The Maryland Fire and Rescue Institute of the University of Maryland is the State’s comprehensive training and education system for all emergency services.

The Institute plans, researches, develops, and delivers quality programs to enhance the ability of emergency service providers to protect life, the environment, and property.
Lesson 1-2: Introduction To Site Operations

Student Performance Objectives

• Given information from discussion, handouts, and reading materials, describe course components and student requirements and identify requirements for site operations, support resources and size-up.

Overview

• Introduction to Site Operations
• Support Resources
• Size-Up
Introduction to Site Operations

• Complete Activity 1-2-1

Introduction to Site Operations

• Management of a rescue operation
  – Assessment
  – Action plan and objectives
  – Resources
  – Hazard identification and isolation/mitigation
  – Site access and egress
  – Rehabilitation

Introduction to Site Operations

• The relationship of site operations to the technical rescue specialties
  – Vehicle and Machinery Rescue
Introduction to Site Operations

- Swiftwater Rescue

Introduction to Site Operations

- Trench Rescue

Introduction to Site Operations

- Technical Rope Rescue
Introduction to Site Operations

• Confined Space Rescue

Introduction to Site Operations

• Structural Collapse Rescue

Introduction to Site Operations

• Basic skills needed to train in specialties
  – Site operations
  – Victim management
  – Maintenance of rescue equipment
  – Ropes and rigging
Support Resources

• Knowledge of resources available
  – Specialized personnel
  – Apparatus
  – Rescue equipment
  – Lighting

What’s available in your jurisdiction?

Support Resources

• Protocols and procedures for requesting required resources
• Rescue-specific resource considerations
  – Vehicle and Machinery Rescue
  – Swiftwater Rescue
  – Trench Rescue
  – Technical Rope Rescue
  – Confined Space Rescue
  – Structural Collapse Rescue

Size-Up

• Size-up questions to be answered
  – What is known?
  – What is likely?
  – What is unknown?
  – What is the response situation?
  – Are the resources adequate?
Size-Up

• The Incident Action Plan:
  – Is comprehensive
  – Is communicated
  – Integrates safety at every level
  – Provides for progress tracking and status reporting

Size-Up

• Action plans must provide for:
  – Scene safety
  – Initial hazard identification
  – EMS triage responsibilities
  – Rescue evaluation
  – Resource requirements
  – Personnel accountability
  – Ongoing hazard identification

Size-Up

• Rescue strategy and tactics
  – Are based on size-up information
  – Identify the easiest, quickest and most effective actions that will safely resolve the incident
  – Are developed through consultation with technical experts
Student Performance Objectives

• Given information from discussion, handouts, and reading materials, describe course components and student requirements and identify requirements for site operations, support resources and size-up.

Review

• Introduction to Site Operations
• Support Resources
• Size-Up
LESSON 2-1
SITE OPERATIONS (CONTINUED)

Student Performance Objective

• Given information from discussion, handouts, and reading materials, identify the requirements for managing hazards, managing resources, conducting searches, performing helicopter ground support, terminating technical rescue operations, and maintaining rescue equipment.

Overview

• Identifying and Mitigating Incident Hazards
• Managing Resources
• Conducting a Search
• Performing Helicopter Ground Support
• Terminating a Technical Rescue Operation
• Maintaining Rescue Equipment
• Exercises
Identifying and Mitigating Incident Hazards

• Identify hazards based on the rescue and the environment in which it will take place

• Incident Scene Hazards
  – Traffic
  – Spectators
  – Power Lines
  – Stored Energy
  – Haz-Mat

RES 101-PPT-2-1-4

Identifying and Mitigating Incident Hazards

• Stored Energy Hazards
  • Electricity
  • Utilities
  • Mechanical energy
  • Pressurized systems and vessels
  • Hazardous energy in vehicles

RES 101-PPT-2-1-4

Identifying and Mitigating Incident Hazards

• Weather Hazards
  • Wind
  • Humidity
  • Temperature
  • Storms

RES 101-PPT-2-1-5
Identifying and Mitigating Incident Hazards

- Terrain Hazards
  - Soil composition
  - Steepness
  - Traction

Identifying and Mitigating Incident Hazards

- Communicate to all personnel all hazards identified
- Mitigate or isolate hazards as possible
- Ensure use of appropriate PPE
- Monitor hazards over the life of the incident
- Ensure a risk-benefit analysis is conducted

Managing Resources

- Implement an incident command structure
  - Management structure
  - Incident action plan
  - Communications
- Identify resources assigned
Managing Resources

- Establish personnel accountability
- Identify the need for additional resources
- Establish rehabilitation facilities as required

Conducting a Search

- Discuss local procedures and guidelines
  - Are there procedures in your jurisdiction?
- Implement incident command
- Gather known facts about the victim and the environment
- Establish search parameters
- Establish personnel accountability

Performing Helicopter Ground Support

- Discuss local and state procedures and guidelines
  - MSP Aviation website: www.mspaviation.org
- Establish scene control
- Facilitate victim transfer
Terminating a Technical Rescue Operation

- Release of scene control and local protocols with law enforcement
- Mitigation of ongoing hazards
- Readiness of personnel
- Readiness of equipment and apparatus

Terminating a Technical Rescue Operation

- Documentation and recordkeeping
- Post-incident analysis and critique
- Critical Incident Stress Management (CISM)

Maintaining Rescue Equipment

- Inspection and maintenance of personal protective equipment
  - Logs and records
  - Personal responsibility for inspection
  - Manufacturer care and maintenance documentation
  - Maintenance tools and supplies
  - Problem reporting and repair procedures
  - The replacement process
Maintaining Rescue Equipment

- Inspection and maintenance of rescue-specific equipment
  - Logs and records
  - Personal responsibility for inspection
  - Manufacturer care and maintenance documentation
  - Maintenance tools and supplies
  - Problem reporting and repair procedures
  - Replacement process

Exercises

- Complete Skill Sheets 2-1-1 and 2-1-2

Student Performance Objective

- Given information from discussion, handouts, and reading materials, identify the requirements for managing hazards, managing resources, conducting searches, performing helicopter ground support, terminating technical rescue operations, and maintaining rescue equipment.
Review

- Identifying and Mitigating Incident Hazards
- Managing Resources
- Conducting a Search
- Performing Helicopter Ground Support
- Terminating a Technical Rescue Operation
- Maintaining Rescue Equipment
- Exercises
Lesson 2-2
Introduction to Ropes and Rigging

Student Performance Objective
• Given information from discussion, handouts, and reading materials, define the components of technical rope rescue and the use of ropes and rigging.

Overview
• Introduction to Technical Rope Rescue
• Ropes and Rigging
• Knots, Bends and Hitches
• Skills Sign-Off
Introduction to Technical Rope Rescue

- How is rope rescue applicable to the rescue specialties?
  - Vehicle and Machinery
  - Swiftwater
  - Trench
  - Technical Rope Rescue
  - Confined Space
  - Structural Collapse

Introduction to Technical Rope Rescue

- Basic technical rope rescue skills needed to train in the rescue specialties (the student is not a technical rope rescuer after this course)

Ropes and Rigging

- Selection of rope for a given task
- Rope materials and construction
  - Natural Fiber
    - Manila
    - Hemp
    - Sisal
Ropes and Rigging

- Synthetic Fiber
  - Nylon
  - Polyester
  - Polypropylene
  - Polyethylene

Ropes and Rigging

- Laid

- Braided

Ropes and Rigging

- Braid on Braid

- Kernmantle
Ropes and Rigging
- Webbing
- Tubular
- Flat

Ropes and Rigging

- Inspection and maintenance
  - Rope
  - Webbing
  - Other equipment

Ropes and Rigging

- Terminology
  - Running end
  - Working end
  - Standing part/ end
  - Bight
  - Round turn
  - Loop
  - Bend
  - Knot
  - Splice
  - Whip
Ropes and Rigging

- Rigging Equipment
  - Carabiners

Ropes and Rigging

- Rigging Equipment
  - Descent control devices

Ropes and Rigging

- Rigging Equipment
  - Ascenders
Ropes and Rigging

• Rigging Equipment
  – Progress Capture Devices

Ropes and Rigging

• Rigging Equipment
  – Rope grabs

Ropes and Rigging

• Rigging Equipment
  – Pulleys
Ropes and Rigging

• Rigging Equipment
  – Anchoring devices

Ropes and Rigging

• Rigging Equipment
  – Belaying devices

Ropes and Rigging

• Rigging Equipment
  – Edge Protectors
Ropes and Rigging

- Rescue Harnesses
  - Class I, II and III

Knots, Bends and Hitches

- Characteristics of rescue knots, bends and hitches
  - They are easy to tie and untie
  - It is easy to determine if they are tied correctly
  - Once tied, dressed and set they remain secure
  - There is minimized effect on rope strength

Knots, Bends and Hitches

- Requirements for tying rescue knots
  - Knots
    - Must be dressed
    - Must be pre-loaded
    - Must have safeties
**Knots, Bends and Hitches**

- Purpose of knots, bends and hitches
  - End-of-line loop
  - Mid-line loop
  - Securing around a desired object
  - Joining rope or webbing ends together
  - Gripping rope

**Knots, Bends and Hitches**

- Demonstrate methods of tying specific knots, bends and hitches
  - Overhand knot
  - Simple figure 8
  - Figure 8 on a bight
  - Figure 8 follow-through
  - Figure 8 bend

**Knots, Bends and Hitches**

- Demonstrate methods of tying specific knots, bends and hitches
  - Grapevine
  - Ring bend (webbing only)
  - Double overhand back-up knot
  - Butterfly
  - Prusik hitch
  - Munter hitch
Skills-Sign-Off

• The remainder of Lesson 2-2 and all of Lesson 4-1 will be hands-on practice with specific knots, bends and hitches.
• The skills sign-off sheet will be completed.

Student Performance Objective

• Given information from discussion, handouts, and reading materials, define the components of technical rope rescue and the use of ropes and rigging.

Review

• Introduction to Technical Rope Rescue
• Ropes and Rigging
• Knots, Bends and Hitches
• Skills Sign-Off
Lesson 3-1
Construction of Rigging Systems

Student Performance Objective

- Given information from discussion, handouts, and reading materials, construct a technical rope rescue anchor, a simple rope mechanical advantage system, and two more-complex mechanical advantage systems.

Overview

- Introduction to Rigging, Anchoring and Mechanical Advantage Systems
- Constructing a Single Point Anchoring System
- Providing Edge Protection
- Constructing a Simple Mechanical Advantage System (2:1)
- Constructing a Z Rig System (3:1)
- Constructing a Piggyback Rig System (4:1)
- Performing a Safety Check
Introduction to Rigging, Anchoring and Mechanical Advantage Systems

- Use of rigging, anchoring and mechanical advantage systems at rescue incidents
- Elements of safety in technical rope rescue
  - Attention to detail
  - Operating as a team
  - Care of equipment

Constructing a Single Point Anchoring System

- The purpose of anchors
  - A means of securing the ropes and other elements of the high angle system to something solid

Constructing a Single Point Anchoring System

- Selection of anchor points
  - Natural anchors: Trees and rocks
    - Examine trees for rot or weak root systems
    - Ensure trees and rocks are stable
    - Ensure stability of soil
Constructing a Single Point Anchoring System

- Anchors on structures: Structural columns, stairwell support beams, supports for large machines, etc.

- Alternative anchor points: Elevator housings, scuppers, wall sections between windows and/or doors

- Placement of anchors
  - Strength required: The anchor must be able to sustain the greatest anticipated force
  - Direction of pull: It is recommended that the anchor be close to and directly above the subject to be rescued
Constructing a Single Point Anchoring System

- Backing up anchors: Create redundant anchors
  - On the same anchor: when the possibility of failure exists in other points of the anchor system (carabiners, knots, slings)
  - On a separate anchor: if the direction of loading will be shifting during the operation

Constructing a Single Point Anchoring System

- Materials used in an anchor system
  - Rope
  - Webbing
  - Anchor hardware

Constructing a Single Point Anchoring System

- Practical exercise
  - The instructor will demonstrate construction of a single point anchor system
  - Students will practice constructing an anchor system
  - A skill signoff sheet will be completed
Providing Edge Protection

- The need for edge protection
- Methods to provide edge protection
  - Rope pads
  - Edge rollers
  - Skid bars

Constructing a Simple Mechanical Advantage System (2:1)

- Benefits of using mechanical advantage
  - Easier
  - Safer
- Calculation of mechanical advantage
  - Theoretical versus actual mechanical advantage
  - Calculations

Constructing a Simple Mechanical Advantage System (2:1)

- Equipment and other requirements to create the system
  - Rope
  - Pulleys
  - Carabiners
  - Position capture device
  - Anchor point
  - Load
Constructing a Simple Mechanical Advantage System (2:1)
- Demonstration
- Student practice
- Skill sign-off

Constructing a Z-Rig System (3:1)
- Demonstration
- Student practice
- Skill sign-off

Constructing a Piggyback Rig System (4:1)
- Demonstration
- Student practice
- Skill sign-off
Performing a Safety Check

• Check each portion of the rig
• Ensure safety knots are in place
• Test rig and anchors before placing a full load

Practice

• The remainder of this lesson and Lesson 4-1 will be dedicated to practicing rescue knots, mechanical advantage systems, and anchors.

Student Performance Objective

• Given information from discussion, handouts, and reading materials, construct a technical rope rescue anchor, a simple mechanical advantage system, and two more-complex mechanical advantage systems.
Review

- Introduction to Rigging, Anchoring and Mechanical Advantage Systems
- Constructing a Single Point Anchoring System
- Providing Edge Protection
- Constructing a Simple Mechanical Advantage System (2:1)
- Constructing a Z-Rig System (3:1)
- Constructing a Piggyback Rig System (4:1)
- Performing a Safety Check
Lesson 5-1
Victim Management

Student Performance Objective
• Given information from discussion, handouts, and reading materials, perform victim management.

Overview
• Introduction to Victim Management
• Supporting Triage of Victims
• Securing a Victim in a Litter
• Performing a Low-Angle Victim Move
• Transferring a Victim to EMS
# Introduction to Victim Management

- Victim management is separate from emergency medical care
- This is a rescue course, not an EMS course
- EMS training is not a prerequisite for this course but is a requirement for treating patients
- Careful coordination is required with rescue and EMS

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# Supporting Triage of Victims

- Rescue versus recovery
- Input of EMS personnel on triage and priorities
- Use of triage materials

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# Securing a Victim in a Litter

- Basket litter rigging
- Flexible litter rigging
Securing a Victim in a Litter

- Patient packaging
  - Check pockets for objects that can cause pressure points
  - Packaging
    - Must not impede airway or circulation
    - Must allow monitoring of subject’s condition
    - Must protect subject from environmental factors
    - Must be done without subject being painfully restrained
    - Should be stable enough at all angles

Securing a Victim in a Litter

- Practical exercise (Pages 290-298)
  - The instructor will demonstrate packaging
  - Students will practice packaging
  - A skill sign-off will be completed

Performing a Low-Angle Victim Move

- The goals are victim and crew safety
- The most appropriate manner of carrying out the move must be selected
- The task starts with a packaged patient in a rigged litter ready for the move
Performing a Low-Angle Victim Move

- Practical Exercise
  - The instructor will demonstrate the move
  - Students will practice the move
  - A skill sign-off will be completed

Transferring a Victim to EMS

- Safe transfer of victim
- Communication of history and condition of victim

Student Performance Objective

- Given information from discussion, handouts, and reading materials, perform victim management.
Review

- Introduction to Victim Management
- Supporting Triage of Victims
- Securing a Victim to a Litter
- Performing a Low-Angle Victim Move
- Transferring a Victim to EMS
Lesson 6-1
Rigging Systems: Low-Angle Environment

Student Performance Objective

• Given information from discussion, handouts, and reading materials, construct and operate a mechanical advantage system and a lowering system in a low-angle environment.

Overview

• Constructing and Operating a Mechanical Advantage System in a Low-Angle Environment
• Functioning as a Litter Tender
• Constructing a Lowering System
• Operating a Lowering System in a Low-Angle Environment
• Conducting a System Safety Check
Constructing and Operating a Mechanical Advantage System in a Low-Angle Environment

- The haul team
  - Communications
  - Haul commands
    - Haul
    - Haul slow
    - Set
    - Slack
    - Stop!

- Use of progress capture devices (PCDs)
  - PCD rigging
  - PCD tender
- Use of a tag line

- Practical Exercise
  - Demonstration
  - Student practice
  - Skill sign-off
Functioning as a Litter Tender

- Body position
- Tie in to litter
- Physical movement and team coordination

Functioning as a Litter Tender

- Practical Exercise
  - Demonstration
  - Student practice
  - Skill sign-off

Constructing a Lowering System

- Load
- Main-line
- Braking systems for lowering
  - Figure 8 descender
  - Brake bar
  - Brake tube
Constructing a Lowering System

- Rigging for lowering
- Belay systems
- Litter rigging
- Tender rigging

Constructing a Lowering System

- Practical Exercise
  - Demonstration
  - Student practice
  - Skill sign-off

Operating a Lowering System
In a Low-Angle Environment

- Communications
  - Radio
  - Voice

- Commands
  - On belay?
  - Down slow
  - Down fast
  - Stop!
  - Stop! Stop! Why stop?
  - Off belay
  - Belay off
  - Slack
  - Tension
  - Slack on belay line
  - Slack on main line
  - Off rope
Operating a Lowering System
In a Low-Angle Environment

- Haul team
  - Rescue team leader
  - Brakeman
  - Rope handler
  - Edge tender
  - Litter tender
  - Belayer

Operating a Lowering System
In a Low-Angle Environment

- Practical Exercise
  - Demonstration
  - Student practice
  - Skill sign-off

Conducting a System Safety Check

- Use of a safety officer
  - Fully knowledgeable of techniques
  - Authorized to stop an operation

- Inspections
  - Rope
  - PPE
  - Rigging
  - Environment
Conducting a System Safety Check

- Practical Exercise
  - Demonstration
  - Student practice
  - Skill sign-off

Student Performance Objective

- Given information from discussion, handouts, and reading materials, construct and operate a mechanical advantage system and a lowering system in a low-angle environment.

Review

- Constructing and Operating a Mechanical Advantage System in a Low-Angle Environment
- Functioning as a Litter Tender
- Constructing a Lowering System
- Operating a Lowering System in a Low-Angle Environment
- Conducting a System Safety Check
Lesson 7-1
Rigging Systems: High-Angle Environment

Student Performance Objectives

• Given information from discussion, handouts, and reading materials, construct and operate a mechanical advantage system, a lowering system and a belay system in a high-angle environment.

Overview

• Constructing and Operating a Hauling/Raising System in a High-Angle Environment
• Operating a High-Angle Lowering System
• Constructing and Operating a Belay System in a High-Angle Environment
• Belaying a Falling Load in a High-Angle Environment
Constructing and Operating a Hauling/Raising System in a High-Angle Environment

• Equipment
  – One main-line rope
  – Three locking carabiners
  – Two pulleys
  – Two rope grabs
  – Separate belay system

Constructing and Operating a Hauling/Raising System in a High-Angle Environment

• Rigging for hauling/raising
• Load rigging
• Communication
  – Radio
  – Voice

Constructing and Operating a Hauling/Raising System in a High-Angle Environment

• Commands
  — On belay?
  — Belay on
  — Down slow
  — Down fast
  — Stop!
  — Stop! Stop! Why Stop?
  — Off belay
  — Belay off
  — Slack
  — Tension
  — Slack on belay line
  — Slack on main line
  — Off rope
Constructing and Operating a Hauling/Raising System in a High-Angle Environment

- Haul team
  - Rescue team leader
  - Brakeman
  - Rope handler
  - Edge Tender
  - Litter Tender
  - Belay

Constructing and Operating a Hauling/Raising System in a High-Angle Environment

- Practical Exercise
  - Instructor demonstrates construction
  - Students practice construction
  - Skill sheet is signed off

Operating a High-Angle Lowering System

- Review commands
- Review team responsibilities
Operating a High-Angle Lowering System

- Practical Exercise
  - Instructor demonstrates operation
  - Students practice operation
  - Skill sheet is signed off

Constructing and Operating a Belay System in a High-Angle Environment

- Types of belay systems
  - Brake belays
  - Tandem Prusik belay system
  - Load releasing (LR) hitches

Constructing and Operating a Belay System in a High-Angle Environment

- Constructing a Tandem Prusik Belay System
- Use of additional devices
  - Prusik minding pulley
  - 540° rescue belay device
Constructing and Operating a Belay System in a High-Angle Environment

- Practical Exercise
  - Instructor demonstrates construction
  - Students practice construction
  - Skill sheet is signed off

Belaying a Falling Load in a High-Angle Environment

- Practical Exercise
  - Instructor demonstrates operation
  - Students practice operation
  - Skill sheet is signed off

Student Performance Objectives

- Given information from discussion, handouts, and reading materials, construct and operate a mechanical advantage system, a lowering system and a belay system in a high-angle environment.
Review

- Constructing and Operating a Hauling/Raising System in a High-Angle Environment
- Operating a High-Angle Lowering System
- Constructing and Operating a Belay System in a High-Angle Environment
- Belaying a Falling Load in a High-Angle Environment