



# Standard Guide for Training for Level III Rope Rescue (R3) Rescuer Endorsement<sup>1</sup>

This standard is issued under the fixed designation F2955; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This guide is intended to be used in conjunction with, and as an add-on to, Guides [F2751](#), [F2752](#), and [F2954](#) (or equivalent for other environments), to address the specific knowledge and skills required for a rescuer who participates in rope rescue at a higher level of responsibility and complexity.

1.1.1 Specifically, this guide is intended to define the training that would prepare an endorsed Level III Rope Rescuer (LRT-R3) or equivalent to support or direct a team in advanced rope rescue functions, including pre-planning and size-up of rope rescue operations, designing and directing the construction of rope systems for moving a victim in low and high angle environments, directing the construction and operation of highline and related rope systems, and performing advanced rope rigging functions, in conjunction with other rescue duties.

1.1.2 This guide establishes the minimum training standard for an endorsed LRT-R3 Rescuer as related to general, field, and rope rescue-specific knowledge and skills.

1.2 An endorsed LRT-R3 Rescuer performs rope rescues in low and high angle terrain and is capable of directing LRT-R1 and LRT-R2 Rescuers.

1.2.1 This guide alone does not provide the minimum training requirements for performing or assisting in rescues that occur in partially or fully collapsed structures, in or on water, in confined spaces, or underground (such as in caves, mines, and tunnels).

1.2.2 This guide alone does not provide the minimum training requirements for climbing Class 5 or higher rock and/or ice to perform a rescue.

1.3 An endorsed LRT-R3 Rescuer is required to have knowledge and skill sets pertaining to technically advanced subject evacuation. These include but are not limited to advanced knots and rigging, functioning as a litter tender in a high angle lowering or raising operation, and directing a team in the rescue of a subject suspended in a high angle environment.

<sup>1</sup> This guide is under the jurisdiction of ASTM Committee [F32](#) on Search and Rescue and is the direct responsibility of Subcommittee [F32.03](#) on Personnel, Training and Education.

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1.4 Type III teams, as defined in Classification [F1993](#), which may utilize personnel trained to this guide are Kind A (wilderness), Kind B (urban), and Kind C (mountainous).

1.4.1 Further training may be required before an endorsed LRT-R3 Rescuer can actually participate on a particular kind of rope rescue team, depending on the authority having jurisdiction (AHJ) regulations or policies.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

[F1633 Guide for Techniques in Land Search](#)

[F1768 Guide for Using Whistle Signals During Rope Rescue Operations](#)

[F1773 Terminology Relating to Climbing, Mountaineering, Search and Rescue Equipment and Practices](#)

[F1993 Classification System of Human Search and Rescue Resources](#)

[F2047 Practice for Workers' Compensation Coverage of Emergency Services Volunteers](#)

[F2209 Guide for Training of Level I Land Search Team Member](#)

[F2751 Guide for Training of Support Level Land Rescue Team Member \(LRT-Support\) Member](#)

[F2752 Guide for Training for Level I Rope Rescue \(R1\) Rescuer Endorsement](#)

[F2954 Guide for Training for Level II Rope Rescue \(R2\) Rescuer Endorsement](#)

## 3. Terminology

3.1 For definitions of terms used in this guide, see Terminology [F1773](#), Guide [F1633](#), Classification [F1993](#), Practice [F2047](#), and other references within this guide.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.2 Except where noted, this document shall use terminology as found in Guides **F2752** and **F2954**.

### 3.3 *Definitions of Terms Specific to This Standard:*

3.3.1 *Rope Rescuer, Level III (LRT-R3), n*—a member or a leader of a rope rescue team who, at a minimum, meets the requirements of this guide. These requirements define the advanced rope rescue knowledge, skills, and capabilities.

3.3.2 *low angle, n*—terrain whose average slope has an angle of 30 to 50° from horizontal.

3.3.3 *high angle, n*—terrain whose average slope has an angle of greater than 50° from horizontal.

## 4. Significance and Use

4.1 This guide establishes a minimum standard for training rope rescuers as it relates to their rope rescue specific knowledge and skills. A person trained to this guide is an endorsed Level III Rope Rescuer (LRT-R3 Rescuer).

4.1.1 Every person who is identified as an endorsed LRT-R3 Rescuer shall have met the requirements of this guide.

4.1.2 This guide is only the third level of training for rope rescue personnel and, in conjunction with Guides **F2209**, **F2751**, **F2752**, and **F2954**, only establishes the minimum knowledge and skills required for a person to perform or lead advanced rope rescue. No other advanced skills are included or implied.

4.1.3 In addition to meeting the requirements of this guide, an endorsed LRT-R3 Rescuer shall also be adequately trained to operate effectively and safely in the environment in which he is expected to work (that is, wilderness, urban, industrial, and so forth).

4.1.4 Nothing in this guide precludes an AHJ from adding additional requirements for its own members.

4.2 Endorsement to Level III Rope Rescue (LRT-R3 Rescuer) is an indication that a person possesses adequate field skills and knowledge to make mission-critical decisions. A person so endorsed is qualified to support or direct a rope rescue team in an area with high fall exposure and/or falling hazard potential, including high angle environments.

4.3 This guide *by itself* is not a complete training document. It is only an outline of the topics required for training or evaluating an endorsed LRT-R3 Rescuer. It may, however, be used in the development of, or as part of, a complete training document or program.

4.3.1 This guide does not stand alone. It must be used with the referenced documents to provide the specific information needed by an endorsed LRT-R3 Rescuer or for an AHJ to properly evaluate a training program or text.

4.4 Though this guide establishes only minimum standards, it does not imply that an endorsed LRT-R3 Rescuer is a “trainee,” “probationary,” or other similar term member of an organization. It is the responsibility of the AHJ to determine the requirements and qualifications for member ratings.

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

and procedures. An endorsed LRT-R3 Rescuer shall complete all activities based on an analysis of risk versus benefit, and shall follow applicable and mandated safety standards.

4.6 This guide can be used to evaluate a document to determine if its content includes the topics necessary for training an endorsed LRT-R3 Rescuer. Likewise, this guide can be used to evaluate an existing training program to see if it meets the requirements of this guide.

4.7 The knowledge and skills requirements in the following sections are not presented in any particular order and do not represent a training sequence.

4.8 Except where a physical skill needs to be shown, it is up to the AHJ to determine the best way to evaluate a person’s knowledge. This may be by written exam, oral exam, demonstration, or by some combination of the three.

## 5. General Knowledge and Skills

### 5.1 *General Requirements:*

5.1.1 As a prerequisite, an endorsed LRT-R3 Rescuer shall possess some training, certification, or endorsement in the environment in which he or she is expected to work (urban, wilderness, mountainous, and so forth).

5.1.2 For Land Rescue Personnel, meeting the requirements of Guides **F2751**, **F2752**, and **F2954** shall be considered sufficient for meeting the requirements of **5.1.1**.

5.1.3 The AHJ shall verify that the endorsee possesses both attitude and aptitude for working and directing a rope rescue team at height, for example, he or she must be comfortable with exposure, have the ability to move safely and effectively in the working environment, have the ability to lead a team in a vertical environment, and have the ability to serve as a safety officer in rope rescue operations.

### 5.2 *Personal Equipment:*

5.2.1 An endorsed LRT-R3 Rescuer shall possess and carry, at a minimum, sufficient Personal Protective Equipment (PPE) and rope rescue equipment to maintain personal safety while working on or around a rope rescue. Suitability of equipment shall be verified by the AHJ to include but not be limited to:

5.2.1.1 Head protection (helmet).

5.2.1.2 Hand protection (gloves).

5.2.1.3 Harness.

5.2.1.4 Slings/lanyards (for personal use).

5.2.1.5 Ascending equipment.

5.2.1.6 Eye protection (glasses/goggles/shield).

5.2.1.7 Adequate clothing.

5.2.1.8 Connectors (carabiners).

5.2.1.9 Descending equipment.

5.2.2 Additional rope rescue equipment necessary for an endorsed LRT-R3 Rescuer to safely participate in or lead a rope rescue varies by type of rope rescue, team assignment, season, environment, and terrain.

5.2.3 An endorsed LRT-R3 Rescuer shall explain the reasons to carry, and explain or demonstrate the use of, all personal rope rescue equipment required by the AHJ.

5.2.4 An endorsed LRT-R3 Rescuer shall be able to inspect PPE and personal rope rescue equipment for the purpose of identifying wear, damage, and operational readiness.

5.2.5 An endorsed LRT-R3 Rescuer shall demonstrate the ability to perform rope rescue equipment maintenance procedures, including cleaning, as well as maintenance of equipment logs and records.

### 5.3 *Team Equipment:*

5.3.1 An endorsed LRT-R3 Rescuer shall have an expert knowledge of team rope rescue equipment identified and commonly used by the AHJ (not including equipment required for climbing Class 5 or higher rock and/or ice). Such equipment may include, but is not limited to, the following:

- 5.3.1.1 Medical equipment.
- 5.3.1.2 Patient packaging equipment.
- 5.3.1.3 Ropes.
- 5.3.1.4 Slings.
- 5.3.1.5 Rope grab devices.
- 5.3.1.6 Litters.
- 5.3.1.7 Communications equipment.
- 5.3.1.8 Lowering devices.
- 5.3.1.9 Hauling or raising devices.
- 5.3.1.10 Connectors and other hardware.

5.3.2 An endorsed LRT-R3 Rescuer shall explain the reasons to carry, and explain or demonstrate the use of, all team rope rescue equipment required by the AHJ including, at a minimum, those items listed in 5.2.1 and 5.3.1.

5.3.3 An endorsed LRT-R3 Rescuer shall be able to inspect team rope rescue equipment used by the AHJ to identify wear, damage, and operational readiness for, at a minimum, those items listed in 5.2.1 and 5.3.1.

5.3.4 An endorsed LRT-R3 Rescuer shall demonstrate the ability to perform appropriate maintenance procedures on rope rescue equipment used by the AHJ. These shall include cleaning and packing, as well as maintenance of applicable logs and records for, at a minimum, those items listed in 5.2.1 and 5.3.1.

### 5.4 *Communications:*

5.4.1 An endorsed LRT-R3 Rescuer shall be familiar with and conversant in the use of whistle signals as found in Guide F1768 or as required by the AHJ.

5.4.2 An endorsed LRT-R3 Rescuer shall be familiar with and conversant in the use of hand signals as required by the AHJ.

## 6. **Rope Rescue Concepts and Capabilities**

### 6.1 *Rope Rescue Concepts:*

6.1.1 An endorsed LRT-R3 Rescuer shall demonstrate an understanding of the principles of physics involved in constructing rope rescue systems, including, but not limited to, the following:

- 6.1.1.1 System safety factors.
- 6.1.1.2 Critical (force-multiplying) angles.
- 6.1.1.3 Causes and effects of force multipliers.
- 6.1.1.4 Identification of the weakest component or link in any rescue system.

### 6.2 *Rope Rescue Capabilities:*

6.2.1 An endorsed LRT-R3 Rescuer shall be self-sustaining and be able to safely and effectively direct a rope rescue operation in the team's normal area of operations for a period of at least 12 hours.

6.2.2 An endorsed LRT-R3 Rescuer shall demonstrate the ability to safely and effectively direct a team in performing rope rescue duties within an incident management system.

6.2.3 An endorsed LRT-R3 Rescuer shall be able to perform any of the common rope rescue team functions including, but not limited to, the following:

- 6.2.3.1 Raising/lowering system operator.
- 6.2.3.2 Litter attendant.
- 6.2.3.3 Safety officer.
- 6.2.3.4 Belay operator.
- 6.2.3.5 Edge attendant.
- 6.2.3.6 Team leader.

### 6.3 *Rope Rescue Techniques:*

6.3.1 An endorsed LRT-R3 Rescuer shall demonstrate the ability to locate and safely access a patient using techniques that require him or her to be raised or lowered on high angle surfaces, which may expose the rescuer to a significant fall hazard.

6.3.2 An endorsed LRT-R3 Rescuer shall have advanced knot tying skills.

6.3.3 An endorsed LRT-R3 Rescuer shall understand advanced anchoring concepts and shall be expert in rigging single and multi-point anchors.

6.3.4 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the construction of a fixed rope system.

6.3.5 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the placement of edge protection.

6.3.6 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the placement of rope protection along the path of the rope, should it be necessary.

6.3.7 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the construction of a simple rope mechanical advantage system.

6.3.8 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the construction of compound and complex rope mechanical advantage systems.

6.3.9 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in the selection and construction of a highline/guiding line/offset rope system.

6.3.10 An endorsed LRT-R3 Rescuer shall demonstrate the ability to operate, and direct a team in the operation of, a highline/guiding line/offset rope system.

6.3.11 An endorsed LRT-R3 Rescuer shall demonstrate the ability to utilize litter attendants within a highline/guiding line/offset rope system.

6.3.12 An endorsed LRT-R3 Rescuer shall demonstrate the ability to utilize, and direct a team in the utilization of, a highline/guiding line/offset rope system to transport rescuers, equipment, and/or an occupied litter.

6.3.13 An endorsed LRT-R3 Rescuer shall demonstrate the ability to utilize, and direct a team in the utilization of, a rope rescue system to move a rescuer and a patient along a horizontal or sloping path above an obstacle or projection.

6.3.14 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in performing low angle litter evacuation procedures, including:

- 6.3.14.1 Rigging main lines.
- 6.3.14.2 Rigging belay lines and constructing and operating a belay system.
- 6.3.14.3 Rigging litters and tending litters.
- 6.3.14.4 Loading and packaging patients.
- 6.3.14.5 Constructing hauling or raising systems.
- 6.3.14.6 Conducting a system safety check.
- 6.3.14.7 Operating rope mechanical advantage systems.
- 6.3.14.8 Conducting a lowering operation.

6.3.15 An endorsed LRT-R3 Rescuer shall demonstrate the ability to direct a team in performing high angle evacuation procedures with or without a litter, including:

- 6.3.15.1 The skills already defined in 6.3.14.
- 6.3.15.2 Completing an assignment while suspended from a rope rescue system.
- 6.3.15.3 Performing a rope rescue of a person suspended from, stranded on, or at the base of a structure or terrain feature.
- 6.3.15.4 Operating a belay system during a lowering or raising operation.
- 6.3.15.5 Moving a victim.

6.3.15.6 Functioning as a litter attendant in a lowering or raising operation.

- 6.3.15.7 Constructing lowering systems.
- 6.3.15.8 Constructing and operating highlines and guiding lines.
- 6.3.15.9 Ascending a fixed rope.
- 6.3.15.10 Descending a fixed rope.
- 6.3.15.11 Operating rope mechanical advantage systems.
- 6.3.15.12 Performing the removal of a suspended subject.
- 6.3.15.13 Performing a rope rescue with a litter using tender(s) to negotiate obstacles, manipulate or position the patient, or provide medical care while being raised and lowered.

6.3.15.14 Moving a patient packaged in a litter up and over an edge during a raising operation with a rope system.

6.3.16 An endorsed LRT-R3 Rescuer shall demonstrate the abilities defined in this guide for a subject wherever they are located, whether suspended from, stranded on, or at the base of a structure or terrain feature.

**7. Keywords**

7.1 belay; extrication; highline; rescue; rope; SAR; technical rescue; USAR

**APPENDIX**

(Nonmandatory Information)

**X1. A COMPARISON OF KNOWLEDGE, SKILLS, CONCEPTS, AND CAPABILITIES ACROSS THE THREE LEVELS OF ROPE RESCUE**

**TABLE X1.1 A Comparison of Knowledge, Skills, Concepts, and Capabilities Across the Three Levels of Rope Rescue**

| 5          | General Knowledge and Skills  | R1 | R2 | R3 |
|------------|---|----|----|----|
| <b>5.1</b> | <b>General Requirements</b>   |    |    |    |
| 5.1.1      | As a prerequisite, Rescuer shall possess some training, certification, or endorsement in the environment in which he or she is expected to work (urban, wilderness, mountainous, and so forth).   | ✓  | ✓  | ✓  |
| 5.1.2      | For Land Rescue Personnel, meeting the requirements of Guide F2751 shall be considered sufficient for meeting the requirements of 5.1.1.  | ✓  |    |    |
| 5.1.2      | For Land Rescue Personnel, meeting the requirements of Guides F2751 and F2752 shall be considered sufficient for meeting the requirements of 5.1.1.   |    | ✓  |    |
| 5.1.2      | For Land Rescue Personnel, meeting the requirements of Guides F2751, F2752, and F2954 shall be considered sufficient for meeting the requirements of 5.1.1.   |    |    | ✓  |
| 5.1.3      | AHJ shall verify that endorsee possesses both attitude and aptitude for working at height, for example comfort with limited exposure, ability to move over the surface of terrain.  | ✓  |    |    |
| 5.1.3      | The AHJ shall verify that the endorsee possesses both attitude and aptitude for working at height, for example, he or she must be comfortable with exposure and must have the ability to move safely and effectively in the working environment.  |    | ✓  |    |
| 5.1.3      | The AHJ shall verify that the endorsee possesses both attitude and aptitude for working and directing a rope rescue team at height, for example, he or she must be comfortable with exposure, have the ability to move safely and effectively in the working environment, have the ability to lead a team in a vertical environment, and have the ability to serve as a safety officer in rope rescue operations. |    |    | ✓  |
| <b>5.2</b> | <b>Personal Equipment</b>   | R1 | R2 | R3 |
| 5.2.1      | Rescuer shall possess and carry, at a minimum, sufficient PPE and rope rescue equipment to maintain personal safety while working on or around a rope rescue. Suitability of equipment shall be verified by the AHJ to include, but not be limited to: (see 5.2.1.1 – 5.2.1.9 below)  | ✓  | ✓  | ✓  |
|            | 5.2.1.1 Head protection (helmet).   | ✓  | ✓  | ✓  |
|            | 5.2.1.2 Hand protection (gloves).   | ✓  | ✓  | ✓  |
|            | 5.2.1.3 Harness.  | ✓  | ✓  | ✓  |
|            | 5.2.1.4 Slings/lanyards (for personal use).   | ✓  | ✓  | ✓  |
|            | 5.2.1.5 Ascending equipment.  | ✓  | ✓  | ✓  |
|            | 5.2.1.6 Eye protection (glasses/goggles/shield).  | ✓  | ✓  | ✓  |
|            | 5.2.1.7 Adequate clothing.  | ✓  | ✓  | ✓  |
|            | 5.2.1.8 Connectors (carabiners).  | ✓  | ✓  | ✓  |
|            | 5.2.1.9 Descending equipment.   | ✓  | ✓  | ✓  |

**TABLE X1.1** *Continued*

|            |  |           |           |           |
|------------|--|-----------|-----------|-----------|
| 5.2.2      | Additional rope rescue equipment necessary for an endorsed Rescuer to safely participate on a rope rescue varies by type of rope rescue, team assignment, season, environment, and terrain.  | ✓         | ✓         |           |
| 5.2.2      | Additional rope rescue equipment necessary for an endorsed Rescuer to safely participate on or lead a rope rescue varies by type of rope rescue, team assignment, season, environment, and terrain.  |           |           | ✓         |
| 5.2.3      | Rescuer shall explain the reasons to carry, and explain or demonstrate the use of, all personal rope rescue equipment required by the AHJ.   | ✓         | ✓         | ✓         |
| 5.2.4      | Rescuer shall be able to inspect PPE and personal rope rescue equipment for the purpose of identifying wear, damage, and operational readiness.  | ✓         | ✓         | ✓         |
| 5.2.5      | Rescuer shall demonstrate the ability to perform appropriate PPE and personal rope rescue equipment maintenance procedures, including cleaning and packing, as well as maintenance of applicable logs and records.   | ✓         | ✓         | ✓         |
| <b>5.3</b> | <b>Team Equipment</b>  | <b>R1</b> | <b>R2</b> | <b>R3</b> |
| 5.3.1      | Rescuer shall be familiar with team rope rescue equipment identified and commonly used by the AHJ. Such equipment may include, but is not limited to, the following: (see 5.3.1.1 – 5.3.1.10 below)  | ✓         | ✓         |           |
| 5.3.1      | Rescuer shall have an expert knowledge of team rope rescue equipment identified and commonly used by the AHJ (not including equipment required for climbing Class 5 or higher rock and/or ice). Such equipment may include, but is not limited to, the following: (see 5.3.1.1 – 5.3.1.10 below)   |           |           | ✓         |
|            | 5.3.1.1 Medical equipment.   | ✓         | ✓         | ✓         |
|            | 5.3.1.2 Patient packaging equipment.   | ✓         | ✓         | ✓         |
|            | 5.3.1.3 Ropes.   | ✓         | ✓         | ✓         |
|            | 5.3.1.4 Anchor slings.   | ✓         |           |           |
|            | 5.3.1.4 Slings.  |           | ✓         | ✓         |
|            | 5.3.1.5 Rope grab devices.   | ✓         | ✓         | ✓         |
|            | 5.3.1.6 Litters.   | ✓         | ✓         | ✓         |
|            | 5.3.1.7 Communications equipment.  | ✓         | ✓         | ✓         |
|            | 5.3.1.8 Lowering devices.  | ✓         | ✓         | ✓         |
|            | 5.3.1.9 Hauling or raising devices.  |           | ✓         | ✓         |
|            | 5.3.1.10 Connectors and other hardware.  | ✓         | ✓         | ✓         |
| 5.3.2      | Rescuer shall explain the reasons to carry, and explain or demonstrate the use of, all team rope rescue equipment required by the AHJ including, at a minimum, those items listed in 5.2.1 and 5.3.1.  | ✓         | ✓         | ✓         |
| 5.3.3      | Rescuer shall be able to inspect team rope rescue equipment used by the AHJ to identify wear, damage, and operational readiness for, at a minimum, those items listed in 5.2.1 and 5.3.1.  | ✓         | ✓         | ✓         |
| 5.3.4      | Rescuer shall demonstrate the ability to perform appropriate maintenance procedures on rope rescue equipment used by the AHJ. These shall include cleaning and packing, as well as maintenance of applicable logs and records for, at a minimum, those items listed in 5.2.1 and 5.3.1.  | ✓         | ✓         | ✓         |
| <b>5.4</b> | <b>Communications</b>  | <b>R1</b> | <b>R2</b> | <b>R3</b> |
| 5.4.1      | Rescuer shall be familiar with and conversant in the use of whistle signals as found in Guide F1768 or as required by the AHJ.   | ✓         | ✓         | ✓         |
| 5.4.2      | Rescuer shall be familiar with and conversant in the use of hand signals as required by the AHJ.   | N/A       | ✓         | ✓         |
| <b>6</b>   | <b>Rope Rescue Concepts and Capabilities</b>   |           |           |           |
| <b>6.1</b> | <b>Rope Rescue Concepts</b>  | <b>R1</b> | <b>R2</b> | <b>R3</b> |
| 6.1.1      | Rescuer shall be able to explain how the following basic concepts affect rope rescue:<br>6.1.1 Loads and forces.<br>6.1.2 Fall line.<br>6.1.3 Friction.<br>6.1.4 Secondary/backup systems.   | ✓         |           |           |
| 6.1.1      | Rescuer shall demonstrate an understanding of how the following basic concepts affect rope rescue:<br>6.1.1.1 Angles.<br>6.1.1.2 Load transfer.<br>6.1.1.3 Passing knots.<br>6.1.1.4 Mechanical advantage.<br>6.1.1.5 Placing edge protection.   |           | ✓         |           |
| 6.1.1      | Rescuer shall demonstrate an understanding of the principles of physics involved in constructing rope rescue systems, including, but not limited to, the following:<br>6.1.1.1 System safety factors.<br>6.1.1.2 Critical (force-multiplying) angles.<br>6.1.1.3 Causes and effects of force multipliers.<br>6.1.1.4 Identification of the weakest component or link in any rescue system. |           |           | ✓         |
| <b>6.2</b> | <b>Rope Rescue Capabilities</b>  | <b>R1</b> | <b>R2</b> | <b>R3</b> |
| 6.2.1      | Rescuer shall demonstrate ability to size up a rope rescue incident.   | ✓         | N/A       | N/A       |
| 6.2.2      | Rescuer shall demonstrate ability to (based on size-up information) determine type of rope rescue, the number and location of victims, and assess resource needs.  | ✓         |           |           |
| 6.2.1      | Rescuer shall demonstrate the ability to manage resource needs.  |           | ✓         | N/A       |
| 6.2.3      | Rescuer shall demonstrate ability to recognize and manage potential site hazards.  | ✓         | N/A       | N/A       |
| 6.2.4      | Rescuer shall demonstrate ability to assess risk-benefits of a rope rescue operation and mitigate reasonably predictable types of rope rescuer and victim risk.  | ✓         | N/A       | N/A       |
| 6.2.5      | Rescuer shall demonstrate ability to identify and discuss factors that affect rope rescue efficiency, including (but not limited to):<br>6.2.5.1 Accuracy.<br>6.2.5.2 Speed.<br>6.2.5.3 Available personnel.<br>6.2.5.4 Terrain.<br>6.2.5.5 Weather.<br>6.2.5.6 Darkness.<br>6.2.5.7 Rope rescuer condition.<br>6.2.5.8 Subject condition.   | ✓         |           |           |

**TABLE X1.1** *Continued*

|            |  |           |           |           |
|------------|--|-----------|-----------|-----------|
| 6.2.2      | Rescuer shall demonstrate the ability to identify conditions that affect the efficiency of a rope rescue operation, including the duration of the incident.  |           | ✓         | N/A       |
| 6.2.6      | Rescuer shall demonstrate ability to identify different types of patient transport devices (litters) appropriate for steep and high angle use and discuss advantages/disadvantages of each.  | ✓         | N/A       | N/A       |
| 6.2.7      | Rescuer shall be able to safely and effectively perform independently in the normal operating environment for a period of at least 12 h.   | ✓         | N/A       |           |
| 6.2.1      | Rescuer shall be self-sustaining and be able to safely and effectively direct a rope rescue operation in the team's normal area of operations for a period of at least 12 hours.   |           |           | ✓         |
| 6.2.8      | Rescuer should be prepared for rescue operations conducted during the day or at night on terrain and seasonal conditions reasonably expected in the team's normal area of operation.   | ✓         | N/A       | N/A       |
| 6.2.9      | Rescuer shall demonstrate ability to understand and make necessary adjustments for (including avoidance of) hazardous environments.  | ✓         | N/A       | N/A       |
| 6.2.10     | Rescuer shall demonstrate ability to safely and effectively perform rope rescue duties within an incident management system.   | ✓         | N/A       |           |
| 6.2.2      | Rescuer shall demonstrate the ability to safely and effectively direct a team in performing rope rescue duties within an incident management system.   |           |           | ✓         |
| 6.2.11     | Rescuer shall be able to define common rope rescue team functions including but not limited to:<br>6.2.11.1 Raising/lowering system operator.<br>6.2.11.2 Litter attendant.<br>6.2.11.3 Safety.<br>6.2.11.4 Belayer.<br>6.2.11.5 Edge attendant.<br>6.2.11.6 Team leader.                                      | ✓         | N/A       |           |
| 6.2.3      | Rescuer shall be able to perform any of the common rope rescue team functions including, but not limited to, the following:<br>6.2.3.1 Raising/lowering system operator.<br>6.2.3.2 Litter attendant.<br>6.2.3.3 Safety officer.<br>6.2.3.4 Belay operator.<br>6.2.3.5 Edge attendant.<br>6.2.3.6 Team leader. |           |           | ✓         |
| <b>6.3</b> | <b>Rope Rescue Techniques</b>  | <b>R1</b> | <b>R2</b> | <b>R3</b> |
| 6.3.1      | Rescuer shall demonstrate ability to locate and access a patient on low angle to steep terrain in normal operating environment.  | ✓         | N/A       |           |
| 6.3.1      | Rescuer shall demonstrate the ability to locate and safely access a patient using techniques that require him or her to be raised or lowered on high angle surfaces, which may expose the rescuer to a significant fall hazard.  |           |           | ✓         |
| 6.3.2      | Rescuer shall demonstrate ability to determine and maintain a point of access to subject on low angle to steep terrain.  | ✓         | N/A       | N/A       |
| 6.3.3      | Rescuer shall demonstrate understanding of concepts and consequences of fall line in low angle to steep terrain.   | ✓         | N/A       | N/A       |
| 6.3.4      | Rescuer shall have basic knot tying skills, including ability to tie at least one of each of the following types of knots/bends:<br>6.3.4.1 End-loop around an object.<br>6.3.4.2 A midline loop.<br>6.3.4.3 Bend to join two ropes.   | ✓         |           |           |
| 6.3.1      | Rescuer shall have intermediate knot tying skills, including the ability to tie a hitch around an object.  |           | ✓         |           |
| 6.3.2      | Rescuer shall have advanced knot tying skills.   |           |           | ✓         |
| 6.3.5      | Rescuer shall understand basic anchoring concepts, including:<br>6.3.5.1 Selection of anchor materials.<br>6.3.5.2 Strength, alignment, and limitation of anchors.<br>6.3.5.3 Proficiency in rigging single point anchors.<br>6.3.5.4 Familiarity with multi-point anchors.                                    | ✓         |           |           |
| 6.3.2      | Rescuer shall understand intermediate anchoring concepts, including proficiency in rigging multi-point anchors.  |           | ✓         |           |
| 6.3.3      | Rescuer shall understand advanced anchoring concepts and shall be expert in rigging single and multi-point anchors.  |           |           | ✓         |
| 6.3.3      | Rescuer shall demonstrate the ability to construct a fixed rope system.  | N/A       | ✓         |           |
| 6.3.4      | Rescuer shall demonstrate the ability to direct a team in the construction of a fixed rope system.   |           |           | ✓         |
| 6.3.4      | Rescuer shall understand the need for, and know how to place edge protection.  | N/A       | ✓         |           |
| 6.3.5      | Rescuer shall demonstrate the ability to direct a team in the placement of edge protection.  |           |           | ✓         |
| 6.3.5      | Rescuer shall understand the need for, and know how to place rope protection along the path of the rope, should it be necessary.   | N/A       | ✓         |           |
| 6.3.6      | Rescuer shall demonstrate the ability to direct a team in the placement of rope protection along the path of the rope, should it be necessary.   |           |           | ✓         |
| 6.3.6      | Rescuer shall demonstrate the ability to construct a simple rope mechanical advantage system.  | N/A       | ✓         |           |
| 6.3.7      | Rescuer shall demonstrate the ability to direct a team in the construction of a simple rope mechanical advantage system.   |           |           | ✓         |
| 6.3.7      | Rescuer shall demonstrate the ability to construct a rope mechanical advantage system.   | N/A       | ✓         |           |
| 6.3.8      | Rescuer shall demonstrate the ability to direct a team in the construction of compound and complex rope mechanical advantage systems.  |           |           | ✓         |
| 6.3.9      | Rescuer shall demonstrate the ability to direct a team in the selection and construction of a highline/guiding line/offset rope system.  | N/A       | N/A       | ✓         |
| 6.3.10     | Rescuer shall demonstrate the ability to operate, and direct a team in the operation of, a highline/guiding line/offset rope system.   | N/A       | N/A       | ✓         |
| 6.3.11     | Rescuer shall demonstrate the ability to utilize litter attendants within a highline/guiding line/offset rope system.  | N/A       | N/A       | ✓         |

**TABLE X1.1** *Continued*

|        |   |     |     |   |
|--------|---|-----|-----|---|
| 6.3.12 | Rescuer shall demonstrate the ability to utilize, and direct a team in the utilization of, a highline/guiding line/offset rope system to transport rescuers, equipment, and/or an occupied litter.  | N/A | N/A | ✓ |
| 6.3.13 | Rescuer shall demonstrate the ability to utilize, and direct a team in the utilization of, a rope rescue system to move a rescuer and a patient along a horizontal or sloping path above an obstacle or projection.   | N/A | N/A | ✓ |
| 6.3.6  | Rescuer shall have sufficient skills to participate in low angle litter evacuation procedures, including:<br>6.3.6.1 Main line rigging.<br>6.3.6.2 Belay line rigging.<br>6.3.6.3 Litter rigging.<br>6.3.6.4 Haul systems.  | ✓   |     |   |
| 6.3.8  | Rescuer shall demonstrate the ability to participate in low angle litter evacuation procedures, including:<br>6.3.8.1 Constructing a belay system.<br>6.3.8.2 Tending litters.<br>6.3.8.3 Loading and packaging patients.<br>6.3.8.4 Constructing hauling or raising systems.<br>6.3.8.5 Conducting a system safety check.<br>6.3.8.6 Managing the operation of a rope mechanical advantage system.<br>6.3.8.7 Managing the operation of a lowering system.   |     | ✓   |   |
| 6.3.14 | Rescuer shall demonstrate the ability to direct a team in performing low angle litter evacuation procedures, including:<br>6.3.14.1 Rigging main lines.<br>6.3.14.2 Rigging belay lines and constructing and operating a belay system.<br>6.3.14.3 Rigging litters and tending litters.<br>6.3.14.4 Loading and packaging patients.<br>6.3.14.5 Constructing hauling or raising systems.<br>6.3.14.6 Conducting a system safety check.<br>6.3.14.7 Operating rope mechanical advantage systems.<br>6.3.14.8 Conducting a lowering operation.  |     |     | ✓ |
| 6.3.9  | Rescuer shall demonstrate the ability to participate in high angle evacuation procedures with or without a litter, including:<br>6.3.9.1 The skills already defined in 6.3.8.<br>6.3.9.2 Assisting with litter movement over an edge during a lowering or raising operation.<br>6.3.9.3 Operating a belay system during a lowering or raising operation.<br>6.3.9.4 Constructing lowering systems.<br>6.3.9.5 Assisting (under qualified supervision) in complex rigging operations including, but not limited to, highlines, guiding lines, and offsets.<br>6.3.9.6 Ascending a fixed rope.<br>6.3.9.7 Descending a fixed rope.  | N/A | ✓   |   |
| 6.3.15 | Rescuer shall demonstrate the ability to direct a team in performing high angle evacuation procedures with or without a litter, including:<br>6.3.15.1 The skills already defined in 6.3.14.<br>6.3.15.2 Completing an assignment while suspended from a rope rescue system.<br>6.3.15.3 Performing a rope rescue of a person suspended from, stranded on, or at the base of a structure or terrain feature.<br>6.3.15.4 Operating a belay system during a lowering or raising operation.<br>6.3.15.5 Moving a victim.<br>6.3.15.6 Functioning as a litter attendant in a lowering or raising operation.<br>6.3.15.7 Constructing lowering systems.<br>6.3.15.8 Constructing and operating highlines and guiding lines.<br>6.3.15.9 Ascending a fixed rope.<br>6.3.15.10 Descending a fixed rope.<br>6.3.15.11 Operating rope mechanical advantage systems.<br>6.3.15.12 Performing the removal of a suspended subject.<br>6.3.15.13 Performing a rope rescue with a litter using tender(s) to negotiate obstacles, manipulate or position the patient, or provide medical care while being raised and lowered.<br>6.3.15.14 Moving a patient packaged in a litter up and over an edge during a raising operation with a rope system. |     |     | ✓ |
| 6.3.16 | Rescuer shall demonstrate the abilities defined in this guide for a subject wherever they are located, whether suspended from, stranded on, or at the base of a structure or terrain feature.   | N/A | N/A | ✓ |

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