

NFPA® 1006

Standard for Technical Rescuer Professional Qualifications

2013 Edition



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An International Codes and Standards Organization

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NFPA® 1006
Standard for
Technical Rescuer Professional Qualifications
2013 Edition

This edition of NFPA 1006, *Standard for Technical Rescuer Professional Qualifications*, was prepared by the Technical Committee on Rescue Technician Professional Qualifications and released by the Technical Correlating Committee on Professional Qualifications. It was issued by the Standards Council on November 27, 2012, with an effective date of December 17, 2012, and supersedes all previous editions.

This edition of NFPA 1006 was approved as an American National Standard on December 17, 2012.

Origin and Development of NFPA 1006

In 1994, the NFPA Standards Council, after receipt of a request for the development of a standard for the professional qualifications of rescue technicians, approved the establishment of a technical committee on Rescue Technician Professional Qualifications under the Professional Qualifications project. The committee developed the first edition of NFPA 1006, *Standard for Rescue Technician Professional Qualifications*, which established general job performance requirements for a rescue technician as well as specific job performance requirements for special rescue operations. These performance requirements include rope rescue, surface water rescue, vehicle and machinery rescue, confined space rescue, structural collapse rescue, and trench rescue.

In the 2003 edition of NFPA 1006, all of the chapters were reviewed and changes were made to comply with the *Manual of Style for NFPA Technical Committee Documents*. Three new chapters were added to the document: Subterranean Rescue, Dive Rescue, and Wilderness Rescue.

For the 2008 edition of NFPA 1006, the document was updated, and chapters for Swiftwater Rescue, Ice Rescue, and Surf Rescue were added. The Subterranean Rescue chapter was broken into two chapters: one on Mine and Tunnel Rescue and the other on Cave Rescue.

Each chapter in the document was broken into two levels, Level I and Level II, and the document was retitled as *Standard for Technical Rescuer Professional Qualifications*. Additional language was added to clarify the use of this document.

The 2013 edition of NFPA 1006 has been updated to recognize passive power sources and new and emerging technologies as challenges that create hazards to the technical rescuer. The goals for meeting these challenges and hazards are as follows:

- To isolate and manage potentially harmful energy sources, so that all hazards are identified, systems are managed, system use is evaluated, and hazards to rescue personnel are minimized
- To identify types of energy sources, isolate system methods, recognize specialized features, ensure availability of proper tools and equipment, and ensure that operations support the tactical objective

Because of the new power sources in automobiles, Chapter 10 of the 2008 edition, Vehicle and Machinery Rescue, has been separated into two chapters, Chapter 10, Vehicle Rescue, and Chapter 19, Machinery Rescue.

The simple-rope mechanical advantage system minimum travel distance for loads has been modified, based on the response area and the discipline-specific application. The distance traveled should reflect a typical distance experienced by a rescuer operating the equipment and performing the task.

Because of the nature and specific knowledge and skills required during a technical rescue incident, language has been included in the administration chapter that mandates a rescuer to remain current and “demonstrate competency on an annual basis.”

Prerequisite knowledge and skills found in Chapter 5 have been clarified based on discipline-specific job performance requirements found in Chapters 6 through 19. The intent is to address all applicable areas of Chapter 5 unless otherwise exempted in the discipline-specific chapters. In other words, each JPR should be addressed in a manner consistent with the discipline.

In Chapter 6, Rope Rescue, specific reference to *highline system* has been changed to *operation of a rope system* to broaden the definition to include other methods for moving a load horizontally.

Chapter 17, Mine and Tunnel Rescue, has been modified and restructured to include Level I and Level II so that it complements the other disciplines within the document.

Annex material, including dive charts, air compression tables, and dive site diagrams, has been upgraded. Annex E, Marking Systems, has been updated to reflect similar references found in NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*.



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NFPA 1006

Standard for

Technical Rescuer Professional

Qualifications

2013 Edition

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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 J. 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 J.

Chapter 1 Administration

1.1* Scope. This standard establishes the minimum job performance requirements (JPRs) necessary for fire service and other emergency response personnel who perform technical rescue operations.

1.2 Purpose. The purpose of this standard is to specify the minimum job performance requirements for service as a rescuer in an emergency response organization. It is not the intent of this standard to restrict any jurisdiction from exceeding these minimum requirements.

1.3* Application.

1.3.1 Each performance objective shall be performed safely, competently, and in its entirety.

1.3.2 The authority having jurisdiction (AHJ) shall establish the instructional priority and the training program content to prepare individuals to meet the performance requirements of this standard.

1.3.3* Performance of each requirement shall be evaluated by individuals approved by the AHJ. Evaluators shall be individu-

als who were not involved as instructors for the performance requirements being evaluated.

1.3.4 In this standard, the terms *rules*, *regulations*, *procedures*, *supplies*, *apparatus*, and *equipment* shall imply those that are available to or used by the AHJ.

1.3.5 Performance of each requirement shall be in accordance with applicable NFPA standards and occupational health and safety regulations.

1.3.6* Rescuers at Level I and Level II shall remain current with technical rescue practices and applicable standards and shall demonstrate competency on an annual basis.

1.4 General.

1.4.1 Job performance requirements shall not be required to be mastered in the order in which they appear.

1.4.2 The AHJ shall be responsible for determining which disciplines are required to achieve the desired types of service and to provide training or certification as necessary to satisfy the service needs.

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. (Reserved)

2.3 Other Publications.

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

2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code*, 2012 edition.

NFPA 402, *Guide for Aircraft Rescue and Fire-Fighting Operations*, 2013 edition.

NFPA 1000, *Standard for Fire Service Professional Qualifications Accreditation and Certification Systems*, 2011 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2009 edition.

NFPA 1143, *Standard for Wildland Fire Management*, 2009 edition.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 2013 edition.

NFPA 1521, *Standard for Fire Department Safety Officer*, 2008 edition.

NFPA 1581, *Standard on Fire Department Infection Control Program*, 2010 edition.

NFPA 1620, *Standard for Pre-Incident Planning*, 2010 edition.

NFPA 1670, *Standard on Operations and Training for Technical Search and Rescue Incidents*, 2009 edition.

NFPA 1983, *Standard on Life Safety Rope and Equipment for Emergency Services*, 2012 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 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 Standard. A document, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and which 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 *Manual of Style for NFPA Technical Committee Documents*.

3.3 General Definitions.

3.3.1 Abrasion. The damaging effect on rope and other equipment caused by friction-like movement.

3.3.2 Access. See 3.3.32, Confined Space Approach.

3.3.3 Anchor Point. A single, structural component used either alone or in combination with other components to create an anchor system capable of sustaining the actual and potential load on the rope rescue system. [1670, 2009]

3.3.3.1 High-Point Anchor. A point above an obstacle to be negotiated used for attachment of rescue systems.

3.3.4 Anchor System. One or more anchor points rigged in such a way as to provide a structurally significant connection point for rope rescue system components. [1670, 2009]

3.3.4.1* Multiple-Point Anchor System. System configuration providing load distribution over more than one anchor point, either proportionally or disproportionally.

3.3.4.2* Single-Point Anchor System. An anchor system configuration utilizing a single anchor point to provide the primary support for the rope rescue system.

3.3.5 Ascending (Line). A means of safely traveling up a fixed line with the use of one or more ascent devices. [1670, 2009]

3.3.6 Ascent Device. An auxiliary equipment system component; a friction or mechanical device utilized to allow ascending a fixed line. [1670, 2009]

3.3.7 Atmospheric Monitoring. A method of evaluating the ambient atmosphere of a space, including but not limited to its oxygen content, flammability, and toxicity.

3.3.8* Attendant. A term used to describe a person who is qualified to be stationed outside one or more confined spaces, who monitors authorized entrants, and who performs specified duties.

3.3.9* Authorized Entrant. A term used to describe a U.S. federally regulated industrial worker designated to enter confined spaces who meets specified training requirements for each specific space he or she enters.

3.3.10* Basic First Aid Kit. Equipment or devices for managing infection exposure, airways, spinal immobilization, fracture immobilization, shock, and bleeding control.

3.3.11* Belay. The method by which a potential fall distance is controlled to minimize damage to equipment and/or injury to a live load. [1670, 2009]

3.3.12* Belay System. A nontensioned, manually operated system designed to belay a load.

3.3.13 Belayer. The rescuer who operates the belay system.

3.3.14 Belt. A system component; material configured as a device that fastens around the waist only and designated as a ladder belt, an escape belt, or a ladder/escape belt.

3.3.15 Benching or Benching System. A method of protecting employees from cave-ins by excavating the side of a trench or excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

3.3.16 Beneficial System. Auxiliary-powered equipment in motor vehicles or machines that can enhance or facilitate rescues such as electric, pneumatic, or hydraulic seat positioners, door locks, window operating mechanisms, suspension systems, tilt steering wheels, convertible tops, or other devices or systems to facilitate the movement (extension, retraction, raising, lowering, conveyor control) of equipment or machinery.

3.3.17 Bight. The open loop in a rope or piece of webbing formed when it is doubled back on itself.

3.3.18* Bombproof. A term used to refer to a single anchor point capable of sustaining the actual or potential forces exerted on the rope rescue system without possibility of failure.

3.3.19 Breach. An opening made in the wall, floor, or ceiling of a structure, based on construction type, that can be used for moving rescuers, equipment, or victims into or out of the structure.

3.3.20 Breaching Techniques. Methods that utilize breaking and cutting tools to create safe openings in masonry, concrete, and wood structures.

3.3.21 Buoyancy Control Device. Jacket or vest that contains an inflatable bladder for the purposes of controlling buoyancy.

3.3.22 Cave. A natural underground void formed by geologic process.

3.3.23 Cave-In. The separation of a mass of soil or rock material from the side of an excavation or trench, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding,

in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person. [1670, 2009]

3.3.24 Collapse Support Operations. Operations performed at the scene that include providing for rescuer comfort, scene lighting, scene management, and equipment readiness.

3.3.25 Collapse Type. Five general types of collapse include lean-to collapse, “V” shape collapse, pancake collapse, cantilever collapse, and A-frame collapse. (See Annex B.)

3.3.26 Collapse Zone. See 3.3.150, Rescue Area.

3.3.27 Common Passenger Vehicle. Light or medium duty passenger and commercial vehicles commonly encountered in the jurisdiction and presenting no unusual construction, occupancy, or operational characteristics to rescuers during an extrication event.

3.3.28 Communications Team. As related to caves, a specific combination of resources with a leader, personnel, and common equipment assembled for the purpose of establishing and maintaining communications between various locations in and out of the cave.

3.3.29* Community Resource List. A list that includes all private and public contact numbers that provide the available community resources to mitigate a specified type or range of rescue incidents and hazardous conditions in the community.

3.3.30 Competent Person. One who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

3.3.31* Confined Space. An area large enough and so configured that a member can bodily enter and perform assigned work but which has limited or restricted means for entry and exit and is not designed for continuous human occupancy. [1500, 2013]

3.3.32 Confined Space Approach. The means of approach to the entry opening of a confined space.

3.3.33 Confined Space Entry. Includes ensuing work activities in a confined space and is considered to have occurred as soon as any part of the entrant’s body breaks the plane of an opening into the space.

3.3.34 Confined Space Entry Opening. The port or opening used to enter a confined space.

3.3.35 Confined Space Entry Permit. A written or printed document established by an employer in applicable U.S. federally regulated industrial facilities for nonrescue entry into confined spaces, that authorizes specific employees to enter a confined space and contains specific information as required. (See Annex C.)

3.3.36* Confined Space Rescue Pre-Plan. An informational document completed by rescue personnel pertaining to a specific space that should include, but is not limited to, information concerning hazard abatement requirements, access to the space, size and type of entry openings, internal configuration of the space, and a suggested action plan for rescue of persons injured within the space.

3.3.37 Confined Space Rescue Team. A combination of individuals trained, equipped, and available to respond to confined space emergencies. [1670, 2009]

3.3.38 Confined Space Retrieval Equipment. See 3.3.155, Retrieval Equipment (Retrieval System).

3.3.39* Confined Space Type. A classification of confined spaces that incorporates the size, configuration, and accessibility of an entry opening as well as the internal configuration/entanglement structures within the space.

3.3.40 Construction Grade Lumber. Lumber products that are readily available in sizes and lengths for general construction applications.

3.3.41* Construction Type. Based on major construction categories, these categories include, but are not limited to, wood frame, steel, unreinforced masonry (URM), tilt-up; precast, high-rise, and formed in place.

3.3.42 Cribbing. Short lengths of timber/composite materials, usually 4 in. × 4 in. (101.60 mm × 101.60 mm) and 18 in. × 24 in. (457.20 mm × 609.60 mm) long that are used in various configurations to stabilize loads in place or while load is moving.

3.3.43 Critical Incident Stress Debriefing (CISD). A post-incident meeting designed to assist rescue personnel in dealing with psychological trauma as the result of an emergency.

3.3.44 Critique. A post-incident analysis of the effectiveness of the rescue effort.

3.3.45 Cross Braces (or Struts). The individual horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

3.3.46* Crush Syndrome. A condition in which muscle death occurs because of pressure applied by an external load (e.g., a vehicle, parts of a fallen building, a rock, or a squeeze in a tight hole).

3.3.47* Cut Sheet. A document that specifies the dimensions, slope, and other pertinent information regarding a particular excavation.

3.3.48 Cut Station. A functional area or sector that utilizes lumber, timber, and an assortment of hand and power tools to complete operational objectives for stabilizing or shoring at a rescue incident or training evolution.

3.3.49 Decontamination. The removal or neutralization of a hazardous material from equipment and/or personnel.

3.3.50 Descending a Line. A means of traveling down a fixed line using a descent control device.

3.3.51 Descent Control Device. An auxiliary equipment item; a friction or mechanical device utilized with rope to control descent. [1983, 2012]

3.3.52 Dewatering Equipment. Electric- or fuel-powered pumps, hose, and appliances that are used in combination to remove water.

3.3.53 Disentanglement. The process of freeing a victim from entrapment.

3.3.54 Dive Profile. Plan for a dive, including the depth and duration of the dive, in order to determine the level of nitrogen in the bloodstream.

3.3.55* Dive Tables. Format utilized by divers, based upon various accepted studies, which calculates nitrogen levels and converts them to tabular data for determining a safe dive profile.



3.3.56 Divemaster. Dive professional demonstrating an advanced level of competency, charged with coordinating and leading divers.

3.3.57 Double Block and Bleed. The closure of a line, duct, or pipe by closing, locking, and tagging two valves in line and opening, locking, and tagging a drain or vent valve in line between the two closed valves.

3.3.58 Dynamic Loads. Forces created by moving loads as well as those caused by the sudden cessation of that movement.

3.3.59 Edge Protection. A means of protecting software components within a rope rescue system from the potentially harmful effects of exposed sharp or abrasive edges. [1670, 2009]

3.3.60 Emergency. A fire, explosion, or hazardous condition that poses an immediate threat to the safety of life or damage to property. [1, 2012]

3.3.61 Emergency Medical Services. The treatment to patients, including first aid, cardiopulmonary resuscitation, basic life support, advanced life support, and other medical protocols prior to arrival at a hospital or other health care facility. [1581, 2010]

3.3.62 Entrant. See 3.3.9, Authorized Entrant.

3.3.63 Entry. The action by which a person passes into a confined space. Entry includes ensuing work or rescue activities in that environment and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space, trench, or excavation. [1670, 2009] (*See also 3.3.33, Confined Space Entry.*)

3.3.64 Entry Opening. See 3.3.34, Confined Space Entry Opening.

3.3.65 Environmental Controls. See 3.3.24, Collapse Support Operations.

3.3.66 Excavation. Any man-made cut, cavity, trench, or depression in an earth surface, formed by the removal of earth. [1670, 2009]

3.3.67* Extinguishing Devices. Devices used to suppress fire, including, but not limited to, CO₂ extinguishers, dry chemical extinguishers, hose lines, and fire-fighting foam.

3.3.68* Face(s). The vertical or inclined earth surface formed as a result of excavation work. [1670, 2009]

3.3.69 Failure. The breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities. [1670, 2009]

3.3.70 Fire Control Measures. Methods used to secure ignition sources at an incident scene that can include hose line placement and utilization of chemical agents to suppress fire potential.

3.3.71 Fixed Line System. A rope rescue system consisting of a nonmoving rope attached to an anchor system. [1670, 2009]

3.3.72 Flood Insurance Rate Maps. Maps produced by the National Flood Insurance Program, under the auspices of the Federal Emergency Management Agency (FEMA), that illustrate geographic areas that are subject to flooding.

3.3.73 Flotation Aids. Devices that provide supplemental flotation for persons in the water but do not meet U.S. Coast Guard performance criteria such as breaking strength of the

thread used in sewing the device, the usable life of the flotation materials including compressibility factors, the colors and fading potential of certain dyes used in the fabrication of the device, and the strength and breaking force required for buckles and tie straps.

3.3.74* General Area. An area surrounding the incident site (e.g., collapsed structure or trench) whose size is proportional to the size and nature of the incident and, within the general area, access by people, heavy machinery, and vehicles is limited and strictly controlled.

3.3.75 Hardware. Rigid mechanical auxiliary equipment that can include, but is not limited to, anchor plates, carabiners, and mechanical ascent and descent control devices. [1670, 2009]

3.3.76 Harness. See 3.3.103, Life Safety Harness.

3.3.77 Hauling System. A rope system generally constructed from life safety rope, pulleys, and other rope rescue system components capable of lifting or moving a load across a given area.

3.3.78 Hazard Mitigation. Activities taken to isolate, eliminate, or reduce the degree of risk to life and property from hazards, either before, during, or after an incident.

3.3.79* Hazardous Atmospheres. Any atmosphere that can expose personnel to the risk of death, incapacitation, injury, acute illness, or impairment of ability to self-rescue. [1670, 2009]

3.3.80 Hazardous Material. A substance or material that has been determined to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated.

3.3.81 Heavy Construction Type. Construction that utilizes masonry, steel, and concrete in various combinations, including tilt-up, steel frame with infill, concrete moment resisting frame, concrete shearwall, unreinforced masonry infill in concrete frame, and precast concrete. (*See Annex D.*)

3.3.82 Heavy Equipment. Typically, construction equipment that can include but is not limited to backhoes, tractors, graders, and cranes.

3.3.83 Heavy Load. Any load over 7000 lb (3175.15 kg).

3.3.84 Heavy Structural Collapse. Collapse of heavy construction-type buildings that require special tools and training to gain access into the building.

3.3.85* Heavy Vehicle. Heavy duty highway, off-road, construction, or mass transit vehicles constructed of materials presenting resistance to common extrication procedures, tactics, and resources and posing multiple concurrent hazards to rescuers from occupancy, cargo, size, construction, weight, or position.

3.3.86 High Angle. Refers to an environment in which the load is predominantly supported by the rope rescue system. [1670, 2009]

3.3.87 Highline System. A system of using rope or cable suspended between two points for movement of persons or equipment over an area that is a barrier to the rescue operation, including systems capable of movement between points of equal or unequal height.

3.3.88 Hitch. A knot that attaches to or wraps around an object so that when the object is removed, the knot will fall apart. [1670, 2009]

3.3.89 Hydrology. Effect of water, its movement, and mechanics, in relation to bodies of water.

3.3.90* Incident. An occurrence, either human-caused or a natural phenomenon, that requires action or support by emergency services personnel to prevent or minimize loss of life or damage to property and/or natural resources. [1143, 2009]

3.3.91 Incident Command System (ICS). A standardized on-scene emergency management construct specifically designed to provide for the adoption of an integrated organizational structure that reflects the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries. ICS is a combination of facilities, equipment, personnel, procedures, and communications operating within a common organizational structure, designed to aid in the management of resources during incidents. It is used for all kinds of emergencies and is applicable to small as well as large and complex incidents. ICS is used by various jurisdictions and functional agencies, both public and private, to organize field-level incident management operations.

3.3.92 Incline Plane. A lifting method that provides mechanical advantage by distributing the work required to lift a load over a distance along an incline rather than straight up and down.

3.3.93 Initial Response Team. As related to caves, a specific combination of resources with a leader, personnel, and common equipment assembled for the purpose of making initial contact to the patient and initiating patient care in the cave.

3.3.94* Isolation. The process by which an area is rendered safe through mitigation of dangerous energy forms.

3.3.95* Isolation System. An arrangement of devices, including isolation devices, applied with specific techniques, that collectively serve to isolate a victim of a trench or excavation emergency from the surrounding product (e.g., soil, gravel, sand).

3.3.96 Job Performance Requirement (JPR). A written statement that describes a specific job task, lists the items necessary to complete the task, and defines measurable or observable outcomes and evaluation areas for the specific task. [1000, 2011]

3.3.97* Knot. A fastening made by tying together lengths of rope or webbing in a prescribed way.

3.3.98 Large Machinery. Complex machines (or machinery systems) constructed of heavy materials, not capable of simple disassembly, and presenting multiple concurrent hazards (e.g., control of energy sources, hazardous materials, change in elevation, multiple rescue disciplines, etc.), complex victim entrapment, or partial or complete amputation, and requiring the direct technical assistance of special experts in the design, maintenance, or construction of the device or machine.

3.3.99 Laser Target. A square or rectangular plastic device used in conjunction with a laser instrument to set the line and grade of pipe. [1670, 2009]

3.3.100 Level I Technical Rescuer. See 3.3.219.1.

3.3.101 Level II Technical Rescuer. See 3.3.219.2.

3.3.102 Levers. Tools that have a relationship of load/fulcrum/force to create mechanical advantage and move a load.

3.3.103 Life Safety Harness. A system component that is an arrangement of materials secured about the body and used to support a person during rescue.

3.3.104 Life Safety Rope. See 3.3.160.1.

3.3.105 Lifting Tools. Hydraulic, pneumatic, mechanical, or manual tools that can lift heavy loads.

3.3.106 Light Frame Construction. Structures that have framework made out of wood or other lightweight materials. (See Annex D.)

3.3.107 Lip (Trench Lip). The area 2 ft horizontal and 2 ft vertical (0.61 m × 0.61 m) from the top edge of the trench face.

3.3.108 Lip Collapse. A collapse of the trench lip, usually subsequent to surcharge loading, impact damage from the excavating bucket, and/or inherent cohesive properties of the soil type.

3.3.109 Lip-In. See 3.3.108, Lip Collapse.

3.3.110 Litter. A transfer device designed to support and protect a victim during movement. [1670, 2009]

3.3.111 Litter Tender. A person who both accompanies and physically manages the litter. [1670, 2009]

3.3.112 Load (Mass). That which is being lowered, raised, or otherwise supported by a rope rescue system. Relative to rope rescue qualification, a minimum weight of 100 lb (45.5 kg).

3.3.113 Load Stabilization. The process of preventing a load from shifting in any direction.

3.3.114* Load Test. A method of preloading a rope rescue system to ensure all components are set properly to sustain the expected load.

3.3.115 Locating Devices. Devices utilized to locate victims in rescue incidents and structural components, including but not limited to voice, seismic, video, K-9, and fiber optic.

3.3.116 Low Angle. Refers to an environment in which the load is predominantly supported by itself and not the rope rescue system (e.g., flat land or mild sloping surface). [1670, 2009]

3.3.117* Lowering System. A rope rescue system used to lower a load under control. [1670, 2009]

3.3.118 Maintenance Kits. Items required for maintenance and inspection that include, but are not limited to, manufacturer product specifications; preventive maintenance checklists; periodic logbook records; inventory equipment lists; appropriate fluids, parts, and hardware; and testing instruments as required.

3.3.119 Marking Systems. Various systems used to mark hazards, victim location, and pertinent structural information. (See Annex E.)

3.3.120 Mechanical Advantage (M/A). A force created through mechanical means including, but not limited to, a system of levers, gearing, or ropes and pulleys usually creating an output force greater than the input force and expressed in terms of a ratio of output force to input force. [1670, 2009]

3.3.121 Mechanical Advantage System.

3.3.121.1 Compound Rope Mechanical Advantage System. A combination of individual rope mechanical advantage systems created by stacking the load end of one rope mechanical advantage system onto the haul line of another or others to multiply the forces created by the individual system(s).



3.3.121.2* Simple Rope Mechanical Advantage System. A rope mechanical advantage system containing a single rope and one or more moving pulleys (or similar devices), all traveling at the same speed and in the same direction, attached directly or indirectly to the load mass; and may contain one or more stationary pulleys (or similar devices), so that the force on the system is distributed approximately evenly among its supporting rope segments.

3.3.122 Member. A person involved in performing the duties and responsibilities of an emergency response organization on a full-time or part-time basis, with or without compensation.

3.3.123 Mode of Transmission. The physical means of entry of a hazardous material into the human body, including inhalation, absorption, injection, and ingestion.

3.3.124 MSDS. Material safety data sheets.

3.3.125 Nonintersecting Trench. See 3.3.228.2.

3.3.126 One-Call Utility Location Service. A service from which contractors, emergency service personnel, and others can obtain information on the location of underground utilities in any area. [1670, 2009]

3.3.127 Packaging. The process of securing a victim in a transfer device, with regard to existing and potential injuries or illness, so as to prevent further harm during movement.

3.3.128 Parbuckling. A technique for moving a load utilizing a simple 2:1 mechanical advantage system in which the load is placed inside a bight formed in a length of rope, webbing, tarpaulin, blanket, netting, and so forth that creates the mechanical advantage, rather than being attached to the outside of the bight with ancillary rope rescue hardware.

3.3.129 Patient Evacuation Team. As related to caves, a specific combination of resources with a leader, personnel, and common equipment assembled for the purpose of evacuating the patient from the cave.

3.3.130 Permit-Required Confined Space. See 3.3.35, Confined Space Entry Permit.

3.3.131 Personal Escape. See 3.3.174, Self-Rescue.

3.3.132* Personal Flotation Device (PFD). A device manufactured in accordance with U.S. Coast Guard specifications that provides supplemental flotation for persons in the water.

3.3.133* Personal Protective Equipment (PPE). The equipment provided to shield or isolate a person from the chemical, physical, or thermal hazards that can be encountered at a specific rescue incident.

3.3.133.1* Water Rescue Personal Protective Equipment. Personal equipment required to protect rescuers from physical dangers posed by exposure to in-water hazards and also those hazards that are associated with the climate and the adjacent area.

3.3.134* Pneumatic Struts. Pneumatic or gas-filled tube and piston assemblies in vehicles or machinery.

3.3.135 Postbriefing. At the termination of an incident, after breakdown and cleanup have occurred, reviews the effectiveness of strategies, tactics, equipment, and personnel at an incident, as well as provides an opportunity to detect the presence of critical incident stress syndrome.

3.3.136 Prebriefing. At the beginning of an incident, after size-up information has been assessed, given to the rescue

team to provide assignments, select and notify of strategy and tactics to be performed, and state the mission objective.

3.3.137 Pre-Entry Medical Exam. A baseline medical evaluation of the rescue entrants performed immediately prior to a rescue entry.

3.3.138* Pre-Incident Plan. A document developed by gathering general and detailed data that is used by responding personnel in effectively managing emergencies for the protection of occupants, responding personnel, property, and the environment. [1620, 2010]

3.3.139 Probability of Area (POA). The chances that the subject, or clues, are in the area being searched.

3.3.140 Probability of Detection (POD). The chances of finding the subject, or clues, given that they are in the area being searched.

3.3.141* Protective System. A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. [1670, 2009]

3.3.142 Public Safety Diving. Underwater diving, related to team operations and training, performed by any member, group, or agency of a community or government-recognized public safety diving or water rescue team. [1670, 2009]

3.3.143 Qualification. Having satisfactorily completed the requirements of the objectives.

3.3.144* Rapid Intervention Crew/Company (RIC). A minimum of two fully equipped personnel on site, in a ready state, for immediate rescue of disoriented, injured, lost, or trapped rescue personnel.

3.3.145 Reach/Extension Device. Any device for water rescue that can be extended to a person in the water so that he or she can grasp it and be pulled to safety without physically contacting the rescuer.

3.3.146 Recovery. Nonemergency operations taken by responders to retrieve property or remains of victims.

3.3.147 Redundant Air System. An independent secondary underwater breathing system (i.e., a pony bottle with first and second stage or a pony bottle supplying a bailout block). [1670, 2009]

3.3.148* Registered Professional Engineer. A person who is registered as a professional engineer in the state where the work is to be performed. [1670, 2009]

3.3.149 Requisite Equipment. Specific tools and equipment that are critical to performing a specific type of technical rescue.

3.3.150 Rescue Area. Sometimes called the "hot," "danger," or "collapse" zone, an area surrounding the incident site (e.g., collapsed structure or trench) that has a size proportional to the hazards that exist.

3.3.151 Rescue Attendant. See 3.3.8, Attendant.

3.3.152 Rescue Entrant. See 3.3.9, Authorized Entrant.

3.3.153 Rescue Service. The rescue team designated for confined space rescue by the AHJ.

3.3.154* Rescue Team. A combination of rescue-trained individuals who are equipped and available to respond to and perform technical rescues.

3.3.155* Retrieval Equipment (Retrieval System). Combinations of rescue equipment used for nonentry (external) rescue of persons from confined spaces.

3.3.156 Rigging. The process of building a system to move or stabilize a load.

3.3.157 Rigging Systems. Systems used to move people or loads that can be configured with rope, wire rope, or cable and utilize different means, both mechanical and manual, to move the load.

3.3.158 Rigging Team. As related to caves, a specific combination of resources with a leader, personnel, and common equipment assembled for the purpose of rigging rope systems to negotiate obstacles to assist patient and rescuer movement in or out of the cave.

3.3.159 Risk–Benefit Analysis. An assessment of the risk to rescuers versus the benefits that can be derived from their intended actions.

3.3.160 Rope. A compact but flexible, torsionally balanced, continuous structure of fibers produced from strands that are twisted, plaited, or braided together, and that serve primarily to support a load or transmit a force from the point of origin to the point of application. (See also 3.3.160.1, *Life Safety Rope*.)

3.3.160.1 Life Safety Rope. Rope dedicated solely for the purpose of supporting people during rescue, fire fighting, other emergency operations, or during training evolutions. (See also 3.3.160, *Rope*.)

3.3.160.2 Water Rescue Rope. Rope that floats, has adequate strength for anticipated use, is not weakened to the point of inadequacy for the task by saturation or immersion in water, and is of sufficient diameter to be gripped by bare wet hands.

3.3.161 Rope Rescue Equipment. Components used to build rope rescue systems including life safety rope, life safety harnesses, and auxiliary equipment. [1670, 2009]

3.3.162 Rope Rescue System. A system comprised of rope rescue equipment and an appropriate anchor system intended for use in the rescue of a subject. [1670, 2009]

3.3.163 Safe Zone. In a trench, the area that projects 2 ft (0.61 m) in all directions around an installed cross brace or wale that is a component of an existing approved shoring system.

3.3.164 Safetied (Safety Knot). A securement of loose rope end issuing from a completed knot, usually fashioned by tying the loose end around another section of rope to form a knot. The means by which the loose end is prevented from slipping through the primary knot.

3.3.165 Scene Security. The means used to prevent or restrict entry to the scene of a rescue incident, either during or following the emergency.

3.3.166 Screw Jack. Shoring system component made of sections of threaded bar stock that are incorporated with lengths of pipe or wood.

3.3.167 SCUBA. Self-contained underwater breathing apparatus.

3.3.168 Search Functions. General area search, reconnaissance, victim location identification, and hazard identification or flagging.

3.3.169 Search Measures.

3.3.169.1* Active Search Measures. This phase of search measures includes those that are formalized and coordinated with other agencies.

3.3.169.2* Passive Search Measures. Search efforts that do not require active searching by the rescuers.

3.3.170 Search Parameters. The defined search area and scope.

3.3.171 Search Team. As related to caves, a specific combination of resources with a leader, personnel, and common equipment assembled for the purpose of searching an area in the cave identified by the incident command.

3.3.172* Secondary Collapse. A subsequent collapse in a building or excavation.

3.3.173 Security Measures. See 3.3.165, Scene Security.

3.3.174 Self-Rescue. Escaping or exiting a hazardous area under one's own power.

3.3.175 Sheeting and Shoring.

3.3.175.1 Supplemental Sheeting and Shoring. Sheeting and shoring operations that involve the use of commercial sheeting/shoring systems and/or isolation devices or that involve cutting and placement of sheeting and shoring when greater than 2 ft (0.61 m) of shoring exist below the bottom of the strongback. [1670, 2009]

3.3.175.2 Traditional Sheeting and Shoring. The use of 1.22 m × 2.44 m (4 ft × 8 ft) sheet panels, with a strongback attachment, supplemented by a variety of conventional shoring options such as hydraulic, screw, and/or pneumatic shores. [1670, 2009]

3.3.176 Sheeting or Sheathing. A component of a shoring system with a large surface area supported by the uprights and cross-bracing of the shoring system that is used to retain the earth in position when loose or running soils are encountered.

3.3.177* Shield or Shield System. An engineered structure that is able to withstand the forces imposed on it by a cave-in and thereby protect persons within the structures.

3.3.178 Shore-Based Rescue. Any technique or procedure that provides a means for extracting a person from the water that does not require any member of the rescue team to leave the safety of the shore.

3.3.179 Shoring System. A system that supports unstable surfaces.

3.3.180 Shoring Team. The group of individuals, with established communications and leadership, assigned to construct, move, place, and manage the shoring or shoring system inside the space, trench, or excavation. [1670, 2009]

3.3.181 Sides. See 3.3.68, Face(s).

3.3.182* Signaling Device. Any resource that provides a distinct and predictable display, noise, or sensation that can be used to communicate a predetermined message or to attract the attention of other persons as desired by the initiator of the signal.

3.3.183 Site Operations. The activities to be undertaken at a specific site to manage the rescue efforts.

3.3.184 Size-Up. The ongoing observation and evaluation of factors that are used to develop strategic goals and tactical objectives.

3.3.185* Sloping System. A protecting system that uses inclined excavating to form sides that are inclined away from the excavation so as to prevent cave-in.

3.3.186 Slough-In. A type of collapse characterized by an interior portion of the trench wall spalling out and potentially leaving an overhanging ledge or void that needs to be filled.

3.3.187 Small Machine. Machinery or equipment capable of simple disassembly, or constructed of lightweight materials, presenting simple hazards, which are capable of being controlled by the rescuer(s).

3.3.188 Software. A flexible fabric component of rope rescue equipment that can include, but is not limited to, anchor straps, pick-off straps, and rigging slings. [1670, 2009]

3.3.189 Soldier Shoring or Skip Shoring. A shoring system that employs a series of uprights spaced at intervals with the exposed soil of the trench wall showing.

3.3.190 Span of Control. The maximum number of personnel or activities that can be effectively controlled by one individual (usually three to seven).

3.3.191 Specialized Equipment. Equipment that is unique to the rescue incident and made available.

3.3.192* Specialized Teams. Emergency response teams with specific skills and equipment that can be needed on the scene.

3.3.193 Spoil Pile (Spoil). A pile of excavated soil next to the excavation or trench.

3.3.194 Stabilization Points. Key points where stabilization devices can be installed on a vehicle or machine to keep the vehicle or object from moving during rescue operations.

3.3.195 Stabilization System. See 3.3.42, Cribbing.

3.3.196 Standard Operating Guideline. A written organizational directive that establishes or prescribes specific operational or administrative methods to be followed routinely, which can be varied due to operational need in the performance of designated operations or actions. [1521, 2008]

3.3.197 Static Loads. Forces applied within a system when the load is not moving.

3.3.198 Steel Cutting Tools. Hand tools, circular saw, exothermic torch, oxyacetylene torch, and plasma cutter.

3.3.199 Stemple. A man-made or natural beam or bar that, when wedged, serves as a removable anchor point.

3.3.200 Stiffbacks. See 3.3.232, Trench Upright.

3.3.201 Strongbacks. See 3.3.232, Trench Upright.

3.3.202 Structural Load Calculations. Load calculations based on the weight per cubic foot of construction materials such as concrete, steel, and wood.

3.3.203 Structural Support System. See 3.3.179, Shoring System.

3.3.204 Strut. The tensioned member placed between two opposing surfaces.

3.3.205 Superimposed Load. See 3.3.207, Surcharge Load.

3.3.206 Support System. A structure, such as underpinning, bracing, or shoring that provides support to an adjacent structure, underground installation, or the sides of an excavation. [1670, 2009]

3.3.207 Surcharge Load. Any weight in the proximity of the trench that increases instability or the likelihood of secondary cave-in.

3.3.208 Surface. A base that is secure and conducive to supporting and stabilizing a vehicle or object.

3.3.209 Surface Encumbrance. A natural or man-made structural object adjacent to or in the immediate vicinity of an excavation or trench.

3.3.210 Surface Water Rescue. Rescue of a victim who is afloat on the surface of a body of water.

3.3.211 Swift Water. Water moving at a rate greater than one (1) knot [1.15 mph (1.85 km/hr)]. [1670, 2009]

3.3.212* Swim. To propel oneself through water by means of purposeful body movements and positioning.

3.3.213* Swim Aids. Items of personal equipment that augment the individual rescuer's ability to propel through water.

3.3.214* System Safety Check. A method of evaluating the safe assembly of a rescue system.

3.3.215* Tabulated Data. Any set of site-specific design data used by a professional engineer to design a protective system at a particular location. [1670, 2009]

3.3.216 Task. A specific job behavior or activity. [1002, 2009]

3.3.217 Team. See 3.3.37, Confined Space Rescue Team.

3.3.218 Technical Rescue. The application of special knowledge, skills, and equipment to safely resolve unique and/or complex rescue situations. [1670, 2009]

3.3.219 Technical Rescuer. A person who is trained to perform or direct the technical rescue.

3.3.219.1 Level I Technical Rescuer. This level applies to individuals who identify hazards, use equipment, and apply limited techniques specified in this standard to perform technical rescue operations.

3.3.219.2 Level II Technical Rescuer. This level applies to individuals who identify hazards, use equipment, and apply advanced techniques specified in this standard to perform technical rescue operations.

3.3.220 Throw Bag. A water rescue system that includes 50 ft to 75 ft (15.24 m to 22.86 m) of water rescue rope, an appropriately sized bag, and a closed-cell foam float.

3.3.221* Tidal Water. Ocean water or bodies of water that are connected to oceans that either experience a twice daily rise and fall of their surface caused by the gravitational pull of the moon or experience a corresponding ebb and flow of water in response to the tides.

3.3.222 Tide Tables. Schedule of predicted rise and fall of the surface of tidal waters above or below a mean water level at predictable times of each day of the year.

3.3.223 Toe. The point where the trench wall meets the floor of the trench.

3.3.224* Tool Kit. Equipment available to the rescuer as defined in this document.

3.3.225 Traffic Control. The direction or management of vehicle traffic such that scene safety is maintained and rescue operations can proceed without interruption.

3.3.226 Traffic Control Devices. Ancillary equipment/resources used at the rescue scene to facilitate traffic control such as flares, barricades, traffic cones, or barrier tape.

3.3.227 Transfer Device. Equipment used to package and allow removal of a victim from a specific rescue environment.

3.3.228* Trench (Trench Excavation). An excavation, narrow in relation to its length, made below the surface of the earth.

3.3.228.1* Intersecting Trench. A trench where multiple trench cuts or legs converge at a single point.

3.3.228.2 Nonintersecting Trench. A trench cut in a straight or nearly straight line with no crossing or converging trench legs or cuts.

3.3.229 Trench Box. See 3.3.177, Shield or Shield System.

3.3.230 Trench Emergency. Any failure of hazard control or monitoring equipment or other event(s) inside or outside a trench or excavation that could endanger entrants within the trench or excavation.

3.3.231 Trench Floor. The bottom of the trench.

3.3.232 Trench Upright. A vertical support member that spans the distance between the toe of the trench and the trench lip to collect and distribute the tension from the opposing wall over a large area.

3.3.233 Triage. The sorting of casualties at an emergency according to the nature and severity of their injuries. [402, 2013]

3.3.234 Triage Tag. A tag used in the classification of casualties according to the nature and severity of their injuries. [402, 2013]

3.3.235 Upright. See 3.3.232, Trench Upright.

3.3.236 Victim Management. The manner of treatment given to those requiring rescue assistance.

3.3.237 Victim Removal System. Those systems used to move a victim to a safe location.

3.3.238 Wales. Also called walers or stringers; horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of a shoring system or earth.

3.3.239 Water Rescue Rope. See 3.3.160.2.

3.3.240 Waterbound Victim. A victim that is in the water needing assistance.

3.3.241* Watercraft. Manned vessels that are propelled across the surface of a body of water by means of oars, paddles, water jets, propellers, towlines, or air cushions and are used to transport personnel and equipment while keeping their occupants out of the water.

3.3.242* Watercraft Conveyance. Devices intended for the purpose of transporting, moving, lifting, or lowering watercraft that may be required to be operated prior to and at the conclusion of every watercraft deployment.

3.3.243 Watermanship Skills. Capabilities that include swimming, surface diving, treading water, and staying afloat with a reasonable degree of comfort appropriate to the required task. [1670, 2009]

3.3.244 Wedges and Shims. Material used to tighten or adjust cribbing and shoring systems.

Chapter 4 Technical Rescuer

4.1* General Requirements.

4.1.1 Because technical rescue is inherently dangerous and technical rescuers are frequently required to perform rigorous activities in adverse conditions, regional and national safety standards shall be included in agency policies and procedures.

4.1.2 Technical rescuers shall complete all activities in the safest possible manner and shall follow national, federal, state, provincial, and local safety standards as they apply to the technical rescuer.

4.2* Entrance Requirements. Before beginning training activities or engaging in rescue operations, technical rescuers shall comply with the following requirements:

- (1) Age requirement established by the AHJ
- (2) Medical requirements established by the AHJ
- (3) Minimum physical fitness as required by the AHJ
- (4) Emergency medical care performance capabilities for entry-level personnel developed and validated by the AHJ
- (5) Minimum educational requirements established by the AHJ
- (6) Minimum requirements for hazardous material incident and contact control training for entry-level personnel, validated by the AHJ

4.3* Minimum Requirements. Qualification is specific to a specialty area. For qualification, a rescuer shall perform all of the job performance requirements in Chapter 5 and all job performance requirements listed in at least one level of a specialty area (Chapters 6 through 19). Technical rescuers will be identified by their specialty area and level of qualification (i.e., Rope Rescuer — Level I, Confined Space Rescuer — Level II, etc.).

4.3.1 Level I. This level shall apply to individuals who identify hazards, use equipment, and apply limited techniques specified in this standard to perform technical rescue operations.

4.3.2 Level II. This level shall apply to individuals who identify hazards, use equipment, and apply advanced techniques specified in this standard to perform technical rescue operations.

Chapter 5 Job Performance Requirements

5.1* General Requirements. The job performance requirements defined in Sections 5.2 through 5.5 shall be met prior to being qualified as a technical rescuer relative to the discipline-specific chapters (Chapters 6 through 19) and the designated response area.

5.2 Site Operations.

5.2.1 Identify the needed support resources, given a specific type of rescue incident, so that a resource cache is managed, scene lighting is provided for the tasks to be undertaken, environmental concerns are managed, personnel rehabilitation is facilitated, and the support operation facilitates rescue operational objectives.

(A) Requisite Knowledge. Equipment organization and tracking methods, lighting resource type(s), shelter and thermal control options, and rehab criteria.

(B) Requisite Skills. The ability to track equipment inventory, identify lighting resources and structures for shelter and thermal protection, select rehab areas, and manage personnel rotations.

5.2.2 Size up a rescue incident, given background information and applicable reference materials, so that the type of rescue is determined, the number of victims is identified, the last reported location of all victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, search parameters are identified, and information required to develop an incident action plan is obtained.

(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an action plan and related information, relationship of size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process.

(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, relay information, and use information gathering sources.

5.2.3 Manage incident hazards, given scene control barriers, personal protective equipment, requisite equipment, and available specialized resources, so that all hazards are identified, resource application fits the operational requirements, hazard isolation is considered, risks to rescuers and victims are minimized, and rescue time constraints are taken into account.

(A) Requisite Knowledge. Resource capabilities and limitations, types and nature of incident hazards, equipment types and their use, isolation terminology, methods, equipment and implementation, operational requirement concerns, common types of rescuer and victim risk, risk-benefit analysis methods and practices, and types of technical references.

(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess victim viability (risk-benefit), utilize technical references, place scene control barriers, and operate control and mitigation equipment.

5.2.4 Manage resources in a rescue incident, given incident information, a means of communication, resources, tactical worksheets, personnel accountability protocol, applicable references, and standard operating procedures, so that references are utilized, personnel are accounted for, deployed resources achieve desired objectives, incident actions are documented, rescue efforts are coordinated, the command structure is established, task assignments are communicated and monitored, and actions are consistent with applicable regulations.

(A) Requisite Knowledge. Incident management system; tactical worksheet application and purposes; accountability protocols; resource types and deployment methods; documentation methods and requirements; availability, capabilities, and limitations of rescuers and other resources; communication problems and needs; communications requirements, methods, and means; types of tasks and assignment responsibilities; policies and procedures of the agency; and technical references related to the type of rescue incident.

(B) Requisite Skills. The ability to implement an incident management system, complete tactical worksheets, use reference materials, evaluate incident information, match resources to operational needs, operate communications equipment, manage incident communications, and communicate in a manner so that objectives are met.

5.2.5 Conduct a discipline-specific search, given hazard-specific personal protective equipment, equipment pertinent to search mission, an incident location, and victim investigative information, so that search parameters are established; the victim profile

is established; the entry and exit of all people either involved in the search or already within the search area are questioned and the information is updated and relayed to command; the personnel assignments match their expertise; all victims are located as quickly as possible; applicable technical rescue concerns are managed; risks to searchers are minimized; and all searchers are accounted for.

(A) Requisite Knowledge. Local policies and procedures and how to operate in the site-specific search environment.

(B) Requisite Skills. The ability to enter, maneuver in, and exit the search environment and provide for and perform self-escape/self-rescue.

5.2.6* Perform ground support operations for helicopter activities, given a rescue scenario/incident, helicopter, operational plans, personal protective equipment, requisite equipment, and available specialized resources, so that rescue personnel are aware of the operational characteristics of the aircraft and demonstrate operational proficiency in establishing and securing landing zones and communicating with aircraft personnel until the assignment is complete.

(A) Requisite Knowledge. Ground support operations relating to helicopter use and deployment, operation plans for helicopter service activities, type-specific personal protective equipment, aircraft familiarization and hazard areas specific to helicopters, scene control and landing zone requirements, aircraft safety systems, and communications protocols.

(B) Requisite Skills. The ability to provide ground support operations, review standard operating procedures for helicopter operations, use personal protective equipment, establish and control landing zones, and communicate with aircrews.

5.2.7* Terminate a technical rescue operation, given an incident scenario, assigned resources, and site safety data, so that rescuer risk and site safety are managed, scene security is maintained and custody transferred to a responsible party, personnel and resources are returned to a state of readiness, record keeping and documentation occur, and post event analysis is conducted.

(A) Requisite Knowledge. Incident Command functions and resources, hazard identification and risk management strategies, logistics and resource management, personnel accountability systems, and AHJ-specific procedures or protocols related to personnel rehab.

(B) Requisite Skills. Hazard recognition, risk analysis, use of site control equipment and methods, use of data collection and management systems, and use of asset and personnel tracking systems.

5.3 Victim Management.

5.3.1 Triage victims, given triage tags and local protocol, so that rescue versus recovery factors are assessed, triage decisions reflect resource capabilities, severity of injuries is determined, and victim care and rescue priorities are established in accordance with local protocol.

(A) Requisite Knowledge. Types and systems of triage according to local protocol, resource availability, methods to determine injury severity, ways to manage resources, and prioritization requirements.

(B) Requisite Skills. The ability to use triage materials, techniques, and resources and to categorize victims correctly.

5.3.2 Move a victim in a low-angle environment, given victim transport equipment, litters, other specialized equipment, and victim removal systems specific to the rescue environment, so that the victim is moved without undue further injuries, risks to rescuers are minimized, the integrity of the victim's securement within the transfer device is established and maintained, the means of attachment to the rope rescue system is maintained, and the victim is removed from the hazard.

(A) Requisite Knowledge. Types of transport equipment and removal systems, selection factors with regard to specific rescue environments, methods to reduce and prevent further injuries, types of risks to rescuers, ways to establish and maintain victim securement, transport techniques, rope rigging applications and methods, and types of specialized equipment and their uses.

(B) Requisite Skills. The ability to secure a victim to transport equipment, assemble and operate environment-specific victim removal systems, and choose an incident-specific transport device.

5.3.3 Access, assess, stabilize, package, and transfer victims, given diagnostic and packaging equipment and an actual or simulated EMS agency, so that rescuers and victim are protected from hazards, the victim's injuries or illnesses are managed, and the victim is delivered to the appropriate EMS provider with information regarding the history of the rescue activity and victim's condition.

(A) Requisite Knowledge. Victim and scene assessment methods; victim treatment, immobilization, and packaging methods; and medical information management and communication methods.

(B) Requisite Skills. The ability to use victim immobilization, packaging, and treatment methods appropriate to the situation and provide victim transfer reports, both verbally and in written format.

5.4 Maintenance.

5.4.1* Inspect and maintain hazard-specific personal protective equipment, given clothing or equipment for the protection of the rescuers, including respiratory protection, cleaning and sanitation supplies, maintenance logs or records, and such tools and resources as are indicated by the manufacturer's guidelines for assembly or disassembly of components during repair or maintenance, so that damage, defects, and wear are identified and reported or repaired, equipment functions as designed, and preventive maintenance has been performed and documented consistent with the manufacturer's recommendations.

(A) Requisite Knowledge. Functions, construction, and operation of personal protective equipment; use of record-keeping systems of the AHJ; requirements and procedures for cleaning, sanitizing, and infectious disease control; use of provided assembly and disassembly tools; manufacturer and department recommendations; pre-use inspection procedures; and ways to determine operational readiness.

(B) Requisite Skills. The ability to identify wear and damage indicators for personal protective equipment; evaluate operational readiness of personal protective equipment; complete logs and records; use cleaning equipment, supplies, and reference materials; and select and use tools specific to the task.

5.4.2* Inspect and maintain rescue equipment, given maintenance logs and records, tools, and resources as indicated by

the manufacturer's guidelines, equipment replacement protocol, and organizational standard operating procedure, so that the operational status of equipment is verified and documented, all components are checked for operation, deficiencies are repaired or reported as indicated by standard operating procedure, and items subject to replacement protocol are correctly disposed of and changed.

(A) Requisite Knowledge. Functions and operations of rescue equipment, use of record-keeping systems, manufacturer and organizational care and maintenance requirements, selection and use of maintenance tools, replacement protocol and procedures, disposal methods, and organizational standard operating procedures.

(B) Requisite Skills. The ability to identify wear and damage indicators for rescue equipment, evaluate operation readiness of equipment, complete logs and records, and select and use maintenance tools.

5.5 Ropes/Rigging.

5.5.1 Tie knots, bends, and hitches, given ropes and webbing, so that the knots are dressed, recognizable, and backed up as required.

(A) Requisite Knowledge. Knot efficiency, knot utilization, rope construction, and rope terminology.

(B) Requisite Skills. The ability to tie representative knots, bends, or hitches for the following purposes:

- (1) End-of-line loop
- (2) Midline loop
- (3) Securing rope around desired objects
- (4) Joining rope or webbing ends together
- (5) Gripping rope

5.5.2 Construct a single-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, meets or exceeds the expected load, and does not interfere with rescue operations, an efficient anchor point is chosen, the need for redundant anchor points is assessed and used as required, the anchor system is inspected and loaded prior to being placed into service, and the integrity of the system is maintained throughout the operation.

(A) Requisite Knowledge. Application of knots, rigging principles, anchor selection criteria, system safety check procedures, rope construction, and rope rescue equipment applications and limitations.

(B) Requisite Skills. The ability to select rope and equipment; tie knots; rig systems; evaluate anchor points for required strength, location, and surface contour; and perform a system safety check.

5.5.3 Place edge protection, given life safety rope or webbing traversing a sharp or abrasive edge, edge protection, and other auxiliary rope rescue equipment, so that the rope or webbing is protected from abrasion or cutting, the rescuer is safe from falling while placing the edge protection, the edge protection is secure, and the rope or webbing is securely placed on the edge protection.

(A) Requisite Knowledge. Materials and devices that can be used to protect ropes or webbing from sharp or abrasive edges, fall protection measures, dangers associated with sharp or abrasive edges, and methods for negotiation of sharp or abrasive edges.

(B) Requisite Skills. The ability to select protective devices for rope and webbing, provide personnel fall protection while working near edges, secure edge protection, and secure ropes or webbing in a specific location.

5.5.4 Construct a simple rope mechanical advantage system, given life safety rope, carabiners, pulleys, rope grab devices, and auxiliary rope rescue equipment, so that the system constructed can accommodate the load, is efficient, and is connected to an anchor system and the load.

(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems, application of knots, rigging principles, and system safety check procedures.

(B) Requisite Skills. The ability to select rope and equipment, tie knots, choose and rig systems, attach the mechanical advantage system to the anchor system and load, and perform a system safety check.

5.5.5* Direct a team in the operation of a simple rope mechanical advantage system in a low-angle raising operation, given rescue personnel, a specified minimum travel distance for the load, an established rope rescue system incorporating a simple rope mechanical advantage system, a load to be moved, and an anchor system, so that the movement is controlled; a reset is accomplished; the load can be held in place when needed; operating methods do not stress the system to the point of failure; commands are used to direct the operation; and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems and low-angle raising operations, correct operation of simple rope mechanical advantage systems, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel effectively, use operational commands, analyze system efficiency, identify safety concerns, and perform a system safety check.

5.5.6* Function as a litter tender in a low-angle lowering or hauling operation, given a rope rescue system, a specified minimum travel distance for the litter tender, life safety harnesses, litters, bridles, and specialized equipment necessary for the environment, so that risks to victims and rescuers are minimized; the means of attachment to the rope rescue system is secure; and the terrain is negotiated while minimizing risks to equipment or persons.

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses, personal protective equipment selection criteria, variations in litter design and intended purpose, low-angle litter attachment principles, techniques and practices for low-angle environments, and common hazards imposed by the terrain.

(B) Requisite Skills. The ability to select and use rescuer harness and personal protective equipment for common environments, attach the life safety harness to the rope rescue system, maneuver across the terrain, manage the litter while suspended from the rope rescue system, and evaluate surroundings for potential hazards.

5.5.7 Construct a lowering system, given an anchor system, life safety rope(s), descent control device, and auxiliary rope rescue equipment, so that the system can accommodate the load, is efficient, is capable of controlling the descent, is capable of holding the load in place or lowering with minimal

effort over the required distance, and is connected to an anchor system and the load.

(A) Requisite Knowledge. Capabilities and limitations of various descent control devices, capabilities and limitations of various lowering systems, application of knots, rigging principles, and system safety check procedures.

(B) Requisite Skills. The ability to tie knots; perform rigging; attach to descent control device, anchor system, and load; and perform a system safety check.

5.5.8* Direct a lowering operation in a low-angle environment, given rescue personnel, an established lowering system, a specified minimum travel distance for the load, and a load to be moved, so that the movement is controlled; the load can be held in place when needed; operating methods do not stress the system to the point of failure; rope commands are used to direct the operation; and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Application and use of descent control devices, capabilities and limitations of various lowering systems in a low-angle environment, operation of lowering systems in a low-angle environment, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the load in a low-angle environment, identify safety concerns in a low-angle environment, and perform a system safety check.

5.5.9 Construct a belay system, given life safety rope, anchor systems, personal protective equipment, and rope rescue equipment, so that the system is capable of arresting a fall, a fall will not result in system failure, the system is not loaded unless actuated, actuation of the system will not injure or otherwise incapacitate the belayer, the belayer is not rigged into the equipment components of the system, and the system is suitable to the site and is connected to an anchor system and the load.

(A) Requisite Knowledge. Principles of belay systems, capabilities and limitations of various belay devices, application of knots, rigging principles, and system safety check procedures.

(B) Requisite Skills. The ability to select a system, tie knots, perform rigging, attach to anchor system and load, don and use task-specific personal protective equipment, and perform a system safety check.

5.5.10 Operate a belay system during a lowering or raising operation, given an operating lowering or hauling system, a specified minimum travel distance for the load, a belay system, and a load, so that the belay device system is not actuated during operation of the primary rope rescue system, the belay system is prepared for actuation at all times during the operation, the belayer is attentive at all times during the operation, the load's position is continually monitored, and the belayer moves rope through the belay device as designed.

(A) Requisite Knowledge. Application and use of belay devices, proper operation of belay systems in conjunction with normal lowering and hauling operations, and operational commands.

(B) Requisite Skills. The ability to tend a belay system as designed, tie approved knots, assess system effectiveness, properly attach a belay line to a belay device, don and use task-specific personal protective equipment, perform a system safety check, and manage and communicate belay system status effectively.

5.5.11* Belay a falling load in a high-angle environment, given a belay system and a dropped load, so that the belay line is not taut until the load is falling, the belay device is actuated when the load falls, the fall is arrested, the belayer utilizes the belay system as designed, and the belayer is not injured or otherwise incapacitated during actuation of the belay system.

(A) Requisite Knowledge. Application and use of belay devices, effective emergency operation of belay devices to arrest falls, use of personal protective equipment, and operating procedures.

(B) Requisite Skills. The ability to operate a belay system as designed, tie approved knots, use task-specific personal protective equipment, recognize and arrest a falling load, and communicate belay system actuation.

5.5.12 Conduct a system safety check, given a rope rescue system and rescue personnel, so that a physical/visual check of the system is made to ensure proper rigging, a load test is performed prior to life-loading the system, and verbal confirmation of these actions is announced and acknowledged before life-loading the rope rescue system.

(A) Requisite Knowledge. System safety check procedures, construction and operation of rope rescue systems and their individual components, use of personal protective equipment, equipment inspection criteria, signs of equipment damage, principles of rigging, and equipment replacement criteria.

(B) Requisite Skills. The ability to apply and use personal protective equipment, inspect rope rescue system components for damage, assess a rope rescue system for configuration, secure equipment components, inspect all rigging, and perform a system safety check.

Chapter 6 Rope Rescue

6.1 Level I General Requirements. The job performance requirements defined in 6.1.3 through 6.1.8 shall be met prior to Level I qualification in rope rescue.

6.1.1* Direct a team in the operation of a simple rope mechanical advantage system in a high-angle raising operation, given rescue personnel, an established rope rescue system incorporating a simple rope mechanical advantage system, a specified minimum travel distance for the load, a load to be moved, and an anchor system, so that the movement is controlled, a reset is accomplished, the load can be held in place when needed, operating methods do not stress the system to the point of failure, commands are used to direct the operation, and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems and high-angle raising operations, correct operation of simple rope mechanical advantage systems, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel effectively, use operational commands, analyze system efficiency, identify safety concerns, and perform a system safety check.

6.1.2* Direct a lowering operation in a high-angle environment, given rescue personnel, an established lowering system, a specified minimum travel distance for the load, and a load to be moved, so that the movement is controlled, the load can be

held in place when needed, operating methods do not stress the system to the point of failure, rope commands are used to direct the operation, and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Application and use of descent control devices, capabilities and limitations of various lowering systems in a high-angle environment, operation of lowering systems in a high-angle environment, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the load in a high-angle environment, identify safety concerns in a high-angle environment, and perform a system safety check.

6.1.3 Construct a multiple-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, the system strength meets or exceeds the expected load and does not interfere with rescue operations, equipment is visually inspected prior to being put in service, the nearest anchor point that will support the load is chosen, the anchor system is system safety checked prior to being placed into service, the integrity of the system is maintained throughout the operation, and weight will be distributed between more than one anchor point.

(A)* Requisite Knowledge. Relationship of angles to forces created in the rigging of multiple-point anchor systems, safety issues in choosing anchor points, system safety check methods that allow for visual and physical assessment of system components, methods to evaluate the system during operations, integrity concerns, weight distribution issues and methods, knots and applications, selection and inspection criteria for hardware and software, formulas needed to calculate safety factors for load distribution, and the concepts of static loads versus dynamic loads.

(B) Requisite Skills. The ability to determine incident needs as related to choosing anchor systems, select effective knots, determine expected loads, evaluate incident operations as related to interference concerns and set-up, choose anchor points, perform a system safety check, and evaluate system components for compromised integrity.

6.1.4 Construct a compound rope mechanical advantage system, given a load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, and rope rescue equipment, so that the system constructed accommodates the load and reduces the force required to lift the load, operational interference is factored and minimized, the system is efficient, a system safety check is completed, and the system is connected to an anchor system and the load.

(A) Requisite Knowledge. Determination of incident needs as related to choosing compound rope systems, the elements of efficient design for compound rope systems, knot selection, methods for reducing excessive force to system components, evaluation of incident operations as related to interference concerns and set-up, rope commands, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.

(B) Requisite Skills. The ability to determine incident needs as related to choosing compound rope systems, select effective knots, calculate expected loads, evaluate incident operations as related to interference concerns and set-up, perform a system safety check, and evaluate system components for compromised integrity.

6.1.5 Construct a fixed rope system, given an anchor system, a life safety rope, and rope rescue equipment, so that the system constructed can accommodate the load, is efficient, and is connected to an anchor system and the load, and a system safety check is performed and the results meet the incident requirements for descending or ascending operations.

(A) Requisite Knowledge. Knot selection, calculating expected loads, incident evaluation operations as related to interference concerns and set-up, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.

(B) Requisite Skills. The ability to select effective knots, calculate expected loads, use rigging principles, evaluate incident operations as related to interference concerns and set-up, perform a system safety check, and evaluate system components for compromised integrity.

6.1.6* Direct the operation of a compound rope mechanical advantage system in a high-angle environment, given a rope rescue system incorporating a compound rope mechanical advantage system and a load to be moved, and a specified minimum travel distance for the load, so that a system safety check is performed; a reset is accomplished, and the movement is controlled; the load can be held in place when needed; operating methods do not stress the system to the point of failure; operational commands are clearly communicated; and potential problems are identified, communicated, and managed.

(A) Requisite Knowledge. Methods to determine incident needs, types of interference concerns, rope commands, system safety check protocol, procedures for continued evaluation of system components for compromised integrity, common personnel assignments and duties, common and critical commands, methods for controlling a load's movement, system stress issues during operations, and management methods for common problems.

(B) Requisite Skills. The ability to determine incident needs, evaluate incident operations as related to interference concerns, complete a system safety check, continually evaluate system components for compromised integrity, direct personnel effectively, communicate commands, analyze system efficiency, manage load movement, and identify concerns.

6.1.7* Ascend a fixed rope in a high-angle environment, given an anchored fixed rope system, a specified minimum distance for the rescuer, a system to allow ascent of a fixed rope, a structure, a belay system, a life safety harness worn by the person ascending, and personal protective equipment, so that the person ascending is secured to the fixed rope in a manner that will not allow him or her to fall; the person ascending is attached to the rope by means of an ascent control device(s) with at least two points of contact; injury to the person ascending is minimized; the person ascending can stop at any point on the fixed rope and rest suspended by his or her harness; the system will not be stressed to the point of failure; the person ascending can convert his or her ascending system to a descending system; obstacles are negotiated; the system is suitable for the site; and the objective is reached.

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses and systems for ascending a fixed rope, personal protective equipment selection criteria, design and intended purpose of ascent control devices utilized, rigging principles, techniques for high-angle environments, converting ascending systems to descending systems, and common hazards posed by maneuvering and harnessing.

(B) Requisite Skills. The ability to select and use rescuer harness, a system for ascending a fixed rope, and personal protective equipment for common environments; attach the life safety harness to the rope rescue system; configure ascent control devices to form a system for ascending a fixed rope; make connections to the ascending system; maneuver around existing environment and system-specific obstacles; convert the ascending system to a descending system while suspended from the fixed rope; and evaluate surroundings for potential hazards.

6.1.8* Descend a fixed rope in a high-angle environment, given an anchored fixed-rope system, a specified minimum travel distance for the rescuer, a system to allow descent of a fixed rope, a belay system, a life safety harness worn by the person descending, and personal protective equipment, so that the person descending is attached to the fixed rope in a manner that will not allow him or her to fall; the person descending is attached to the rope by means of a descent control device; the speed of descent is controlled; injury to the person descending is minimized; the person descending can stop at any point on the fixed rope and rest suspended by his or her harness; the system will not be stressed to the point of failure; the system is suitable for the site; and the objective is reached.

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses and systems for descending a fixed rope; personal protective equipment selection criteria; design, intended purpose, and operation of descent control devices utilized; safe rigging principles; techniques for high-angle environments; and common hazards posed by maneuvering and harnessing.

(B) Requisite Skills. The ability to select and use rescuer harness, a system for descending a fixed rope, and personal protective equipment for common environments; attach the life safety harness to the rope rescue system; make attachment of the descent control device to the rope and life safety harness; operate the descent control device; maneuver around existing environment and system-specific obstacles; and evaluate surroundings for potential hazards.

6.2 Level II General Requirements. The job performance requirements defined in Section 6.1 and 6.2.1 through 6.2.8 shall be met prior to Level II qualification in rope rescue.

6.2.1* Complete an assignment while suspended from a rope rescue system in a high-angle environment, given a rope rescue system, an assignment, life safety harnesses, litters, bridles, and specialized equipment necessary for the environment, so that risks to victims and rescuers are minimized; the means of attachment to the rope rescue system is secure; selected specialized equipment facilitates efficient rescuer movement; and specialized equipment does not unduly increase risks to rescuers or victims.

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses, personal protective equipment selection criteria, variations in litter design and intended purpose, rigging principles, techniques and practices for high-angle environments, and common hazards posed by improper maneuvering and harnessing.

(B) Requisite Skills. The ability to select and use rescuer harness and personal protective equipment for common environments, attach the life safety harness to the rope rescue system, maneuver around existing environment and system-specific obstacles, perform work while suspended from the rope rescue system, and evaluate surroundings for potential hazards.

6.2.2* Manage the movement of the victim as the rescuer in a high-angle environment, given a rope rescue system, a specified minimum travel distance for the victim, victim transfer devices, and specialized equipment necessary for the environment, so that risks to victims and rescuers are minimized; undesirable victim movement within the transfer device is minimized; the means of attachment to the rope rescue system is maintained; the victim is removed from the hazard; selected specialized equipment facilitates efficient victim movement; and the victim can be transported to the local EMS provider.

(A) Requisite Knowledge. Task-specific selection criteria for patient transfer devices, various carrying techniques, personal protective equipment selection criteria, design characteristics and intended purpose of various transfer devices, rigging principles, methods to minimize common environmental hazards, and hazards created in high-angle environments.

(B) Requisite Skills. The ability to choose patient transfer devices, select and use personal protective equipment appropriate to the conditions, attach a transfer device to the rope rescue system, reduce hazards for rescuers and victims, and determine specialized equipment needs for victim movement.

6.2.3* Function as a litter tender in a high-angle lowering or hauling operation, given a rope rescue system, a specified minimum travel distance for the litter tender, life safety harnesses, litters, bridles, and specialized equipment necessary for the environment, so that risks to victims and rescuers are minimized; the means of attachment to the rope rescue system is secure; and the terrain is negotiated while minimizing risks to equipment or persons.

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses, personal protective equipment selection criteria, variations in litter design and intended purpose, high-angle litter attachment principles, techniques and practices for high-angle environments, and common hazards imposed by the various structures.

(B) Requisite Skills. The ability to select and use rescuer harness and personal protective equipment for common environments, attach the life safety harness to the rope rescue system, maneuver the litter past obstacles or natural structural features, manage the litter while suspended from the rope rescue system, and evaluate surroundings for potential hazards.

6.2.4 Direct a team in the removal of a victim suspended from rope or webbing in a high-angle environment, given a victim suspended by a harness attached to anchored rope or webbing, devices for removal of the victim from the rope or webbing, and a means of removal of the victim to the ground or other safe area, so that risks to victims and rescuers are minimized, injury to the victim is minimized, the means of attachment to the rope rescue system is maintained, the victim is removed from the rope or webbing, and the victim is brought to a safe area for transfer to EMS.

(A)* Requisite Knowledge. Techniques and systems for safe transfer of suspended victims from an existing anchored rope or webbing to a rope rescue system, various techniques for handling suspended victims, and principles of suspension-induced injuries.

(B) Requisite Skills. Select and construct systems for rapid removal of victims from lanyards or rope or webbing, manage operation of the selected system, determine condition of the suspended victim, reduce hazards for rescuers and victims, and determine specialized equipment needs for victim movement.

6.2.5* Direct a team in the construction of a system intended to move a suspended rescue load along a horizontal path to avoid an obstacle, given rescue personnel, life safety rope, rope rescue equipment, and a suitable anchor capable of supporting the load, so that personnel assignments are made and clearly communicated; the system constructed can accommodate the load; tension applied within the system will not exceed the rated capacity of any of its components' parts; a system safety check is performed; movement on the load is efficient; and loads can be held in place or moved with minimal effort over the required distance.

(A) Requisite Knowledge. Determination of incident needs as related to operation of a system, capabilities and limitations of various systems (including capacity ratings), incident site evaluation as related to interference concerns and obstacle negotiation, rigging principles, system safety check protocol, common personnel assignments and duties, common and critical operational commands, and common problems and ways to minimize these problems during construction.

(B) Requisite Skills. The ability to determine incident needs as related to construction of a system, evaluate an incident site as related to interference concerns and set-up, identify the obstacles or voids to be negotiated, select a system for defined task, perform system safety checks, use rigging principles, and communicate with personnel effectively.

6.2.6* Direct a team in the operation of a rope system to move a suspended rescue load along a horizontal path, given rescue personnel, an established system, a target for the load, a load to be moved, and personal protective equipment, so that the movement is controlled; the load is held in place when needed; operating methods do not stress the system to the point of failure; personnel assignments are made; tasks are communicated; and potential problems are identified, communicated and managed.

(A) Requisite Knowledge. Determination of incident needs as related to the operation of a system, capabilities and limitations of various systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, common and critical operational commands, common problems and ways to minimize or manage those problems, and ways to increase the efficiency of load movement.

(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel effectively, manage movement of the load, and evaluate for any potential problems.

6.2.7* Access a victim in a high-angle environment using techniques that require rescuers to climb up or down natural or man-made structures given a belay, a belay system, or other mechanisms, so that the risks from a fall are minimized or eliminated; the patient is accessed; and the objective is achieved.

(A) Requisite Knowledge. The ability to determine the need for fall protection in a climbing environment. An understanding of fall factors and methods for reducing them for a rescuer performing climbing operations.

(B) Requisite Skills. The ability to select and use tools and techniques that minimize fall potential and fall factors.



6.2.8 Isolate and manage potentially harmful energy sources found in erected structures, including power systems and construction materials, given personal protective equipment, so that all hazards are identified, systems are managed, beneficial system use is evaluated, and hazards to rescue personnel and victims are minimized.

(A) Requisite Knowledge. Types and uses of personal protective equipment, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.

(B) Requisite Skills. The ability to select and use task- and incident-specific personal protective equipment, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

Chapter 7 Confined Space Rescue

7.1 Level I General Requirements. The job performance requirements defined in 7.1.1 through 7.1.5 shall be met prior to Level I qualification in confined space rescue.

7.1.1* Conduct monitoring of the environment, given monitoring equipment reference material, personal protective equipment, accurately calibrated detection and monitoring equipment, and size-up information, so that a representative sample of the space is obtained, accurate readings are made, readings are documented, and effects of ventilation in determining atmospheric conditions and the conditions of the space have been determined for exposures to existing or potential environmental hazards.

(A) Requisite Knowledge. Capabilities and limitations of detection and monitoring equipment, ways to confirm calibration, defining confined space configuration as it applies to obtaining a representative sample of space, basic physical properties of contaminants, and how to determine contents of a confined space.

(B) Requisite Skills. The ability to use and confirm calibration of detection and monitoring equipment and acquire representative samples of space.

7.1.2 Prepare for entry into the confined space, given a confined space and a confined space rescue tool kit, so that victim communication is established when possible, continuous atmospheric monitoring is initiated, rescuer readiness is verified, rescuers' limitations are identified and evaluated, rescuers unsuitable to entry operations are reassigned and replaced, route and methods of entry are determined, and rescuer evacuation is planned.

(A) Requisite Knowledge. Effects of hazardous atmospheres on victims and rescuers, types and operation of required hazard-specific monitoring equipment, organization protocol for medical and psychological evaluation related to entry, methods of entry into confined space in accordance with operational protocols, and rescuer evaluation methods.

(B) Requisite Skills. The ability to operate monitoring equipment, perform rescuer pre-entry medical exam, evaluate rescuer capabilities and limitations, identify victim communication needs, evaluate for point and route of entry, and select evacuation methods.

7.1.3 Enter a confined space, given personal protective equipment; safety, communication, and operational protocols; and a confined space rescue tool kit, so that the victim is contacted, controlled entry is established and maintained, atmosphere is continuously monitored, the victim's mental and physical conditions are further assessed, patient care is initiated, the patient is packaged to restrictions of the space, and patient removal can be initiated.

(A) Requisite Knowledge. Principles of operation for atmospheric monitoring equipment; methods for patient care in confined spaces; safety, communication, medical, and operational protocols; and controlled entry and egress procedures for confined spaces.

(B) Requisite Skills. The ability to use and apply personal protective equipment and rescue-related systems and equipment; implement safety, communication, and operational protocols; use medical protocols to determine treatment priorities; use medical equipment specific to confined space victim needs; and reassess and confirm mode of operation.

7.1.4* Package the victim for removal from a confined space, given a confined space rescue tool kit, so that damage to the rescue/retrieval equipment is prevented, the victim is given the smallest possible profile, and further harm to the victim is minimized.

(A) Requisite Knowledge. Spinal management techniques, victim packaging techniques, how to use low-profile packaging devices and equipment, methods to reduce or avoid damage to equipment, and the similarities and differences between packaging for confined spaces and for other types of rescue.

(B) Requisite Skills. The ability to immobilize a victim's spine; package victims in harnesses, low-profile devices, and litters; recognize and perform basic management of various traumatic injuries and medical conditions; support respiratory efforts; and perform cardiopulmonary resuscitation as required based on the environment.

7.1.5 Remove all entrants from a confined space, given personal protective equipment, rope and related rescue and retrieval systems, personnel to operate rescue and retrieval systems, and a confined space rescue tool kit, so that internal obstacles and hazards are negotiated, all persons are extricated from a space in the selected transfer device, the victim and rescuers are decontaminated as necessary, and the victim is delivered to the EMS provider.

(A) Requisite Knowledge. Personnel and equipment resource lists, specific personal protective equipment, types of confined spaces and their internal obstacles and hazards, rescue and retrieval systems and equipment, operational protocols, medical protocols, EMS providers, and decontamination procedures.

(B) Requisite Skills. The ability to select and use personal protective equipment, select and operate rescue and retrieval systems used for victim removal, utilize medical equipment, and use equipment and procedures for decontamination.

7.2 Level II General Requirements. The job performance requirements defined in Section 7.1 and 7.2.1 through 7.2.3 shall be met prior to Level II qualification in confined space rescue.

7.2.1 Preplan a confined space incident, given applicable guidelines and regulations and a preplan form, so that a standard approach is used during a confined space rescue emergency, hazards are recognized and documented, isolation methods are identified and documented, all accesses to the location of the

entry opening are identified and documented, all types of entry openings are identified and documented, and internal configurations and special resource needs are documented for future rescuer use.

(A) Requisite Knowledge. Operational protocols, specific preplan forms, types of hazards common to jurisdictional boundaries, hazards that should and must be identified on preplans, isolation methods and issues related to preplanning, issues and constraints relating to the types of confined space openings, internal configuration special resource needs of a confined space, and applicable legal issues.

(B) Requisite Skills. The ability to select a specific preplan form; draft or draw a sketch of confined spaces; complete supplied forms; identify and evaluate various configurations of confined spaces, access points, entry openings, isolation procedures, and energy control locations; recognize general and site-specific hazards; document all data; and apply all regulatory compliance references.

7.2.2* Assess the incident, given a preplan of the space or size-up information, information from technical resources, monitoring equipment, and personal protective equipment required to perform the assessment, so that general area and space-specific hazards are identified, bystanders and victims are interviewed, immediate and ongoing monitoring of the space is performed, the victims' conditions and location are determined, a risk–benefit analysis is performed, methods of ingress and egress for rescuer and victims are identified, rescue systems for victim removal are determined, and an emergency means of retrieval for rescue entrants is established.

(A) Requisite Knowledge. Use of preplans, size-up, and interviewing techniques; types of personal protective equipment; monitoring equipment protocols; rescue and retrieval systems; permit programs; types of and uses for available resources; risk–benefit analysis methods; common hazards and their influence on the assessment; methods to identify egress from and ingress into the space; and processes to identify size, type, and configuration of the opening(s) and internal configuration of the space.

(B) Requisite Skills. The ability to select and interpret preplan and size-up information, conduct interviews, choose and utilize personal protective equipment, operate monitoring equipment, identify hazard mitigation options, identify probable victim location, perform risk–benefit analysis, recognize characteristics and hazards of confined spaces, and evaluate specific rescue systems for entry and retrieval of rescuers and victims during confined space incidents.

7.2.3 Control hazards, given personal protective equipment and a confined space tool kit, so that the rescue area is established; access to the incident scene is controlled; rescuers are protected from exposure to hazardous materials and atmospheres, all forms of harmful energy releases, and physical hazards; and victims are protected from further harm.

(A) Requisite Knowledge. Personal protective equipment; safety protocols; monitoring equipment and procedures; ventilation equipment and procedures; incident hazards; types of hazardous materials exposure risks; forms, sources, and control of harmful energy and physical hazards in the confined space.

(B) Requisite Skills. The ability to utilize personal protective equipment, place scene control barriers, operate atmospheric monitoring equipment, isolate dangerous forms of energy, and mitigate physical and atmospheric hazards.

Chapter 8 Trench Rescue

8.1 Level I General Requirements. The job performance requirements defined in 8.1.1 through 8.1.7 shall be met prior to Level I qualification in trench rescue.

8.1.1* Conduct a size-up of a collapsed trench, given an incident and background information and applicable reference material, so that the size-up is conducted within the scope of the incident management system; the existing and potential conditions are evaluated within the trench and the rescue area; general hazards are identified; a witness or “competent person” is secured; the probability of victim existence, number, condition, and location is determined; potential for rapid, nonentry rescues or victim self-rescue is recognized; needed personnel, supply, and equipment resources are evaluated; and utility involvement and location are determined. (*See Annex F.*)

(A) Requisite Knowledge. Methods to distinguish soil types, collapse mechanics, and other contributing factors such as severe environmental conditions and other general hazards; need to immediately secure “competent person” or witness; signs and evidence of victim involvement, number, and location; jurisdictional and community resource lists and agreements; effects and hazards of collapse and rescue efforts on utilities at the incident site; personnel training level and availability; risk–benefit analysis; protocols; incident management system; and all applicable regulations, laws, and standards.

(B) Requisite Skills. The ability to measure dimensions of trench, categorize soil, identify type and degree of collapse, and determine severe environmental conditions with implications for secondary collapse and victim survivability; demonstrate interview techniques; implement protocols and resource acquisition agreements; implement public works utility notification, response, and location procedures; perform a risk–benefit analysis for determining self-rescue, rescue, or recovery mode; implement an incident management system for span of control; and apply governing regulations, laws, and standards.

8.1.2* Implement a trench emergency action plan, given size-up information and a trench incident, so that initial size-up information is utilized; prebriefing is given to rescuers; documentation is ongoing; the collapse zone is established; a risk–benefit analysis is conducted; rapid, nonentry rescues or victim self-rescues are performed; the rescue area and general area are made safe; strategy and tactics are confirmed and initiated for existing and potential conditions; rapid intervention team and operational tasks are assigned; other hazards are mitigated; rescue resources are staged; and a protective system is being utilized.

(A) Requisite Knowledge. Size-up information and documentation; need to brief rescuers; areas that could be affected by collapse; variables to factor risk–benefit analysis; criteria for rapid, nonentry rescues; methods to control hazards in the general area; options for strategy and tactical approach by factoring time frame, risk–benefit, approved shoring techniques, and personnel and equipment available; incident management system; rescue personnel and equipment cache staging; and options for victim isolation and/or protective systems.

(B) Requisite Skills. The ability to use and document tactical worksheets; disseminate information; understand mechanics and extent of collapse effects; perform risk–benefit analysis;

execute rapid, nonentry rescues; mitigate hazards by isolation, removal, or control; choose strategy and tactics that will enhance successful outcome; use incident management system and resource staging; and apply choice of isolation and/or protective system promptly to surround victim.

8.1.3* Implement support operations at trench emergencies, given an assignment, and equipment and other resources, so that a resource cache is managed, scene lighting is provided for the tasks to be undertaken, environmental concerns are managed, a cut station is established, supplemental power is provided for all equipment, atmospheric monitoring and ventilation are implemented, personnel rehab is facilitated, operations proceed without interruption, extrication methods are in place, and the support operations facilitate rescue operational objectives.

(A) Requisite Knowledge. Equipment organization and tracking methods, lighting resources, dewatering methods, shelter and thermal control options, basic carpentry methods, hand and power tool applications, atmospheric monitoring protocol, rehab criteria, and extrication and removal equipment options.

(B) Requisite Skills. The ability to track equipment inventory, provide power, use lighting, choose and deploy dewatering techniques, acquire or construct structures for shelter and thermal protection, select rehab areas and personnel rotations, operate atmospheric monitoring and ventilation equipment, and perform patient packaging and removal.

8.1.4* Support a nonintersecting straight wall trench of 2.4 m (8 ft) or less as a member of a team, given size-up information, an action plan, a trench tool kit, and an assignment, so that strategies to minimize the further movement of soil are implemented effectively; trench walls, lip, and spoil pile are monitored continuously; rescue entry team(s) remains in a safe zone; any slough-in and wall shears are mitigated; emergency procedures and warning systems are established and understood by participating personnel; incident-specific personal protective equipment is utilized; physical hazards are identified and managed; victim and rescuer protection is maximized; victim extrication methods are considered; and a rapid intervention team is staged.

(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, protocols on making the general area safe, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.

(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, install supplemental shoring, use protocols, choose methods to stabilize, use personal protective equipment, anticipate extrication logistics, and create systems in trenches 2.4 m (8 ft) deep.

8.1.5* Release a victim from soil entrapment by components of a nonintersecting collapsed trench of 2.4 m (8 ft) or less in depth, given personal protective equipment, a trench rescue tool kit, and specialized equipment, so that hazards to rescue personnel and victims are minimized, considerations are given to crush syndrome and other injuries, techniques are used to enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing trench shoring system.

(A) Requisite Knowledge. Identification, utilization, and required care of personal equipment; general hazards associ-

ated with each type of trench collapse; methods of evaluating shoring systems and trench wall stability; crush syndrome protocols; identification of collapse characteristics; causes and associated effects of trench collapse; potential signs of subsequent collapse; selection and application of rescue tools and resources; risk-benefit assessment techniques for extrication methods; and time restraints.

(B) Requisite Skills. The ability to select, use, and care for personal protective equipment, operate rescue tools and stabilization systems, identify crush syndrome clinical settings, and complete risk-benefit assessments for selected methods of rescue and time restraints.

8.1.6* Remove a victim from a trench, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required, the victim is evaluated for signs of crush syndrome, methods and packaging devices selected are compatible with intended routes of transfer, universal precautions are employed to protect personnel from bloodborne pathogens, and extraction times meet time constraints for medical management.

(A) Requisite Knowledge. Medical protocols, available medical resources, transfer methods and time needed to execute, universal precautions protocol, rope rescue systems, high-point anchor options, and patient ladder raise removal techniques.

(B) Requisite Skills. The ability to select and use personal protective equipment, provide basic medical care and immobilization techniques, identify the need for advanced life support and crush syndrome management, and use a removal system that matches logistical and medical management time frame concerns.

8.1.7* Disassemble support systems at a trench emergency incident, given personal protective equipment, trench tool kit, and removal of victim(s), so that soil movement is minimized, all rescue equipment is removed from the trench, sheeting and shoring are removed in the reverse order of their placement, emergency protocols and safe zones in the trench are adhered to, rescue personnel are removed from the trench, the last supporting shores are pulled free with ropes, equipment is cleaned and serviced, reports are completed, and a postbriefing is performed.

(A) Requisite Knowledge. Selection of personal protective equipment, equipment used and its location, shoring and shielding tactics and order of placement, shoring removal protocols, criteria for a "safe zone" within the trench, personnel accountability, emergency procedures, manufacturer's recommended care and maintenance procedures, and briefing protocols.

(B) Requisite Skills. The ability to use personal protective equipment, remove equipment and protective systems, use trench safety protocols, clean and service equipment, and perform an incident debriefing.

8.2 Level II General Requirements. The job performance requirements defined in Section 8.1 and 8.2.1 through 8.2.6 shall be met prior to Level II qualification in trench rescue.

8.2.1* Support an intersecting trench as a member of a team, given size-up information and an action plan, a trench tool kit, and an assignment, so that strategies to minimize the further movement of soil are implemented effectively; trench walls, lip, and spoil pile are monitored continuously; rescue entry team(s) in the trench remains in a safe zone; any slough-in and wall shears are mitigated; emergency procedures and

warning systems are established and understood by participating personnel; incident-specific personal protective equipment is utilized; physical hazards are identified and managed; victim protection is maximized; victim extrication methods are considered; and a rapid intervention team is staged.

(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, types of intersecting trenches and techniques to stabilize, protocols on making the general area safe, criteria for safe zones in the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.

(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, identify type of intersecting trench, use trench rescue protocols, select types of collapse and methods to stabilize, identify hazards in a trench, use personal protective equipment, and anticipate extrication logistics.

8.2.2* Install supplemental sheeting and shoring for each 2 ft (0.61 m) of depth dug below an existing approved shoring system, given size-up information, an action plan, and a trench tool kit, so that the movement of soil is minimized effectively, initial trench support strategies are facilitated, rescue entry team safe zones are maintained, excavation of entrapping soil is continued, victim protection is maximized, victim extrication methods are considered, and a rapid intervention team is staged.

(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, methods and techniques to install supplemental sheeting and shoring, protocols on making the general area safe, criteria for safe zones in the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.

(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, identify supplemental sheeting and shoring, use all trench rescue protocols, identify types of collapse and methods to stabilize, identify exposure to hazards within the trench relative to existing safe zones, select and use personal protective equipment, and anticipate extrication logistics.

8.2.3* Construct load stabilization systems, given an assignment, personal protective equipment, and a trench tool kit, so that the stabilization system will support the load safely, the system is stable, and the assignment is completed.

(A) Requisite Knowledge. Different types of stabilization systems and their construction methods, limitations of the system, load calculations, principles of and applications for stabilization systems, and safety considerations.

(B) Requisite Skills. The ability to select and construct stabilization systems, evaluate structural integrity of the system, determine stability, and calculate loads.

8.2.4* Lift a load, given a trench tool kit, so that the load is lifted the required distance to gain access; settling or dropping of the load is prevented; control and stabilization are maintained before, during, and after the lift; and operational objectives are attained.

(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics and types of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic,

mechanical, and manual lifting tools; how to calculate the weight of the load; and safety protocols.

(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, the correct operations of the tools, operation of a lever, and application of load stabilization systems.

8.2.5* Coordinate the use of heavy equipment, given personal protective equipment, means of communication, equipment and operator, and an assignment, so that operator capabilities and limitations for task are evaluated, common communications are maintained, equipment usage supports the operational objectives, and hazards are avoided.

(A) Requisite Knowledge. Types of heavy equipment, capabilities, application and hazards of heavy equipment and rigging, operator training, types of communication, and methods to establish communications.

(B) Requisite Skills. The ability to use hand signals, use radio equipment, recognize hazards, assess operator for skill and calm demeanor, assess heavy equipment for precision of movement and maintenance, monitor rescuer and victim safety, and use personal protective equipment.

8.2.6* Release a victim from entrapment by components of a collapsed trench, given personal protective equipment, a trench rescue tool kit, and specialized equipment, so that hazards to rescue personnel and victims are minimized, considerations are given to crush syndrome and other injuries, techniques are used to enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing trench shoring system.

(A) Requisite Knowledge. Identification, utilization, and required care of personal equipment; general hazards associated with each type of trench collapse; methods of evaluating shoring systems and trench wall stability; crush syndrome protocols; identification of collapse characteristics; causes and associated effects of trench collapse; potential signs of subsequent collapse; selection and application of rescue tools and resources; risk–benefit assessment techniques for extrication methods; and time restraints.

(B) Requisite Skills. The ability to select, use, and care for personal protective equipment; operate rescue tools and stabilization systems; identify crush syndrome clinical settings; and complete risk–benefit assessments for selected methods of rescue and time restraints.

Chapter 9 Structural Collapse

9.1 Level I General Requirements. The job performance requirements defined in 9.1.1 through 9.1.13 shall be met prior to Level I qualification in structural collapse rescue.

9.1.1* Conduct a size-up of a light frame collapsed structure, given an incident and specific incident information, so that existing and potential conditions within the structure and the immediate periphery are evaluated, needed resources are defined, hazards are identified, construction and occupancy types are determined, collapse type is identified if possible, the need for rescue is assessed, a scene security perimeter is established, and the size-up is conducted within the scope of the incident management system.

(A) Requisite Knowledge. Identification of light frame construction types, characteristics, and probable occupant locations;

methods to assess rescue needs; expected behavior of light frame construction in a structural collapse incident; causes and associated effects of structural collapses; types and capabilities of resources; general hazards associated with structural collapse and size-up; and procedures for implementing site control and scene management.

(B) Requisite Skills. The ability to categorize light frame construction types, evaluate structural stability and hazards, and implement resource and security (scene management) protocols.

9.1.2 Determine potential victim locations in light frame construction collapse incidents, given size-up information, a structural collapse tool kit, the type of construction and occupancy, time of day, and collapse pattern, so that search areas are established and victims can be located.

(A) Requisite Knowledge. Capabilities and limitation of search instruments and resources, types of building construction, occupancy classifications, collapse patterns, victim behavior, and potential areas of survivability.

(B) Requisite Skills. The ability to use size-up information, occupancy classification information, and search devices, and assess and categorize type of collapse.

9.1.3 Develop a collapse rescue incident action plan, given size-up information and a light frame collapsed structure, so that initial size-up information is utilized, an incident management system is incorporated, existing and potential conditions within the structure and the immediate periphery are included, specialized resource needs are identified, work perimeters are determined, collapse type/category and associated hazards are identified, construction and occupancy types are determined, incident objectives are established, and scene security measures are addressed.

(A) Requisite Knowledge. Incident-specific size-up information, incident management system components, dynamics of incident conditions and peripheral areas, incident-specific resources in a given geographical area, construction and occupancy types, scene security requirements, personnel needs and limitations, and rescue scene operational priorities.

(B) Requisite Skills. The ability to utilize size-up information, implement an incident management system, monitor changing conditions specific to the incident, identify potential specialized resources, determine construction and occupancy types, identify specific incident security requirements, and create written documentation.

9.1.4 Implement a collapse rescue incident action plan, given an action plan and a light frame collapsed structure, so that pertinent information is used, an incident management system is established and implemented, monitoring of dynamic conditions internally and externally is established, specialized resources are requested, hazards are mitigated, victim rescue and extraction techniques are consistent with collapse and construction type, and perimeter security measures are established.

(A) Requisite Knowledge. Components of an action plan specific to collapse incidents, incident management systems, dynamics of incident conditions and peripheral areas, identification of specialized resource lists, hazard identification, rescue and extrication techniques consistent with each collapse and construction type, perimeter security measures, and personnel needs and limitations.

(B) Requisite Skills. The ability to implement the components of an action plan in a collapse incident, implement an incident management system, initiate hazard mitigation objectives, request specialized resources, initiate rescue objectives, and demonstrate perimeter security measures.

9.1.5 Search a light frame collapsed structure, given personal protective equipment, the structural collapse tool kit, an assignment, operational protocols, and size-up information, so that all victim locations and potential hazards are identified, marked, and reported; protocols are followed; the mode of operation can be determined; and rescuer safety is maintained. (*See also Annex E.*)

(A) Requisite Knowledge. Concepts and operation of the incident management system as applied to the search function, application of specialty tools and locating devices, application of recognized marking systems, voice sounding techniques, potential victim locations as related to the type of structure and occupancy, building construction, collapse types and their influence on the search function, operational protocols, and various hazards and their recognition.

(B) Requisite Skills. The ability to implement an incident management system, apply search techniques, use marking systems, identify and mitigate hazards, and select and use victim locating devices.

9.1.6* Stabilize a collapsed light frame structure as a member of a team, given size-up information, a specific pattern of collapse, a basic structural collapse tool kit, and an assignment, so that strategies to effectively minimize the movement of structural components are identified and implemented; hazard warning systems are established and understood by participating personnel; incident-specific personal protective equipment is identified, provided, and utilized; physical hazards are identified; confinement, containment, and avoidance measures are discussed; and a rapid intervention team is established and staged.

(A) Requisite Knowledge. Identification and required care of personal protective equipment; structural load calculations for shoring system requirements; shoring systems for stabilization; specific hazards associated with light frame structural collapse; strategic planning for collapse incidents; communications and safety protocols; atmospheric monitoring equipment needs; identification, characteristics, expected behavior, type, causes, and associated effects of light frame structural collapses; and recognition of, potential for, and signs of impending secondary collapse.

(B) Requisite Skills. The ability to select and construct shoring systems for collapses in light frame structures, use personal protective equipment, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and safety protocols, and mitigate specific hazards associated with shoring tasks.

9.1.7 Implement collapse support operations at a rescue incident, given an assignment and available resources, so that scene lighting is adequate for the tasks to be undertaken, environmental concerns are managed, personnel rehabilitation is facilitated, and the support operations facilitate rescue operational objectives.

(A) Requisite Knowledge Resource management protocols, principles for establishing lighting, environmental control methods, and rescuer rehabilitation protocols.

(B) Requisite Skills. The ability to manage resources, set up lights, initiate environmental controls, and set up rehabilitation for rescuers.

9.1.8 Release a victim from entrapment by components of a light frame collapsed structure, given personal protective equipment and resources for breaching, breaking, lifting, prying, shoring, and/or otherwise moving or penetrating the off-fending structural component, so that hazards to rescue personnel and victims are minimized, considerations are given to crush syndrome, techniques enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing structure or structural support systems.

(A) Requisite Knowledge. Identification, utilization, and required care of personal protective equipment; general hazards associated with each type of structural collapse; methods of evaluating structural integrity; crush syndrome protocols; identification of construction types and collapse characteristics of light frame structures; causes and associated effects of structural collapses; potential signs of impending secondary collapse; selection and application of rescue tools and resources; and risk–benefit assessment techniques for extrication methods and time constraints.

(B) Requisite Skills. The ability to select, use, and care for personal protective equipment, operate rescue tools and stabilization systems, recognize crush syndrome indicators, and complete risk–benefit assessments for selected methods of rescue and time constraints.

9.1.9* Remove a victim from a light frame collapse incident, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required, victim is evaluated for signs of crush syndrome, advanced life support is called if needed, methods and packaging devices selected are compatible with intended routes of transfer, universal precautions are employed to protect personnel from bloodborne pathogens, and extraction times meet time constraints for medical management.

(A) Requisite Knowledge. Identification, utilization, and required care of personal protective equipment resources for structural collapse incidents; general hazards associated with structural collapse; identification of light frame construction types; characteristics and expected behavior of each type in a structural collapse incident; causes and associated effects of structural collapses; recognition of potential for and signs of impending secondary collapse; characteristic mechanisms of injury and basic life support; and patient packaging principles.

(B) Requisite Skills. Selection, use, and care of personal protective equipment, basic prehospital care of soft-tissue injuries, fracture stabilization, airway maintenance techniques, and cardiopulmonary resuscitation; and selection and use of patient packaging equipment.

9.1.10* Lift a heavy load as a team member, given a structural collapse tool kit and a load to be lifted, so that the load is lifted; control and stabilization are maintained before, during, and after the lift; and access can be gained.

(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic, mechanical, and manual lifting tools; how to calculate the weight of the load; safety protocols; and stabilization systems.

(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, the operations of lifting tools, the application of a lever, and the application of load stabilization systems.

9.1.11* Move a heavy load as a team member, given a structural collapse tool kit, so that the load is moved the required distance to gain access and so that control is constantly maintained.

(A) Requisite Knowledge. Applications of rigging systems, applications of levers, classes of levers, inclined planes, gravity and load balance, friction, mechanics of load stabilization and load lifting, capabilities and limitations of lifting tools, how to calculate the weight of the load, and safety protocols.

(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, operate required tools, construct and use levers and incline planes, utilize rigging systems, and stabilize the load.

9.1.12 Breach light frame structural components, given an assignment, personal protective equipment, various types of construction materials, and a structural collapse tool kit, so that the opening supports the rescue objectives, the necessary tools are selected, structural stability is maintained, and the methods utilized are safe and efficient.

(A) Requisite Knowledge. Effective breaching techniques; types of building construction and characteristics of materials used in each; the selection, capabilities, and limitations of tools; safety protocols for breaching operations; calculation of weight; and anticipation of material movement during breaching and stabilization techniques.

(B) Requisite Skills. Select and use breaching tools, implement breaching techniques based on building construction type, use personal protective equipment, and apply stabilization where required.

9.1.13* Construct cribbing systems, given an assignment, personal protective equipment, a structural collapse tool kit, various lengths and dimensions of construction-grade lumber, wedges, and shims, so that the cribbing system will safely support the load, the system is stable, and the assignment is completed.

(A) Requisite Knowledge. Different types of cribbing systems and their construction methods, limitations of construction lumber, load calculations, principles of and applications for cribbing, and safety protocols.

(B) Requisite Skills. The ability to select and construct cribbing systems, evaluate the structural integrity of the system, determine stability, and calculate loads.

9.2 Level II General Requirements. The job performance requirements defined in Section 9.1 and 9.2.1 through 9.2.16 shall be met prior to Level II qualification in structural collapse rescue.

9.2.1 Conduct a size-up of a collapsed heavy construction-type structure, given an incident and specific incident information, so that existing and potential conditions within the structure and the immediate periphery are evaluated, needed resources are defined, hazards are identified, construction and occupancy types are determined, collapse type is identified if possible, the need for rescue is assessed, a scene security perimeter is established, and the size-up is conducted within the scope of the incident management system. (*See Annexes B, D, and E for additional information.*)

(A) Requisite Knowledge. Identification of heavy construction types, characteristics, and probable occupant locations;

methods to assess rescue needs; expected behavior of heavy construction in a structural collapse incident; causes and associated effects of structural collapses; types and capabilities of resources; general hazards associated with structural collapse and size-up; and procedures for implementing site control and scene management.

(B) Requisite Skills. The ability to categorize heavy construction types, evaluate structural stability and hazards, and implement resource and security (scene management) protocols.

9.2.2 Determine potential victim locations in a heavy construction-type incident, given size-up information, a structural collapse tool kit, the type of construction and occupancy, time of day, and collapse pattern, so that search areas are established and victims can be located.

(A) Requisite Knowledge. Capabilities and limitation of search instruments and resources, types of building construction, occupancy classifications, collapse patterns, victim behavior, and potential areas of survivability.

(B) Requisite Skills. The ability to use size-up information, occupancy classification information, and search devices, and assess and categorize type of collapse.

9.2.3 Develop a collapse rescue incident action plan, given size-up information and a heavy collapsed structure, so that initial size-up information is utilized, an incident management system is incorporated, existing and potential conditions within the structure and the immediate periphery are included, specialized resource needs are identified, work perimeters are determined, collapse type/category and associated hazards are identified, construction and occupancy types are determined, incident objectives are established, and scene security measures are addressed.

(A) Requisite Knowledge. Incident-specific size-up information, incident management system components, dynamics of incident conditions and peripheral areas, incident-specific resources in a given geographical area, construction and occupancy types, scene security requirements, personnel needs and limitations, and rescue scene operational priorities.

(B) Requisite Skills. The ability to utilize size-up information, implement an incident management system, monitor changing conditions specific to the incident, identify potential specialized resources, determine construction and occupancy types, identify specific incident security requirements, and create written documentation.

9.2.4 Implement a collapse rescue incident action plan, given an action plan and a heavy construction-type collapsed structure, so that pertinent information is used, an incident management system is established and implemented, monitoring of dynamic conditions internally and externally is established, specialized resources are requested, hazards are mitigated, victim rescue and extraction techniques are consistent with collapse and construction type, and perimeter security measures are established.

(A) Requisite Knowledge. Components of an action plan specific to collapse incidents, incident management systems, dynamics of incident conditions and peripheral areas, identification of specialized resource lists, hazard identification, rescue and extrication techniques consistent with each collapse and construction type, perimeter security measures, and personnel needs and limitations.

(B) Requisite Skills. The ability to implement the components of an action plan in a collapse incident, implement an incident management system, initiate hazard mitigation objectives, request specialized resources, initiate rescue objectives, and demonstrate perimeter security measures.

9.2.5 Search a heavy construction-type collapsed structure, given personal protective equipment, the structural collapse tool kit, an assignment, operational protocols, and size-up information, so that all victim locations and potential hazards are identified, marked, and reported; protocols are followed; the mode of operation can be determined; and rescuer safety is maintained. (*See also Annex E.*)

(A) Requisite Knowledge. Concepts and operation of the incident management system as applied to the search function, application of specialty tools and locating devices, application of recognized marking systems, voice sounding techniques, potential victim locations as related to the type of structure and occupancy, building construction, collapse types and their influence on the search function, operational protocols, and various hazards and their recognition.

(B) Requisite Skills. The ability to implement an incident management system, apply search techniques, use marking systems, identify and mitigate hazards, and select and use victim locating devices.

9.2.6 Stabilize a collapsed heavy construction-type structure as a member of a team, given size-up information, a specific pattern of collapse, a basic structural collapse tool kit, and an assignment, so that strategies to effectively minimize the movement of structural components are identified and implemented; hazard warning systems are established and understood by participating personnel; incident-specific personal protective equipment is identified, provided, and utilized; physical hazards are identified; confinement, containment, and avoidance measures are discussed; and a rapid intervention team is established and staged.

(A) Requisite Knowledge. Identification and required care of personal protective equipment; structural load calculations for shoring system requirements; shoring systems for stabilization; specific hazards associated with heavy structural collapse; strategic planning for collapse incidents; communications and safety protocols; atmospheric monitoring equipment needs; identification, characteristics, expected behavior, type, causes, and associated effects of heavy structural collapses; and recognition of, potential for, and signs of impending secondary collapse.

(B) Requisite Skills. The ability to select and construct shoring systems for collapses in heavy structures, use personal protective equipment, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and safety protocols, and mitigate specific hazards associated with shoring tasks.

9.2.7 Implement collapse support operations at a rescue incident, given an assignment and available resources, so that scene lighting is adequate for the tasks to be undertaken, environmental concerns are managed, personnel rehabilitation is facilitated, and the support operations facilitate rescue operational objectives.

(A) Requisite Knowledge. Resource management protocols, principles for establishing lighting, environmental control methods, and rescuer rehabilitation protocols.

(B) Requisite Skills. The ability to manage resources, set up lights, initiate environmental controls, and set up rehabilitation for rescuers.

9.2.8 Release a victim from entrapment by components of a heavy construction–type collapsed structure, given personal protective equipment and resources for breaching, breaking, lifting, prying, shoring, and/or otherwise moving or penetrating the offending structural component, so that hazards to rescue personnel and victims are minimized, considerations are given to crush syndrome, techniques enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing structure or structural support systems.

(A) Requisite Knowledge. Identification, utilization, and required care of personal protective equipment; general hazards associated with each type of structural collapse; methods of evaluating structural integrity; crush syndrome protocols; identification of construction types and collapse characteristics of heavy construction–type structures; causes and associated effects of structural collapses; potential signs of impending secondary collapse; selection and application of rescue tools and resources; and risk–benefit assessment techniques for extrication methods and time constraints.

(B) Requisite Skills. The ability to select, use, and care for personal protective equipment, operate rescue tools and stabilization systems, recognize crush syndrome indicators, and complete risk–benefit assessments for selected methods of rescue and time constraints.

9.2.9 Remove a victim from a heavy construction–type collapse incident, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required, victim is evaluated for signs of crush syndrome, advanced life support is called if needed, methods and packaging devices selected are compatible with intended routes of transfer, universal precautions are employed to protect personnel from bloodborne pathogens, and extraction times meet time constraints for medical management.

(A) Requisite Knowledge. Identification, utilization, and required care of personal protective equipment resources for structural collapse incidents; general hazards associated with structural collapse; identification of heavy construction types; characteristics and expected behavior of each type in a structural collapse incident; causes and associated effects of structural collapses; recognition of, potential for, and signs of impending secondary collapse; characteristic mechanisms of injury and basic life support; and patient packaging principles.

(B) Requisite Skills. Selection, use, and care of personal protective equipment; basic pre-hospital care of soft-tissue injuries; fracture stabilization; airway maintenance techniques, and cardiopulmonary resuscitation; and selection and use of patient packaging equipment.

9.2.10 Lift a heavy load as a team member, given a structural collapse tool kit and a load to be lifted, so that the load is lifted; control and stabilization are maintained before, during, and after the lift; and access can be gained.

(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic, mechanical, and manual lifting tools; how to calculate the weight of the load; safety protocols; and stabilization systems.

(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, the operations of lifting tools, the application of a lever, and the application of load stabilization systems.

9.2.11 Move a heavy load as a team member, given a structural collapse tool kit, so that the load is moved the required distance to gain access and so that control is constantly maintained.

(A) Requisite Knowledge. Applications of rigging systems, applications of levers, classes of levers, inclined planes, gravity and load balance, friction, mechanics of load stabilization and load lifting, capabilities and limitations of lifting tools, how to calculate the weight of the load, and safety protocols.

(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, operate required tools, construct and use levers and incline planes, utilize rigging systems, and stabilize the load.

9.2.12 Breach heavy structural components, given an assignment, personal protective equipment, various types of construction materials, and a structural collapse tool kit, so that the opening supports the rescue objectives, the necessary tools are selected, structural stability is maintained, and the methods utilized are safe and efficient.

(A) Requisite Knowledge. Effective breaching techniques; types of building construction and characteristics of materials used in each; the selection, capabilities, and limitations of tools; safety protocols for breaching operations; calculation of weight; and anticipation of material movement during breaching and stabilization techniques.

(B) Requisite Skills. Select and use breaching tools, implement breaching techniques based on building construction type, use personal protective equipment, and apply stabilization where required.

9.2.13 Construct cribbing systems, given an assignment, personal protective equipment, a structural collapse tool kit, various lengths and dimensions of construction-grade lumber, wedges, and shims, so that the cribbing system will safely support the load, the system is stable, and the assignment is completed.

(A) Requisite Knowledge. Different types of cribbing systems and their construction methods, limitations of construction lumber, load calculations, principles of and applications for cribbing, and safety protocols.

(B) Requisite Skills. The ability to select and construct cribbing systems, evaluate the structural integrity of the system, determine stability, and calculate loads.

9.2.14* Stabilize a collapsed heavy construction–type structure as a member of a team, given size-up information, hazard-specific personal protective equipment, an assignment, a specific pattern of collapse, a structural collapse tool kit, specialized equipment necessary to complete the task, and engineering resources if needed, so that hazard warning systems are established and understanding by team members is verified, all unstable structural components that can impact the work and egress routes are identified, alternative egress routes are established when possible, expert resource needs are determined and communicated to command, load estimates are calculated for support system requirements, all shoring systems meet or exceed load-bearing demands, shoring systems are monitored continuously for integrity, safety protocols are followed, a rapid intervention crew (RIC) is established and staged to aid search and rescue personnel in the event of entrapment, an accountability system is established, atmospheric monitoring is ongoing, and progress is communicated as required.



(A) Requisite Knowledge. Identification and required care of personal protective equipment, structural load calculations for shoring system requirements, shoring systems for stabilization, specific hazards associated with heavy structural collapse, hazard warning systems, specialized resource and equipment needs, communications and rescuer safety protocols, atmospheric monitoring equipment needs, identification of construction types, characteristics and expected behavior of each type in a structural collapse incident, causes and associated effects of structural collapses, and recognition of potential for and signs of impending secondary collapse.

(B) Requisite Skills. The ability to select and construct shoring systems for heavy construction-type collapses, use personal protective equipment, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and rescuer safety protocol, and mitigate specific hazards associated with shoring tasks.

9.2.15 Cut through structural steel, given a structural collapse tool kit, personal protective equipment, and an assignment, so that the steel is efficiently cut, the victim and rescuer are protected, fire control measures are in place, and the objective is accomplished.

(A) Requisite Knowledge. Safety considerations; the selection, capabilities, and limitations of steel cutting tools; cutting tool applications; types of potential and actual hazards and mitigation techniques; and characteristics of steel used in building construction.

(B) Requisite Skills. The ability to assess tool needs, use cutting tools, implement necessary extinguishment techniques, mitigate hazards, and stabilize heavy loads.

9.2.16 Coordinate the use of heavy equipment, given personal protective equipment, means of communication, equipment and operator, and an assignment, so that common communications are established, equipment usage supports the operational objective, hazards are avoided, and rescuer and operator safety protocols are followed.

(A) Requisite Knowledge. Types of heavy equipment, capabilities, application and hazards of heavy equipment and rigging, safety protocols, and types and methods of communication.

(B) Requisite Skills. The ability to use hand signals and radio equipment, recognize hazards, assess for operator and rescuer safety, and use personal protective equipment.

Chapter 10 Vehicle Rescue

10.1 Level I General Requirements. Level I rescue skills are applicable to vehicle events involving common passenger vehicles and environments where rescuer intervention does not constitute a high level of risk based upon the environment or other factors. The job performance requirements defined in 10.1.1 through 10.1.10 shall be met prior to Level I qualification in vehicle rescue.

10.1.1 Plan for a vehicle incident, and conduct an initial and ongoing size-up, given agency guidelines, planning forms, and an operations-level vehicle incident or simulation, so that a standard approach is used during training and operational scenarios; emergency situation hazards are identified; isolation methods and scene security measures are considered; fire

suppression and safety measures are identified; vehicle stabilization needs are evaluated; and resource needs are identified and documented for future use.

(A) Requisite Knowledge. Operational protocols, specific planning forms, types of vehicles common to the AHJ boundaries, vehicle hazards, incident support operations and resources, vehicle anatomy, and fire suppression and safety measures.

(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of vehicles, identify and evaluate various types of vehicles within the AHJ boundaries, request support and resources, identify vehicle anatomy, and determine the required fire suppression and safety measures.

10.1.2* Establish "scene" safety zones, given scene security barriers, incident location, incident information, and personal protective equipment, so that action hot, warm, and cold safety zones are designated, zone perimeters are consistent with incident requirements, perimeter markings can be recognized and understood by others, zone boundaries are communicated to incident command, and only authorized personnel are allowed access to the rescue scene.

(A) Requisite Knowledge. Use and selection of personal protective equipment, traffic control flow and concepts, types of control devices and tools, types of existing and potential hazards, methods of hazard mitigation, organizational standard operating procedure, and types of zones and staffing requirements.

(B) Requisite Skills. The ability to select and use personal protective equipment, apply traffic control concepts, position traffic control devices, identify and mitigate existing or potential hazards, and apply zone identification and personal safety techniques.

10.1.3* Establish fire protection, given an extrication incident and fire control support, so that fire and explosion potential is managed and fire hazards and rescue objectives are communicated to the fire support team.

(A) Requisite Knowledge. Types of fire and explosion hazards, incident management system, types of extinguishing devices, agency policies and procedures, types of flammable and combustible substances and types of ignition sources, and extinguishment or control options.

(B) Requisite Skills. The ability to identify fire and explosion hazards, operate within the incident management system, use extinguishing devices, apply fire control strategies, and manage ignition potential.

10.1.4* Stabilize a common passenger vehicle, given a vehicle tool kit and personal protective equipment, so that the vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.

(A) Requisite Knowledge. Types of stabilization devices, mechanism of common passenger vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.

(B) Requisite Skills. The ability to apply and operate stabilization devices.

10.1.5* Isolate and manage potentially harmful energy sources, including propulsion power, restraint systems, and construction materials, given passenger vehicle, vehicle tool kit, and personal protective equipment, so that all hazards are identified; systems are managed; beneficial system use is evaluated; and hazards to rescue personnel and victims are minimized.

(A) Requisite Knowledge. Types and uses of personal protective equipment, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.

(B) Requisite Skills. The ability to select and use task- and incident-specific personal protective equipment, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

10.1.6 Determine the common passenger vehicle access and egress points, given the structural and damage characteristics and potential victim location(s), so that the victim location(s) is identified; entry and exit points for victims, rescuers, and equipment are designated; flows of personnel, victim, and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise vehicle stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are enforced.

(A) Requisite Knowledge. Common passenger vehicle construction/features, entry and exit points, routes and hazards operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.

(B) Requisite Skills. The ability to identify entry and exit points and probable victim locations, and to assess and evaluate impact of vehicle stability on the victim.

10.1.7 Create access and egress openings for rescue from a common passenger vehicle, given a vehicle tool kit, specialized tools and equipment, personal protective equipment, and an assignment, so that the movement of rescuers and equipment complements victim care and removal; an emergency escape route is provided; the technique chosen is expedient; victim and rescuer protection is afforded; and vehicle stability is maintained.

(A) Requisite Knowledge. Common passenger vehicle construction and features; electrical, mechanical, hydraulic, pneumatic, and alternative entry and exit equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.

(B) Requisite Skills. The ability to identify common passenger vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

10.1.8 Disentangle victim(s), given an operations-level extrication incident, a vehicle tool kit, personal protective equipment, and specialized equipment, so that undue victim injury is prevented; victim protection is provided; and stabilization is maintained.

(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.

(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

10.1.9 Remove a packaged victim to a designated safe area, as a member of a team, given a victim transfer device, a designated egress route, and personal protective equipment, so that the team effort is coordinated; the designated egress route is used; the victim is removed without compromising victim packaging; undue injury is prevented; and stabilization is maintained.

(A) Requisite Knowledge. Patient handling techniques; incident management system; types of immobilization, packaging, and transfer devices; types of immobilization techniques; and uses of immobilization devices.

(B) Requisite Skills. Use of immobilization, packaging, and transfer devices for specific situations; immobilization techniques; application of medical protocols and safety features to immobilize, package, and transfer; and all techniques for lifting the patient.

10.1.10* Terminate a vehicle incident, given personal protective equipment specific to the incident, isolation barriers, and an extrication tool kit, so that rescuers and bystanders are protected during termination operations; the party responsible for the operation, maintenance, or removal of the affected vehicle is notified of any modification or damage created during the extrication process; scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; and command is terminated.

10.2 Level II General Requirements. Level II skills apply to those incidents where commercial or heavy vehicles are involved, complex extrication processes have to be applied, or multiple uncommon concurrent hazards are present. The job performance requirements defined in Section 10.1 and 10.2.1 through 10.2.5 shall be met prior to Level II qualification in vehicle rescue.

10.2.1* Plan for a commercial/heavy vehicle incident, and conduct initial and ongoing size-up, given agency guidelines, planning forms, and an operations-level vehicle incident or simulation, so that a standard approach is used during training and operational scenarios; emergency situation hazards are identified; isolation methods and scene security measures are considered; fire suppression and safety measures are identified; vehicle stabilization needs are evaluated; and resource needs are identified and documented for future use.

(A) Requisite Knowledge. Operational protocols, specific planning forms, types of commercial/heavy vehicles common to the AHJ boundaries, vehicle hazards, incident support operations and resources, vehicle anatomy, and fire suppression and safety measures.

(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of commercial/heavy vehicles, identify and evaluate various types of commercial/heavy vehicles within the AHJ boundaries, request support and resources, identify commercial/heavy vehicles anatomy, and determine the required fire suppression and safety measures.

10.2.2* Stabilize commercial/heavy vehicles, given a vehicle and machinery tool kit and personal protective equipment, so that the vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise



vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.

(A) Requisite Knowledge. Types of stabilization devices, mechanism of heavy vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.

(B) Requisite Skills. The ability to apply and operate stabilization devices.

10.2.3 Determine the heavy vehicle access and egress points, given the structural and damage characteristics and potential victim location(s), so that the victim location(s) is identified; entry and exit points for victims, rescuers, and equipment are designated; flows of personnel, the victim(s), and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise vehicle stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are enforced.

(A) Requisite Knowledge. Heavy vehicle construction/features, entry and exit points, routes and hazards, operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.

(B) Requisite Skills. The ability to identify entry and exit points and probable victim locations and assess and evaluate impact of heavy vehicle stability on the victim(s).

10.2.4 Create access and egress openings for rescue from a heavy vehicle, given vehicle tool kit, specialized tools and equipment, personal protective equipment, and an assignment, so that the movement of rescuers and equipment complements victim care and removal; an emergency escape route is provided; the technique chosen is expedient; victim and rescuer protection is afforded; and vehicle stability is maintained.

(A) Requisite Knowledge. Heavy vehicle construction and features; electrical, mechanical, hydraulic, and pneumatic systems; alternative entry and exit equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.

(B) Requisite Skills. The ability to identify heavy vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

10.2.5 Disentangle victim(s), given an extrication incident, a vehicle tool kit, personal protective equipment, and specialized equipment, so that undue victim injury is prevented; victim protection is provided; and stabilization is maintained.

(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.

(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

10.2.6 Isolate and manage potentially harmful energy sources, including propulsion power, restraint systems, and construction materials, given heavy vehicle, vehicle tool kit, and personal protective equipment, so that all hazards are identified; systems are

managed; beneficial system use is evaluated; and hazards to rescue personnel and victims are minimized.

(A) Requisite Knowledge. Types and uses of personal protective equipment, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.

(B) Requisite Skills. The ability to select and use task- and incident-specific personal protective equipment, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

Chapter 11 Surface Water Rescue

11.1 Level I General Requirements. This chapter is for rescue situations with water moving less than 1 knot. Level I water rescue skills are applicable only to basic swimming and support of Level II water rescue. The job performance requirements defined in Chapters 4 and 5 and 11.1.1 through 11.1.15 shall be met prior to Level I qualification in surface water rescue.

11.1.1* Develop a site survey for an existing water hazard, given historical data, specific personal protective equipment for conducting site inspections, flood insurance rate maps, tide tables, and meteorological projections, so that life safety hazards are anticipated, risk-benefit analysis is included, site inspections are completed, water conditions are projected, site-specific hazards are identified, routes of access and egress are identified, boat ramps (put-in and take-out points) are identified, method of entrapment is considered, and areas with high probability for victim location are determined.

(A) Requisite Knowledge. Requisite contents of a site survey; types, sources, and information provided by reference materials; hydrology and influence of hydrology on rescues; types of hazards associated with water rescue practices scenarios, inspections practices, and considerations techniques; risk-benefit analysis; identification of hazard-specific personal protective equipment; factors influencing access and egress routes; behavioral patterns of victims; and environmental conditions that influence victim location.

(B) Requisite Skills. The ability to interpret reference materials, perform a scene assessment, evaluate site conditions, complete risk-benefit analysis, and select and use necessary personal protective equipment.

11.1.2* Select water rescue personal protective equipment, given a water rescue assignment and assorted items of personal protective and life-support equipment, so that rescuer is protected from temperature extremes and environmental hazards, correct buoyancy is maintained, AHJ protocols are complied with, swimming ability is maximized, routine and emergency communications are established between components of the team, self-rescue needs have been evaluated and provided for, and pre-operation safety checks have been conducted.

(A) Requisite Knowledge. Manufacturer's recommendations; standard operating procedures; basic signals and communications techniques; selection criteria of insulating garments; buoyancy characteristics; personal escape techniques; applications for and capabilities of personal escape equipment; hazard assessment; AHJ protocols for equipment positioning; classes of personal flotation devices; selection criteria for personal protective clothing, personal flotation devices, and water rescue helmets; personal escape techniques; applications

for and capabilities of personal escape equipment; and equipment and procedures for signaling distress.

(B)* Requisite Skills. The ability to use personal protective equipment according to the manufacturer's directions, proficiency in emergency escape procedures, proficiency in communications, don and doff equipment in an expedient manner, use pre-operation checklists, select personal flotation devices, don and doff personal flotation devices, select water rescue helmets, don and doff water rescue helmets, select personal protective clothing and equipment, don and doff in-water insulating garments, proficiency in emergency escape procedures, and proficiency in communicating distress signals.

11.1.3* Define search parameters for a water rescue incident, given topographical maps of a search area, descriptions of all missing persons and incident history, hydrologic data including speed and direction of current or tides, so that areas with high probability of detection are differentiated from other areas, witnesses are interviewed, critical interview information is recorded, passive and active search tactics are implemented, personnel resources are considered and used, and search parameters are communicated.

(A) Requisite Knowledge Topographical map components, hydrologic factors and wave heights, methods to determine high probability of detection areas, critical interview questions and practices, methods to identify track traps, ways to identify spotter areas and purposes for spotters, personnel available and effects on parameter definition, the effect of search strategy defining parameters, communication methods, and reporting requirements.

(B) Requisite Skills. Not applicable.

11.1.4 Develop an action plan for a shore-based rescue of a single or multiple waterbound victim(s), given an operational plan and a water rescue tool kit, so that all information is factored, risk–benefit analysis is conducted, protocols are followed, hazards are identified and minimized, personnel and equipment resources will not be exceeded, assignments are defined, consideration is given to evaluating changing conditions, and the selected strategy and tactics fit the conditions.

(A) Requisite Knowledge. Elements of an action plan; types of information provided by reference materials and size-up; hydrology; types of hazards associated with water rescue practices; risk–benefit analysis; identification of hazard-specific personal protective equipment; factors influencing access and egress routes; behavioral patterns of victims; environmental conditions that influence victim location; safety, communications, and operational protocols; and resource capability and availability.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk–benefit analysis; apply safety, communications, and operational protocols; specify personal protective equipment requirements; and determine rescue personnel requirements.

11.1.5 Conduct a witness interview, given witnesses and checklists, so that witnesses are secured, information is gathered, last seen point can be determined, last known activity can be determined, procedures to re-contact the witnesses are established, and reference objects can be utilized.

(A) Requisite Knowledge. Elements of an action plan; types of and information provided by reference materials and size-up;

hydrology; types of hazards associated with water rescue practices; risk–benefit analysis; identification of hazard-specific personal protective equipment; factors influencing access and egress routes; behavioral patterns of victims; environmental conditions that influence victim location; safety, communications, and operational protocols; and resource capability and availability.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk–benefit analysis; apply safety, communications, and operational protocols; specify personal protective equipment requirements; and determine rescue personnel requirements.

11.1.6* Deploy a water rescue reach device to a waterbound victim, given required equipment and personal protective equipment so that the deployed equipment reaches the victim(s), the rescue equipment does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the device.

(A) Requisite Knowledge. Types and capabilities of personal protective equipment, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion, hydrology and characteristics of water, behaviors of waterbound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.

(B) Requisite Skills. The ability to select personal protective equipment specific to the water environment, don personal protective equipment, identify water hazards (i.e., upstream or downstream, current or tides), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

11.1.7* Deploy a water rescue rope to a waterbound victim, given a water rescue rope in a throw bag, a coiled water rescue rope 50 ft to 75 ft (15.24 m to 22.86 m) in length, and personal protective equipment, so that the deployed rope lands within reach of the victim, the rescue rope does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the throw line.

(A) Requisite Knowledge. Types and capabilities of personal protective equipment, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of waterbound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.

(B) Requisite Skills. The ability to deploy both a water rescue rope bag and a coiled water rescue rope, select personal protective equipment specific to the water environment, don personal protective equipment, identify water hazards (e.g., upstream or downstream, current or tides), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.



11.1.8* Use watercraft for rescue operations, given watercraft, policies, and procedures used by the AHJ, so that watercraft pre-deployment checks are completed, watercraft launch or recovery is achieved as stipulated by AHJ operational protocols, divers are deployed and recovered, both on-board and dive rescue operations conform with watercraft operational protocols and capabilities, communications are clear and concise, and the candidate is familiar with watercraft nomenclature, operational protocols, design limitations, and launch/recovery site issues.

(A) Requisite Knowledge. Entry/exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, tides, and currents.

(B) Requisite Skills. Implement entry/exit procedures and communications with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

11.1.9* Define procedures to provide support for helicopter water rescue operations within the area of responsibility for the AHJ, given a helicopter service, operational protocols, helicopter capabilities and limitations, water rescue procedures, and risk factors influencing helicopter operations, so that air-to-ground communications are established and maintained, applications are within the capabilities and skill levels of the helicopter service, the applications facilitate victim extraction from water hazards that are representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, air crew and ground personnel safety are not compromised, landing zones are designated and secured, and fire suppression resources are available at the landing zone.

(A) Requisite Knowledge. Local aircraft capabilities and limitations, landing zone requirements, hazards to aircraft, local protocols, procedures for operating around aircraft, dynamics of rescue options, crash survival principles, personal protective equipment limitations and selection criteria, ancillary helicopter rescue equipment, and helicopter surf rescue procedures.

(B) Requisite Skills. The ability to determine applicability of air operations, establish and control landing zones, assess fire protection needs, communicate with air crews, identify hazards, rig aircraft for anticipated rescue procedures, apply crash survival procedures, select and use personal protective equipment, and work with air crews to rescue a victim from the water.

11.1.10* Negotiate a designated water course in a watercraft, given a watercraft that is available to the team, a course that is representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, a range of assignments, and water rescue personal protective equipment, so that the specified objectives are attained, all performance parameters are achieved, movement is controlled, hazards are continually assessed, launch does not proceed if the watercraft is inadequate or incapable of operating in the existing condition, distress signals are communicated, and rapid intervention for the watercraft crew has been staged for deployment.

(A) Requisite Knowledge. Limitations and uses of available watercraft, dynamics of moving water and its effects on watercraft handling, launch and docking procedures, conditional requirements for personal protective equipment, applications for motorized and nonmotorized craft, managing hazards as related to conditions, and crew assignments and duties.

(B) Requisite Skills. The ability to navigate watercraft with and without primary means of propulsion, evaluate conditions for launch, don water rescue personal protective equipment, utilize communications systems, apply procedures for broaching and righting watercraft, and apply procedures for casting and recovering personnel from watercraft.

11.1.11 Use techniques appropriate for the water environment to extricate an incapacitated waterbound victim from the water, as a member of a team, given a water hazard that is representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, watercraft that is available to the team (if applicable), nets, webbing, blankets, tarpaulins or ropes, a means of securement, and water rescue personal protective equipment, so that the watercraft is not broached; control of the watercraft is maintained; risks to the victim and rescuers are minimized; and the victim is removed from the hazard expediently and efficiently.

(A) Requisite Knowledge. Limitations and uses of available watercraft, local environmental entry and exit procedures, parbuckling (rollup) techniques, dynamics of moving water and its effects on watercraft handling, conditional requirements for personal protective equipment, and effects of extrication on watercraft handling and stability.

(B) Requisite Skills. The ability to construct a simple mechanical advantage and demonstrate lifting techniques.

11.1.12* Demonstrate fundamental watersmanship skills, given safety equipment, props, and a confined water body, so that basic skills are demonstrated in a controlled environment, performance parameters are achieved, and problems can be identified prior to work in a high-stress environment.

(A) Requisite Knowledge. Basic forward stroke swimming theory (surface skills).

(B) Requisite Skills. Basic swimming skills, including the ability to swim and float in different water conditions with and without flotation aids or swimming aids as required, and apply water survival skills.

11.1.13* Escape from a simulated life-threatening situation, given water rescue personal protective equipment, swim aids as required, and flotation aids, so that the rescuer reaches safety at a predetermined area.

(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative water rescue environment (shoreline, in-water, and climatic), selection criteria for water rescue personal protective equipment, swim aids and flotation aids for anticipated water conditions, and hazards and swimming techniques for representative bodies of water.

(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swimming aids; apply water survival skills; don and doff personal protective equipment; select and use personal protective equipment, flotation aids, and swim aids; utilize communications systems; and evaluate water conditions to identify entry points and hazards.

11.1.14 Identify procedures for operation of rope systems particular to the water rescue needs of the AHJ, given rescue personnel, an established rope system, a load to be moved, and personal protective equipment, so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.