Rope Rescue Awareness and Operations (2021)

Course Plan

Course Details

Description: This course provides the knowledge and skills to prepare an emergency responder to conduct operations-level tower rescue operations in a safe and effective manner in accordance with AHJ policies and procedures. Topics include PPE and rope rescue equipment; incident size up, planning, and support; constructing anchor systems; placing edge protection; constructing and using fall protection systems; constructing and operating lowering systems, simple, compound, and complex rope mechanical advantage systems, and ladder rescue systems; rescue operations in low-angle and high-angle environments; and incident termination. This course incorporates awareness and operations training based on NFPA 1006 (2021).

Designed For: Fire fighters with three years' full-time or six years' part-time/volunteer experience and any emergency personnel who perform rope rescue operations.

Prerequisites: IS-100: Introduction to the Incident Command System (FEMA)
IS-200: ICS for Single Resources and Initial Action Incidents (FEMA)
IS-700: National Incident Management System, An Introduction (FEMA)
IS-800: National Response Framework, An Introduction (FEMA)

Standard: Complete all activities and formative tests.

Complete all summative tests with a minimum score of 80%.

Hours (Total): 40 hours

(7.5 lecture / 32.5 application)

Maximum Class Size: 24

Instructor Level: SFT Rope Rescue Awareness and Operations Registered Instructor

Instructor/Student Ratio: 1:24 (lecture)

1:6 (application)

Restrictions: All instructors counted toward student ratios, including application components, must be SFT Registered Rope Rescue Awareness and Operations Instructors.

SFT Designation: FSTEP

Table of Contents

Required Resources

Instructor Resources

To teach this course, instructors may use:

- *Rope Rescue Technician Manual* (James A. Frank, CMC Rescue, Inc., current edition)
- *Technical Rescue Field Operations Guide* (Tom Pendley, Desert Rescue Research, current edition)
- *Fundamentals of Technical Rescue* (Jones & Bartlett Learning, current edition)
- *Fundamentals of Technical Rescue Toolkit* (Jones & Bartlett Learning, current edition)
- *National Park Service Technical Rescue Manual* (U.S. Department of the Interior, National Park Service, 11th edition, 2014)
- FIRESCOPE ICS 162
- National Fire Protection Association (NFPA)
    - 1006: Standard for Technical Rescue Personnel Professional Qualifications (current edition)
    - 2500: Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Service (current edition)
- American National Standards Institute (ANSI)
    - Z359 (fall protection)
    - Z490 (training)
    - 10.48 (safety practices)
- Occupational Safety and Health Administration (Fed/OSHA)
    - 1910.140 (fall protection systems)
- California Division of Occupational Safety and Health (Cal/OSHA)
    - 1670 (fall arrest, fall restraint, positioning devices)
    - 3270 (general access)
    - 3270.1 (use of rope access equipment)
- Full personal protective equipment per AHJ requirements (including helmet, eye protection, gloves, boots, long sleeve shirt, and pants)

Online Instructor Resources

The following instructor resources are available online at https://osfm.fire.ca.gov/what-we-do/state-fire-training/fire-service-training-and-education-program

- None

Student Resources

To participate in this course, students need:

- Any textbook chosen by the instructor
- Full personal protective equipment per AHJ requirements (including helmet, eye protection, gloves, boots, long sleeve shirt, and pants)

Facilities, Equipment, and Personnel

Facilities

The following facilities are required to deliver this course:

- Standard learning environment or facility, which may include:
  - Writing board or paper easel chart
  - Markers, erasers
  - Amplification devices
  - Projector and screen
  - Laptop or tablet with presentation or other viewing software
  - Internet access with appropriate broadband capabilities
- A Rope Rescue training site with the NFPA 1006 required facilities, structures, work areas, materials, props, tools, and equipment of adequate size, type, and quantity to fully and safely support the cognitive and psychomotor training required to deliver the curriculum

Equipment

Student safety is of paramount importance when conducting the type of high-risk training associated with this Rope Rescue (2021) course.

- The equipment listed below is the minimum for the delivery of this course.
- The student is responsible for providing all PPE and ensuring that all PPE meets AHJ and site requirements.
- For all tools and equipment, ensure that you have the power source, operating supplies (blades, fuel, etc.), cleaning supplies, and appropriate PPE.

The following equipment is required to deliver this course:

Quantity Per 12-person Squad	Required Equipment
Determined by scenario	Rope, static kernmantle, general use, with rope bag and rope logs
12	Rope, tie ropes and webbing, 15’
Determined by scenario	Rope rescue gear bags
2	Descent control devices
20	Carabiner, locking
Determined by scenario	Collection plate (per AHJ)
Determined by scenario	Edge protection (based on site needs)
6	Pulley, single (prusik minding where applicable)
2	Pulley, double
6	Prusik loop, short
6	Prusik loop, long
6	Webbing, orange, 1”x20’
6	Webbing, blue, 1”x15’

6	Webbing, yellow, 1”x12’
6	Webbing, green, 1”x6’
Determined by scenario	Anchor straps (commercial or tied on site)
12	Pickets, steel or equivalent with associated equipment
2	Sledgehammer
6	Harness, commercial Class III
1	Harness, commercial victim pelvic
1	Harness, commercial victim chest
1	Litter basket (with pre-rig or equivalent)
Determined by scenario	Ladder, fire service, length appropriate for site and skills
1	Ground cover
Recommended Equipment	
Determined by scenario	Litter wheel
Determined by scenario	Personal mechanical advantage (set of fours)
Determined by scenario	Swivels
Determined by scenario	Cord, 8mm x 33’
Determined by scenario	Ascenders (preferably hand held)
Determined by scenario	Pick-off straps
Determined by scenario	Load-release device, commercial or field assembled (required based on DCD used)
Determined by scenario	Picket plates
Determined by scenario	Backboard, long
Determined by scenario	Rescue manikin
Determined by scenario	Fire apparatus
Determined by scenario	Rope, static kernmantle, general use, 20’ sections
Determined by scenario	Pulley, knot passing
Determined by scenario	Energy absorber with lock (e.g., ASAP’SORBER)

The course provider or agency assumes all responsibility, liability, and maintenance for the engineering design, strength, stability, and adequacy of all props. The provider or agency further assumes all responsibility, liability, and maintenance for all tools, equipment, and supplies used at the site for the delivery of a Rope Rescue class.

Personnel

The following personnel are required to deliver this course:

- Any instructor counted toward student ratios must be an SFT Registered Rope Rescue Awareness and Operations (2021) Instructor.

Time Table

Segment	Lecture	Application	Unit Total
Unit 1: Introduction			
Topic 1-1: Orientation and Administration	0.50	0.0	
Unit 1 Totals	**0.50**	**0.0**	**0.50**
Unit 2: Introduction to Rope Rescue			
Topic 2-1: Introduction to Rope Rescue	0.25	0.0	
Topic 2-2: Standards and Regulations	0.25	0.0	
Unit 2 Totals	**0.50**	**0.0**	**0.50**
Unit 3: PPE and Equipment			
Topic 3-1: Selecting, Using, Inspecting, and Maintaining PPE	0.25	0.50	
Topic 3-2: Selecting, Using, Inspecting, and Maintaining Rescue Equipment	0.25	0.0	
Topic 3-3: Demonstrating Knots, Bends, and Hitches	0.25	0.50	
Unit 3 Totals	**0.75**	**1.0**	**1.75**
Unit 4: Incident Size Up, Planning, and Support			
Topic 4-1: Sizing Up a Rope Rescue Incident	0.25	0.25	
Topic 4-2: Recognizing the Need for Technical Rescue Resources	0.25	0.25	
Topic 4-3: Supporting an Operations- or Technician-level Incident	0.25	0.25	
Topic 4-4: Recognizing Incident Hazards and Initiating Isolation Procedures	0.25	0.25	
Topic 4-5: Conducting a System Safety Check	0.25	0.25	
Unit 4 Totals	**1.25**	**1.25**	**2.50**
Unit 5: Anchor Systems			
Topic 5-1: Constructing Anchor Systems	0.25	2.75	
Unit 5 Totals	**0.25**	**2.75**	**3.0**
Unit 6: Edge Protection			
Topic 6-1: Placing Edge Protection	0.25	1.0	
Unit 6 Totals	**0.25**	**1.0**	**1.25**
Unit 7: Fall Protection			
Topic 7-1: Using Fall Protection Systems	0.25	1.0	
Topic 7-2: Constructing a Fixed Rope System	0.25	1.0	
Topic 7-3: Constructing and Operating a Belay System	0.25	4.0	
Topic 7-4: Belaying a Falling Load	0.25	2.0	
Topic 7-5: Constructing and Operating a Twin-tension Rope System	0.25	3.0	

Unit 7 Totals	**1.25**	**11.0**	**12.25**
Unit 8: Rescue Systems			
Topic 8-1: Constructing, Operating, and Directing the Operation of a Lowering System	0.25	2.0	
Topic 8-2: Constructing, Operating, and Directing the Operation of a Simple Rope Mechanical Advantage System	0.25	2.0	
Topic 8-3: Constructing, Operating, and Directing the Operation of a Compound Rope Mechanical Advantage System	0.25	2.0	
Topic 8-4: Constructing, Operating, and Directing the Operation of a Complex Rope Mechanical Advantage System	0.25	2.0	
Topic 8-5: Constructing, Operating, and Directing the Operation of Ladder Rescue Systems	0.25	1.0	
Unit 8 Totals	**1.25**	**9.0**	**10.25**
Unit 9: Rescue Operations			
Topic 9-1: Negotiating an Edge	0.25	0.50	
Topic 9-2: Rescuing a Victim	0.25	1.0	
Topic 9-3: Lowering and Raising a Litter in a Low-Angle Environment	0.25	1.0	
Topic 9-4: Operating as a Litter Tender	0.25	0.50	
Topic 9-5: Lowering and Raising a Litter in a High-Angle Environment	0.25	1.0	
Topic 9-6: Descending a Fixed Rope	0.25	2.0	
Unit 9 Totals	**1.50**	**6.0**	**7.50**
Unit 10: Termination			
Topic 10-1: Terminating a Technical Rescue Operation	0.25	0.25	
Unit 10 Totals	**0.25**	**0.25**	**0.50**
Formative Assessments			
Determined by AHJ or educational institution	**0.0**	**0.0**	**0.0**
Summative Assessment			
Determined by AHJ or educational institution	**0.0**	**0.0**	**0.0**
Course Totals	**7.75**	**32.25**	**40.0**

Time Table Key

1. The Time Table documents the amount of time required to deliver the content included in the course plan.

2. Time is documented using the quarter system: 15 min. = .25 / 30 min. = .50 / 45 min. = .75 / 60 min. = 1.0.

3. The Course Totals do not reflect time for lunch (1 hour) or breaks (10 minutes per each 50 minutes of instruction or assessment). It is the instructor's responsibility to add this time based on the course delivery schedule.

4. Application (activities, skills exercises, and formative testing) time will vary depending on the number of students enrolled. The Application time documented is based on the maximum class size identified in the Course Details section.

5. Summative Assessments are determined and scheduled by the authority having jurisdiction. These are not the written or psychomotor State Fire Training certification exams. These are in-class assessments to evaluate student progress and calculate course grades.

Unit 1: Introduction

Topic 1-1: Orientation and Administration

Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, skills exercises, resources, evaluation methods, and participation requirements in the course syllabus.

Enabling Learning Objectives

1. Identify facility requirements
    - Restroom locations
    - Food locations
    - Smoking locations
    - Emergency procedures
2. Identify classroom requirements
    - Start and end times
    - Breaks
    - Electronic device policies
    - Special needs and accommodations
    - Other requirements as applicable
3. Review course syllabus
    - Course objectives
    - Calendar of events
    - Course requirements
    - Student evaluation process
    - Assignments
    - Activities
    - Required student resources
    - Class participation requirements

Discussion Questions

1. Determined by instructor

Application

1. Determined by instructor

Unit 2: Introduction to Rope Rescue

Topic 2-1: Introduction to Rope Rescue

Terminal Learning Objective

At the end of this topic a student, given terrain and features common to the AHJ, will be able to identify rope rescue incidents common to the AHJ and factors that determine incident complexity so that rescuers are prepared to respond to rope rescue incidents.

Enabling Learning Objectives

1. Define “low-angle” rope rescue
    - Refers to an environment in which the load is predominantly supported by itself and not the rope rescue system
2. Define “high-angle” rope rescue
    - Refers to an environment in which the load is predominantly supported by the rope rescue system
3. Identify terrain and features common to the AHJ where rope rescue might be necessary
    - Urban environments
        - Residential
        - Commercial
        - Industrial
        - Other
    - Rural environments
        - Cliffs
        - Back country
        - Other
4. Identify technical rescue disciplines that incorporate or utilize rope rescue skills
    - Tower Rescue
    - Confined Space Rescue
    - Animal Technical Rescue
    - Trench Rescue
    - Water Rescue
    - Other
5. Identify factors that determine incident complexity
    - High vs. low angle
    - Access
    - Height
    - Number of victims
    - Victim position and condition
    - Risk to victim and rescuers
    - Tools or equipment required
    - Environmental hazards

Discussion Questions

1. What type of rope rescue incidents are common in your AHJ?

2. What factors determine incident complexity for a rope rescue?

Application

1. Determined by instructor

Instructor Notes

1. For ELOs that references the AHJ, adjust the course content to reflect AHJ-specific policies, practices, equipment, operations, tactics, etc.

CTS Guide Reference: None

Topic 2-2: Standards and Regulations

Terminal Learning Objective

At the end of this topic a student, given standards, regulations, policies, and procedures, will be able to identify industry and AHJ requirements, so that rope rescue operations are carried out in accordance with all applicable requirements.

Enabling Learning Objectives

1. Identify industry standards applicable to rope rescue
   - FIRESCOPE ICS 162
   - National Fire Protection Association (NFPA)
     - 1006: Standard for Technical Rescue Personnel Professional Qualifications
     - 2500: Standard for Operations and Training for Technical Search and Rescue Incidents and Life Safety Rope and Equipment for Emergency Services
   - American National Standards Institute (ANSI)
     - Z359 (fall protection)
     - Z490 (training)
     - 10.48 (safety practices)
   - Other standards as defined by state and federal law
2. Identify industry regulations applicable to rope rescue
   - Occupational Safety and Health Administration (Fed/OSHA)
     - 1910.140 (fall protection systems)
   - California Division of Occupational Safety and Health (Cal/OSHA)
     - 1670 (fall arrest, fall restraint, positioning devices)
     - 3270 (general access)
     - 3270.1 (use of rope access equipment)
   - Other regulations as defined by state and federal law
3. Describe how Cal/OSHA 3270.1 applies
   - During training
   - During a rescue event
4. Identify AHJ policies and procedures
   - Determined by AHJ

Discussion Questions

1. What rope rescue policies and procedures do you have in your AHJ?
2. What other stakeholders might have standards and regulations that impact rope rescue?
3. How do standards and regulations for rope rescue training differ from those used for rope rescue operations?

Application

1. Determined by instructor

Instructor Notes

1. While training, all operations must adhere to Cal/OSHA rope access standard 3270.1.

CTS Guide Reference: None

Unit 3: PPE and Equipment

Topic 3-1: Selecting, Using, Inspecting, and Maintaining PPE

Terminal Learning Objective

At the end of this topic a student, given clothing or equipment for the protection of the rescuers, inspection procedures, cleaning and sanitation supplies, maintenance logs or records, and tools and resources indicated by the manufacturer's guidelines for assembly or disassembly of components during repair or maintenance, will be able to select, use, inspect, and maintain hazard-specific PPE so that PPE, tools, and equipment are appropriate to incident response needs, donned and worn correctly, and used in accordance with manufacturer specifications and all applicable policies and procedures; 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.

Enabling Learning Objectives

1. Describe functions, construction, and operation of PPE
   - Helmet
   - Head lamp
   - Eye protection
   - Gloves
   - Boots
   - Long sleeve shirt and pants
   - Harness (full body)
   - Radio/comms
2. Identify protections provided by PPE during rope rescue incidents
3. Identify limitations of PPE during rope rescue incidents
4. Identify when and how to don and doff PPE
   - Safety considerations
   - Manufacturer guidelines
   - AHJ policies and procedures
5. Describe how to use AHJ record-keeping systems
6. Describe maintenance requirements and procedures
   - Cleaning
   - Sanitizing
   - Infectious disease control
7. Describe how to use assembly and disassembly tools
8. Describe manufacturer and AHJ recommendations
9. Describe pre-use inspection procedures and determine operational readiness
10. Don and doff PPE
    - Select and use tools specific to the task
11. Inspect and maintain PPE
    - Identify wear and damage indicators for PPE

- Evaluate operational readiness of PPE
- Complete logs and records
- Use cleaning equipment, supplies, and reference materials

Discussion Question

1. What types of PPE does your AHJ have available for rope rescue operations?
2. What are your AHJ's PPE inspection guidelines?
3. What type of equipment logs do you use?
4. Where are your AHJ's maintenance logs and records kept?

Application

1. Don and doff PPE

Instructor Notes

1. Students will inspect and maintain their PPE daily as part of the class but are not required to perform inspection and maintenance as a skill.

CTS Guide Reference: CTS 2-2

Topic 3-2: Selecting, Using, Inspecting, and Maintaining Rescue Equipment

Terminal Learning Objective

At the end of this topic a student, given maintenance logs and records, tools, and resources as indicated by the manufacturer's guidelines, inspection procedures, equipment replacement protocol, and organizational standard operating procedure, will be able to select, use, inspect, and maintain rescue equipment, so that tools and equipment are appropriate to incident response needs and are used correctly in accordance with manufacturer specifications and all applicable policies and procedures; 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.

Enabling Learning Objectives

1. Describe functions and operations of rescue equipment
    - Rope and rigging
        - Hardware
            - Carabiners
            - Pulleys
            - Descent control devices
        - Software
            - Rope
            - Webbing
            - Drop bags
    - Harnesses
        - Attachment points
            - Dorsal
            - Chest
            - Pelvic
            - Positioning
        - Size/fit
    - Self belay
        - Self-belaying device (e.g., ASAP®, quantum, etc.)
        - Shock absorbers (e.g., ASAP'Sorber, etc.)
    - Anchoring
        - Anchor straps
        - Wire rope chokers or slings
    - Specialty equipment
        - Mini mechanical advantage (haul) system
    - Victim Rescue
        - Stabilization
        - Packaging
        - Removal
2. Describe how to select and use maintenance tools
3. Describe methods for cleaning tools and equipment

- Cleaning
- Sanitizing
- Infectious disease control

4. Describe replacement protocols and procedures
5. Identify when and how to remove tools and equipment from service
   - Manufacturer guidelines
   - AHJ guidelines
   - Documentation and reporting requirements
6. Describe disposal methods
7. Describe AHJ standard operating procedures
8. Describe how to use record-keeping systems
9. Identify guidelines for cleaning, inspecting, and maintaining tools and equipment
   - Manufacturer guidelines
   - AHJ guidelines
   - NFPA 2500
   - Documentation and reporting requirements
10. Select, use, and maintain tools and equipment
    - Identify wear and damage indicators for rescue equipment
    - Evaluate operational readiness of equipment
    - Complete logs and records
    - Select and use maintenance tools

Discussion Questions

1. What is your AHJ's retirement or replacement criteria?
2. What does your AHJ use for proper equipment cleaning?
3. What are your AHJ's pre-use inspection procedures?

Application

1. Determined by instructor

Instructor Notes

1. ELO 1 – Use the course equipment list as the minimum requirements and then include any other tools and equipment common to your AHJ.
2. Consider showing equipment with both normal and excessive wear and out-of-service equipment.

CTS Guide Reference: CTS 2-3

Topic 3-3: Demonstrating Knots, Bends, and Hitches

Terminal Learning Objective

At the end of this topic a student, given ropes, webbing, and a list of knots used by the AHJ, will be able to demonstrate knots, bends, and hitches so that the knots are dressed, recognizable, and backed up as required.

Enabling Learning Objectives

1. Describe rope and webbing types
   - Material type
   - Construction
   - Rating
   - Use/purpose
2. Identify rope terminology
   - Running
   - Working
   - Standing
3. Describe knot efficiency
   - Easy to tie
   - Easy to untie
   - Easy to identify
   - Maintains rope strength
4. Describe when and how to use knots, bends, and hitches
5. Tie representative knots, bends, and hitches for the following purposes:
   - End-of-line loop
   - Midline loop
   - Securing rope around desired objects
   - Joining rope or webbing ends together
   - Friction hitches

Discussion Questions

1. What is the difference between a knot, a bend, and a hitch?
2. What are the names of the parts of a rope?

Application

1. Demonstrate an end-of-line loop
2. Demonstrate a midline loop
3. Demonstrate securing rope around desired objects
4. Demonstrate joining rope or webbing ends together
5. Demonstrate friction hitches

Instructor Notes

1. None

CTS Guide Reference: CTS 4-4

Unit 4: Incident Size Up, Planning, and Support

Topic 4-1: Sizing Up a Rope Rescue Incident

Terminal Learning Objective

At the end of this topic a student, given background information and applicable reference materials, will be able to size up a rope rescue incident 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.

Enabling Learning Objectives

1. Describe components of a rope rescue size up
    - Number of victims
    - Victim location
        - Urban vs. rural
        - Front vs. back country
        - Above vs. below rescuer
        - Supported vs. unsupported
        - Time last seen (TLS)
        - Point last seen (PLS)
    - Victim condition
        - Physical
        - Emotional/psychological
        - Ability to participate in rescue
    - Anticipated hazards
    - Environmental conditions
    - Access and egress routes
        - Urban vs. rural
2. Describe a risk/benefit assessment
    - Rescue vs. recovery
    - Survivability profile
    - Current and forecasted weather
    - Terrain/feature conditions
    - Time of day
3. Describe types of reference materials and their uses
    - Target hazard pre-plan
    - AHJ policies and procedures
    - Owner/operator resources
4. Describe availability and capability of resources
5. Describe elements of an incident action plan and related information
6. Describe relationship of size-up to the incident management system

7. Describe information gathering techniques and how that information is used in the size-up process
    - Pre-incident
    - En route
    - On scene
    - Evolving
8. Describe basic search criteria for rope rescue incidents
9. Read technical rescue reference materials
10. Gather information
11. Relay information
12. Use information-gathering sources

Discussion Questions

1. What are some ways to gather information for your scene size up?
2. What policies and procedures does your AHJ use to analyze risk vs. benefit?
3. What specialty resources to support rope rescue are available in your AHJ?
4. What are your AHJ's PACE planning policies and procedures?

Application

1. Size up a rope rescue incident

Instructor Notes

1. Review a Training Action Plan (TAP) and walk the students through the components.

CTS Guide Reference: CTS 1-2, CTS 2-1

Topic 4-2: Recognizing the Need for Technical Rescue Resources

Terminal Learning Objective

At the end of this topic a student, given incident information, will be able to recognize the need for technical rescue resources, so that the need for additional resources is identified, the response system is initiated, the scene is secured and rendered safe until additional resources arrive, and awareness-level personnel are incorporated into the operational plan.

Enabling Learning Objectives

1. Describe resource types and deployment methods
    - Availability
    - Capabilities
    - Limitations
2. Describe operational protocols
    - Identify need for additional resources
    - Initiate response system
    - Secure scene and render safe until additional resources arrive
    - Incorporate personnel into operational plan
3. Describe how to complete specific planning forms
    - Determined by AHJ
    - Tactical worksheet
        - Application
        - Purpose
4. Describe types of incidents common to the AHJ
5. Describe hazards
6. Describe incident support operations and resources
    - Engine company
    - Truck company
    - Rescue company
    - EMS
    - Law enforcement
    - Responsible party
    - Other outside resources
7. Describe safety measures
8. Identify communications requirements, methods, and means
9. Apply operational protocols
10. Select specific planning forms based on types of incidents
11. Identify and evaluate various types of hazards within the AHJ
12. Match resources to operational needs
13. Request support and resources
14. Determine required safety measures

Discussion Questions

1. What factors determine when an incident requires additional or specialty resources?
2. What technical rescue resources are available in your AHJ? In surrounding agencies?

3. What process does your AHJ use to request resources?

Application

1. Recognize the need for technical rescue resources

Instructor Notes

1. None

CTS Guide Reference: CTS 1-4

Topic 4-3: Supporting an Operations- or Technician-level Incident

Terminal Learning Objective

At the end of this topic a student, given an incident, an assignment, an incident action plan, and resources from the tool cache, will be able to support an operations- or technician-level incident, so that the assignment is carried out, progress is reported to command, environmental concerns are managed, personnel rehabilitation is facilitated, and the incident action plan is supported.

Enabling Learning Objectives

1. Describe AHJ operational protocols
2. Describe hazard recognition
3. Describe incident management
4. Describe PPE selection
5. Describe resource selection and use
6. Describe scene support requirements
    - Scene control and access
    - Operational zones
    - Liaison with victims, family, bystanders, agency, etc.
    - Logistical support
        - Lighting
        - Shelter
        - Rehabilitation
    - Organization and tracking
    - Managing personnel rotations
7. Apply operational protocols
8. Function within an incident management system
9. Follow and implement an incident action plan
10. Report task progress status to a supervisor or incident command

Discussion Questions

1. What are your limitations operating at the awareness level?
2. What logistical support operations need to be addressed during a complex rope rescue incident?
3. What support resources are available in your AHJ?
4. What is your AHJ's rehab policy?

Application

1. Support an operations- or technician-level incident

Instructor Notes

1. None

CTS Guide Reference: CTS 1-5

Topic 4-4: Recognizing Incident Hazards and Initiating Isolation Procedures

Terminal Learning Objective

At the end of this topic a student, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, will be able to recognize incident hazards and initiate isolation procedures, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, victims, and bystanders are minimized, and rescue time constraints are taken into account.

Enabling Learning Objectives

1. Describe types and natures of incident hazards
    - Structural integrity
    - Animal interference (snakes, birds, insects)
    - Physical hazards (falls, sharp objects, burns, exhaustion, dehydration, etc.)
    - Psychological hazards (fear, panic, etc.)
    - Falling objects
    - Environmental conditions (wind, heat, cold, etc.)
    - Victim behavior
2. Describe resource capabilities and limitations
3. Describe equipment types and their use
4. Describe hazard recognition and terminology
5. Describe isolation terminology, methods, equipment, and implementation
6. Identify operational requirement concerns
7. Describe common types of rescuer and victim risk
8. Describe risk/benefit analysis considerations
9. Describe methods for controlling access to the scene
10. Describe types of technical references
11. Identify resource capabilities and limitations
12. Identify incident hazards
13. Assess potential hazards to rescuers and bystanders
14. Place scene control barriers
15. Operate control and mitigation equipment

Discussion Questions

1. What type of risks and hazards can be present at a rope rescue incident?
2. What tools and equipment does your AHJ use to control or mitigate these risks and hazards?
3. What references or guides do you use in your AHJ?

Application

1. Recognize incident hazards and initiate isolation procedures

Instructor Notes

1. None

CTS Guide Reference: CTS 1-3

Topic 4-5: Conducting a System Safety Check

Terminal Learning Objective

At the end of this topic a student, given a rope rescue system and rescue personnel, will be able to conduct a system safety check, 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.

Enabling Learning Objectives

1. Describe system safety check procedures
    - Perform physical and visual system checks
        - Inspect rope rescue system components for damage
        - Assess rope rescue system configuration
        - Secure equipment components
        - Inspect all rigging
        - Ensure system can accommodate anticipated load(s)
    - Apply and use PPE
    - Perform function test before life-loading the system
    - Confirm commands and hand signals
    - Announce actions and confirm acknowledgment before life-loading the system
2. Describe equipment replacement criteria
3. Perform a system safety check

Discussion Questions

1. What are the key components of a system safety check?
2. Who does your AHJ recognize as authorized to perform a system safety check?

Application

1. Conduct a system safety check

Instructor Notes

1. None

CTS Guide Reference: CTS 2-7

Unit 5: Anchor Systems

Topic 5-1: Constructing Anchor Systems

Terminal Learning Objective

At the end of this topic a student, given life safety rope and other auxiliary rope rescue equipment, will be able to construct single-point and multiple-point anchor systems, so that the chosen anchor system fits the incident needs, distributes force, 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.

Enabling Learning Objectives

1. Describe anchor selection criteria
   - Natural (rock, tree, etc.)
   - Structural (buildings, bridges, towers, etc.)
   - Artificial (pickets, vehicles, etc.)
2. Describe types of anchor slings
   - Engineered (pre-assembled)
   - Improvised (tied on site)
3. Describe selection and inspection criteria for hardware and software
4. Describe weight distribution issues and methods
   - Load sharing
   - Focal/directional
5. Identify formulas to calculate safety factors for load distribution
6. Describe load types
   - Static
   - Dynamic
7. Describe how to construct anchor slings
   - Single loop
   - Multi loop
   - Basket/three-bight
   - Girth hitch
   - Double-locking girth hitch
   - Wrap three, pull two
   - Tensionless/no knot
   - Other (as determined by AHJ)
8. Describe how to use anchor slings to construct anchor systems
   - Single-point system
   - Two-point system
   - Three-point system
   - Tie-back system
   - Other (as determined by AHJ)

9. Describe rigging systems
    - Principles
    - Application
    - Limitations
    - Equipment
    - Critical angles
10. Describe application of knots, bends, and hitches
11. Describe system safety check procedures
    - Visual assessment
    - Physical assessment
    - Ongoing evaluation
    - Integrity concerns
12. Select rope and equipment
13. Tie knots, bends, and hitches as required by the AHJ
14. Rig systems
15. Evaluate anchor points for required strength, location, and surface contour
16. Perform a system safety check

Discussion Questions

1. What considerations go into anchor selection and construction?

Application

1. Construct a single loop single-point anchor system
2. Construct a multi loop single-point anchor system
3. Construct a basket/three-bight single-point anchor system
4. Construct a girth hitch single-point anchor system
5. Construct a double-locking girth hitch single-point anchor system
6. Construct a wrap three, pull two single-point anchor system
7. Construct a tensionless/no knot single-point anchor system
8. Construct a picket system
9. Construct a two-point anchor system
10. Construct a three-point anchor system
11. Construct a tie-back anchor system

Instructor Notes

1. Reference: California Code of Regulations, Title 8, Section 1670 Personal Fall Protection
2. Reference: California Code of Regulations, Title 8, Section 3270.1 Use of Rope Access Equipment

CTS Guide Reference: CTS 2-5, CTS 2-6

Unit 6: Edge Protection

Topic 6-1: Placing Edge Protection

Terminal Learning Objective

At the end of this topic a student, given life safety rope or webbing traversing a sharp or abrasive edge, edge protection, and other auxiliary rope rescue equipment, will be able to place edge protection, 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.

Enabling Learning Objectives

1. Describe materials and devices that can be used to protect ropes or webbing from sharp or abrasive edges
2. Describe fall protection measures
3. Identify dangers associated with sharp or abrasive edges
4. Describe methods for negotiating sharp or abrasive edges
5. Select protective devices for rope and webbing
6. Protect personnel from falls while working near edges
7. Secure edge protection
8. Secure ropes or webbing in a specific location

Discussion Questions

1. What types of edge protection are available in your AHJ?
2. What methods does your AHJ use to secure edge protection?
3. What hazards are associated with not using edge protection?

Application

1. Place edge protection

Instructor Notes

1. None

CTS Guide Reference: CTS 2-8

Unit 7: Fall Protection

Topic 7-1: Using Fall Protection Systems

Terminal Learning Objective

At the end of this topic a student, given a rope rescue incident, life-safety rope, auxiliary rope rescue equipment, and an anchor system, will be able to recognize, identify, and use typical fall protection equipment used by rescuers so that risk to rescuer and victim are minimized in low- and high-angle environments.

Enabling Learning Objectives

1. Describe fall factor and its effects on anchors, equipment, and people
2. Define fall arrest
3. Define fall arrest attachments
4. Define fall restraint
5. Define fall restraint attachments
6. Define travel restraint
7. Describe fall protection devices and their applications
    - Energy absorber with lock (e.g., ASAP'SORBER)
    - Others
8. Operate fall protection

Discussion Question

1. What are the similarities and differences between fall arrest, fall restraint, and travel restriction equipment?
2. What equipment does your AHJ use for fall protection?
3. What are some methods to reduce impact force while using fall protection equipment?

Application

1. Operate fall protection equipment

Instructor Notes

1. Use Cal/OSHA 1670 to define the terms in ELOs 3, 4, 5, 6, and 7.
2. Use Fed/OSHA 1910.140 to define the term in ELO 8.
3. All equipment must be used in accordance with manufacturer's recommendations and Cal/OSHA's regulations.
4. Ensure that students are clear on the attachment points for equipment used during fall arrest and fall restraint.

CTS Guide Reference: None

Topic 7-2: Constructing a Fixed Rope System

Terminal Learning Objective

At the end of this topic a student, given an anchor system, a life safety rope, and rope rescue equipment, will be able to construct a fixed rope system, 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.

Enabling Learning Objectives

1. Describe the purpose of a fixed rope system
    - Fall protection
    - Descending
    - Ascending
2. Describe how to construct a fixed rope system
    - Select knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
    - Evaluate interference concerns related to incident operations and setup
    - Evaluate system components for compromised integrity
    - Perform safety check

Discussion Questions

1. How does your AHJ use fixed rope systems during rescue incidents?

Application

1. Construct a fixed rope system

Instructor Notes

1. None

CTS Guide Reference: CTS 2-12

Topic 7-3: Constructing and Operating a Belay System

Terminal Learning Objective

At the end of this topic a student, given life safety rope, anchor systems, PPE, rope rescue equipment, an operating lowering or raising mechanical advantage system, and a specified minimum travel distance for the load, will be able to construct and operate a dedicated belay system with a dedicated main during lowering or raising operations, so that the belay operator is not rigged into the equipment components of the system, the system is suitable to the site and is connected to an anchor system and the load, the system is capable of arresting a fall with minimal fall factor, 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 belay operator, the load's position is continually monitored, the belay operator moves rope through the belay device as designed.

Enabling Learning Objectives

1. Describe principles of belay systems
2. Describe belay devices
   - Application
   - Use
   - Capabilities
   - Limitations
3. Describe application of knots, bends, and hitches
4. Describe rigging principles
5. Describe proper operation of belay systems in conjunction with lowering and raising operations
6. Describe operational commands
7. Describe system safety check procedures
8. Select a system
9. Tie knots, bends, and hitches
10. Perform rigging
11. Attach to anchor system and load
12. Don and use task-specific PPE
13. Perform a system safety check
14. Operate a belay system
15. Assess system effectiveness
16. Properly attach a rope to a belay device
17. Communicate belay system status

Discussion Questions

1. What are some examples of belays used in your AHJ?
2. What commands does your AHJ during belay system operations?
3. How do you effectively minimize the fall factor?
4. Why is it important to stay attentive while belaying?

Application

1. Construct and operate a dedicated belay system with a dedicated main during lowering or raising operations

Instructor Notes

1. Refer to NFPA 1006 (2021) A.5.2.9 for clarification on single-tensioned and two-tensioned rope systems.

CTS Guide Reference: CTS 2-9, CTS 2-10

Topic 7-4: Belaying a Falling Load

Terminal Learning Objective

At the end of this topic a student, given a belay system and a failed line creating a dropped load, will be able to belay a falling load in a high-angle environment, 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 in a manner that minimizes the force transmitted to the load, the belay operator utilizes the belay system as designed, and the belay operator is not injured or otherwise incapacitated during operation of the belay system.

Enabling Learning Objectives

1. Describe effective emergency operation of belay devices to arrest falls
2. Describe operating procedures
3. Operate a belay system as designed
4. Tie approved knots, bends, and hitches
5. Use task-specific PPE
6. Recognize and arrest a falling load
7. Communicate belay system actuation

Discussion Questions

1. What is the proper action in response to a belay line actuation?
2. What are your AHJ's policies for recovering from a line failure?

Application

1. Belay a falling load in a high-angle environment

Instructor Notes

1. The instructor may simulate one line of a TTRS failing so that the students transfer the load to the other line.

CTS Guide Reference: CTS 2-11

Topic 7-5: Constructing and Operating a Twin-tension Rope System

Terminal Learning Objective

At the end of this topic a student, given life safety rope, anchor systems, PPE, rope rescue equipment, an operating lowering or raising mechanical advantage system, and a specified minimum travel distance for the load, will be able to construct and operate a twin-tension rope system (TTRS) during lowering or raising operations, so that the operator is not rigged into the equipment components of the system, the system is suitable to the site and is connected to an anchor system and the load, the system is capable of arresting a fall with minimal fall factor, a fall will not result in system failure, system actuation will not injure or otherwise incapacitate the operator, the load's position is continually monitored, and the operator moves rope through the devices as designed.

Enabling Learning Objectives

1. Describe TTRS principles
2. Describe TTRS devices
   - Application
   - Use
   - Capabilities
   - Limitations
3. Describe application of knots, bends, and hitches
4. Describe rigging principles
5. Describe proper operation of TTRS during lowering and raising operations
6. Describe operational commands
7. Describe system safety check procedures
8. Select a system
9. Tie knots, bends, and hitches
10. Perform rigging
11. Attach to anchor system and load
12. Don and use task-specific PPE
13. Perform a system safety check
14. Operate a TTRS
15. Assess system effectiveness

Discussion Questions

1. What are some examples of TTRS used in your AHJ?
2. What commands does your AHJ use during TTRS operations?
3. How do you effectively minimize the fall factor?
4. Why is it important to stay attentive while operating a TTRS?

Application

1. Construct and operate a TTRS during lowering or raising operations

Instructor Notes

1. Refer to NFPA 1006 (2021) A.5.2.9 for clarification on single-tensioned and two-tensioned rope systems.

CTS Guide Reference: CTS 2-9, CTS 2-10

Unit 8: Rescue Systems

Topic 8-1: Constructing, Operating, and Directing the Operation of a Lowering System

Terminal Learning Objective

At the end of this topic a student, given an anchor system, life safety rope(s), a descent control device, auxiliary rope rescue equipment, rescue personnel, a load, and a specified minimum travel distance for the load to be moved, will be able to construct, operate, and direct the operation of a lowering system 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; 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.

Enabling Learning Objectives

1. Describe the purpose of a lowering system
   - Lower a load in a controlled manner
2. Describe various descent control devices
   - Application
   - Use
   - Capabilities
   - Limitations
3. Describe capabilities and limitations of various lowering systems
   - Low-angle environment
   - High-angle environment
4. Describe how to construct a lowering system
   - Select rope and equipment
   - Select and apply knots, bends, and hitches
   - Evaluate expected loads
   - Select and rig system
   - Perform system safety check
5. Identify safety concerns
   - Low-angle environment
   - High-angle environment
6. Describe how to operate lowering systems
   - Low-angle environment
   - High-angle environment
   - Knot passing
7. Describe how to direct a lowering operation
   - Direct personnel
   - Use operational commands
   - Analyze system efficiency

8. Construct, operate, and directing the operation of a lowering system

Discussion Questions

1. What different descent-control devices are used in your AHJ?
2. What are some advantages and disadvantages of different descent control devices?
3. What methods can be used for passing knots?

Application

1. Construct a lowering system in a low-angle environment
2. Operate a lowering system in a low-angle environment
3. Direct the operation of a lowering system in a low-angle environment
4. Construct a lowering system in a high-angle environment
5. Operate a lowering system in a high-angle environment
6. Direct the operation of a lowering system in a high-angle environment
7. Perform a knot pass during a lowering operation

Instructor Notes

1. None

CTS Guide Reference: CTS 2-13, CTS 2-14

Topic 8-2: Constructing, Operating, and Directing the Operation of a Simple Rope Mechanical Advantage System

Terminal Learning Objective

At the end of this topic a student, given life safety rope, carabiners, pulleys, rope grab devices, auxiliary rope rescue equipment, rescue personnel, a load, a specified minimum travel distance for the load to be moved, and an anchor system, will be able to construct, operate, and direct the operation of a simple rope mechanical advantage system, so that the system constructed can accommodate the load, is efficient, and is connected to an anchor system and the load; 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 operations; and potential problems are identified, communicated, and managed.

Enabling Learning Objectives

1. Describe the purpose of a simple rope mechanical advantage system
    - Raise a load in a controlled manner
2. Describe principles of mechanical advantage
3. Describe types of simple rope mechanical advantage systems
    - 1:1
    - 2:1
    - 3:1
    - 4:1
    - 5:1
4. Describe various simple rope mechanical advantage systems
    - Application
    - Use
    - Forces
    - Capabilities
    - Limitations
5. Describe how to construct simple rope mechanical advantage systems
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Include ability to convert from lowering to hauling
    - Perform system safety check
6. Identify safety concerns
    - Low-angle environment
    - High-angle environment
7. Describe how to operate simple rope mechanical advantage systems
    - Haul line operation
    - Low-angle environment
    - High-angle environment
    - Knot passing

8. Describe how to direct the operation of a simple rope mechanical advantage system
    - Assign and direct personnel
    - Use operational commands
    - Analyze system efficiency
9. Construct, operate, and direct the operation of a simple rope mechanical advantage system

Discussion Questions

1. What is a simple rope mechanical advantage system?
2. What are some common types of simple rope mechanical advantage systems?

Application

1. Construct a 3:1 simple rope mechanical advantage system
2. Operate a 3:1 simple rope mechanical advantage system
3. Direct the operation of a 3:1 simple rope mechanical advantage system
4. Construct a 5:1 simple rope mechanical advantage system
5. Operate a 5:1 simple rope mechanical advantage system
6. Direct the operation of a 5:1 simple rope mechanical advantage system
7. Perform a knot pass during a raising operation

Instructor Notes

1. None

CTS Guide Reference: CTS 1-1, CTS 2-15, CTS 2-16

Topic 8-3: Constructing, Operating, and Directing the Operation of a Compound Rope Mechanical Advantage System

Terminal Learning Objective

At the end of this topic a student, given a load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, and rope rescue equipment, rescue personnel, a load, and a specified minimum travel distance for the load to be moved, will be able to construct, operate, and direct the operation of a compound rope mechanical advantage system so that the system constructed accommodates 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; the system is connected to an anchor system and load; 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.

Enabling Learning Objectives

1. Describe the purpose of a compound rope mechanical advantage system
    - Raise a load in a controlled manner
2. Describe types of compound rope mechanical advantage systems
3. Describe various compound rope mechanical advantage systems
    - Application
    - Use
    - Forces
    - Capabilities
    - Limitations
4. Describe how to construct compound rope mechanical advantage systems
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Reduce excessive force to system components
    - Perform system safety check
    - Evaluate system components for compromised integrity
5. Identify safety concerns
    - Low-angle environment
    - High-angle environment
6. Describe how to operate compound rope mechanical advantage systems
    - Low-angle environment
    - High-angle environment
    - Interference/hazards
7. Describe how to direct the operation of a compound rope mechanical advantage system
    - Assign and direct personnel
    - Use operational commands
    - Analyze system efficiency

8. Construct, operate, and direct the operation of a compound rope mechanical advantage system

Discussion Questions

1. What is a compound rope mechanical advantage system?
2. What is are common types of compound rope mechanical advantage systems?
3. What are the advantages and disadvantages of compound mechanical advantage systems?

Application

1. Construct a compound rope mechanical advantage system
2. Operate a compound rope mechanical advantage system
3. Direct the operation of compound rope mechanical advantage system

Instructor Notes

1. None

CTS Guide Reference: CTS 2-17, CTS 2-18

Topic 8-4: Constructing, Operating, and Directing the Operation of a Complex Rope Mechanical Advantage System

Terminal Learning Objective

At the end of this topic a student, given a load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, rope rescue equipment, rescue personnel, a load, and a specified minimum travel distance for the load to be moved, will be able to construct, operate, and direct the operation of a complex rope mechanical advantage system, 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; the system is connected to an anchor system and the load; 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.

Enabling Learning Objectives

1. Describe the purpose of a complex rope mechanical advantage system
    - Raise a load in a controlled manner
2. Describe types of complex rope mechanical advantage systems
3. Describe various complex rope mechanical advantage systems
    - Application
    - Use
    - Forces
    - Capabilities
    - Limitations
4. Describe how to construct complex rope mechanical advantage systems
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Reduce excessive force to system components
    - Perform system safety check
    - Evaluate system components for compromised integrity
5. Identify safety concerns
    - Low-angle environment
    - High-angle environment
6. Describe how to operate compound rope mechanical advantage systems
    - Low-angle environment
    - High-angle environment
    - Interference/hazards
7. Describe how to direct the operation of a compound rope mechanical advantage system
    - Assign and direct personnel
    - Use operational commands
    - Analyze system efficiency

8. Construct, operate, and direct the operation of a complex rope mechanical advantage system

Discussion Questions

1. What is a complex rope mechanical advantage system?
2. What are some common types of complex rope mechanical advantage systems?
3. What are the advantages and disadvantages of complex mechanical advantage systems?

Application

1. Construct a complex rope mechanical advantage system
2. Operate a complex rope mechanical advantage system
3. Direct the operation of complex rope mechanical advantage system

Instructor Notes

1. None

CTS Guide Reference: CTS 2-19

Topic 8-5: Constructing, Operating, and Directing the Operation of Ladder Rescue Systems

Terminal Learning Objective

At the end of this topic a student, given fire service ladders and rope rescue equipment, will be able to construct, operate, and direct the operation of ladder systems so that the system constructed accommodates the load; operational interference is factored and minimized; the system is efficient; a system safety check is completed; 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.

Enabling Learning Objectives

1. Describe the purpose of a ladder system
    - Raise, lower, or move load in a controlled manner
2. Identify ladder systems
    - Moving ladder
    - Ladder slide
    - Ladder A frame
3. Describe ladder systems
    - Components
    - Operational functions
    - When to use
4. Describe how to construct a moving ladder system
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Reduce excessive force to system components
    - Perform system safety check
    - Evaluate system components for compromised integrity
5. Describe how to construct a ladder slide system
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Reduce excessive force to system components
    - Perform system safety check
    - Evaluate system components for compromised integrity
6. Describe how to construct a ladder A-frame system
    - Select and apply knots, bends, and hitches
    - Evaluate expected loads
    - Rig system
        - Reduce excessive force to system components
    - Perform system safety check
    - Evaluate system components for compromised integrity

7. Describe how to operate ladder systems
    - Moving ladder
    - Ladder slide
    - Ladder A frame
8. Identify safety considerations
9. Describe how to direct the operation of a ladder system
    - Assign and direct personnel
    - Use operational commands
    - Analyze system efficiency
10. Explain safety considerations for ladder rescue systems
11. Construct, operate, and direct the operation of ladder rescue systems

Discussion Questions

1. What are the different types of fire service ladders?
2. What hazards are associated with ladder rescue systems?

Application

1. Construct a moving ladder system
2. Operate a moving ladder system
3. Construct a ladder slide system
4. Operate a ladder slide system
5. Construct a ladder A-frame system
6. Operate a ladder A-frame system

Instructor Notes

1. An A-frame ladder should only be used as an artificial high-point when no other viable option is available.

CTS Guide Reference: CTS 2-20

Unit 9: Rescue Operations

Topic 9-1: Negotiating an Edge

Terminal Learning Objective

At the end of this topic a student, given a rope rescue system, a specified minimum travel distance for the rescuer, life safety harnesses, an edge to negotiate during the lower and raise, and specialized equipment necessary for the environment, will be able to negotiate an edge while attached to a rope rescue system during low-angle and high-angle lowering and raising operations so that risk to the rescuer is minimized, the means of attachment to the rope rescue system is secure, and all projections and edges are negotiated while minimizing risks to the rescuer or equipment.

Enabling Learning Objectives

1. Describe common hazards imposed by projections and edges
   - Trips/falls
   - Sharps objects and edges
   - Broken/uneven/unstable terrain
   - Plants and animals
2. Describe techniques and practices for negotiating projections and edges along a travel path while attached to a functioning rope-based lowering and raising mechanical advantage system
   - Low-angle environment
   - High-angle environment
3. Select and use harness and PPE for common environments
4. Attach the rescuer to rope rescue system
5. Maneuver across projections and edges along travel path
6. Evaluate surroundings for potential hazards

Discussion Questions

1. What are some ways your AHJ negotiates an edge?
2. What are some different types of edges that may need to be negotiated?
3. What are some safety concerns during edge negotiation?

Application

1. Negotiate an edge while attached to a rope rescue system

Instructor Notes

1. None

CTS Guide Reference: CTS 2-21, CTS 2-22

Topic 9-2: Preparing a Victim for Transfer

Terminal Learning Objective

At the end of this topic a student, given a victim, a rope rescue system, diagnostic and packaging equipment, and an actual or simulated EMS agency, will be able to access, assess, stabilize, package, and transfer victims, so that rescuers and victim are protected from hazards, the victim's injuries or illnesses are managed, and victim is delivered to the appropriate EMS provider with information regarding the history of the rescue activity and victim's condition.

Enabling Learning Objectives

1. Describe how to establish victim rapport
2. Describe victim access methods
   - From above
   - From below
3. Describe victim assessment considerations
   - Mental status
     - Compliant
     - Combative
     - Unresponsive
   - Time constraints
     - How long has the victim been there?
     - How much longer can the victim remain there?
     - Suspension syndrome
   - Falls
     - Mechanism
   - Equipment
     - What does the victim have?
     - Is it accessible and usable for rescue?
   - Injury status
4. Describe victim stabilization considerations
   - Basic life support (BLS)
   - Advanced life support (ALS)
   - Fall prevention
5. Describe packaging methods
   - Commercial victim harness
   - Litter
   - Other (per AHJ)
6. Describe victim rescue methods
   - Assisted "walk out" (ambulatory victim)
   - Litter operations (non-ambulatory victim)
7. Describe how to transfer a victim to EMS
   - Victim transfer report
     - Rescue activity

    - Victim condition
  - Medical information management
  - Communication methods
8. Assess and stabilize a victim
9. Use victim immobilization, packaging, and treatment methods
10. Provide victim transfer reports, both verbally and in written format

Discussion Questions

1. What packaging equipment and methods does your AHJ use?
2. What information should be passed on to the EMS provider?

Application

1. Assess and stabilize a victim
2. Package an ambulatory victim in a low-angle environment
3. Perform an ambulatory victim rescue in a low-angle environment

Instructor Notes

1. Topics 9-3, 9-4, and 9-5 cover litter rescues in-depth. Use this as an introduction to the concept and focus on ambulatory victims.

CTS Guide Reference: CTS 2-23

Topic 9-3: Lowering and Raising a Litter in a Low-Angle Environment

Terminal Learning Objective

At the end of this topic a student, given rescue personnel, an established lowering/mechanical advantage system, a specified minimum travel distance for the load, a victim packaged in a litter to be moved, and a means for negotiating edges and projections along the travel path, will be able to lower and raise or direct a litter-lowering or litter-raising operation, so that the litter is attached to the lowering/raising and belay systems; movement is controlled; litter tender(s) are used to manage the litter during the lower and raise; the litter 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.

Enabling Learning Objectives

1. Describe the purpose of a litter lower/raise operation
   - Transport rescuer and tools to victim
   - Rescue victim
2. Identify safety concerns in a low-angle environment
3. Describe litter-tender functions and limitations in the low-angle environment
4. Describe how to lower and raise a litter in a low-angle environment
   - Select and apply knots, bends, and hitches
   - Evaluate expected loads
   - Attach litter to system
   - Perform system safety check
   - Manage litter position and movement
5. Describe how to direct a litter lowering and raising operation
   - Assign and direct personnel
   - Use operational commands
   - Analyze system efficiency
6. Lower and raise or direct a litter-lowering or litter-raising operation

Discussion Questions

1. What type of litter does your AHJ use?
2. What is the configuration for a low-angle litter bridle in your AHJ?

Application

1. Raise and lower a litter in a low-angle environment
2. Direct a raising and lowering operation in a low-angle environment

Instructor Notes

1. None

CTS Guide Reference: CTS 2-24

Topic 9-4: Operating as a Litter Tender

Terminal Learning Objective

At the end of this topic a student, 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, will be able to operate as a litter tender in a low-angle lowering or raising operation 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.

Enabling Learning Objectives

1. Describe task-specific selection criteria for life safety harnesses
2. Describe PPE selection criteria
3. Describe litters
   - Design
   - Intended purpose
4. Describe low-angle litter and rescuer attachment principles
   - Attach litter to system
   - Attach rescuer(s) to system
5. Describe rescue techniques and practices
   - Three-person litter tender
   - Other (per AHJ)
6. Describe common hazards imposed by terrain
7. Describe considerations for litter tender teams
   - Safe lifting techniques
   - Communication
   - Mobility and coordination
8. Select and use rescuer harnesses and PPE for common environments
9. Attach life safety harness to rope rescue system
10. Maneuver across terrain
11. Manage litter while supported by rope rescue system
12. Evaluate surroundings for potential hazards

Discussion Questions

1. What are various methods for attaching litter tenders to the system?
2. Which does your AHJ use?

Application

1. Package a victim in a litter in a low-angle environment
2. Perform a litter rescue as part of a three-person litter tender configuration in a low-angle environment

Instructor Notes

1. All rescuer attachment methods must adhere to industry standards and recommended best practices.
2. You must demonstrate a three-person litter tender configuration. You may add other configurations common to your AHJ.

CTS Guide Reference: CTS 2-25

Topic 9-5: Lowering and Raising a Litter in a High-Angle Environment

Terminal Learning Objective

At the end of this topic a student, given rescue personnel, an established lowering/mechanical advantage system, a specified minimum travel distance for the load, a victim packaged in a litter to be moved, and a means for negotiating edges and projections along the travel path, will be able to lower and raise a litter or direct a litter-lowering or litter-raising operation in a high-angle environment, so that the litter is attached to the lowering/raising and belay systems; an edge is negotiated during lower and raise; tag lines are used to manage the litter during lower and raise; the litter 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.

Enabling Learning Objectives

1. Describe the purpose of a litter lower/raise operation
   - Transport rescuer and tools to victim
   - Rescue victim
2. Identify safety concerns in a high-angle environment
3. Describe litter positioning options (vertical and horizontal)
4. Describe how to lower and raise a litter in a high-angle environment
   - Select and apply knots, bends, and hitches
   - Evaluate expected loads
   - Attach litter to system
   - Perform system safety check
   - Manage litter movement and position
5. Lower and raise a litter or direct a litter-lowering or litter-raising operation in a high-angle environment
6. Describe how to direct a litter lowering and raising operation in a high-angle environment
   - Assign and direct personnel
   - Use operational commands
   - Analyze system efficiency

Discussion Questions

1. What type of litter rig does your AHJ use?
2. What is the configuration for a high-angle litter bridle?
3. What are differences between the high-angle bridle setup and a low-angle bridle setup?
4. What tools does your AHJ have to manage or maneuver a litter around hazards or obstacles?

Application

1. Raise and lower a litter in a high-angle environment
2. Direct a raising and lowering operation in a high-angle environment

Instructor Notes

1. None

CTS Guide Reference: CTS 2-26

Topic 9-6: Descending a Fixed Rope

Terminal Learning Objective

At the end of this topic a student, 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 PPE, will be able to descend a fixed rope in low-angle and high-angle environments so that the person descending is attached to the fixed rope in a manner that will not allow them 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 their harness, the system will not be stressed to the point of failure, the system is suitable for the site, and the objective is reached.

Enabling Learning Objectives

1. Describe task-specific selection criteria for PPE and life safety harnesses and systems for descending a fixed rope
2. Describe descent control devices
   - Design
   - Intended purpose
   - Operation
3. Describe safe rigging principles
4. Describe descending techniques
   - Low-angle environments
   - High-angle environments
   - Lock-off
5. Describe hazards associated with descending operations
   - Falling
   - Hand injuries
   - Unstable terrain
   - Prolonged suspension
   - Inversion
6. Select and use rescuer harnesses, a system for descending a fixed rope, and PPE for common environments
7. Attach life safety harness to rope rescue system
8. Attach descent control device to rope and life safety harness
9. Operate descent control device
10. Maneuver around existing environment and system-specific obstacles
11. Evaluate surroundings for potential hazards

Discussion Questions

1. What descending system(s) do(es) your AHJ use?
2. What is the difference between an auto-stop descender and a manual descender?

Application

1. Descend a fixed rope in a high-angle environment
2. Lock-off a descent control device (to facilitate hands-free operations)

Instructor Notes

1. Use contingency anchors on all fixed ropes. (See CMC *Rope Rescue Technician Manual.*)

CTS Guide Reference: CTS 3-11

Unit 10: Termination

Topic 10-1: Terminating a Technical Rescue Operation

Terminal Learning Objective

At the end of this topic a student, given an incident scenario, assigned resources, and site safety data, will be able to terminate a technical rescue operation 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, recordkeeping and documentation occur, and post-event analysis is conducted.

Enabling Learning Objectives

1. Describe Incident Command functions and resources
2. Describe PPE characteristics
   - PPE requirements change in IDLH vs non-IDLH
   - Decontamination, maintenance, and repair requirements
3. Describe hazard and risk identification
   - Reevaluate mitigated and ongoing hazards
   - Resources in transition
   - Complacency
   - Normalized deviance
   - Fatigue
4. Describe equipment removal procedures
   - When to leave in place
   - Systematic breakdown and removal
5. Describe isolation techniques
6. Identify statutory requirements
   - Determined by AHJ
7. Identify responsible parties
8. Describe logistics and resource management
9. Describe personnel accountability systems
   - PAR – personnel accountability report
10. Describe personnel rehab procedures or protocols
    - Determined by AHJ
11. Describe documentation and reporting requirements
    - Determined by AHJ
12. Describe post-incident analysis techniques
    - Determined by AHJ
    - Critical incident stress debriefing
13. Select and use hazard-specific PPE
14. Decontaminate PPE
15. Recognize hazards and analyze risk
16. Use barrier protection techniques
17. Implement data collection and record-keeping/reporting protocols

18. Conduct post-incident analysis activities

Discussion Questions

1. What are the considerations for a personnel accountability report (PAR)?
2. What are the components of an after-action review?
3. What are hazards associated with terminating an incident, including equipment breakdown and decontamination?
4. Who are some examples of responsible parties that may assume responsibility for the scene when the incident terminates?
5. What critical incident stress management resources are available to you?

Application

1. Terminate a rope rescue incident

Instructor Notes

1. Students will participate in PAR, clean up, and inventory as part class participation.

CTS Guide Reference: CTS 2-27

Drill Ground Activities and Evolutions

The following components must be covered in the drill ground activities and/or evolutions but can be combined and completed in the order that best suites the props available and AHJ policies and procedures.

Students will conduct skills with an asterisk (*) individually. All other skills may be carried out as part of a rescue team.

Drill ground activities must incorporate the following learning objectives:

- Size up a rope rescue incident
- Recognize the need for technical rescue resources
- Support an operations- or technician-level incident
- Recognize incident hazards and initiate isolation procedures
- Conduct a system safety check
- Terminate a rope rescue incident

Drill ground activities must address the following operations:

- PPE and Equipment
    - Don and doff PPE *
    - Demonstrate an end-of-line loop *
    - Demonstrate a midline loop *
    - Demonstrate securing rope around desired objects *
    - Demonstrate joining rope or webbing ends together *
    - Demonstrate friction hitches *
- Anchor Systems
    - Construct a single loop single-point anchor system *
    - Construct a multi loop single-point anchor system *
    - Construct a basket/three-bight single-point anchor system *
    - Construct a girth hitch single-point anchor system *
    - Construct a double-locking girth hitch single-point anchor system *
    - Construct a wrap three, pull two single-point anchor system *
    - Construct a tensionless/no knot single-point anchor system *
    - Construct a picket system *
    - Construct a two-point anchor system *
    - Construct a three-point anchor system *
    - Construct a tie-back anchor system *
- Edge Protection
    - Place edge protection
- Fall Protection
    - Operate fall protection equipment *
    - Construct a fixed rope system

    - Construct and operate a dedicated belay system with a dedicated main during lowering or raising operations
    - Belay a falling load in a high-angle environment *
    - Construct and operate a TTRS during lowering or raising operations
- Rescue Systems
    - Construct a lowering system in a low-angle environment
    - Operate a lowering system in a low-angle environment
    - Direct the operation of a lowering system in a low-angle environment
    - Construct a lowering system in a high-angle environment
    - Operate a lowering system in a high-angle environment
    - Direct the operation of a lowering system in a high-angle environment
    - Perform a knot pass during a lowering operation
    - Construct a 3:1 simple rope mechanical advantage system
    - Operate a 3:1 simple rope mechanical advantage system
    - Direct the operation of a 3:1 simple rope mechanical advantage system
    - Construct a 5:1 simple rope mechanical advantage system
    - Operate a 5:1 simple rope mechanical advantage system
    - Direct the operation of a 5:1 simple rope mechanical advantage system
    - Perform a knot pass during a raising operation
    - Construct a compound rope mechanical advantage system
    - Operate a compound rope mechanical advantage system
    - Direct the operation of compound rope mechanical advantage system
    - Construct a complex rope mechanical advantage system
    - Operate a complex rope mechanical advantage system
    - Direct the operation of complex rope mechanical advantage system
    - Construct a moving ladder system
    - Operate a moving ladder system
    - Construct a ladder slide system
    - Operate a ladder slide system
    - Construct a ladder A-frame system
    - Operate a ladder A-frame system

Drill ground activities must incorporate the following rescue scenarios:

- Negotiate an edge while attached to a rope rescue system *
- Assess and stabilize a victim
- Package an ambulatory victim in a low-angle environment
- Perform an ambulatory victim rescue in a low-angle environment
- Raise and lower a litter in a low-angle environment
- Direct a raising and lowering operation in a low-angle environment
- Package a victim in a litter in a low-angle environment *
- Perform a litter rescue as part of a three-person litter tender configuration in a low-angle environment
- Raise and lower a litter in a high-angle environment

- Direct a raising and lowering operation in a high-angle environment
- Descend a fixed rope in a high-angle environment *
- Lock-off a descent control device (to facilitate hands-free operations) *

How to Read a Course Plan

A course plan identifies the details, logistics, resources, and training and education content for an individual course. Whenever possible, course content is directly tied to a national or state standard. SFT uses the course plan as the training and education standard for an individual course. Individuals at fire agencies, academies, and community colleges use course plans to obtain their institution's consent to offer course and provide credit for their completion. Instructors use course plans to develop syllabi and lesson plans for course delivery.

Course Details
The Course Details segment identifies the logistical information required for planning, scheduling, and delivering a course.

Required Resources
The Required Resources segment identifies the resources, equipment, facilities, and personnel required to deliver the course.

Unit
Each Unit represents a collection of aligned topics. Unit 1 is the same for all SFT courses. An instructor is not required to repeat Unit 1 when teaching multiple courses within a single instructional period or academy.

Topics
Each Topic documents a single Terminal Learning Objective and the instructional activities that support it.

Terminal Learning Objective
A Terminal Learning Objective (TLO) states the instructor's expectations of student performance at the end of a specific lesson or unit. Each TLO includes a task (what the student must be able to do), a condition (the setting and supplies needed), and a standard (how well or to whose specifications the task must be performed). TLOs target the performance required when students are evaluated, not what they will do as part of the course.

Enabling Learning Objectives
The Enabling Learning Objectives (ELO) specify a detailed sequence of student activities that make up the instructional content of a lesson plan. ELOs cover the cognitive, affective, and psychomotor skills students must master to complete the TLO.

Discussion Questions
The Discussion Questions are designed to guide students into a topic or to enhance their understanding of a topic. Instructors may add to or adjust the questions to suit their students.

Application
The Application segment documents experiences that enable students to apply lecture content through cognitive and psychomotor activities, skills exercises, and formative testing. Application experiences included in the course plan are required. Instructors may add additional application experiences to suit their student population if time permits.

Instructor Notes
The Instructor Notes segment documents suggestions and resources to enhance an instructor's ability to teach a specific topic.

CTS Guide Reference
The CTS Guide Reference segment documents the standard(s) from the corresponding Certification Training Standard Guide upon which each topic within the course is based. This segment is eliminated if the course is not based on a standard.

Skill Sheet
The Skill Sheet segment documents the skill sheet that tests the content contained within the topic. This segment is eliminated if the course does not have skill sheets.