



Rope Rescue Technician (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; ascending and descending a fixed rope; escaping from a jammed or malfunctioning device; climbing and traversing natural features and manmade structures; rescuing victims from a feature, suspended from rope or webbing, and using a litter; and moving a suspended load along a horizontal and vertical path. This course incorporates technician 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:** Rope Rescue Awareness and Operations (2017 or 2021)
or
Low Angle Rope Rescue **and** Rescue Systems 1
- Standard:** Complete all activities and formative tests.
Complete all summative tests with a minimum score of 80%.
- Hours (Total):** 40 hours
(5 lecture / 35 application)
- Maximum Class Size:** 24
- Instructor Level:** SFT Rope Rescue Technician 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 Technician Instructors.
- SFT Designation:** FSTEP

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Required Resources

Instructor Resources

To teach this course, instructors may use:

- Manuals for artificial high-directionals
- *Rope Rescue Technician Manual* (James A. Frank, CMC Rescue, Inc., current edition)
- *Technical Rescue Field Operations Guide* (Tom Pendley, Desert Rescue Research, 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 or application (app) 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
40	Carabiner, locking
Determined by scenario	Collection plate (per AHJ)
Determined by scenario	Edge protection (based on site needs)
12	Pulley, single (prusik minding where applicable)
4	Pulley, double
12	Prusik loop, short
12	Prusik loop, long
12	Webbing, orange, 1"x20'
12	Webbing, blue, 1"x15'

12	Webbing, yellow, 1"x12'
12	Webbing, green, 1"x6'
Determined by scenario	Anchor straps (commercial or tied on site)
6	Harness, commercial Class III
2	Harness, commercial victim pelvic
2	Harness, commercial victim chest
1	Litter basket (with pre-rig or equivalent)
2	Ground cover
4	Ascenders
2	Etriers
3	Work positioning straps (e.g., Petzl Grillion or similar)
1	Pulley, knot passing
3	Double bypass lanyards
2	Personal mechanical advantage (set of fours)
1	Artificial high direction (e.g., Arizona Vortex, TerrAdapter)
2	Self-trailing belay with energy absorber (e.g., ASAP'SORBER)
Recommended Equipment	
Determined by scenario	Load cell
Determined by scenario	Swivels
Determined by scenario	Cord, 8mm x 33'
Determined by scenario	Ladder, fire service, appropriate length for site and skills
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	Pickets, steel or equivalent with associated equipment
Determined by scenario	Sledgehammer
Determined by scenario	Personal progress capture device (e.g., Croll)

Training Props

The following training props are required to deliver this course:

- Structure
 - 20 feet minimum height with working roof that is of sound and safe engineering design

- An environment for high-angle evolutions where the load is predominately supported by the rope rescue system (if working without a tower or structure)
- Area to demonstrate and practice skills (rescue knots, rescue/victim packaging, anchors, and rope systems)
- A minimum vertical distance of 10 to 20 feet
- A minimum ascending distance of 10 to 20 feet
- A minimum horizontal travel distance of 20 feet and vertical height of 20 feet measured from the ground to loaded midspan is required for horizontal load movement activities
- An obstacle to negotiate while ascending and descending
- An obstacle to negotiate during lowering and raising operations
- An edge problem to be negotiated during litter tender

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 Technician (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 and Rescue Equipment	0.25	0.0	
Topic 3-2: Demonstrating Knots, Bends, and Hitches	0.25	0.50	
Unit 3 Totals	0.50	0.50	1.0
Unit 4: Incident Size Up, Planning, and Support			
Topic 4-1: Sizing Up a Rope Rescue Incident	0.25	0.50	
Topic 4-2: Recognizing Incident Hazards and Initiating Isolation Procedures	0.25	0.50	
Topic 4-3: Conducting a System Safety Check	0.25	0.50	
Unit 4 Totals	0.75	1.50	2.25
Unit 5: Anchor Systems			
Topic 5-1: Constructing Tensioned Anchor Systems	0.25	2.0	
Topic 5-2: Constructing, Operating, and Directing the Operation of a High-Directional	0.25	2.0	
Unit 5 Totals	0.50	4.0	4.50
Unit 6: Rescue Skills			
Topic 6-1: Descending a Fixed Rope	0.25	4.0	
Topic 6-2: Ascending a Fixed Rope	0.25	4.0	
Topic 6-3: Escaping from a Jammed or Malfunctioning Device	0.25	0.0	
Topic 6-4: Climbing and Traversing Natural Features or Manmade Structures	0.25	4.0	
Unit 6 Totals	1.0	12.0	13.0
Unit 7: Rescue Operations			
Topic 7-1: Interacting with a Person at Height in Crisis	0.25	0.0	
Topic 7-2: Removing a Victim from a Feature	0.25	4.0	
Topic 7-3: Removing a Victim Suspended from Rope of Webbing	0.25	4.0	
Topic 7-4: Rescuing a Victim Using a Litter	0.25	4.0	

Topic 7-5: Moving a Suspended Load Along a Horizontal and Vertical Path	0.25	5.0	
Unit 7 Totals	1.25	17.0	18.25
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	5.0	35.0	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 Technician

Topic 2-1: Introduction to Rope Rescue Technician

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. Describe 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. Describe how rope rescue skills are integrated into other technical rescue disciplines
 - 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 have you been part of at the awareness or operations level?
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 technician 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 and Rescue Equipment

Terminal Learning Objective

At the end of this topic a student, given maintenance logs and records, tools, and resources 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 PPE and 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, construction, and operation of PPE
 - Helmet
 - Head lamp
 - Eye protection
 - Gloves
 - Boots
 - Long sleeve shirt and pants
 - Harness (full body)
 - Radio/comms
2. Describe equipment certification, testing, and rating standards
3. Describe functions and operations of rescue equipment
 - Rope and rigging
 - Hardware
 - Carabiners/connectors
 - 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
 - Bypass lanyards
 - Positioning devices
 - Ascenders
 - Artificial high directional
 - Victim Rescue
 - Stabilization
 - Packaging
 - Removal
4. Describe how to select and use maintenance tools
 5. Describe methods for cleaning tools and equipment
 - Cleaning
 - Sanitizing
 - Infectious disease control
 6. Describe replacement protocols and procedures
 7. Identify when and how to remove tools and equipment from service
 - Manufacturer guidelines
 - AHJ guidelines
 - Documentation and reporting requirements
 8. Describe disposal methods
 9. Describe AHJ standard operating procedures
 10. Describe how to use record-keeping systems
 11. Describe guidelines for cleaning, inspecting, and maintaining tools and equipment
 - Manufacturer guidelines
 - AHJ guidelines
 - NFPA 2500
 - Documentation and reporting requirements
 12. Describe how to select, use, and maintain tools and equipment
 - Describe wear and damage indicators for rescue equipment
 - Evaluate operation readiness of equipment
 - Complete logs and records
 - Select and use maintenance tools

Discussion Questions

1. What are your AHJ's pre-use inspection procedures?
2. What does your AHJ use for proper equipment cleaning?
3. What is your AHJ's out-of-service protocol?

Application

1. Determined by instructor

Instructor Notes

1. ELO 3 – Use the course equipment list as the minimum requirements and then include any other tools and equipment common to your AHJ.
2. Show equipment with both normal and excessive wear and out-of-service equipment.

CTS Guide Reference: CTS 2-3

Topic 3-2: 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 2-4

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 a rope rescue incident, 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
 - Victim condition
 - Anticipated hazards
 - Environmental conditions
 - Access and egress routes
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 preplan
 - 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. How does a technician's size up differ from an initial or operations-level 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. None

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

Topic 4-2: Recognizing Incident Hazards and Initiating Isolation Procedures

Terminal Learning Objective

At the end of this topic a student, given a rope rescue incident, 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 nature 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. Describe 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 are associated with rope rescue technician operations?
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 4-3: 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. Explain construction and operation of rope rescue systems and their individual components
3. Describe use of PPE
4. Describe equipment inspection criteria
5. Identify signs of equipment damage
6. Describe principles of rigging
7. Describe equipment replacement criteria
8. 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. ELOs 2 through 7 are covered extensively in Rope Rescue Awareness and Operations. This should be a brief refresh.

CTS Guide Reference: CTS 2-7

Unit 5: Anchor Systems

Topic 5-1: Constructing Tensioned 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
 - Rated
 - Non-rated
2. Describe weight distribution issues and methods
 - Load sharing
 - Focal/directional
3. Describe load types
 - Static
 - Dynamic
4. Describe formulas to calculate load distribution
 - System safety factors
 - Critical angles
 - Force multipliers
5. Describe how to construct anchor slings
6. Describe types and uses of tensioned anchor systems
 - Pretensioned back ties
 - Front ties
 - Focused floating
 - Deflected
 - Other (per AHJ)
7. Describe application of knots, bends, and hitches
8. Describe system safety check procedures
 - Visual assessment
 - Physical assessment
 - Ongoing evaluation
 - Integrity concerns
9. Construct tensioned anchors

Discussion Questions

1. What is the purpose of a focused floating anchor?
2. When might you need to use a pretensioned back tie?

3. Why would you pretension a back tie?

Application

1. Construct a pretensioned back tie anchor system
2. Construct a front tie anchor system
3. Construct a focused floating anchor system
4. Construct a deflected 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 3-13

Topic 5-2: Constructing, Operating, and Directing the Operation of a High-Directional

Terminal Learning Objective

At the end of this topic a student, given a scenario, a rope rescue system, and materials from within the AHJ, will be able to construct, operate, and direct the operation of a natural, structural, or artificial high-directional 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 high directional
 - Raise, lower, or move load in a controlled manner
 - Ease an edge transition
 - Reduce friction
2. Describe types of and uses for high-directionals
 - Types
 - Natural
 - Structural
 - Artificial
 - Components
 - Uses
 - Functional Operations
 - Forces
3. Describe how to construct a high directional
 - 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
4. Describe how to operate a high directional
 - Assign and direct personnel
 - Use operational commands
 - Analyze system efficiency
5. Identify the type of high-directional needed for different scenarios
6. Construct, operate, and direct the operation of a high-directional

Discussion Questions

1. What tools and materials could be used to construct a high-directional?
2. What is resultant force?
3. What artificial high directionals does your AHJ have?

Application

1. Construct an artificial high directional
2. Operate an artificial high directional
3. Direct the operation of a high directional

Instructor Notes

1. Refer to manuals for artificial high directionals.

CTS Guide Reference: CTS 3-1

Unit 6: Rescue Skills

Topic 6-1: 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 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
 - 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 the 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)

3. Descend past a knot or obstruction

Instructor Notes

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

CTS Guide Reference: CTS 3-11

Topic 6-2: Ascending a Fixed Rope

Terminal Learning Objective

At the end of this topic a student, given an anchored fixed rope system, a specified minimum distance for the rescuer, a system to allow ascent of a fixed rope, a structure, a belay system, a life safety harness worn by the person ascending, and PPE, will be able to ascend a fixed rope in a high-angle environment, so that the person ascending is secured to the fixed rope in a manner that will not allow them to fall; the person ascending is attached to the rope by means of an ascent control device(s) with at least two points of contact; injury to the person ascending is minimized; the person ascending can stop at any point on the fixed rope and rest suspended by their harness; the system will not be stressed to the point of failure; the person ascending can convert their ascending system to a descending system; obstacles are negotiated; 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 ascending a fixed rope
2. Describe ascent control devices
 - Design
 - Intended purpose
 - Operation
3. Describe rigging principles
4. Describe ascending techniques
5. Describe common hazards associated with ascending operations
 - Falling
 - Hand injuries
 - Unstable terrain
 - Prolonged suspension
 - Inversion
 - Frustration (rope rage)
 - Fatigue
6. Describe how to convert ascending systems to descending systems
7. Select and use rescuer harnesses, a system for ascending a fixed rope, and PPE for common environments
8. Attach life safety harness to rope rescue system
9. Configure ascent control devices to form a system for ascending a fixed rope
10. Make connections to ascending system
11. Maneuver around existing environment and system-specific obstacles
12. Convert ascending system to a descending system while suspended from the fixed rope
13. Evaluate surroundings for potential hazards

Discussion Questions

1. What ascending system(s) do(es) your AHJ use?
2. When does your AHJ convert an ascending system to a descending system?

Application

1. Ascend a fixed rope in a high-angle environment
2. Convert an ascending system to a descending system while suspended from a fixed rope
3. Ascend past a knot or obstruction

Instructor Notes

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

CTS Guide Reference: CTS 3-10

Topic 6-3: Escaping from a Jammed or Malfunctioning Device

Terminal Learning Objective

At the end of this topic a student, given an anchored fixed-rope system with a simulated malfunctioning descent control device, a system to allow escape from the malfunctioning device, a belay system, a life safety harness worn by the person descending, and PPE, will be able to escape from a jammed or malfunctioning device during a fixed-rope descent in a high-angle environment 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 means for escape will allow the rescuer to escape either upward or downward from the malfunctioning descent control device; injury potential to the rescuer is minimized; 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, equipment, and methods used to escape a jammed or malfunctioning descent control device
2. Describe escape systems
 - Design
 - Intended purpose
 - Operation
3. Describe safe rigging principles
4. Describe escape techniques for high-angle environments
 - Jammed
 - Unweight system
 - Disentangle jam
 - Reinstall rope
 - Reweight system
 - Malfunctioning
 - Unweight system
 - Remove malfunctioning device
 - Replace device or descend by alternate means
5. Describe converting ascending systems to descending systems
6. Describe common hazards posed by malfunctioning descent control devices
7. Select and use rescuer harness, a system for escaping a malfunctioning descent control device, and PPE for common environments
8. Attach life safety harness to rope rescue system
9. Attach descent control device to rope and life safety harness
10. Attach and operate escape system to remove rescuer from malfunctioning descent control device while maintaining patent attachment to fixed rope and belay
11. Use escape system to maneuver upward or downward from malfunctioning descent control device
12. Evaluate surroundings for potential hazards

Discussion Questions

1. What is a possible cause of a jammed device?

2. What equipment is needed for self-rescue in this scenario?

Application

1. Determined by instructor

Instructor Notes

1. Ascending and descending past an obstacle or knot (in Topics 6-1 and 6-2) uses the same skill set. Instructor may create an additional application if time permits

CTS Guide Reference: CTS 3-12

Topic 6-4: Climbing and Traversing Natural Features or Manmade Structures

Terminal Learning Objective

At the end of this topic a student, given equipment used by the AHJ and a task that reflects the anticipated rescue environment, will be able to climb and traverse natural features or manmade structures that require the use of climbing aids, positioning equipment, or fall prevention systems to prevent the fall or unwanted movement of the rescuer, so that the objective is achieved, the rescuer can perform the required task, and fall prevention is maintained.

Enabling Learning Objectives

1. Describe climbing, positioning, and fall prevention equipment used by AHJ
2. Describe climbing, positioning, and fall prevention systems
 - Application
 - Limitations
 - Fall factors
 - Risks
3. Describe system safety check protocol
4. Perform system safety checks
5. Climb vertical or near-vertical paths using surfaces provided by environment or AHJ climbing aids
6. Transition horizontally between structural elements and rescue system
7. Use positioning equipment to support rescuer's weight in a vertical or near-vertical environment permitting rescuer to perform a task

Discussion Questions

1. What type of scenarios or environments might require climbing and traversing?
2. What climbing aids does your AHJ use?
3. What are some methods to reduce impact force during protected climbing?
4. What equipment does your AHJ use to ensure 100% tie off?

Application

1. Climb a vertical or near-vertical path using a 100% tie off or vertical lifeline fall protection system
2. Transition horizontally between structural elements and rescue system using a 100% tie off fall protection system
3. Place and use work positioning equipment permitting the rescuer to perform a task

Instructor Notes

1. None

CTS Guide Reference: CTS 3-8

Unit 7: Rescue Operations

Topic 7-1: Interacting with a Person at Height in Crisis

Terminal Learning Objective

At the end of this topic a student, given an environment consistent with the AHJ's mission, AHJ policies and procedures, and a person in a crisis scenario, will be able to interact with a person at height who is in an emotional or psychological crisis, so that the condition is recognized and communicated to the team, the rescuer is prevented from harm, and the actions of the rescuer do not escalate the incident.

Enabling Learning Objectives

1. Identify indicators of a person in emotional crisis
2. Identify typical triggers that can cause individuals to become agitated or anxious
3. Describe methods of interacting to prevent harm to rescuer and subject
 - Maintain a safe distance
 - Do not stand directly in front of, behind, or beneath subject
 - Communicate and interact in a manner that does not escalate incident
 - Use interview techniques that provide insight to subject's motives and state of mind
4. Describe best practices to deescalate incidents involving persons in crisis
5. Describe AHJ crisis-intervention resources
6. Use methods of approach that minimize the risk to the rescuer

Discussion Questions

1. What are your AHJ's protocols for managing people in emotional or psychological crisis?
2. What are some local or national support resources?

Application

1. Determined by instructor

Instructor Notes

1. Focus on minimizing risk to responders and AHJ resources and protocols.
2. Consider referencing:
 - National Alliance of Mental Illness "How to Help Someone in Crisis": <https://www.nami.org/Blogs/NAMI-Blog/September-2017/How-to-Help-Someone-in-Crisis>
 - Suicide Prevention Resource Center: <https://www.sprc.org/settings/first-responders>
 - SAMHSA "Psychological First Aid for First Responders": <https://psychiatry.uw.edu/wp-content/uploads/2020/04/4.-SAMHSA-PFA-disaster-02.pdf>

CTS Guide Reference: CTS 3-9

Topic 7-2: Removing a Victim from a Feature

Terminal Learning Objective

At the end of this topic a student, given a victim stranded on or clinging to a feature and a means of removal of the victim to the ground or other safe area, will be able to direct a team in the operation of a rope rescue system to remove a victim stranded on or clinging to a natural or manmade feature in a high-angle environment, so that risks to victims and rescuers are minimized, injury to the victim is minimized, the means of attachment to the rope rescue system is maintained, and the victim is removed and brought to a safe area for transfer to EMS.

Enabling Learning Objectives

1. Describe PPE selection and criteria
2. Describe techniques for handling stranded victims without inducing a fall
 - Communicate with victim
 - Establish rapport
 - Assess victim
 - Physical condition
 - Psychological condition
 - Give instructions
 - Secure victim
 - To a temporary fixed point
 - Quick action to secure victim from falling while other actions occur
 - To rope rescue system
 - For rescue operation
 - Package victim
 - Commercial victim harness
 - Litter
 - Other (per AHJ)
3. Describe how to access a victim
 - Bottom up
 - Top down
4. Describe techniques and systems for safe transfer of stranded victims from a natural or manmade feature
 - Lower to victim, lower to surface/structure
 - Team-based rescue
 - Rescuer-based rescue
 - Lower to victim, raise to surface/structure
 - Team-based rescue
5. Describe system safety check protocol
 - Rescuer and victim both connected to a redundant system
6. Reduce hazards for rescuers and victims
7. Determine condition of the stranded victim
8. Determine specialized equipment needs for victim movement

9. Select and construct systems for rapid removal of stranded victims from natural or manmade features
10. Manage operation of selected system

Discussion Questions

1. What are the differences between a team-based and a rescuer-based pickoff?
2. Why would you choose one or the other?
3. What victim packaging options are used by your AHJ?

Application

1. Rescue a victim stranded on or clinging to a natural or manmade feature in a high-angle environment

Instructor Notes

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

CTS Guide Reference: CTS 3-2

Topic 7-3: Removing a Victim Suspended from Rope or Webbing

Terminal Learning Objective

At the end of this topic a student, given a victim suspended by a harness attached to anchored rope or webbing, a rope rescue system, and a means of removing the victim to the ground or other safe area, and specialized equipment necessary for the environment, will be able to direct a team in the operation of a rope rescue system to remove a victim suspended from rope or webbing in a high-angle environment, while also suspended, so that risks to victims and rescuers are minimized, injury to the victim is minimized, the means of attachment to the rope rescue system is maintained, the victim is removed from the rope or webbing, undesirable victim movement during the transfer is minimized, the victim is removed from the static line and lowered or raised to a stable surface, victim positioning is managed to reduce adverse effects associated with suspension-induced injuries, selected specialized equipment facilitates efficient victim movement, and the victim can be transported to the local EMS provider.

Enabling Learning Objectives

1. Describe PPE selection and criteria
2. Describe how to access a victim
 - Bottom up
 - Top down
3. Describe various techniques for handling suspended victims
 - Communicate with victim
 - Establish rapport
 - Assess victim
 - Physical condition
 - Psychological condition
 - Give instructions
 - Evaluate condition of victim's suspension materials
 - Secure victim (if needed to reinforce their equipment)
 - Package victim (if needed)
 - Commercial victim harness
 - Litter
 - Other (per AHJ)
 - Transfer victim from static line to lowering or raising system
4. Describe transfer systems
 - Design characteristics
 - Intended purpose
 - Rigging principles
 - Use
5. Describe techniques for safe transfer to rope rescue system
 - Lower to victim, lower to surface/structure
 - Team-based rescue
 - Rescuer-based rescue
 - Lower to victim, raise to surface/structure

- Team-based rescue
- Ascend to victim, lower to surface/structure
 - Team-based rescue
 - Rescuer-based rescue
- 6. Describe principles, causes, and effects of suspension-induced injuries
- 7. Describe methods to minimize common environmental hazards
- 8. Describe system safety check protocol
 - Rescuer and victim both connected to a redundant system
- 9. Choose victim transfer systems
- 10. Select and use PPE appropriate to conditions
- 11. Reduce hazards for rescuers and victims
- 12. Determine condition of suspended victim
- 13. Determine specialized equipment needs for victim movement
- 14. Select and construct systems for rapid removal of victims from lanyards, rope, or webbing
- 15. Manage operation of the selected system
- 16. Transfer victim from a static line to lowering or raising system

Discussion Questions

1. What is suspension trauma?
2. What is your EMS' suspension trauma protocol?
3. What are the differences between a team-based and a rescuer-based pickoff?
4. Why would you choose one or the other?
5. How do you transfer a victim to the rescue system without shock-loading the system?

Application

1. Transfer a victim suspended from rope or webbing in a high-angle environment from a static line to a lowering or raising system (rescuer suspended)

Instructor Notes

1. For safety reasons, do not leave a live simulated victim suspended for five minutes or longer.

CTS Guide Reference: CTS 3-3, CTS 3-4

Topic 7-4: Rescuing a Victim Using a Litter

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 perform the activities of a litter tender in a high-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 travel path 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 high-angle litter attachment principles
 - Attach litter to system
 - Horizontal configuration
 - Vertical configuration
 - Adjustable configuration
 - Attach rescuer(s) to system
 - Two points of attachment
 - Ability to travel above and below litter
5. Describe how to package a victim in a litter
 - Victim on a surface
 - Victim suspended above a surface
6. Describe techniques and practices for high-angle environments
 - Lower to victim, lower to surface/structure
 - Lower to victim, raise to surface/structure
 - Ascend to victim, lower to surface/structure
7. Describe common hazards imposed by environment
8. Describe system safety check protocol
9. Select and use rescuer harness and PPE for common environments
10. Attach life safety harness to rope rescue system
11. Maneuver litter past obstacles or natural structural features
12. Manage litter while attached to rope rescue system
13. Demonstrate tender's vertical positioning independent of litter during transit
14. Evaluate surroundings for potential hazards

Discussion Questions

1. Why might a litter tender be required?
2. What methods can the litter tender use to attach to the litter?

Application

1. Tend a litter, including positioning above and below the litter, in a high-angle environment

Instructor Notes

1. None

CTS Guide Reference: CTS 3-5

Topic 7-5: Moving a Suspended Load Along a Horizontal and Vertical Path

Terminal Learning Objective

At the end of this topic a student, given rescue personnel, life safety rope, rope rescue equipment, and suitable anchors capable of supporting the load, will be able to construct, operate, and direct the operation of a rope rescue system intended to move a suspended rescue load along a horizontal and vertical path to avoid an obstacle, so that personnel assignments are made and clearly communicated; the system constructed can accommodate the load; tension applied within the system will not exceed the rated capacity of any of its components' parts; a system safety check is performed; movement of the load is controlled and efficient; and load is held in place when needed or moved with minimal effort over the required distance; operating methods do not stress the system to the point of failure; and potential problems are identified, communicated, and managed.

Enabling Learning Objectives

1. Describe the purpose of a high-line system
 - Move a suspended load along a horizontal path
2. Describe types of high-line systems
 - Horizontal
 - Offsets
 - Cross hauls
 - Deflections
 - Track lines
3. Describe various systems
 - Application
 - Use
 - Forces
 - Capabilities
 - Limitations
 - Capacity ratings
4. Describe how to evaluate site for hazards, interference, and obstacle negotiation
5. Describe how to construct a high-line system
 - Select and apply knots, bends, and hitches
 - Evaluate expected loads
 - Rig system
 - Methods for limiting excessive force to system components
 - Perform system safety check
6. Describe common problems and ways to minimize these problems during construction
7. Describe ways to increase the efficiency of load movement
8. Describe how to operate a high-line system
 - Horizontal position
 - Vertical position
9. Describe how to direct the operation of a high-line system

- Assign and direct personnel
- Use common and critical operational commands
- Analyze system efficiency
- Identify obstacles or voids to be negotiated
- Manage load movement
- Evaluate for potential problems

10. Construct, operate, and direct the operation of a system to move a suspended load horizontally and vertically

Discussion Questions

1. What are the different systems used for horizontal movement?
2. What system does your AHJ use?
3. What are some communication challenges in operating horizontal rope rescue systems?
4. How can forces change during the operation of a horizontal rope rescue system?

Application

1. Construct a high-line capable of horizontal and vertical movement
2. Move a suspended rescue load horizontally and vertically on a high-line system
3. Direct the operation of a high-line system

Instructor Notes

1. This topic is intended to include, but is not restricted to, systems such as high lines, two-rope offsets, deflection, tracking, and guiding lines.

CTS Guide Reference: CTS 3-6, CTS 3-7

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 suits 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 incident hazards and initiate isolation procedures
- Conduct a system safety check

Drill ground activities must address the following operations:

- 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 *
- Construct a pretensioned back tie anchor system
- Construct a front tie anchor system
- Construct a focused floating anchor system
- Construct a deflected anchor system
- Construct an artificial high directional
- Operate an artificial high directional
- Direct the operation of a high directional
- Descend a fixed rope in a high-angle environment *
- Lock-off a descent control device (to facilitate hands-free operations) *
- Descend past a knot or obstruction *
- Ascend a fixed rope in a high-angle environment *
- Convert an ascending system to a descending system while suspended from the fixed rope *
- Ascend past a knot or obstruction *
- Climb a vertical or near-vertical path using a 100% tie off or vertical lifeline fall protection system *
- Transition horizontally between structural elements and rescue system using a 100% tie off fall protection system *
- Place and use work positioning equipment permitting the rescuer to perform a task *

Drill ground activities must incorporate the following rescue scenarios:

- Rescue a victim stranded on or clinging to a natural or manmade feature in a high-angle environment *
- Transfer a victim suspended from rope or webbing in a high-angle environment from a static line to a lowering or raising system (rescuer suspended) *
- Tend a litter, including positioning above and below the litter, in a high-angle environment *
- Construct a high-line capable of horizontal and vertical movement
- Move a suspended rescue load horizontally and vertically on a high-line system
- Direct the operation of a high-line system

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.