5.1.3** Actual driving skills need to be practiced before driving on public streets, when possible.

**A.5.2.1** Driver training can include the use of virtual reality driver training simulators (DTS) that simulate FESO response conditions, provided the requirement of 5.2.2 is strictly enforced. DTS can be utilized for various types of driving conditions that would normally require the fire apparatus driver/operator to be placed into a dangerous situation that could result in property damage, serious bodily harm, or fatality (e.g., intersection analysis or scene placement) or in conditions that cannot be prescheduled or foreseen (e.g., rain, snow, or other types of weather conditions).

**A.5.3.1** Defensive driving means doing all that can be done to prevent a crash from occurring. The defensive driver adjusts his or her driving to fit the weather conditions and the actions of other drivers and pedestrians. Where a dangerous situation is identified, the defensive driver takes preventive action. The defensive driver does not assume that the crash will be prevented by another driver.

Driver trainees should think about what can happen when approaching a potentially dangerous situation. For example, where children are playing by the side of the road, the defensive driver should be prepared if a child runs into the street. A ball rolling onto the roadway is often followed by a child.

It is important to see and be seen. Driver trainees should avoid driving in the blind spots of other vehicles and should scan the sides and rear of the vehicle continually to prevent tunnel vision.

The keys to defensive driving include the following:

- (1) Aiming high in steering
- (2) Getting the big picture
- (3) Maintaining eye movement
- (4) Leaving an "out"
- (5) Making sure others see you

**▲ A.5.3.2** The committee's intent is that this standard be applied to all fire service vehicles. Drivers of vehicles not specifically addressed in Chapters 5 through 10 of NFPA 1002 (e.g., staff or command vehicles, rescue or utility vehicles, buses), are expected to meet the requirements of Chapter 4 of NFPA 1002. Agencies operating unique or special vehicles (e.g., tractors, bulldozers, cranes, graders) should develop job performance requirements and training programs for those vehicles.

**A.5.3.3** The committee's intent is not to restrict training opportunities for FESO vehicle trainees under the provisions of this paragraph. However, the committee's intent is that all drivers/operators who have been approved by the authority having jurisdiction comply with this requirement.

**A.5.3.4** In 1986, the United States Congress passed the Commercial Motor Vehicle Safety Act. This act requires that

states adopt uniform minimum licensing and testing standards for drivers of commercial vehicles. Although waivers have been granted for the operation of some emergency vehicles equipped with audible and visual signals while operated by a member of a volunteer or paid fire or rescue organization, the committee feels that those members should be knowledgeable of their state requirements.

**A.5.3.5** Hazards associated with preventive maintenance procedures should be included in training sessions. Some examples of these hazards include hydrogen gas explosions and sulfuric acid burns resulting from the improper testing or "jumping" of batteries, flammability and toxicity of fumes associated with fuels, and scalding resulting from improper opening of radiators.

**A.5.3.7** Drivers who could be required to drive or operate FESO response vehicles under off-road driving conditions should be familiar with the dangers unique to those conditions.

**A.5.3.8** Examples of unconventional and specialized units could include fabricated water tankers that can or cannot have baffling, heavy-duty rescue units, towing vehicles, cranes, etc., that due to unique road-handling characteristics can warrant additional training and certification.

**A.5.3.11** The training program should include the proper use of mobile data terminals (MDTs), cell phones, radios, backup cameras, collision avoidance systems, and other electronics provided.

**A.5.3.14** A common training method used in the fire service is a critique of fire suppression activities. Whenever a vehicular crash occurs, the incident should be investigated thoroughly and critiqued to ensure that preventive measures are used in the future. Crash reports should be used as training tools, and care should be taken not to embarrass those involved in the crash.

**A.5.4.1** While requirements and regulations can vary by jurisdiction, the following should be considered when selecting an instructor:

- (1) Possession of a valid license for the type and class of vehicle
- (2) Approval of the official with overall responsibility for the authority having jurisdiction's training program
- (3) Prior demonstration of the ability to operate the type and class of vehicle properly and safely
- (4) Availability of a professional instructor employed by a private sector driver training program

**A.5.4.2** A particular training class or session can be conducted by an individual who has special expertise or abilities in the subject area, whether or not the instructor is a member of the fire department or a qualified fire service instructor.

**A.5.5.8** Field testing should be conducted in an isolated area away from public vehicular or pedestrian traffic. The serpentine exercise can be used as practice for or in the evaluation of a driver's ability to steer the apparatus in close clearances without stopping. The exercise should be conducted with the apparatus moving first backward and then forward. The course or path of travel for this exercise can be established by placing a minimum of three markers in a line, each spaced between 30 ft and 38 ft (9 m and 12 m). The spacing of the markers should be based on the wheel base of the vehicle used. Adequate space should be provided on each side of the markers so the appara-

tus can move freely. The driver should drive the apparatus along the left side of the markers in a straight line and stop just beyond the last marker. The driver then should back the apparatus between the markers by passing to the left of marker No. 1, to the right of marker No. 2, and to the left of marker No. 3. At this point, the driver should stop the vehicle and then drive forward between the markers by passing to the right of marker No. 3, to the left of marker No. 2, and to the right of marker No. 1. Note that for large vehicles, such as aircraft rescue and fire-fighting (ARFF) apparatus, this course could need to be modified.

**A.5.6** See NFPA 1401 for further information and guidance.

**A.5.6.2** A log of the driver's experience should be maintained that includes whether the activity is non-emergency, training, or emergency driving experience.

**A.6.1.1** Most motor vehicle laws and regulations are governed by the appropriate state or province; however, there could be certain local ordinances regarding the operation of motor vehicles with which the FESO driver should be familiar. Weight and height restrictions on certain highways, local parking plazas, bridges, and overpasses should be observed.

**A.6.1.2** In addition to state and local regulations on most vehicles, the DOT establishes specifications and operating requirements by weight and application for buses, trucks, and trailers.

**A.6.1.3** These waivers pertain to restrictions such as responding and returning speed limits, driving in adverse weather conditions, direction signs, and traffic signals.

**A.6.2.1** The FESO should have, as a minimum, the following insurance protection:

- (1) Worker's compensation/employer's liability coverage meeting the state's legal requirements
- (2) Automobile liability coverage on all owned, non-owned, or hired vehicles covering both injury and property damage
- (3) Commercial liability coverage for both bodily injury and property damage caused by or arising out of the department's operations, which can be either through the purchase of traditional commercial insurance, a self-funded program, or a combination of both

**A.6.2.2** Acts of gross negligence can void any tort protection afforded by the authority having jurisdiction.

**A.7.1.1** Each jurisdiction or FESO could have its own rules governing the speed of FESO vehicles when responding to emergencies. Some jurisdictions permit FESO vehicles to exceed posted speed limits, while others limit emergency vehicles to the posted speed limit. All drivers should have a thorough knowledge of the rules governing speed for FESO vehicles in their own jurisdictions and the jurisdictions of their mutual aid partners.

**A.7.1.3** Crashes at intersections can contribute to both civilian and FESO personnel deaths and injuries while FESO vehicles are responding to or returning from an emergency incident. Coming to a complete stop where there are any intersection hazards and proceeding only when the driver can do so safely can reduce crashes and risk of injury or death. It is recommended that intersection control devices be installed that allow FESO vehicles to control traffic lights at intersections.

**A.7.1.4** It is recommended that where railroad crossings are unguarded or where visibility is limited for any reason, including geography or weather, the FESO apparatus should come to a complete stop before entering the crossing and should not proceed to cross until a crew member on foot outside the vehicle has signaled that it is safe to cross.

Where the vehicle driver is responding alone or where, due to patient care, the crew member is unable to assist, the vehicle driver should idle the engine; turn off all radios, fans, wipers, and other noise-producing equipment in the cab; lower the windows; and listen for a train's horn before entering a graded crossing.

**A.7.1.5** Operating space is that area around the vehicle that enables the driver to stop or turn in order to avoid another vehicle or object. The necessary following distance varies depending on the type of pavement and whether the roadway is wet or dry, the speed of the vehicle, the condition of the braking system, and the reaction time of the driver. Rear-end collisions often occur because of inadequate operating space.

**A.7.1.6** A rule of thumb established by some training organizations standardizes the traveling distance for vehicles and apparatus traveling in queue as a 5-second interval for nonresponding and 8-second interval for responding apparatus and vehicles. This margin would provide adequate safe separation during speed-up and braking maneuvers.

**A.7.1.7** When it is necessary to pass other vehicles, the pass should be made to the left side of the other vehicle. Passing on the right side of other vehicles should be avoided.

**A.7.1.9** Many FESO responses can be done in a non-emergency mode. Such responses can include the following:

- (1) Lock-outs
- (2) Dumpster fires (no exposures)
- (3) Investigation of unknown odors
- (4) Assisting police
- (5) Standby for bomb scare

**A.8.1.2** In general, when drivers position FESO apparatus, the vehicles should be positioned so that they are not required to back up. Where vehicles need to be backed up, at least one person (spotter) should be positioned at the rear of the vehicle to assist the driver. In the event an apparatus needs to be backed up without assistance, the driver should come to a complete stop, secure the apparatus, and walk completely around the unit to identify any potential obstacles or problems. All FESO apparatus should be equipped with a backup alarm.

**A.8.1.4** Helmets and eye protection (e.g., goggles, safety glasses, or face shields) should be worn by all members riding in positions that do not provide the protection of an enclosed cab. Helmets are also recommended for members riding in enclosed areas where seats are not designed to provide head and neck protection in the event of a collision. Properly designed seats with head and neck protection alleviate the need for helmets, and, in some cases, helmets can compromise the safety provided by the seats.

**▲ A.8.1.7** NFPA 1500 requires that hearing protection be provided and used by all members riding on fire apparatus where subjected to a noise level in excess of 90 dB. In order to meet this requirement, it is the responsibility of the fire department to conduct surveys and measure sound levels in each vehicle under all operating conditions. Where necessary, the fire



department should install adequate protective equipment to shield employees from overexposure.

**A.8.2.2** The driver of any vehicle has a legal responsibility for its safe and prudent operation at all times.

**A.8.2.3** While the driver is responsible for the operation of the vehicle, the officer is responsible for the actions of the driver.

▲ **A.8.2.5** Emergency lights should be used only when responding to and operating at the scene of an emergency. Their use at other times can be confusing to other motorists and can create apathy by the public. The use of identification lights or non-emergency warning lights such as amber flashers on the rear of apparatus can be appropriate, depending on the circumstances. This standard is not intended to contradict the requirements of federal, state, or provincial laws or the provisions of NFPA 1901.

**A.8.2.6** As is the case with most mutual aid arrangements, the rules governing that jurisdiction designated for emergency operations and response should be observed.

**A.8.2.8** This knowledge can then be used to improve judgment when backing up, changing lanes, and maneuvering the vehicle.

**A.8.2.9** Burning embers in the engine air filter can catch the engine and vehicle on fire.

**A.8.2.10.1** Pinch and crush points include moving components such as aerial ladders, mechanized equipment storage devices, doors, light towers, and similar items.

**A.8.2.12** Auxiliary braking devices might need to be disengaged when the apparatus is operated on slippery surfaces. Follow the auxiliary braking device manufacturer's recommendations.

**A.8.2.13** Diesel engines do not require a spark for ignition and will continue to run as long as there is fuel available. If the engine is operated in an atmosphere that is laden with fuel vapors such as is found at a fuel spill, the engine could increase speed uncontrollably. Turning the ignition switch or battery switch off in this situation will not affect the speed of the engine. Before operating a diesel engine in this type of environment, ensure that the vehicle is equipped with a means of shutting off the air intake supply to the engine and that the driver is present to operate the shutdown whenever the engine is running.

▲ **A.8.3.1** For more specific information concerning this subsection, the reader should refer to Section 6.3 of NFPA 1500.

**A.8.3.3** There are some instances in which members need to provide emergency medical care while the vehicle is in motion. In some situations, the provision of such care does not allow the members to remain seated and secured to the vehicle. Such situations, while they occur infrequently, could include performing chest compressions during CPR. If a vehicle crash were to occur while an unsecured member was performing necessary medical care, there could be substantial risk of injury to the member.

**A.8.4.1** See USFA report FA-248, *Safe Operations of Fire Tankers*, for additional guidance.

**A.8.5.1** A model standard operating procedure and additional information on safe operations in or near moving traffic may be found at [www.respondersafety.com](http://www.respondersafety.com).

**A.8.5.4** Public safety agencies should examine their policies on the use of FESO vehicle lighting, especially after a traffic incident scene is secured, with the intent of reducing the use of this lighting as much as possible while not endangering those at the scene. Special consideration should be given to reducing or extinguishing forward facing FESO vehicle lighting, especially on divided roadways, to reduce distractions to oncoming road users. Because the glare from floodlights or vehicle headlights can impair the nighttime vision of approaching road users, any floodlights or vehicle headlights that are not needed for illumination, or to provide notice to other road users of an incident response vehicle being in an unexpected location, should be turned off at night.

**A.9.1.2** The responsibility for establishing and enforcing safety rules and regulations is that of the management of the fire department. Enforcement implies that appropriate action, including disciplinary measures, if necessary, is to be taken to ensure compliance. A standard approach to enforcement should address both sanctions for violations and rewards for accomplishments.

**A.9.1.4** A common training method used in the fire service is a critique of fire suppression activities. Whenever a vehicular crash occurs, the incident should be investigated thoroughly and critiqued to ensure that preventive measures are used in the future. Crash reports should be used as training tools, and care should be taken not to embarrass those involved in the crash.

▲ **A.9.2.3** As part of a crash prevention program, the FESO should maintain on a permanent basis a copy of a state driver's license transcript for all FESO vehicle drivers/operators. These records should detail, at a minimum, a 3-year driving history that is updated at least annually. These records should be reviewed by the safety officer for potential safety and risk exposure as specified in 4.2.3 of NFPA 1500.

**A.10.2.1** The FESO driver/operator is not expected to be a mechanic. However, the driver/operator is expected to perform routine maintenance such as replacing light bulbs, checking and maintaining fluid levels and tire pressures, and keeping vehicles clean. Additional items that should be checked include the following:

- (1) Windshield and all windows are clean.
- (2) Driver's seat is adjusted properly.
- (3) Mirrors are adjusted properly.
- (4) Seat belts are easily accessed.
- (5) Lights and warning devices are in working order.
- (6) All compartments and vehicle doors are closed.

**A.10.2.2** The purpose of the requirements in 10.2.2 is to ensure that all vehicles are inspected on a regular basis and checked for the proper operation of all safety features. This inspection should include tires, brakes, warning lights and devices, headlights and clearance lights, windshield wipers, mirrors, and seat belts. Apparatus should be started and the operations of pumps and other equipment should be verified. Fluid levels should be checked regularly. Where apparatus is in regular daily use, these checks should be performed daily. Apparatus stored in unattended stations that might not be used for extended periods should be checked weekly. Any time such a vehicle is used, it should be checked before being placed back in service. The 24-hour reference provides for situations where a vehicle can be used within the period preceding a scheduled

inspection, although any deficiencies noted during use should be corrected without delay.

**A.10.2.3** FESO vehicle drivers/operators should perform routine tests, inspections, and servicing functions on the specified systems and components, according to manufacturer's specifications, so that the safe operational status of the vehicle is verified. Areas to be checked include the following:

- (1) Batteries
- (2) Braking system
- (3) Coolant system
- (4) Electrical system
- (5) Fuel
- (6) Hydraulic fluids
- (7) Lubrication
- (8) Oil
- (9) Tires
- (10) Steering system
- (11) Belts
- (12) Tools, appliances, and equipment

The preventive maintenance program should further build on the inspections with monthly, semiannual, and annual servicing and testing. This should be done in accordance with existing NFPA testing standards, manufacturer's recommendations, local experience, and accepted good maintenance practices. The manufacturer's instructions should be considered as minimum criteria for the maintenance, inspection, and repair of equipment.

**A.10.2.4.1** The authority having jurisdiction should establish, in writing, the conditions in the following vehicle equipment systems that require the vehicle to be placed out of service:

- (1) Brakes
- (2) Steering
- (3) Emergency warning lights
- (4) Audible warning devices
- (5) Tires/wheels
- (6) Fuel system
- (7) Hydraulic system
- (8) Air system
- (9) Crankcase oil
- (10) Running lights
- (11) Electrical system
- (12) Coolant system
- (13) Drive train
- (14) Suspension

Note that this list should not be considered all-inclusive. The authority having jurisdiction should review and expand it as appropriate.

#### **Annex B Emergency Vehicle Hazard Avoidance Checklist**

*This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.*

**Δ B.1** Table B.1 is not all-inclusive of the requirements within NFPA 1451 and is included as a basis for establishing the organization's training program.

**Δ Table B.1 Emergency Vehicle Hazard Avoidance Checklist**

Topic	Description	Details
<b>General Emergency Vehicle Training</b>		
Seat Belts	<input type="checkbox"/> Always wear a seat belt when the vehicle is in motion. <input type="checkbox"/> Ride with the seat back upright and the lap belt snug and low about the hips. <input type="checkbox"/> Keep shoulder belt snug against the chest. <input type="checkbox"/> Never use a single belt for more than one person or across more than one seating position. <input type="checkbox"/> Never wear the shoulder belt under the arm or swing it around the neck over the inside shoulder. <input type="checkbox"/> Place the seat belt inside the cab before closing the door.	<p>Wearing your seat belt greatly reduces the risk of injury or death in a crash. See the Ambulance Training section of this table for instructions on patient care during transport. This configuration will reduce the risk of serious injury to the abdomen or neck that could be caused by sliding under the seat belts in a crash.</p> <p>A loose shoulder belt increases the excursion of the occupant in a crash.</p> <p>Seat belts are designed to restrain the weight of only one person at a time. Doubling-up can cause the seat belts to break in a crash.</p> <p>The shoulder belt must be worn properly over the outside shoulder, or it will not restrain the occupant in a crash.</p> <p>A seat belt that is left outside the door can be damaged by being caught between the door latch and the striker. A damaged belt can fail in a crash.</p>
Air Bags	<input type="checkbox"/> Do not place objects in the path of an air bag deployment.	<p>Know where each air bag on the vehicle will deploy. Any item placed in this area will be launched by the air bag during a crash and can injure or kill the occupant.</p>
Seat Belt Tensioners	<input type="checkbox"/> Keep items and body parts away from the path of belt tensioning devices.	<p>Know where each seat belt tensioning device is on the vehicle. These devices will engage instantly and with great force during deployment in a crash.</p>
Suspension Seat Pull-Down Devices	<input type="checkbox"/> Keep items and body parts away from the path of the suspension seat mechanism and pull-down device.	<p>Know where each suspension seat pull-down device is on the vehicle. These devices will engage instantly and with great force during deployment in a crash.</p>

(continues)



**Table B.1** *Continued*

Topic	Description	Details
Crash Sensors	<input type="checkbox"/> Never disturb a crash sensor from its factory-installed position.	A roll sensor that is moved during servicing can deploy the air bags and belt tensioning devices without warning. Frontal crash sensors might not work during a crash if disturbed.
SCBA Storage	<input type="checkbox"/> Never ride in a seat equipped with an SCBA storage bracket unless the SCBA pack is in place or a suitable substitute seat back insert is installed. <input type="checkbox"/> Always ensure that the SCBA storage bracket is suitable for the make and model of the SCBA pack and the size of the cylinder. <input type="checkbox"/> Place movable headrests in the closed position before the vehicle is placed in motion. <input type="checkbox"/> Always leave the SCBA harness loose when riding in the seat.	<p>Riding in a seat that is equipped with an SCBA storage bracket but does not have an SCBA pack installed will not provide sufficient back support during rough riding or a crash. Back damage may result.</p> <p>Most modern SCBA storage devices must be adjusted to the specific SCBA cylinder size or SCBA pack make or model. Improperly adjusted brackets may allow the pack to come loose during a crash.</p> <p>A headrest will reduce the risk of head injury during a collision.</p> <p>Tight SCBA straps will add the weight of the occupant to the cylinder and will pull the cylinder out of the holder in the event of a crash. The cylinder restraining devices are designed for the weight of the cylinder only.</p>
Mirror Adjustment	<input type="checkbox"/> Adjust mirrors before driving.  <input type="checkbox"/> Know the blind spots.  <input type="checkbox"/> Check mirrors at start of every shift.	<p>Adjust mirrors in a way that will optimize visibility to the sides and the rear.</p> <p>Using a partner, have him or her walk around the sides and the rear of the vehicle to determine where the blind spots are.</p> <p>Adjustments for the assigned vehicle driver should be made between each shift and not postponed until the driver is driving away.</p>
Vehicle Access	<input type="checkbox"/> Use three points of contact when entering or exiting or climbing on or off the vehicle.  <input type="checkbox"/> Face inward toward steps and handholds when ascending, descending, entering, or exiting the vehicle. <input type="checkbox"/> Keep steps and handholds in continuous good repair.  <input type="checkbox"/> Keep steps clean.  <input type="checkbox"/> Use extra care during inclement weather. <input type="checkbox"/> Never step, walk, or climb on any surface unless it is slip resistant. <input type="checkbox"/> Make sure folding steps are deployed in the down position before entering, exiting, ascending, or descending.	<p>“Three points of contact” means you have one hand and two feet, or two hands and one foot, in contact with the vehicle at all times. If you cannot find features to provide three points of contact, have the vehicle modified or repaired. It is very difficult to maintain three points of contact without facing the vehicle. Backing out is much safer.</p> <p>Weak, broken, or malfunctioning steps or handholds are hazardous to you and others. Have them repaired. Ensure that attaching bolts and hardware are tight, thus eliminating any movement of steps and handholds.</p> <p>Keep steps, hand rails, and shoes free of grease, mud, dirt, fuel, ice, and snow that could cause you to slip and fall.</p> <p>Slow down during weather that can create slippery conditions on steps, walking surfaces, and handrails.</p> <p>If you must walk or work on a surface that is not slip resistant, use rubber mats or other devices keep you from slipping.</p> <p>Certain steps might be of a pivoting or folding design. Be certain that such steps are firmly engaged in the weight-bearing position before placing full weight on the step.</p>
Means of Escape	<input type="checkbox"/> Know the secondary means of escape in the event that the primary means of exit is blocked.	A crash could block doors on one side of a vehicle. Practice escaping through a secondary route, which might be over an engine tunnel, through a bulkhead passageway, or through a roof hatch.

*(continues)*

**Table B.1** *Continued*

Topic	Description	Details
Loose Items	<input type="checkbox"/> Ensure there are no loose items in a vehicle occupant area.	All items within occupied areas of an emergency vehicle should be secured in mounting devices or in compartments in accordance with the requirements of NFPA 1901, NFPA 1906, NFPA 414, or NFPA 1917.
Head Protection	<input type="checkbox"/> Know and follow head protection policy.	Helmets should be worn when working at emergency scenes around working vehicles. They should not be worn while riding inside a vehicle, as they reduce head clearance and can increase the risk of neck injury to a belted occupant during a crash.
Exterior Compartment Doors	<input type="checkbox"/> Never step on open horizontal compartment doors.  <input type="checkbox"/> Never step on open vertical compartment doors.  <input type="checkbox"/> Wear helmets when working around vehicles or apparatus.  <input type="checkbox"/> Keep compartment doors closed except when stowing or retrieving equipment.	<p>When climbing or walking on the vehicle, never step on a horizontally hinged compartment door that has been left open. Hold-open devices are not designed to support more than the weight of the door itself. Doors will close if stepped on, and personnel can fall.</p> <p>When climbing or walking on the vehicle, never step on the edge of a vertically hinged compartment door that has been left open. Vertically hinged doors can swing unexpectedly, and personnel can fall.</p> <p>Open compartment doors can extend out from the vehicle in a manner that creates a strike hazard. Walk well around open doors, not next to them or under them.</p> <p>Closed doors produce no hazard to personnel working around the vehicle.</p>
Ember-Rich Environments	<input type="checkbox"/> Know the vehicle's protection from burning embers.	Burning embers in the engine air filter can catch the engine and vehicle on fire. Some vehicles might have ember protection devices and others might not. Personnel should be trained to recognize where the air intake opening is located, under what conditions burning embers could be ingested into the engine air intake, and how to position and operate the vehicle in a manner that reduces the risk of engine fire caused by burning embers.
Night Operation	<input type="checkbox"/> Use scene lights during night operation.	Personnel should be trained in how to provide adequate lighting for people working on or around a vehicle at night to prevent slips, trips, and falls.
Operating Around Power Lines	<input type="checkbox"/> Look up and live.  <input type="checkbox"/> Keep vehicle and equipment away from power lines.	<p>Always check the area and identify power lines before positioning the vehicle and raising any device such as aerial ladders, antennae, scene lights, etc.</p> <p>Do not work within 10 ft (3.1 m) of high-voltage lines energized from 600 to 50,000 volts. Overhead power lines are not insulated. Some lines have a weather covering and appear to be insulated, but they are not. The vehicle, or parts of the vehicle, does not need to touch the power line for the vehicle to be energized. Electricity arcs across ionized paths of air when a conductor is close enough. Consider all overhead wires or cables to be hazardous and dangerous.</p>
Charged Vehicles	<input type="checkbox"/> Stay away from vehicles charged by power lines.	Never touch the outside of the vehicle while standing on the ground. Electricity will flow from the vehicle through the person and into the ground. Move away from the vehicle and stay away. Warn others to stay away.

*(continues)*

**Table B.1** *Continued*

Topic	Description	Details
	<input type="checkbox"/> Stay in or on a charged vehicle.	If a vehicle contacts a live wire or becomes charged, stay calm. Personnel on or inside of a charged vehicle should stay where they are. Unless the vehicle is on fire, it is safer to stay in the vehicle than to attempt to exit. Never allow part of your body to touch the vehicle and the ground at the same time. If it is necessary to exit the vehicle, jump as far away as possible while landing with both feet together. Maintain balance. Fall forward rather than backward towards the vehicle. Once clear from the vehicle, do not return until a power company representative confirms that it is safe and that the line has been de-energized and grounded. Do not attempt to rescue a person in or on a charged vehicle.
Pinch and Crush	<input type="checkbox"/> Identify all potential pinch or crush hazards on each vehicle.	Each emergency vehicle should be inspected to identify pinch or crush points. Personnel should be trained to recognize each pinch or crush point. Work procedures and operational methods should be followed that enable personnel to perform their functions while staying clear of all pinch and crush points on the vehicle.
Rotating Shafts	<input type="checkbox"/> Identify and stay away from all rotating shafts.	Each emergency vehicle should be inspected to identify all rotating shafts. Personnel should be trained to recognize each shaft and the hazard that it presents. Keep all personnel clear of rotating shafts. Do not wear loose clothing or other items that could get tangled in the shaft. During extremely cold weather, hot-shift PTO clutches could momentarily transmit power even when they are disengaged. Follow work procedures and operational methods that enable personnel to perform their functions while staying clear of all rotating shafts on the vehicle.
Vehicle Inspection	<input type="checkbox"/> Inspect vehicles at shift changes.  <input type="checkbox"/> Report deficiencies.  <input type="checkbox"/> Verify repairs.	<p>The daily inspection criteria from the vehicle manufacturer, department SOPs, and the federal commercial driver's license pre-trip inspection requirements should be consolidated into a single pre-trip or start-of-shift inspection. Drivers of all emergency vehicles other than passenger cars or light trucks should perform the pre-trip or start-of-shift inspection in teams of two, with one person to operate interior controls while the second person is checking for exterior functions such as turn signal lamps, flashers, brake lights, etc.</p> <p>All deficiencies should be noted and recorded in compliance with NFPA 1911.</p> <p>The prior vehicle inspection report should be reviewed at the start of each shift to ensure that any deficiency noted has been resolved.</p>
Vehicle Size and Weight	<input type="checkbox"/> Know the vehicle's size.  <input type="checkbox"/> Select appropriate routes.	<p>Drivers should be trained to recognize the height, width, and axle weights of all vehicles that they are assigned to operate. All roads and bridges that the emergency vehicle might drive upon should be identified, and a list of all height, width, and weight restrictions created. Identify alternate routes to avoid traveling over roads or bridges that would not support the vehicle load.</p>

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**Table B.1** *Continued*

Topic	Description	Details
	<input type="checkbox"/> Know the vehicle's turning radius.  <input type="checkbox"/> Know the vehicle's rear swing-out.	<p>Each vehicle has a turning capability that is measured in terms of a wall-to-wall or curb-to-curb radius. The turning capability might not be the same for each direction. Personnel should know the capability of each vehicle and be trained in maneuvering in tight conditions.</p> <p>Certain vehicles might have a large distance between the rear axle and the rear bumper. This causes the rear of the vehicle to swing outside the path of the vehicle travel during a turn. Personnel should understand the swing-out of each vehicle and be trained to drive in a manner that will avoid damage to the vehicle or its surroundings.</p>
Vehicle Loading	<input type="checkbox"/> Know axle limits and load the vehicle accordingly.  <input type="checkbox"/> Know side-to-side limits.  <input type="checkbox"/> Know, check, and set correct tire pressure.  <input type="checkbox"/> Follow limitations on fire service-rated tires.	<p>Before placing the apparatus in service, load all compartments with the intended equipment and manpower, and obtain front and rear axle weights from a certified scale. Compare the results to the axle capacities listed on the Federal Motor Vehicle Safety Standard (FMVSS) information decal located inside the cab. In-service weights must not exceed the axle capacities listed on the tag.</p> <p>Personnel should be trained in how to load equipment to ensure that side-to-side tire loading remains in compliance with NFPA 1901, NFPA 1906, NFPA 414, or NFPA 1917.</p> <p>Proper tire inflation is essential to safe vehicle performance and handling. Tire inflation pressure must match the weight on each axle. Before placing the vehicle in service, obtain the axle weights with all equipment loaded and tanks full. Adjust the tire pressure to match the tire loads.</p> <p>Fire apparatus axle loads are often higher than typical vocational trucks. Tire manufacturers recognize the need for fire apparatus to carry higher loads, but also understand that in most cases a fire apparatus does not travel at high speeds for long periods of time. Tire manufacturers rate some of their tires with a special "fire service" intermittent duty rating. This allows the tire to carry greater loads or attain higher speeds. The understanding is that these high loads and speeds will not be sustained for long periods of time. To avoid tire degradation, fire service-rated tires have limits on the amount of time they can be driven at high speed and high load before they must cool down.</p>
Brakes	<input type="checkbox"/> Know ABS operation.  <input type="checkbox"/> Chock the wheels when parked.  <input type="checkbox"/> Know that brake capabilities change after brake service.	<p>Drivers should be trained in the proper operation of brakes when apparatus are equipped with antilock braking systems (ABS), emphasizing the fact that ABS cannot provide more braking performance than the road conditions will permit.</p> <p>Operators of emergency vehicles other than passenger cars and light trucks shall be trained to always chock the wheels of the vehicle immediately after applying the parking brake.</p> <p>Drivers should be trained to be alert for service work on their apparatus involving brake lining replacement and adjust their driving accordingly. The vehicle's stopping distance and the capability of the vehicle to hold on a specific grade might decrease temporarily whenever new friction material is installed.</p>

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**Table B.1** *Continued*

Topic	Description	Details
	<input type="checkbox"/> Know how quick build-up brake systems function and drive carefully until the air pressure builds up.	Fire apparatus drivers should be trained to understand the function and limitations of the quick buildup air brake feature as required by NFPA 1901. The quick build-up feature allows the vehicle to be driven even though the front brake section may not have sufficient air pressure to enable sustained or full force braking. Use extreme caution when operating the vehicle with either air brake section charged to less than 60 psi (414 kPa). Store in-service fire apparatus with an external air supply connection to ensure that sufficient air brake system pressure is immediately available prior to each call.
Auxiliary Brakes	<input type="checkbox"/> Understand the operation of auxiliary brakes during slippery conditions.	The use of any auxiliary brake system during slippery road conditions or inclement weather could cause rear wheel lock-up and loss of vehicle control. Drivers of vehicles equipped with auxiliary braking systems should be trained to operate them properly in inclement weather. Training should use the instructions provided in the vehicle manufacturer's operator manual.
Front Wheel Locks	<input type="checkbox"/> Use front wheel locks only with engine running and vehicle attended.	Drivers of air brake-equipped vehicles should be trained in the proper use of the auxiliary front wheel lock feature if the vehicle they are assigned to is so equipped. The auxiliary front wheel lock feature uses air brake system pressure to keep the front brakes applied and should therefore be used only with the engine running and a qualified attendant present at all times. The auxiliary front wheel lock feature is a supplemental brake only, which does not meet the FMVSS parking brake criteria and must be used in combination with the yellow parking brake valve when parking the vehicle. The auxiliary front wheel lock feature is meant to enhance the parking performance of the vehicle but does not take the place of the spring brakes or the act of chocking the wheels.
Electronic Stability Control	<input type="checkbox"/> Drive within vehicle limitations.	Drivers of vehicles equipped with electronic stability control systems should be trained on its benefits and limitations. Electronic stability control systems cannot prevent accidents or loss of control of the vehicle. A driver can still exceed the physical limitations of the system with either excess speed or extreme cornering, causing a loss of directional control or rollover.
Vapor-Rich Environments	<input type="checkbox"/> Avoid diesel powered vehicle operation in fuel-rich environments.	Drivers of diesel engine-equipped vehicles should be trained in the hazard of operating the vehicle around fuel vapors. Diesel engines do not require a spark for ignition and will continue to run as long as there is fuel available. If the engine is operated in an atmosphere that is laden with fuel vapors such as is found at a fuel spill, the engine could increase speed uncontrollably. Turning the ignition switch or battery switch off in this situation will not affect the speed of the engine. Before operating a diesel engine in this type of environment, ensure that the vehicle is equipped with a means of shutting off the air intake supply to the engine and that the driver is present to operate the shutdown whenever the engine is running.

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**Table B.1** *Continued*

Topic	Description	Details
Cab Tilt Operation	<input type="checkbox"/> Remove loose items before tilting cab.  <input type="checkbox"/> Use mechanical prop.  <input type="checkbox"/> Position vehicle on level surface.  <input type="checkbox"/> Keep personnel clear of area while tilting.	<p>Remove all loose items from the cab compartment before tilting, as contents can shift or drop. Check the front bumper and bumper extension to ensure that covers are shut and plumbing swivels are rotated forward before tilting cab.</p> <p>Never work around or under a tilted cab unless the stay arm or mechanical support is secured in the support position. Hydraulic cylinders can leak or drift and cannot be relied upon to support the cab on their own.</p> <p>Always ensure that the vehicle is on a flat and level surface before tilting the cab. Tilting the cab on an inclined or non-flat surface could produce interference between components as the cab is lowered.</p> <p>Always check to make sure that people working on or around the cab are clear before raising or lowering the cab.</p>
Engine Coolant	<input type="checkbox"/> Never open cap on hot radiator.	<p>Always allow the engine to cool before opening the pressure cap of the radiator. Wrap a thick, heavy cloth around the cap. Push down, and turn the cap to the first notch position. Pause before opening completely to allow any remaining pressure to escape. Follow this procedure to avoid burns from hot steam or coolant.</p>
Engine Fan	<input type="checkbox"/> Avoid spinning fan.	<p>Keep hands, hair, and clothes away from the fan. Never operate the engine with personnel in the vicinity of the fan, as the fan could engage without warning. Do not operate the engine if the cooling fan is worn, notched, bent, or damaged in any manner, or comes in contact with any other component while spinning, or personal injury or death can result.</p>
Exhaust Hazards	<input type="checkbox"/> Keep clear of hot exhaust parts.  <input type="checkbox"/> Do not breathe exhaust fumes.  <input type="checkbox"/> Know when exhaust regeneration can occur.	<p>Each emergency vehicle should be inspected to identify components that will get hot during operation. Personnel should be trained to recognize each hot surface hazard and to avoid these hazards.</p> <p>Internal combustion engines give off hazardous fumes and gases while running. Do not operate the engine in an area where exhaust gases can accumulate, or serious injury or death could occur. Diesel engine exhaust and some of its constituents are known to cause cancer, birth defects, and other reproductive harm.</p> <p>Diesel engines equipped with diesel particulate filters require regeneration that involves high heat. The exhaust system can get extremely hot without warning. Keep away from exhaust gas during regeneration, and do not park the vehicle near flammable material. Parked regeneration causes high exhaust gas temperatures at zero vehicle speed. Keep personnel away from the exhaust outlet to avoid serious burns and injury.</p>

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**Table B.1** *Continued*

Topic	Description	Details
Batteries	<input type="checkbox"/> Avoid explosive hazards.  <input type="checkbox"/> Avoid inhalation hazards.  <input type="checkbox"/> Avoid caustic hazards.  <input type="checkbox"/> Avoid poison hazards.	<p>Personnel assigned to perform routine service need to be trained in the safe handling of batteries. Batteries give off hydrogen gas that is highly explosive. Keep all sources of ignition away when working around batteries. Sparks caused by connection of battery terminals, jumper cables, or charging systems can be a source of ignition. Whenever disconnecting battery terminals, always disconnect the ground terminal first. When reconnecting, always connect the ground terminal last. Do not attempt to jump-start a vehicle having a frozen battery, because the battery could rupture or explode. If a frozen battery is suspected, examine all fill vents on the battery. If ice can be seen, do not attempt to start with jumper cables. Thaw out battery before jump-starting or recharging. Do not check battery condition by shorting across terminals.</p> <p>Inhaling hydrogen gas produced by the normal operation of the battery could result in partial or permanent damage to the respiratory system.</p> <p>Always wear safety goggles and protective clothing when working on or around batteries.</p> <p>Battery posts, terminals, and related accessories contain lead and lead compounds — chemicals known to cause cancer and reproductive harm. Wash hands after handling.</p>
Electric Circuit Protection	<input type="checkbox"/> Replace fuses or circuit breakers with same size only.	Personnel assigned to operate emergency vehicles should be trained to recognize and respond to basic electrical circuit protection faults. Improper fuse or circuit breaker sizing can cause wires to overheat and burn, which could cause personal injury or death. Do not increase the circuit breaker or fuse size.
Line Voltage	<input type="checkbox"/> Avoid electrical shock.	Each emergency vehicle should be inspected to identify any line voltage sources, lines, outlets, and equipment. Personnel assigned to vehicles equipped with line voltage systems need to be trained to recognize line voltage circuits and to avoid electrocution hazards. All electrical circuits associated with auxiliary power units (APUs), shore power, and inverters should be considered high voltage. Only trained technicians should perform service on line voltage circuits or inside high voltage components.
<b>Pumper Apparatus Training</b>		
Hose Storage Covers and Restraints	<input type="checkbox"/> Restrain all hose before placing vehicle in motion.  <input type="checkbox"/> Use care in windy conditions.	<p>Personnel should be trained in how to use and adjust hose restraint devices. If the apparatus does not include hose restraints, personnel should be trained in how to pack and secure hose in a manner that eliminates the possibility that the hose can come out of the storage area during transport.</p> <p>Personnel should be trained in the hazards of solid hose storage covers in windy conditions. Covers can close unexpectedly from gusts of wind. Keep personnel clear of open hose covers. Keep covers closed except when stowing or retrieving hose or equipment.</p>
Discharging Water Around Power Lines	<input type="checkbox"/> Never spray water on live power lines.	Personnel need to be trained to recognize hazards created by spraying water around high voltage electrical wires. Electricity can travel down a water stream. Never spray water or foam through or onto live electric wires.

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**Table B.1** *Continued*

Topic	Description	Details
Hose Packing	<input type="checkbox"/> Pack hose to avoid snags during payout.  <input type="checkbox"/> Work at height safely.  <input type="checkbox"/> Drive slowly.	<p>Personnel should be trained in methods of packing hose that will reduce the possibility of snags during hose deployment. Pack hose carefully in any hose storage area to minimize the risk of hose or connections snagging or snarling during deployment. Hose that snags or snarls during deployment from a moving vehicle can whip violently, causing death or injury.</p> <p>Personnel should be trained to pack hose using methods that will protect them from slips and falls. This could include the use of auxiliary ladders, scaffolding, safety harnesses, or other methods.</p> <p>Never drive a vehicle over 5 mph (8 kph) while deploying or retrieving hose.</p>
Hoses Under Pressure	<input type="checkbox"/> Use safe hose handling practices.	<p>Personnel should be trained in the hazards of pressurized hose. Fire hose under pressure can burst without warning. Never straddle or stand over a charged hose. Hose fittings can fail without warning. Inspect hose fittings for cracks, chips, or other damage and replace when worn or damaged. An uncontrolled hose discharging foam or water will whip violently. Never pressurize a hose unless the discharge nozzle is closed and the nozzle is held or secured firmly.</p>
Pump Heat	<input type="checkbox"/> Keep pump water cool.	<p>Pump operators should be trained in procedures necessary to keep pump water cool. Always circulate cool water through the pump. A pump without a constant supply of cool water can raise the temperature of the water to boiling in seconds. Hot water can scald if valves are opened or hoses burst.</p>
Pump Pressure	<input type="checkbox"/> Know hose and valve pressure limitations.  <input type="checkbox"/> Never exceed pressure limits.	<p>Pump operators should be trained to recognize the maximum operating pressures of all hoses, fittings, valves, and nozzles used on the apparatus.</p> <p>Hoses and fittings can explode if pressure capacity is exceeded. Never exceed the working pressure of downstream devices.</p>
Pump Shift Procedures	<input type="checkbox"/> Engage and disengage pump correctly.	<p>Pump operators should be trained in the proper methods of engaging and disengaging the pump. Training should include procedures for manually engaging the pump and manually maintaining engine rpm in the event that the primary methods malfunction.</p>
Pump and Roll	<input type="checkbox"/> Never ride outside the cab of a moving vehicle.  <input type="checkbox"/> Stay well clear of any vehicle that is in motion.	<p>Personnel assigned to apparatus with pump and roll capability should be trained in safe methods of operation. Develop procedures or use methods that keep personnel in a seated and belted position during vehicle motion. Consider the use of remote controlled turrets or other means.</p> <p>Personnel operating a hand line next to a moving vehicle should keep sufficient clearance to avoid being run over if they were to trip or fall. Keep in sight of the driver at all times. Never walk in front of a moving vehicle.</p>

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**Table B.1** *Continued*

Topic	Description	Details
Pressure Fluctuation	<input type="checkbox"/> Control sources of pressure fluctuation.	Pump operators should be trained in the methods of minimizing sudden changes in water pressure. Rapidly fluctuating pressure in a fire hose can cause the hose to whip. There are many causes of pressure fluctuation, including opening or closing valves too quickly, air trapped in the lines, engine malfunctions, etc. Always bleed the air from an intake line before opening the intake valve at the apparatus. Stay alert for fluctuations in hose pressure and to react safely when they do occur.
Inlet and Discharge Caps	<input type="checkbox"/> Drain pressure before removing caps.  <input type="checkbox"/> Do not stand in front of caps during removal. <input type="checkbox"/> Remove caps slowly.	<p>Personnel assigned to operate pumping apparatus should be trained to remove inlet and discharge caps safely. Inlet and discharge caps can trap pressure if the valve is opened and then closed again when there is pressure in the system. This pressure can remain trapped between the cap and the valve. Always open the drain or bleeder valves to relieve any pressure before attempting to remove an inlet or discharge cap.</p> <p>Never stand in front of a cap during its removal to avoid injury if the cap is pressurized.</p> <p>Open caps slowly to allow pressure to bleed out slowly through the threads. Opening a cap rapidly that has pressure behind it can cause it to be expelled with great force.</p>

**Aerial Apparatus Training**

Aerial Device Operation	<input type="checkbox"/> Know the emergency stop location.  <input type="checkbox"/> Know emergency power unit operation.  <input type="checkbox"/> Know the manual override controls.  <input type="checkbox"/> Understand emergency override functions.  <input type="checkbox"/> Recognize stabilizer hazards.	<p>Know the location and function of the emergency stop function. Train personnel to use the emergency stop when necessary.</p> <p>Personnel should be trained to operate the auxiliary power unit to keep the aerial device operating if the main hydraulic power supply fails.</p> <p>Personnel should be trained to operate the manual override controls if so equipped. These controls can be used to operate the aerial if the main controls fail. Procedures might be needed to ensure the safe operation of the aerial using these controls depending on the location or operation.</p> <p>Personnel assigned to an aerial apparatus equipped with an emergency override function should be trained to understand the seriousness of employing this function and the consequences that could occur. When the emergency override function is used, safety interlocks that would normally keep the device from operating in dangerous modes are no longer functioning. Use emergency override controls with extreme caution and only when all other personnel are well clear of any hazard.</p> <p>Personnel assigned to an aerial apparatus should be trained to recognize the hazards presented by the stabilizers while being deployed or stowed. Personnel should be trained to keep themselves and others well clear of stabilizer beams, jacks, and pads during movement to avoid pinch or crush hazards.</p>
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Table B.1 Continued

Topic	Description	Details
	<input type="checkbox"/> Understand ice conditions.	Personnel assigned to operate an aerial device should be trained to use extreme caution when retracting or extending an aerial device that is coated with ice. Keep personnel well clear of the path of falling ice. Move the device slowly to allow ice to fall away. Inspect the device thoroughly after operation in an icing condition, as operation with an ice coating can damage many components of the device and render it unsafe for future use.
	<input type="checkbox"/> Recognize rung pinch or crush hazards.	Personnel authorized to climb or operate a ladder-style device should be trained to recognize and avoid the danger of climbing or standing on the ladder while it is being operated. The relative motion between ladder sections can pinch or crush hands, feet, or other body parts. Keep all personnel clear of ladder rungs during extension or retraction of a ladder-style device.
	<input type="checkbox"/> Understand safety harness use.	Each safety harness anchor on each aerial device should be identified. Personnel authorized to climb an aerial ladder or ride in an aerial platform should be trained in the proper use of their safety harness and where it is safe to anchor. All personnel should be attached to the device by a safety harness when not climbing.
	<input type="checkbox"/> Know aerial device capacity.	Personnel assigned to operate an aerial device should be trained to understand the capacity of the device using the load charts and the instructions provided in the device manufacturer's operator manual. Training should specifically include: <ol style="list-style-type: none"> <li>1. Knowledge of and demonstration in the use of the load chart to determine how many personnel and associated equipment the device can accommodate, in which locations, and in all the various conditions of deployment</li> <li>2. Knowledge of and demonstration in how to apply reductions in capacity due to high wind, buildup of ice on the device, and water monitor reaction forces</li> <li>3. Knowledge of dynamic loading and the proper operation of the device to minimize dynamic loads</li> <li>4. Knowledge of how to approach victims from above to avoid people jumping down onto the device, causing an overload situation</li> </ol>
	<input type="checkbox"/> Conduct aerial device inspection.	Critical points on the device that should be regularly inspected should be identified based on the recommendations of the device manufacturer. Personnel assigned to operate an aerial device should be trained to inspect these points and look for signs of wear, corrosion, or impending failure. Critical points of inspection should include, but not be limited to, the following: <ol style="list-style-type: none"> <li>1. Pins</li> <li>2. Sheaves</li> <li>3. Cables</li> <li>4. Cylinders</li> <li>5. Weld joints</li> <li>6. Electrical cabling</li> <li>7. Mounted equipment</li> <li>8. Wear pads</li> <li>9. Insulation</li> <li>10. Slip-resistant surfaces</li> <li>11. Lighting</li> </ol>

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**Table B.1** *Continued*

Topic	Description	Details
	<input type="checkbox"/> Understand operator station attendance.	Personnel assigned to operate, climb, or ride on an aerial device should be trained to keep a trained operator at the main controls at all times when personnel are in or on the device. The operator station attendant should be trained to react to the following changes in: <ol style="list-style-type: none"> <li>1. Wind speed</li> <li>2. Icing conditions</li> <li>3. Wind and smoke direction</li> <li>4. Flames</li> <li>5. Heat</li> </ol>
Aerial Apparatus Pump Operator	<input type="checkbox"/> Stay on pump operator's platform.	Pump operators should be trained to remain standing on the pump operator's platform of aerial apparatus. Aerial devices could contact live electrical wires during operation. Electric current will travel down the device and seek a path to ground. Standing on the pump operator's platform rather than the ground will reduce the risk of this hazard.
<b>Ambulance Training</b>		
Ambulance Operation	<input type="checkbox"/> Understand vehicle axle weight limitations.  <input type="checkbox"/> Know the primary patient care position.  <input type="checkbox"/> Use seat belts whenever possible.  <input type="checkbox"/> Understand child seating restraints.  <input type="checkbox"/> Understand cot retention.	<p>Ambulance operators should be trained to understand the axle capacity of the ambulance and limit the personnel and equipment carried to stay within the capabilities of the vehicle. Personnel should demonstrate their understanding of the consequences of overloading a vehicle, including the following:</p> <ol style="list-style-type: none"> <li>1. Reduced acceleration</li> <li>2. Increased stopping distance</li> <li>3. Tire blowout risk</li> <li>4. Handling degradation</li> </ol> <p>The primary patient care position should be identified. Personnel should be trained to use this position in a manner that will accommodate caregiving while allowing the operator the best opportunity to remain in a seated and belted condition.</p> <p>Personnel should be trained in methods to maximize the amount of time they are seated and belted while the vehicle is in motion. Personnel should be trained in the importance of restraining themselves and others in the ambulance to minimize the risk of death or injury during a crash.</p> <p>Seating positions in the ambulance that are most appropriate for transporting infants and children should be identified. Personnel should be trained in the correct methods of securing infant and child seats using the instructions provided in the vehicle and seat manufacturer's operator manual. Avoid transporting infants in a side facing orientation. Avoid seating positions that would be subject to flying objects in the event of a crash. Do not place infant or child seats in locations with air bags.</p> <p>Personnel should be trained in the correct methods of securing patients into the cot prior to transport using the instructions provided in the vehicle and cot manufacturer's operator manual.</p>