

Chapter 10 Structural Collapse Rescue

10.1 General Requirements. The job performance requirements defined in 10.1.1 through 10.1.16 shall be met prior to certification in structural collapse rescue.

10.1.1* Conduct a size-up of a 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 construction types, characteristics, and probable occupant locations; methods to assess rescue needs; expected behavior of each construction type 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 construction types, evaluate structural stability and hazards, and implement resource and security (scene management) protocols.

10.1.2 Determine potential victim locations, 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.

10.1.3 Develop a collapse rescue incident action plan, given size-up information and a 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.

10.1.4 Implement a collapse rescue incident action plan, given an action plan and a 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.

10.1.5 Search a 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.

(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.

10.1.6* 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 proper 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.

10.1.7* 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 basic 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, Rapid Intervention Crew (RIC) are 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 proper 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.

10.1.8 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.

10.1.9 Release a victim from entrapment by components of a 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 proper 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; 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.

10.1.10* Remove a victim from a 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 proper care of personal protective equipment resources for structural collapse incidents; general hazards associated with structural collapse; identification of 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; selection and use of patient packaging equipment.

10.1.11* 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.

10.1.12* 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, incline planes, utilize rigging systems, and stabilize the load.

10.1.13 Breach 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.

10.1.14 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.

10.1.15* 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.

10.1.16 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.