2027 Tech Rescue Training Manual



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Protocols

PURPOSE:

To establish a procedure for Tech Rescue personnel responding to rope rescue incidents, ensuring safe and efficient operations using proper rope systems, edge control, and patient movement techniques.

PROCEDURE:

First-in Apparatus:
- First in E/M/L shall go to the addressed tone, secure RP, and establish scene control.
- If a confirmed rope rescue, deliver the Tech Rescue IRR and request the following additional resources as applicable:
  - Rescue61
  - Battalion Chief
  - Additional technical rescue-qualified personnel
- Don minimum PPE: helmet, eye protection, gloves, and boots, harness.
- Establish exclusion zone within 10 feet of edge unless fall protection is in place.
- Establish communication plan using voice, department radio, team radio, and/or whistle.
- Interface with LE or other responding agencies as needed.

Communication

- Tools
    - Voice, Dept Radio, Team Radio, Whistle
- Rope Specific commands-
    - “All quiet”
    - “Edge is in control”
    - Rope commands
        - “Rescuer on/at edge” – Operations beginning
        - “Lower”
        - “Raise”
        - “Stop” – “Why Stop?”
        - “Lock off” – Set all for safety
        - “On Belay?” – Is belay ready
        - “Belay on” – Belay is ready
        - “On Main?” – Is Main ready?
        - “Main on” – Ready to work

The following numbered tasks are meant to be followed in order, if the first one will not work, then move to the next. Principle is to keep it simple, then work up in complexity only as necessary.

Mechanical advantage

- 3:1, Clutch and Capto
- 4:1 CSR2 – Con Space and Aerial ops

Lowering system

1. TTRS, Clutch - (DRR pg 43)
2. Clutch with asap belay on second line (DRR pg 42/40)
3. Break bar rack with tandem prusik belay (DRR pg 41)
4. Figure 8 plate with tandem prusik belay (consider rope around carabiner vs around yoke)

Raising system

1. TTRS, 3:1, Clutch and Capto (DRR pg 45)
2. Compound system
3. Lok head winch when available

Knot passing

1. Jumper with AZTEK

Anchors and Redundancy (DRR pg 18-26)

- Single point exception (DJ Walker)
  - Trusted manufacturer/ISO 9001, 3rd party testing
  - No moving parts/No human intervention/failure
  - Impossible to screw up
- Could it fail? What would happen if it did?

Litter

- Two line, interwoven long tail bowline (DRR pg 59)
- Tied to Ring, one tail to pt, one tail for rescuer.
- Rescuer tied to end, prusik attached for no extension
  - Grillion or Aztex can be used for work positioning.

Edge negotiation

1. Structural High directional (DRR pg 28)

2. AHD with vortex, tripod easel A configuration, guyed back. (DRR pg 30)
3. Low directional (roller), red straps attached below midpoint of litter. (DRR pg 28 and pg 62)

Artificial High Directional

1. Structural high directional (DRR pg 28)
2. Vortex in tripod configuration
3. Vortex in easel A configuration, guyed back. (DRR pg 30)
4. Vortex in offset bipod (ARS pg 70, DRR pg 32)
5. Vortex in standard bipod (ARS pg 69),
6. Monopod (vortex or paratech) (ARS pg 70,

Ascending rope, structures (natural or man-made)

1. Find a different way around
2. Haul team, TTRS or main and belay
3. 2x ascenders with ASAP on separate line
4. Purcells, with ASAP on separate line
5. Lead climb with dynamic rope
    - Consider fall distance (obstructions) and Fall factor.

Horizontal movement with Rope

1. Skate block– (DRR pg 79, ARS pg 86)
2. Guiding Line – (DRR pg 80)
3. Two rope offset – (DRR pg 82)
4. Twin rope Highline – (DRR pg 83-86)
    - Last resort when absolutely necessary, consider loads on track line, potential failure and loads on anchors.
    - Consider Rule of 18's for ½", Rule of 12's for 11mm.
    - Norwegian reeve with secondary connection, when reeve is needed.

Tasks – SCT

Building evaluation, collapse zone (SOG 1.2-1.15)

Visual and verbal search

Victim location and Building Markings (SOG 1.23-1.27)

Moving victim from elevated or subterranean position.

- Carry
- Ladder slide
- Portland Pick
- Rope System

Shoring

Heavy lift – Progression

- Go around it
- Go over it
- Go under it
- Go through it
- Move it
- Lift it

Tasks – Confined Space

Recognition of Confined Space

Definition

- is large enough and so configured that an employee can bodily enter and perform assigned work
- has limited or restricted means for entry or exit,
- is not designed for continuous employee occupancy
- Converging walls or floor

Hazards and Lock-out/Tag-out

Entry team PPE Ensemble

- Helmet
- 2 light sources
- Face piece
- Fire resistive clothing, long sleeve
- Communications
- Harness
- Boots
- Leather Gloves
- SABA system, or SCBA

Air system

- SCBA if space allows, and victim is visible
- SABA, with escape bottle

- Air cart, and box air system as back up
- Note: 300’ max from air source to rescuer.

Comm System

- Voice or radio if line of sight into space and victim is visible
- ConSpace hardline comm system.

Ventilation

- Call for Hazmat team to assist with air monitoring
- Natural ventilation if effective until more techs arrive
- Ventilation hoses and small fan
- Ventilation hoses with large ram fan

Raising and Lowering systems

- Vortex in standard tripod with 4:1, CSR2, belay line with ASAP
- Vortex in standard tripod with Lok-Head when available
- Monopod off of Rescue, with 3:1, haul system in line with rig, belay with ASAP.
- Vortex with 3:1, Low COD to haul system
- 4:1 off of Aerial, belay with ASAP.

Tasks – Trench

Trench vs Excavation

Resources – Utilities

Ventilation

Straight 8’ or less trench

“L” shaped trench

“T” Trench

Stabilizing and lifting a load

Coordinate using heavy equipment

Interview questions

Tasks – Machinery Rescue

Elevator plan

Moving victim from elevation

Tasks - Surface water-

- PPE
- Interview questions - PLS
- Search patters
- Shore based, boat based, water based

Tasks - Tower-

- Size-up/Hazards
- PPE
- Rope systems specific to tower

CPFR Technical Rescue – Full JPR Matrix

Discipline	JPR	Feb	Mar	Apr	May	July	Aug	Sept	Oct	Nov	Dec
Rope	5.1.x	P				S			S		
Rope	5.2.x	S				P			S		
Rope	5.3.1–6					P			S		
Rope	5.3.7–11					S			P		
Collapse	6.1.x		P				S				
Collapse	6.2.1–6		P				S				
Collapse	6.2.7–10		S				P				
Collapse	6.3.1–15						P				
Confined	7.1.x			P				S			
Confined	7.2.1–9			P				S			
Confined	7.2.10–16			S				P			
Confined	7.3.1–6							P			
Trench	12.1.x				P					S	
Trench	12.2.x				P					S	
Trench	12.3.x									P	
Vehicle	8.1.x	P									S
Vehicle	8.2.x	S			P						S
Vehicle	8.3.x				S						P
Heavy	9.x				S						P
Machine	13.x				S						P

JANUARY – TRUCK OPS AND TRUCK ROPE EVOLUTIONS

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

JUNE – MAKE-UP / CATCH-UP

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

Monthly Intent

- Bring new members up to baseline
- Reinforce standardized systems early
- Set expectations for:
    - Rope systems (your way)
    - Vehicle ops (clean, safe, repeatable)

DRILL 1: Rope PPE, Knots, and Basic Systems

Objective

Establish foundational rope skills and safety practices.

JPRs Addressed

- **5.1.1** – Identify PPE
- **5.1.2** – Identify rope types/components
- **5.1.3** – Tie knots
- **5.1.4** – Inspect rope systems

Protocol Integration

- PPE standards
- Knot selection tied to system use
- Safety mindset first

Execution

- PPE check
- Knot stations (figure 8, bowline, prusik)
- System inspection drills

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

DRILL 2: Anchors & Basic Lowering System

Objective

Build simple anchors and operate a basic lowering system.

JPRs Addressed

- **5.2.5** – Anchor systems
- **5.2.7** – System safety check
- **5.2.13** – Construct lowering system

Protocol Integration

- Anchor evaluation mindset
- TTRS introduction

Execution

- Build anchor
- Rig simple lowering system
- Run load

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

DRILL 3: Vehicle Stabilization Basics

Objective

Perform foundational vehicle stabilization.

JPRs Addressed

- **8.1.1–8.1.3** – Identify hazards
- **8.2.3 (a–c)** – Basic stabilization (cribbing, chocking)

Protocol Integration

- Stabilization always first
- 45° stabilization goal

Execution

- Stabilize vehicle
- Build cribbing base
- Demonstrate movement control

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

DRILL 4: Basic Access & Glass Management

Objective

Create safe access to a vehicle.

JPRs Addressed

- **8.2.5** – Determine access
- **8.2.6 (a–d)** – Basic access techniques

Protocol Integration

- Glass → door → access sequence
- Tool control

Execution

- Remove glass
- Open door
- Create access point

FEBRUARY – ROPE + EXTRICATION BASICS (FOUNDATION BLOCK)

DRILL 5: Intro Scenario – Low Complexity Rescue

Objective

Combine rope and extrication basics in a simple scenario.

JPRs Addressed

- Supporting rope + vehicle JPRs

Execution

- Simple slope or low-angle rope
- Vehicle stabilization
- Patient access + movement

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

Monthly Intent

- Build competency in:
    - Size-up & hazard control
    - Air monitoring & ventilation
    - Non-entry → entry → packaging
- Cover ~50% of Confined Space JPRs
- Set foundation for August (advanced integration)

DRILL 1: Size-Up, Hazard Control, and Non-Entry Rescue

Objective

Develop initial confined space operations including hazard recognition, isolation, and non-entry rescue.

JPRs Addressed

- **7.1.1 –** Initiate isolation procedures
- **7.1.3 –** Communicate with victim
- **7.1.4 –** Perform non-entry rescue
- **7.1.5 –** Size-up confined space incident
- **7.1.6 –** Recognize need for resources
- **7.2.2 –** Perform size-up
- **7.2.5 –** Control hazards

Protocol Integration

- Confined space recognition (definition + hazards)
- Lock-out / tag-out
- Communication methods (voice/radio/hardline)

- Ventilation considerations

Setup

- Simulated vault/tank entry
- Victim visible from opening
- Hazard: unknown atmosphere

Execution

1. Size-up + identify confined space
2. Establish control zones
3. Initiate LOTO
4. Attempt non-entry retrieval (rope/pole system)

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

DRILL 2: Atmospheric Monitoring & Ventilation

Objective

Establish safe working environment through monitoring and ventilation.

JPRs Addressed

- **7.2.3 –** Conduct atmospheric monitoring
- **7.2.4 –** Assess incident
- **7.2.5 –** Control hazards

Protocol Integration

- Air system decision-making:
    - Natural ventilation
    - Fan + ducting
- Hazmat interface for monitoring
- Air supply considerations (SCBA vs SABA)

Setup

- Confined space with simulated poor atmosphere
- Gas monitor + fans available

Execution

1. Monitor atmosphere
2. Identify hazard
3. Implement ventilation plan
4. Re-evaluate conditions

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

DRILL 3: Horizontal Entry & Victim Packaging

Objective

Perform entry into horizontal confined space and package victim.

JPRs Addressed

- **7.2.9 –** Prepare for horizontal entry
- **7.2.10 –** Enter horizontal confined space
- **7.2.11 –** Package victim in litter
- **7.2.8 –** Perform spinal immobilization

Protocol Integration

- Entry team PPE requirements
- Communication systems
- Packaging inside confined space
- Air system selection

Setup

- Horizontal pipe or low-profile tunnel
- Victim 10–20 ft inside

Execution

1. Prep entrant + air
2. Enter space
3. Package victim
4. Prepare for removal

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

DRILL 4: Vertical Entry Using AHD (Tripod/Vortex)

Objective- Perform vertical confined space entry and removal using an AHD.

JPRs Addressed

- **7.2.12 –** Assemble high point anchor
- **7.2.13 –** Prepare for vertical entry
- **7.2.14 –** Enter vertical confined space
- **7.2.15 –** Package victim for vertical removal

Protocol Integration

- Vortex configurations:
    - Tripod
    - CSR2 (4:1 system)
- Belay with ASAP
- Main + belay system

Setup

- Vertical shaft (tower, manhole, training prop)
- Victim at bottom

Execution

1. Build tripod/Vortex
2. Set main + belay
3. Lower entrant
4. Package + raise victim

MARCH – CONFINED SPACE (PHASE 1 / FOUNDATIONAL)

DRILL 5: Emergency Removal (Rapid Extraction)

Objective - Perform immediate extraction under life-threatening conditions.

JPRs Addressed

- **7.2.16 (a/b) –** Remove victim (horizontal/vertical)
- **7.2.17 –** Remove all entrants
- **7.2.18 –** Terminate incident

Protocol Integration

- Emergency decision-making
- Rapid removal vs full packaging
- Air system limitations (300’ rule)

Setup

- Scenario shift: atmosphere deteriorates
- Entrant + victim inside

Execution

1. Inject: “conditions worsening”
2. Initiate emergency extraction
3. Remove victim + rescuer
4. Terminate operation

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

Monthly Intent

- Build foundational trench competency:
    - Hazard recognition
    - Soil management
    - Basic shoring
- Reinforce extrication:
    - Stabilization
    - Access
    - Disentanglement
- Introduce **controlled multi-discipline thinking**

DRILL 1: Trench Size-Up, Hazard Control, and Non-Entry Ops

Objective

Develop initial trench operations including hazard recognition, zone control, and non-entry rescue.

JPRs Addressed

- **12.1.1** – Interview witness / competent person
- **12.1.3** – Identify trench hazards
- **12.1.4** – Size-up trench incident
- **12.1.5** – Recognize hazards and initiate isolation
- **12.2.1** – Identify hazards to rescuers/victims
- **12.2.2** – Implement hazard control plan

Protocol Integration

- Trench vs excavation recognition

- Utility identification
- Scene control + collapse zones
- Non-entry mindset first

Setup

- Straight trench ≤8 ft
- Victim partially buried
- Equipment staged but not yet deployed

Execution

1. Conduct size-up
2. Interview “competent person”
3. Establish zones + hazard control
4. Attempt non-entry options

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

DRILL 2: Straight Trench Shoring (≤8 ft)

Objective - Develop and implement a basic trench shoring plan.

JPRs Addressed

- **12.2.3** – Develop shoring plan (≤8 ft trench)
- **12.2.4** – Implement shoring plan
- **12.2.5** – Release victim from soil entrapment

Protocol Integration

- Straight trench operations
- Panel + strut placement
- Keep it simple → build as needed

Reference

- Shoring concepts (SOG principles applied to trench mindset)

Setup

- 6–8 ft trench
- Victim waist-deep buried

Execution

1. Build shoring plan
2. Install panels + struts
3. Begin soil removal
4. Access victim

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

DRILL 3: Intersecting Trench (T or L Configuration)

Objective

Introduce complexity in trench geometry and shoring.

JPRs Addressed

- **12.3.1** – Develop intersecting trench shoring plan
- **12.3.2** – Implement intersecting trench shoring
- **12.3.5** – Support intersecting trench as team

Protocol Integration

- “L” and “T” trench recognition
- Expanded hazard zones
- Progressive shoring

Setup

- Intersecting trench configuration
- Victim near intersection

Execution

1. Identify trench type
2. Adjust shoring plan
3. Install shoring
4. Access victim

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

DRILL 4: Vehicle Stabilization & Access (Extrication Focus)

Objective

Stabilize vehicle and create access for victim removal.

JPRs Addressed

- **8.2.3 (a–e)** – Stabilize vehicle (chocks, cribbing, struts, airbags)
- **8.2.4 (a–c)** – Isolate energy sources
- **8.2.5** – Determine access/egress
- **8.2.6 (a–h)** – Create access (glass, doors, roof, dash, tools)

Protocol Integration

- Stabilization priority (45° goal, 70° lift concept)
- Tool use and sequencing
- Energy isolation

Setup

- Passenger vehicle (on wheels or slight tilt)
- 1 trapped victim

Execution

1. Stabilize vehicle
2. Isolate hazards
3. Create access
4. Prepare for removal

APRIL – TRENCH & EXTRICATION (PHASE 1 + INTRO TO INTEGRATION)

DRILL 5: Combined Scenario – Vehicle into Trench

Objective

Apply trench and extrication skills in a controlled, combined scenario.

JPRs Addressed

- **12.2.1–12.2.5** – Trench hazard control, shoring, victim release
- **8.2.3–8.2.7** – Vehicle stabilization, access, disentanglement

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Protocol Integration

- Decision pathway:
    - Stabilize vehicle FIRST
    - Then trench hazard control
- Heavy lift decision-making (if needed)

Setup

- Vehicle partially in trench
- Victim trapped between vehicle + soil

Execution

1. Stabilize vehicle
2. Establish trench safety zones
3. Shore trench
4. Access + remove victim

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

Monthly Intent

Apply rope technician skills in elevated and complex environments, focusing on:

- Movement on rope
- Structural access
- Controlled descent and escape
- Patient interaction at height

DRILL 1 – Tower Climb & Traverse (Fall Protection Movement)

Objective

Climb and traverse a structure using fall protection and rope systems.

Primary JPRs

- **5.3.7**

Secondary JPRs

- 5.2.5, 5.2.7

Protocol Focus

- Fall protection systems
- Tie-off discipline
- Movement control

Setup

- Training tower or vertical structure
- Multiple anchor/tie-off points

Execution

1. Assess structure
2. Establish fall protection system
3. Climb vertically
4. Traverse laterally across structure

5. Maintain continuous tie-off

Reps

- Rotate climbers

Common Mistakes / Watch-Outs

- Loss of tie-off
- Poor movement planning
- Overreaching or unstable positioning

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

DRILL 2 – Crisis at Height (Subject Interaction)

Objective

Approach and manage a subject in crisis at height.

Primary JPRs

- 5.3.8

Secondary JPRs

- 5.3.1

Protocol Focus

- Verbal de-escalation
- Rescuer positioning
- Scene control

Setup

- Actor positioned at height
- Simulated emotional distress

Execution

1. Perform size-up
2. Establish safe access
3. Engage subject verbally
4. Secure subject physically (if appropriate)
5. Prepare for removal

Reps

- Rotate rescuers

Common Mistakes / Watch-Outs

- Rushing approach
- Poor communication

- Unsafe positioning near edge

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

DRILL 3 – Gondola Access & Initial Contact (UPDATED)

Objective

Access a gondola cabin and establish control of occupants.

Primary JPRs

- **5.3.7, 5.3.8**

Secondary JPRs

- 5.3.1

Protocol Focus

- Safe approach to suspended cabin
- Fall protection + positioning
- Patient communication and control

Setup

- Simulated gondola cabin (elevated or mock)
- Multiple occupants (2–4)
- Mixed conditions (calm, anxious, mild injury)

Execution

1. Access cabin (rope or structure-based)
2. Establish secure position
3. Assess occupants
4. Communicate evacuation plan
5. Prepare for lowering

Common Mistakes

- Poor positioning outside cabin
- Failure to control scene
- Rushing patient contact

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

DRILL 4 – Gondola Evacuation (Individual Lowering)

Objective

Remove a single occupant from gondola using rope lowering system.

Primary JPRs

- **5.3.10**

Secondary JPRs

- 5.2.13, 5.2.14

Protocol Focus

- Controlled descent
- Packaging for non-ambulatory / low-skill subjects
- Clear communication between rescuer and ground

Setup

- Cabin with 1–2 occupants
- Lowering system established

Execution

1. Package occupant (harness/litter)
2. Connect to system
3. Lower to ground
4. Reset system

Common Mistakes

- Poor packaging

- Miscommunication during lowering
- Loss of descent control

MAY – TOWER RESCUE + GONDOLA EVACUATION (INTEGRATION BLOCK)

DRILL 5 – FULL GONDOLA EVACUATION (MULTI-PATIENT SCENARIO)

Objective

Conduct a full gondola evacuation with multiple occupants and limited resources.

Primary JPRs

- **5.3.7–5.3.11 (integrated)**

Secondary JPRs

- 5.2.x system operations

Protocol Focus

- ICS / span of control
- Resource management
- Repetition and efficiency
- Safety under fatigue

Setup

- Gondola cabin with:
    - 4–8 occupants
    - Mixed conditions:
        - Ambulatory
        - Non-ambulatory
        - Panicked
- Limited rescuers (6–8)

Execution

1. Establish IC and divisions
2. Assign rope teams
3. Access cabin
4. Prioritize occupants
5. Conduct repeated lowering operations
6. Rotate rescuers
7. Maintain accountability

Reps

- Full evolution (long-duration scenario)

Common Mistakes

- Poor organization / ICS breakdown
- Inefficient rotation of crews
- Fatigue-driven errors
- Loss of accountability

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

Monthly Intent

- Build on prior collapse fundamentals
- Develop technician-level collapse capability focused on:
    - Complex structural stabilization
    - Breaching & breaking
    - Heavy lifting operations
    - Void access and victim removal
    - Multi-step rescue scenarios

DRILL 1 – Advanced Shoring Systems (Complex Stabilization)

Objective

Design and construct advanced shoring systems to stabilize compromised structures.

Primary JPRs

- **6.3.1, 6.3.2, 6.3.3**

Secondary JPRs

- 6.2.5, 6.2.6

Protocol Focus

- Load path recognition
- Multi-point shoring systems
- System sequencing

Setup

- Complex collapse prop:
    - Leaning wall
    - Void space

    - Multiple load directions

Execution

1. Perform size-up and hazard assessment
2. Identify load paths
3. Design shoring plan
4. Construct system (vertical + raker + supplemental)
5. Evaluate effectiveness

Reps

- Minimum 2 full builds

Common Mistakes / Watch-Outs

- Misidentifying load path
- Overbuilding or underbuilding
- Poor wedge placement
- Lack of system integration

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

DRILL 2 – Breaching & Breaking (Access Creation)

Objective

Create access through structural components to reach a victim.

Primary JPRs

- **6.3.4, 6.3.5, 6.3.6**

Secondary JPRs

- 6.2.7

Protocol Focus

- Tool selection (cutting, breaking, breaching)
- Structural awareness
- Controlled access

Setup

- Concrete/wood obstruction
- Simulated victim beyond barrier

Execution

1. Evaluate structure
2. Select breaching method
3. Establish safety zones
4. Breach opening
5. Access victim space

Reps

- Multiple tool rotations

Common Mistakes / Watch-Outs

- Poor tool selection
- Creating secondary collapse hazard
- Uncontrolled breaching

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

DRILL 3 – Heavy Lift Operations (Integrated Systems)

Objective

Lift and stabilize heavy structural components to access a trapped victim.

Primary JPRs

- **6.3.7, 6.3.8, 6.3.9**

Secondary JPRs

- 6.2.9

Protocol Focus

- Cribbing progression
- Controlled lift
- Load stabilization

Setup

- Heavy object (concrete slab, vehicle, debris)
- Victim trapped beneath

Execution

1. Establish hazard control
2. Build cribbing base
3. Initiate lift (hydraulic or mechanical)
4. Progressively crib load
5. Stabilize and access victim

Reps

- Full evolution twice

Common Mistakes / Watch-Outs

- Lifting too fast
- Poor cribbing progression
- Uneven load distribution

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

DRILL 4 – Void Access & Technical Search (Advanced)

Objective

Access and search void spaces within a collapsed structure.

Primary JPRs

- **6.3.10, 6.3.11, 6.3.12**

Secondary JPRs

- 6.2.5–6.2.7

Protocol Focus

- Void identification
- Confined movement
- Victim location

Setup

- Collapse prop with multiple voids
- Limited access points
- Hidden victim

Execution

1. Conduct structured search
2. Identify viable void
3. Create access (if needed)
4. Enter and locate victim
5. Prepare for removal

Reps

- Rotate search teams

Common Mistakes / Watch-Outs

- Unstructured search pattern
- Missing viable voids
- Unsafe entry

JULY – STRUCTURAL COLLAPSE (PHASE 2 / INTEGRATION)

DRILL 5 – FULL SCENARIO: Multi-Step Collapse Rescue

Objective

Conduct a full structural collapse rescue involving multiple systems and decision points.

Primary JPRs

- **6.3.13, 6.3.14, 6.3.15**

Secondary JPRs

- 6.2.x integration
- Rope + confined integration

Protocol Focus

- ICS structure
- Multi-team coordination
- Sequencing of operations

Setup

- Complex collapse:
    - Multiple hazards
    - Entrapped victim(s)
    - Structural instability

Execution

1. Establish IC and divisions
2. Perform size-up

3. Stabilize structure
4. Breach and access
5. Lift and remove victim
6. Introduce complication mid-scenario

Reps

- 1–2 full evolutions

Common Mistakes / Watch-Outs

- Poor coordination between teams
- Incorrect sequencing of operations
- Tunnel vision on one task
- Breakdown in command structure

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

Monthly Intent

Develop technician-level confined space capability focused on:

- Complex entry (vertical & horizontal)
- Multi-system integration (rope + air + packaging)
- Problem-solving in restricted environments
- Emergency procedures and contingency management

DRILL 1 – Complex Vertical Entry (AHD + Rope System)

Objective

Perform a vertical confined space entry using an AHD and rope system.

Primary JPRs

- **7.3.1**

Secondary JPRs

- 7.2.10–7.2.12
- 5.2.13, 5.2.14

Protocol Focus

- AHD setup
- Main + belay system
- Controlled entry into restricted vertical space

Setup

- Vertical shaft (manhole, vault, tank)
- Limited entry diameter
- Victim at bottom

Execution

1. Establish hazard control (air monitoring, LOTO)
2. Build AHD
3. Rig main and belay systems
4. Lower rescuer into space
5. Assess and secure victim

Reps

- Rotate rigging team and entrant

Common Mistakes / Watch-Outs

- Poor AHD alignment
- Inadequate edge management
- Failure to maintain atmospheric monitoring
- Rushing entry before system is complete

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

DRILL 2 – Horizontal Confined Space Rescue (Restricted Access)

Objective

Access and remove a victim from a horizontal confined space with limited clearance.

Primary JPRs

- **7.3.2**

Secondary JPRs

- 7.2.9, 7.2.13

Protocol Focus

- Low-profile entry
- Limited movement environment
- Packaging in place

Setup

- Pipe or culvert (low clearance)
- Victim located deep inside

Execution

1. Establish hazard control
2. Enter confined space
3. Reach victim with limited maneuverability
4. Package victim in restricted environment
5. Remove victim

Reps

- Rotate entrant roles

Common Mistakes / Watch-Outs

- Poor body positioning
- Inefficient movement
- Incomplete packaging
- Loss of communication

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

DRILL 3 – Patient Packaging in Confined Space (Complex Environment)

Objective

Package a patient in a restricted confined space for safe removal.

Primary JPRs

- **7.3.3**

Secondary JPRs

- 7.2.14
- 5.3.4

Protocol Focus

- Minimal space packaging
- Litter vs SKED decision-making
- Patient protection

Setup

- Tight confined space
- Limited ability to fully access patient

Execution

1. Assess patient
2. Select packaging method
3. Package patient within constraints
4. Prepare for movement

Reps

- Multiple packaging reps

Common Mistakes / Watch-Outs

- Over-packaging
- Poor spinal alignment
- Inefficient packaging sequence

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

DRILL 4 – Air Management & Extended Operations

Objective

Manage air supply and sustain operations during extended confined space rescue.

Primary JPRs

- **7.3.4**

Secondary JPRs

- 7.2.6

Protocol Focus

- Supplied air systems
- Air monitoring
- Crew rotation

Setup

- Simulated hazardous atmosphere
- Extended operation timeline

Execution

1. Establish air monitoring
2. Deploy air supply system
3. Rotate crews
4. Maintain safe atmosphere throughout operation

Reps

- Run extended scenario

Common Mistakes / Watch-Outs

- Poor air tracking
- Failure to rotate crews
- Complacency over time

AUGUST – CONFINED SPACE (PHASE 2 / INTEGRATION)

DRILL 5 – FULL SCENARIO: Multi-System Confined Space Rescue

Objective

Conduct a full confined space rescue requiring integration of multiple systems.

Primary JPRs

- **7.3.5, 7.3.6**

Secondary JPRs

- 7.2.x
- 5.2.x / 5.3.x integration

Protocol Focus

- ICS structure
- Multi-system coordination
- Contingency planning

Setup

- Complex confined space:
    - Vertical + horizontal components
    - Limited access
    - Multiple hazards
- Victim requiring packaging and removal

Execution

1. Full size-up and IC assignment

2. Hazard control
3. System build (rope + air + packaging)
4. Entry and victim contact
5. Packaging
6. Removal
7. Contingency (inject problem mid-evolution)

Reps

- 1–2 full evolutions

Common Mistakes / Watch-Outs

- Breakdown in coordination
- Poor sequencing of operations
- Failure to anticipate complications
- Loss of accountability

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

Monthly Intent

Deliver technician-level rope rescue capability focused on:

- High-angle rescue
- Pickoff and transfer
- Litter operations
- Horizontal movement systems

Reinforce:

- Movement on rope (ascent/descent/traverse/escape)

DRILL 1 – System Build, Belay & Edge Management

Objective

Construct and operate a complete rope rescue system with mainline, belay, and edge protection.

Primary JPRs

- **5.2.5, 5.2.7, 5.2.13, 5.2.14**

Secondary JPRs

- 5.3.9, 5.3.10 (system familiarity)

Protocol Focus

- TTRS system
- Main + belay always
- Edge protection = mandatory

Setup

- Elevated edge (training tower or slope)
- Fixed anchor options (multiple types)

Execution

1. Evaluate anchor options

2. Build mainline system
3. Build independent belay
4. Install edge protection
5. Conduct full system safety check
6. Operate system (raise/lower)

Reps

- Minimum 2 full builds per team

Common Mistakes / Watch-Outs

- Skipping belay setup
- Poor anchor evaluation
- Inadequate edge protection
- Rushing safety checks

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

DRILL 2 – High-Angle Stranded Victim Rescue

Objective

Access, package, and remove a stranded victim in a high-angle environment.

Primary JPRs

- 5.3.1

Secondary JPRs

- 5.2.13, 5.2.14

Protocol Focus

- Controlled descent
- Patient-first mindset
- Communication with victim

Setup

- Victim located on steep slope or tower
- Conscious, ambulatory or semi-ambulatory

Execution

1. Perform size-up
2. Build rope system
3. Rescuer descends to victim
4. Secure and package victim
5. Lower both to safe area

Reps

- Rotate rescuer and IC

Common Mistakes / Watch-Outs

- Poor victim communication
- Unsafe approach at edge

- Lack of rescuer positioning control

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

DRILL 3 – Pickoff & Suspended Victim Transfer

Objective

Rescue and transfer a suspended victim from one system to another.

Primary JPRs

- **5.3.2, 5.3.3**

Secondary JPRs

- 5.2.15–5.2.18

Protocol Focus

- AZTEK / short-haul systems
- Controlled load transfer
- Redundancy

Setup

- Victim suspended on rope system
- Separate rescue system staged

Execution

1. Rescuer ascends or lowers to victim
2. Secure victim to rescue system
3. Transfer load
4. Disconnect original system
5. Lower or raise victim

Reps

- Minimum 2 evolutions

Common Mistakes / Watch-Outs

- Uncontrolled load transfer
- Poor connection points

- Lack of communication during transfer

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

DRILL 4 – High-Angle Litter Operations

Objective

Operate a litter system in a high-angle rescue environment.

Primary JPRs

- **5.3.4**

Secondary JPRs

- 5.2.13, 5.2.14

Protocol Focus

- Litter orientation
- Attendant positioning
- Smooth movement

Setup

- Packaged patient in litter
- Vertical or steep angle environment

Execution

1. Package patient
2. Rig litter to system
3. Assign attendant
4. Raise/lower litter
5. Maintain orientation and control

Reps

- Rotate litter attendant

Common Mistakes / Watch-Outs

- Poor patient packaging
- Jerky movement

- Poor coordination between teams

SEPTEMBER – ROPE RESCUE (REINFORCEMENT BLOCK)

DRILL 5 – Horizontal Movement System (Highline / Offset)

Objective

Construct and operate a horizontal movement system to move a rescuer or victim across an obstacle.

Primary JPRs

- **5.3.5, 5.3.6**

Secondary JPRs

- 5.3.7, 5.3.9

Protocol Focus

- Two-rope offset or skate block
- Tension management
- System coordination

Setup

- Gap, trench, or simulated void
- Anchor points on both sides

Execution

1. Build dual-anchor systems
2. Tension track lines
3. Rig load to system
4. Move load horizontally
5. Control movement and landing

Reps

- Build and operate twice

Common Mistakes / Watch-Outs

- Poor tensioning

- Misaligned anchors
- Lack of system coordination

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

Monthly Intent

- Build on April fundamentals
- Introduce:
    - Deep trench (>8 ft)
    - Complex/intersecting systems
    - Load stabilization + lifting
    - Heavy equipment coordination
- Complete **technician-level trench JPRs**

DRILL 1: Deep Trench Shoring (>8 ft)

Objective

Develop and implement a shoring plan for a trench deeper than 8 feet.

JPRs Addressed

- **12.3.3** – Develop shoring plan (>8 ft trench)
- **12.3.4** – Implement shoring plan (>8 ft trench)
- **12.3.6** – Install supplemental shoring for added depth

Protocol Integration

- Depth recognition → escalation of risk
- Layered shoring approach

- Maintain control of soil movement

Setup

- Simulated trench >8 ft
- Victim partially buried

Execution

1. Identify trench depth + hazards
2. Develop deeper shoring plan
3. Install panels + additional layers
4. Begin controlled excavation

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

DRILL 2: Intersecting Trench (Advanced Shoring & Access)

Objective

Stabilize and operate within a complex intersecting trench environment.

JPRs Addressed

- **12.3.1** – Develop intersecting trench plan
- **12.3.2** – Implement intersecting trench shoring
- **12.3.5** – Support intersecting trench as team

Protocol Integration

- “L” and “T” trench configurations
- Expanded collapse zones
- Progressive system build-out

Setup

- Intersecting trench
- Victim at junction

Execution

1. Identify trench configuration
2. Build shoring plan
3. Install intersecting supports
4. Access victim

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

DRILL 3: Load Stabilization & Lifting in a Trench

Objective

Stabilize and lift a load within a trench environment.

JPRs Addressed

- **12.3.8** – Construct load stabilization systems
- **12.3.9** – Lift a load using trench equipment
- **12.3.11** – Release victim from entrapment

Protocol Integration

- Heavy lift progression:
    - Go around
    - Go over
    - Go under
    - Move
    - Lift
- Controlled lifting within trench constraints

Reference

- ARS cribbing and lifting concepts

Setup

- Load (pipe, slab, or debris) inside trench
- Victim pinned

Execution

1. Stabilize load
2. Build crib system
3. Lift incrementally
4. Free victim

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

DRILL 4: Heavy Equipment Coordination

Objective

Integrate heavy equipment safely into trench rescue operations.

JPRs Addressed

- **12.3.10** – Coordinate use of heavy equipment
- **12.2.2** – Implement hazard control plan
- **12.2.1** – Identify hazards

Protocol Integration

- Operator communication
- Spotter responsibilities
- Equipment exclusion zones

Setup

- Trench with access for excavator (real or simulated)
- Operator + spotter roles

Execution

1. Establish communication plan
2. Assign spotter
3. Simulate soil removal
4. Maintain trench safety

OCTOBER – TRENCH RESCUE (PHASE 2 / ADVANCED)

DRILL 5: Full Scenario – Deep Trench with Multiple Problems

Objective

Manage a full trench rescue with multiple hazards and evolving conditions.

JPRs Addressed

- **12.2.1–12.2.8** – Ops-level trench tasks
- **12.3.1–12.3.11** – Technician-level trench operations

Protocol Integration

- Full trench workflow:
  - Size-up
  - Hazard control
  - Shoring
  - Access
  - Removal
- Decision-making under constraint

Setup

- Deep trench
- Victim buried
- Additional hazard (load, water, or instability)

Execution

1. Full size-up + IAP
2. Establish zones

3. Build shoring
4. Introduce inject (shift/load issue)
5. Adjust plan
6. Remove victim

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

Monthly Intent

Develop technician-level capability across:

- Passenger vehicle extrication
- Heavy vehicle rescue (commercial/bus/semi)
- Machinery rescue (industrial entanglement)

Focus on:

- Complex stabilization
- Advanced disentanglement
- Multi-system coordination
- Decision-making under pressure

DRILL 1 – Complex Stabilization (Multi-Plane / Multi-Vehicle)

Objective

Stabilize vehicles in complex orientations and environments.

Primary JPRs

- **8.3.1, 8.3.2**
- **9.3.1**

Secondary JPRs

- 8.2.x

Protocol Focus

- Multi-point stabilization
- Load path control
- Integration of cribbing, struts, and vehicle stabilization systems

---

Setup

- Vehicle:
    - On side, roof, or uneven terrain
- Optional second vehicle or object interaction

Execution

1. Perform size-up
2. Identify load paths
3. Stabilize vehicle in all planes
4. Reassess before operations

Reps

- Multiple stabilization scenarios

Common Mistakes / Watch-Outs

- Incomplete stabilization
- Missing secondary movement
- Poor load path recognition

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

DRILL 2 – Advanced Passenger Vehicle Disentanglement

Objective

Perform complex disentanglement of a trapped patient in a passenger vehicle.

Primary JPRs

- **8.3.3, 8.3.4, 8.3.5**

Secondary JPRs

- 8.2.5–8.2.8

Protocol Focus

- Tool selection
- Sequential disentanglement
- Patient protection

Setup

- Vehicle with:
    - Dash displacement
    - Entrapped lower extremities
- Limited access

Execution

1. Stabilize vehicle
2. Create access
3. Displace structural components
4. Free patient

Reps

- Rotate tool operators

Common Mistakes / Watch-Outs

- Cutting without plan
- Poor patient protection
- Inefficient sequencing

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

DRILL 3 – Heavy Vehicle Rescue (Commercial / Bus / Semi)

Objective

Access and remove a victim from a heavy vehicle environment.

Primary JPRs

- **9.3.2, 9.3.3, 9.3.4**

Secondary JPRs

- 8.3.x

Protocol Focus

- Large vehicle stabilization
- Access challenges (height, structure)
- Extended operations

Setup

- Simulated:
    - Bus
    - Semi cab
    - Commercial vehicle

Execution

1. Size-up vehicle hazards
2. Stabilize vehicle
3. Create access
4. Remove patient

Reps

- Multiple vehicle types if possible

Common Mistakes / Watch-Outs

- Underestimating scale of vehicle
- Poor access planning
- Incomplete stabilization

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

DRILL 4 – Machinery Rescue (Industrial / Entanglement)

Objective

Safely remove a victim from machinery entrapment.

Primary JPRs

- **13.3.1–13.3.3**

Secondary JPRs

- 13.2.x

Protocol Focus

- Lockout/Tagout (LOTO)
- Energy control
- Precision disentanglement

Setup

- Simulated machinery:
    - Conveyor
    - Auger
    - Industrial equipment

Execution

1. Identify hazards
2. Perform LOTO
3. Stabilize machinery
4. Disentangle victim

Reps

- Rotate rescuers

Common Mistakes / Watch-Outs

- Failure to fully isolate energy
- Rushing disentanglement
- Poor hazard recognition

NOVEMBER – VEHICLE & MACHINERY RESCUE (FINAL INTEGRATED BLOCK)

DRILL 5 – FULL SCENARIO: Multi-System Rescue (Vehicle + Heavy + Machinery)

Objective

Manage a complex rescue involving multiple vehicle types and/or machinery.

Primary JPRs

- **8.3.6–8.3.9**
- **9.3.5–9.3.7**
- **13.3.4–13.3.5**

Secondary JPRs

- 8.2.x / 9.2.x / 13.2.x

Protocol Focus

- ICS structure
- Resource management
- Multi-team coordination

Setup

- Complex incident:
    - Multiple vehicles or machinery
    - Multiple patients
    - Conflicting hazards

Execution

1. Establish IC and divisions

2. Assign rescue groups
3. Stabilize all hazards
4. Conduct extrication operations
5. Rotate crews
6. Introduce complication mid-scenario

Reps

- 1–2 full evolutions

Common Mistakes / Watch-Outs

- Breakdown in command structure
- Tunnel vision on one patient
- Poor coordination between teams
- Fatigue-related errors

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

DRILL 1: Size-Up, Marking, and Surface Victim Removal

Objective

Develop initial collapse operations: size-up, hazard control, and surface victim removal.

JPRs Addressed

- **6.1.1** – Identify incident hazards
- **6.1.2** – Initiate a search
- **6.1.3** – Apply building marking system
- **6.1.6** – Size-up a structural collapse incident

- **6.2.1** – Conduct collapse size-up
- **6.2.2** – Determine victim locations
- **6.2.3** – Develop IAP
- **6.2.4** – Implement IAP

Protocol Integration

- Building evaluation & collapse zones
- Marking system + victim location
- Visual/verbal search

Setup

- Light-frame collapse prop
- 1 visible victim, 1 missing

Execution

- Establish command + zones
- Conduct search
- Remove surface victim

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

DRILL 2: Vertical Shoring Operations

Objective

Stabilize compromised interior structure using vertical shores.

JPRs Addressed

- **6.2.3** – Develop IAP
- **6.2.4** – Implement IAP
- **6.2.6 (a–c)** – Construct vertical shores:
    - Double T-shore
    - Two-post
    - Multi-post

Protocol Integration

- Shoring operations
- Collapse zone control
- “Keep it simple → build up” principle

Reference

- SOG vertical shoring construction

Execution

- Size-up → select shore → build → stabilize → access

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

DRILL 3: Raker Shores & Exterior Stabilization

Objective

Stabilize compromised exterior wall using raker systems.

JPRs Addressed

- **6.2.6 (g–i)** – Construct raker shores:
    - Flying raker
    - Split raker
    - Solid raker

Protocol Integration

- Collapse evaluation
- Exterior hazard mitigation
- Progressive stabilization

Reference

- SOG lateral shoring systems

Execution

- Identify wall failure
- Select raker type
- Build + secure

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

DRILL 4: Interior Search & Void Access

Objective

Locate and access victim in a void space within a collapse.

JPRs Addressed

- **6.2.2** – Determine victim location
- **6.2.5** – Search collapsed structure
- **6.2.7** – Release victim from entrapment

Protocol Integration

- Search operations
- Victim location + communication
- Access decision pathway (around/over/under/through)

Execution

- Assign search teams
- Locate victim
- Create access path

DECEMBER – STRUCTURAL COLLAPSE (FINAL – ALL 5 DRILLS, OPTION A FORMAT)

DRILL 5: Heavy Lift & Victim Removal

Objective

Perform coordinated lifting operations to free and remove a victim.

JPRs Addressed

- **6.2.7** – Release victim
- **6.2.8** – Remove victim
- **6.2.9** – Lift heavy load

Protocol Integration

- Heavy lift progression:
    - Go around
    - Go over
    - Go under
    - Move
    - Lift

Reference

- Cribbing + lifting concepts (ARS guide)

Execution

- Build crib stack
- Lift incrementally
- Stabilize + remove victim



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Location of equipment cache.

Winter - Mountain Top Back room in White Boxes:

6 Zip Rescue Packs and 6 150' evacuation ropes with Bermude evacuation seat harnesses.

Summer - Mountain Top Back room in White Boxes:

3 Zip Rescue Packs and 3 150' evacuation ropes with Bermude seat harnesses.

Patrol Aid Room at Base in Volunteer Radio Room:

3 Zip Rescue Packs and 3 150' evacuation ropes with Bermude seat harnesses.

1. Following a 10 minute stoppage of the Gondola, and after consulting Lift Maintenance, a line skier will be dispatched. The line skier will note the number of cabins, both heavy and light sides, per span. This information is relayed to Dispatch. They will also communicate with guests in the cabins using a bull horn.

2. If necessary, Lift Maintenance will make the decision to evacuate Gondola. Lift Evacuation leader (LEL) will dispatch up to 6 teams to the appropriate spans. Each team will consist of:

   a. One qualified cable rider (Zip Rescuer).

   Cable Rider will carry the Zip Rescue Pack.

   b. One qualified tower climber/Zip rescue assistant.

   Assistant will carry the lift evacuation rope w/ Bermude seat harness, Tower climbing tether and 6mm belay line as required.

3. List of qualified Gondola evacuation personnel is available in the Patrol Directors' office.

4. Additional ground support will be dispatched to assist as needed.

5. Spans between towers 5-8 are steep having slope angles of 30-33 degrees. Cable riders will be belayed on these spans from the 6mm belay line housed on each tower.

6. Team will communicate to Lift Evacuation Leader when assigned cabin is cleared.

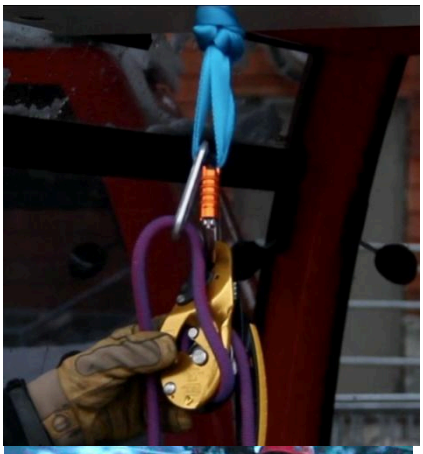
7. The line will be skied confirming all Cabins are clear and relayed to Lift Evacuation Leader. The line skier will take note of any equipment left on towers or cabins that need to be retrieved.

The Zip Rescue system will be utilized in the event of an evacuation of the Rainier Gondola. Each Zip Rescue unit attaches to the haul rope and allows a rescuer to ride to each gondola cabin and evacuate the guests. The Zip Rescue braking mechanism works on haul ropes up to 30 degrees. However, where the angle of the haul rope exceeds 30 degrees the rescuer will be belayed.

The following procedures have been developed in conjunction with a training specialist, Brian Brechwald, from Zip Rescue, and are to be used at Crystal Mountain in the event of an evacuation of the Rainier Gondola.

- Put on harness:
  - Make sure waist is high and tight
  - Buckle leg loops
  - Tighten shoulder straps: set dorsal attachment so it reaches no higher than C-7 when pulled upwards; tuck away extra strap
  - Adjust yellow straps and tuck away extra length
  - Have qualified Zip Rescue Assistant check harness.
- Attach # 2 tether/lanyard to ventral clip in point leaving 2+' of slack to use for tower climbing and daisy chain remainder tether; clip MGO off to side
- Check that #3 fall protection tether with MGO is attached to harness
- Attach etrier/ladder to harness gear loop with non locking carabiner
- Attach ascender with non locking carabiner
- Attach 3 80cm runners with screw gate locking carabiners
- Attach 2-3 120cm runners with screw gate carabiners
- Attach 100' 6mm rope in bag. Secure end of rope to prevent dropping
- Attach ID lowering device w/ locking D and non locking carabiner (for redirect)
- Attach 1 steel locking carabiner (for anchor)
- Attach 1 extra pear biner
- Attach # 1 tether to ventral clip in point and clip Zip Rescue unit to racking carabiner on side
- Climb tower to be ready to deploy when authorized. Decide if you should bring evac rope and Bermude evac seat with you
- Confirm clearance with lift maintenance to deploy onto haul rope
- Get onto tower sheave assembly/cat walk:
  - Make sure #2 and #3 are securely attached - #2 tether should be in working position
  - Attach Zip Rider, #1, to haul rope ensuring wheel bracket side latch is secured over wheel and brake is set using the thumb screw on top
  - Move #2 and #3 MGO's to haul rope behind Zip Rescue unit
- Put etrier on a static part of the Zip Rescue unit to allow rescuer to transfer his/her weight onto the Zip unit. Adjust #1and #2 tethers so that full body weight is on the #1 (Zip Rescue)
- Check camber of the brake and adjust as needed
- Slopes 30 degrees and over will be belayed from an attachment point off the Zip Rescue unit
- Attach etrier to the accelerator wire loop. Check brake and adjust bottom brake screw to allow Zip unit to move

- Ride haul rope to gondola cabin
- At the grip assembly of the cabin move #2 and #3 MGO's to downhill side of grip. Leave Zip on uphill side and tighten brake
- Attach 80cm runner to grip carriage and clip in #s 1 and 2 tethers as a redirect. Adjust tethers and remove #3 tether
- Using a steel locking carabiner clip two 80cm runners to the gondola evac anchor. Couple these with another locking carabiner.



- Contact passengers and have them move away from the doors
- Punch (with the heel of your hand) the door release mechanism to unlock the doors
- Lower down to cabin level of the gondola using the Grillions off the #1 and 2 tethers and open doors of the cabin
- Consider if you will lower guests from cabin or ground – if lowering from the the cabin, attach the ID lowering unit
    - Stay positioned in front of the door
    - Lower your secured 6mm rope to ground to raise the evac rope and seat (Bermude) – consider adding weight to 6mm rope if windy
    - Bring Bermude into car and explain the evacuation plan
    - Lay Bermude out on seat and explain how to put it on – consider using the fabric attachment points for very small individuals or children, along with a chest harness



    - Secure main evac rope. Attach steel locking carabiner into Bermude and onto evac rope
    - Remove slack on ID as guest stands. Belay rope should have a redirect just above the ID so rope exits upwards from ID
    - Have guest move to door opening and fully weight the belayed rope
    - Instruct him/her to turn around to face car as he/she is lowered, thereby protecting their face as they pass by the gondola floor
    - Instruct guest to sit fully on the ground after being lowered. Ensure the patroller on the ground can receive guest
    - Attach Bermude to the evac rope
    - Remove rope from ID to run solely through carabiner



- Attach guest's skis to the standing part of the evac rope to lower skis while simultaneously raising Bermude back to the gondola – make sure sling and carabiner from ski eventually returns to gondola

· When cabin is cleared, alert dispatch, ascend back to the top of the gondola and prepare to continue down the line as necessary

- Close and lock the cabin door by pulling down hard on the door release/locking mechanism

· If more cabins are to be evacuated consider trailing evac rope and bermude with you as you ride down

· On haul rope, reattach #3 MGO behind grip

· Attach #1 Zip unit to in front of #2 tether and tighten top thumb screw for brake to prevent movement

· Move #3 to behind #2 , loosen the brake screw on the bottom and descend haul rope to next car

· If passing a tower, rescuer can attach an etrier onto the carriage of the sheave assembly or to the Zip Rescue unit to assist in ascending to the cat walk – there will be a hole on the arm of the assembly to attach the etrier

- Allow enough slack in #1 and 2 tethers to hoist yourself onto the catwalk

· Rescuers may elect to rappel/lower directly off the cabin anchor

PROCEDURES FOR GONDOLA CABLE RIDER ASSISTANT/BELAYER:

· Assist cable rider with harness

- Check all equipment

· Climb tower

· Set up anchors/belay as needed

· Help cable rider deploy onto haul rope – make sure brake works

· Belay as necessary

· Recover belay rope if necessary

· Descend tower and assist at first gondola as necessary

- Attach 10.5mm evacuation rope w/ Bermude seat harness

· Assist with lowering of guests

- Record guest names and confirm their safe evacuation from the slopes
- Let Lift Evacuation Leader know when assigned cabin is cleared

A-8 : PETZL Line Drawings
Figures 1-4



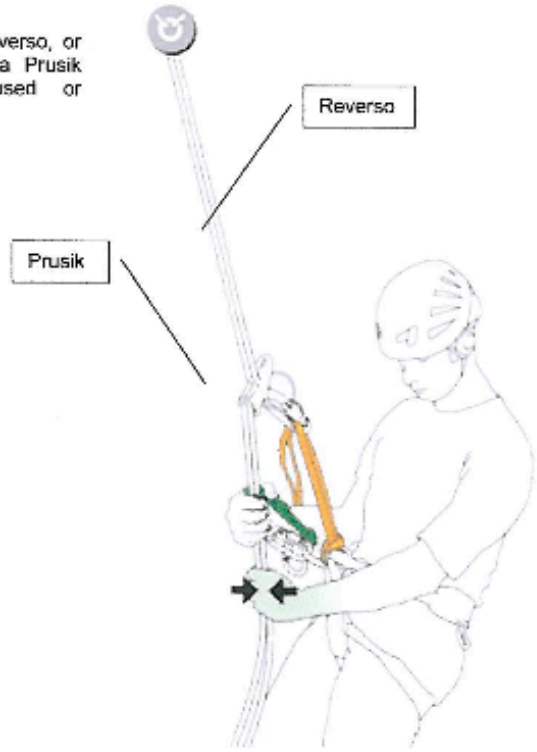
Figure 1:
Lowering with I'D in vertical plane from top anchor



Figure 2:
Lowering with I'D
from Ground Support

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Figure 3:
When rappelling or belaying with a Reverso, or comparable non self-braking device, a Prusik back-up (autoblock) should be used or incorporated.



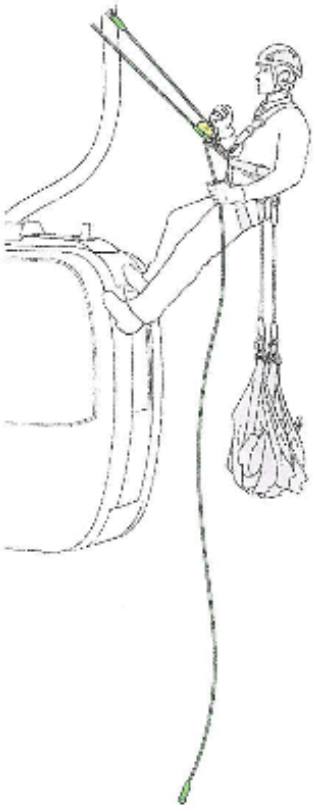


Figure 4:
Descending into the gondola cabin using Grillon MGO

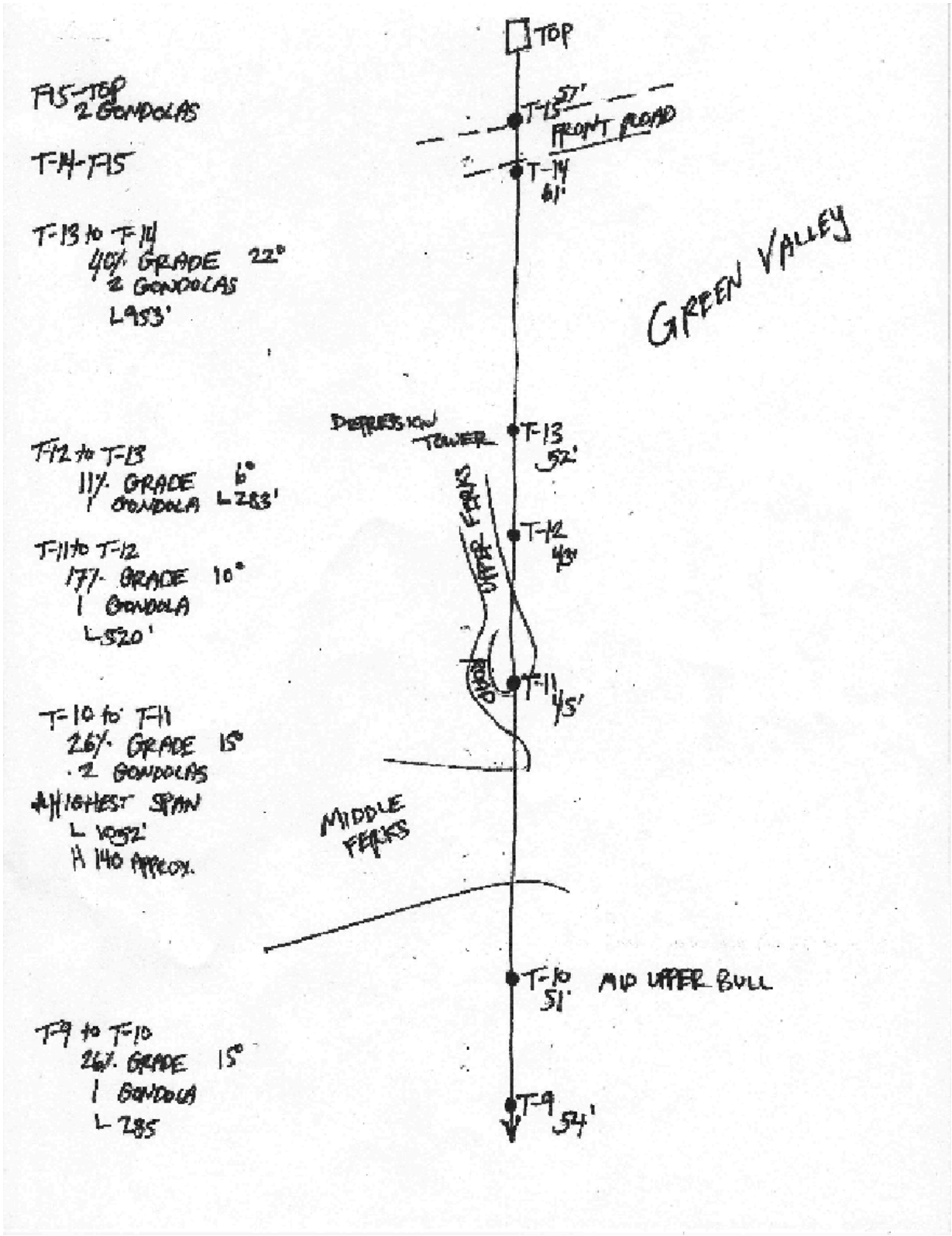
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Towers	# of cabins	height	Length*	steepness	comments
Top-15	2	57'		4 º	
15-14	2	61'		16 º	
14-13	4	61'	953'	22º	long span
13-12	2	52'	283'	6º	tower 13 - depression tower; more difficult to deploy onto
12-11	2	43'	520'	10º	
11-10	4	110'	1052'	15º	highest and longest span
10-9	2	51'	285'	15º	
9-8	2	54'	284'	23º	
8-7	2	48'	655'	34º	steepest span - belayed section
7-6	2	71'	970'	29º	belayed section, long span, T-7 very high
6-5	2	57'	580'	30º	belayed section- add 10º if car in span
5-4	2	57'	315'	30º	belayed section- add 10º if car in span
4-3	2	45'	679'	16º	tower 4 – depression tower; more difficult to deploy onto
3-2	2	43'	172'	20º	

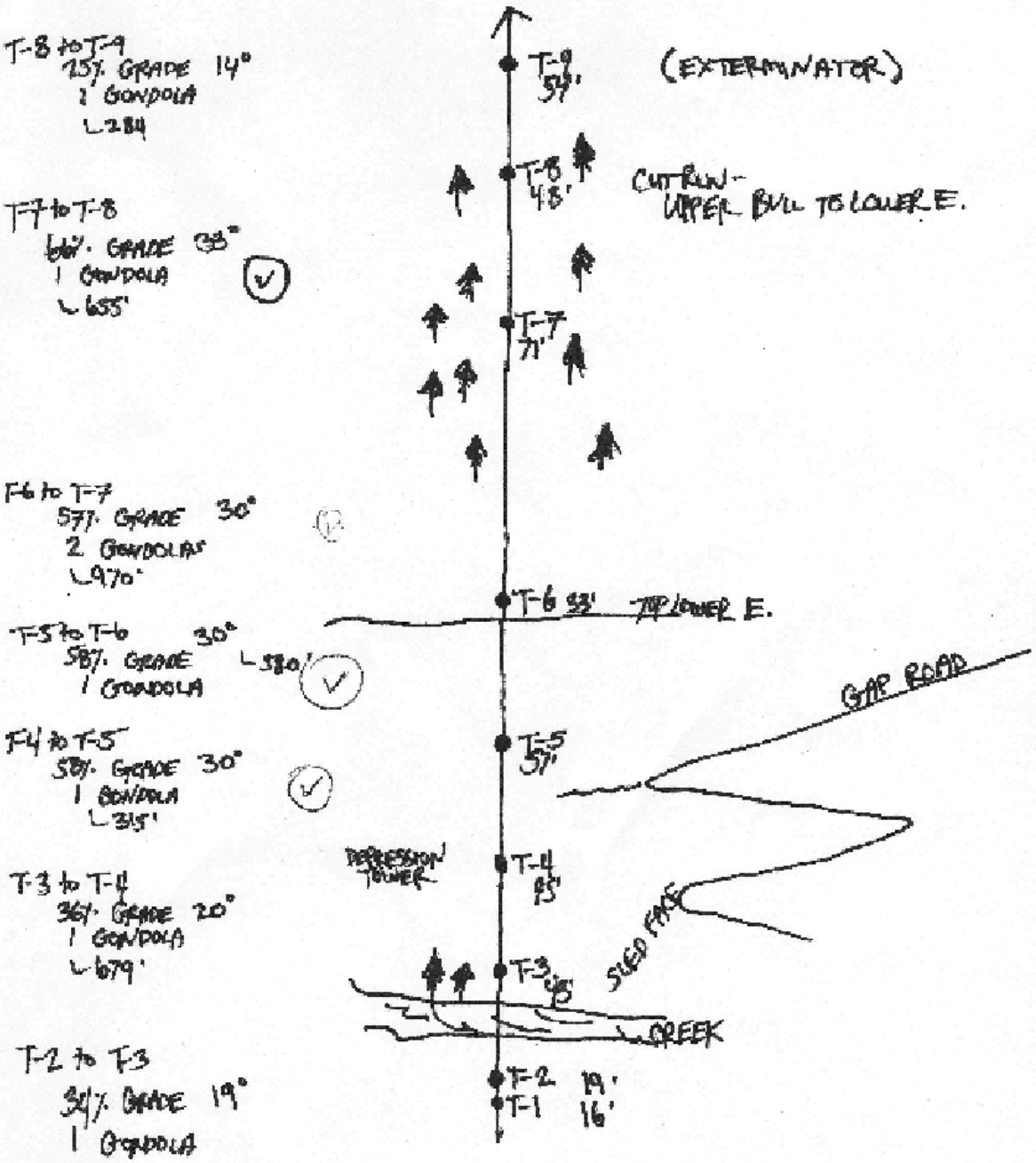
Distance between cabins with 17 cabins on line: 824’

Distance between cabins with 22 cabins on line: 636’ (sometime after mid-February 2011. This change will also affect how many cars could be between tower spans)

*Note: These distances are written as a reference for the length of belay between spans for the cable rider assistant/belayer.


TOP
T-15 57'
FRONT ROAD
T-14
61'
GREEN VALLEY
DEPRESSION TOWER
T-13
52'
UPPER FERRIS
T-12
43'
T-11
45'
MIDDLE FERRIS
T-10
51'
MID UPPER BULL
T-9
54'
T-15-TOP
2 GONDOLAS
T-14-T-15
T-13 to T-14
40% GRADE 22°
2 GONDOLAS
L 953'
T-12 to T-13
11% GRADE 6°
1 GONDOLA L 283'
T-11 to T-12
17% GRADE 10°
1 GONDOLA
L 520'
T-10 to T-11
26% GRADE 15°
2 GONDOLAS
HIGHEST SPAN
L 1092'
A 140 APPROX.
T-9 to T-10
26% GRADE 15°
1 GONDOLA
L 285

RAINIER GONDOLA



🟦 ROPE (Chapter 5)

Awareness

- **5.1.1** – Identify rope rescue hazards and operational considerations
- **5.1.2** – Recognize rope rescue equipment and system components
- **5.1.3** – Describe basic rope rescue concepts and safety practices
- **5.1.4** – Identify scene requirements for rope rescue operations

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Operations

- **5.2.1** – Inspect and maintain rope rescue equipment
- **5.2.2** – Tie and apply appropriate knots and hitches
- **5.2.3** – Construct anchor systems
- **5.2.4** – Evaluate anchor strength and placement
- **5.2.5** – Build single-point and multi-point anchor systems
- **5.2.6** – Select and use hardware (carabiners, pulleys, etc.)
- **5.2.7** – Construct rope rescue systems (mainline)
- **5.2.8** – Construct belay systems
- **5.2.9** – Apply edge protection
- **5.2.10** – Package a patient for rope rescue
- **5.2.11** – Attach patient to rope system
- **5.2.12** – Operate lowering systems
- **5.2.13** – Operate raising systems
- **5.2.14** – Transition between raising/lowering
- **5.2.15** – Build mechanical advantage systems
- **5.2.16** – Operate mechanical advantage systems
- **5.2.17** – Manage rope systems under load
- **5.2.18** – Conduct system safety checks

Technician

- **5.3.1** – Rescue a stranded or clinging victim in a high-angle environment
- **5.3.2** – Rescue a victim suspended from rope or fall protection
- **5.3.3** – Transfer a load between rope systems

- **5.3.4** – Perform high-angle litter operations
- **5.3.5** – Construct horizontal movement systems (highline/offset)
- **5.3.6** – Operate horizontal movement systems
- **5.3.7** – Climb and traverse structures or terrain using rope systems
- **5.3.8** – Interact with and manage a subject in crisis at height
- **5.3.9** – Ascend a fixed rope system
- **5.3.10** – Descend a rope system safely
- **5.3.11** – Escape from a failed or jammed descent device

🟫 STRUCTURAL COLLAPSE (Chapter 6)

Awareness

- **6.1.1** – Recognize collapse hazards and structural instability
- **6.1.2** – Identify types of collapse patterns
- **6.1.3** – Identify personal safety considerations

Operations

- **6.2.1** – Conduct size-up of collapse incidents
- **6.2.2** – Establish hazard zones and scene control
- **6.2.3** – Perform basic search operations
- **6.2.4** – Mark structures and search areas
- **6.2.5** – Identify and access void spaces
- **6.2.6** – Construct basic shoring systems
- **6.2.7** – Perform breaching (basic)
- **6.2.8** – Perform breaking operations
- **6.2.9** – Conduct heavy lifting operations
- **6.2.10** – Stabilize structures during rescue

Technician

- **6.3.1** – Design advanced shoring systems
- **6.3.2** – Construct complex shoring configurations
- **6.3.3** – Evaluate structural stability under load

- **6.3.4** – Perform advanced breaching operations
- **6.3.5** – Perform advanced breaking operations
- **6.3.6** – Create access in reinforced structures
- **6.3.7** – Plan and execute heavy lifting operations
- **6.3.8** – Stabilize loads during lifting operations
- **6.3.9** – Integrate lifting and shoring systems
- **6.3.10** – Access and operate within complex voids
- **6.3.11** – Conduct technical search operations
- **6.3.12** – Remove victims from confined voids
- **6.3.13** – Coordinate multi-step collapse rescue operations
- **6.3.14** – Manage hazards during extended operations
- **6.3.15** – Conduct full structural collapse rescue scenario

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🟧 CONFINED SPACE (Chapter 7)

Awareness

- **7.1.1** – Identify confined space hazards
- **7.1.2** – Recognize permit-required spaces
- **7.1.3** – Identify atmospheric hazards

Operations

- **7.2.1** – Perform confined space size-up
- **7.2.2** – Establish hazard control (LOTO)
- **7.2.3** – Monitor atmosphere
- **7.2.4** – Ventilate confined space
- **7.2.5** – Perform non-entry rescue
- **7.2.6** – Manage air supply systems
- **7.2.7** – Enter confined space safely
- **7.2.8** – Conduct victim assessment
- **7.2.9** – Remove victim from confined space
- **7.2.10–7.2.16** – Perform increasingly complex entry, packaging, and removal operations

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Technician

- **7.3.1** – Perform complex vertical confined space rescue
- **7.3.2** – Perform complex horizontal confined space rescue
- **7.3.3** – Package patient in restricted environment
- **7.3.4** – Manage air systems during extended rescue
- **7.3.5** – Integrate multiple rescue systems in confined space
- **7.3.6** – Conduct full confined space rescue scenario

🚗 **VEHICLE / HEAVY / MACHINERY (Condensed for usability)**

Vehicle Technician (8.3.x)

- **8.3.1–8.3.2** – Stabilize complex vehicle positions
- **8.3.3–8.3.5** – Perform advanced disentanglement
- **8.3.6–8.3.9** – Manage multi-patient and complex vehicle rescue scenarios

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Heavy Vehicle Technician (9.3.x)

- **9.3.1–9.3.3** – Stabilize and access heavy vehicles
- **9.3.4–9.3.5** – Perform disentanglement in large vehicle environments
- **9.3.6–9.3.7** – Conduct complex heavy vehicle rescue operations

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🟨 **TRENCH RESCUE – (CHAPTER 12)**

🟦 **Awareness (12.1.x)**

- **12.1.1 – Identify trench hazards and collapse risks**
- **12.1.2 – Recognize soil types and failure indicators**

🟧 **Operations (12.2.x)**

- **12.2.1 – Perform trench incident size-up**
- **12.2.2 – Establish hazard control zones and scene safety**
- **12.2.3 – Construct basic trench shoring systems**
- **12.2.4 – Stabilize trench walls to prevent collapse**
- **12.2.5 – Perform safe excavation around a victim**

- **12.2.6 – Package and remove a victim from a trench**

🔴 **Technician (12.3.x)**

(Note: Number of JPRs can vary slightly by edition, but this reflects the full technician scope you're training to)

- **12.3.1 – Design and construct advanced trench shoring systems**
- **12.3.2 – Install complex shoring in deep or unstable trenches**
- **12.3.3 – Stabilize intersecting or multiple trench systems**
- **12.3.4 – Coordinate excavation with shoring operations**
- **12.3.5 – Manage spoil piles and external loads affecting trench stability**
- **12.3.6 – Integrate heavy equipment safely into trench rescue**
- **12.3.7 – Perform victim access and removal in complex trench environments**
- **12.3.8 – Conduct full trench rescue operations with multiple hazards**

Machinery Technician (13.3.x)

- **13.3.1–13.3.2** – Control energy sources and stabilize machinery
- **13.3.3** – Perform disentanglement from machinery
- **13.3.4–13.3.5** – Conduct complex machinery rescue scenarios

NFPA 2021 1006 Chapter 4 Tower Rescue

4.1 Awareness Level.

Prior to qualification at the awareness level in tower rescue, the individual shall meet the requirements defined in Section 4.1.

4.1.1 * Perform the rescue of a person from a tower while working from ground ladders, aerial ladders, or other elevated devices employed by the AHJ, given an incident not requiring the rescuer to be solely supported by the tower, so that the patient is transferred from the tower to the elevated device, the agency's protocol for the use of the device is followed, and the risks to the victim and rescuer are minimized.

A.4.1.1 Agencies that have established practices for using conventional tools in the rescue of persons from an above grade environment should not be prevented by this standard from using those tools to perform a rescue from a tower. This job performance requirement is not meant to address rescues requiring rescuers to climb on or work from the tower itself, but rather it addresses the utilization of elevated devices to make external access to the patient for removal from the tower. Where this is possible, rescuers must utilize due caution to minimize fall hazards.

(A) Requisite Knowledge. Familiarization with the use of ladders or elevated devices and specific procedures for using them in victim transfer from a tower.

(B) Requisite Skills. Ability to work from or operate ladders or elevated devices capable of accessing and rescuing the tower victim and providing positive transfer from the tower to the aerial while providing fall protection for the victim and rescue personnel.

4.1.2 Size up a tower rescue incident, given background information and applicable reference materials, so that the scope of the 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, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.

(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process, and basic search criteria for tower rescue incidents.

(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

4.1.3 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.

(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.

(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

4.1.4 Recognize the need for technical rescue resources at an operations- or technical-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

4.1.5 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

4.2 Operations Level.

The job performance requirements defined in Sections 4.1, 4.2, 5.2, 5.3.9, 5.3.10, and 5.3.11shall be met prior to or during operations-level qualification in tower rescue.

4.2.1 Participate in a pre-rescue survey given a tower rescue preplan, the specific tower targeted in the preplan, an operations-level tower rescue tool kit, and a tower rescue team, so that the targeted elevation in the tower is attained using the tools and techniques designated for use during a rescue operation, all elements of the rescue plan are implemented, and the full scope of the plan is exercised.
(A) Requisite Knowledge. Tower preplan, contents, and use of the operations-level tower rescue tool kit and organizations' policies and procedures for operations tower rescue.
(B) Requisite Skills. Tower climbing to the designated height, selection, and transportation of designated tools.

4.2.2 Isolate and manage exposure to potentially harmful energy sources found in erected structures, including power systems such as mechanical, radio frequency (RF), and electrical hazards, given lock-out tag-out (LOTO) equipment and construction materials and PPE, so that all hazards are identified, systems are managed, beneficial system use is evaluated, and hazards to rescue personnel and victims are minimized.
(A) Requisite Knowledge. Types and uses of PPE, hazardous energy monitoring and testing equipment, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.
(B) Requisite Skills. The ability to select and use hazard-specific PPE, monitor and test equipment, identify hazards, operate beneficial systems in support of tactical objectives, operate

tools and devices for securing and disabling hazards, and engage in practices that minimize exposure to known or suspected hazards.

4.2.3 Assess the integrity of the tower structure and related components, given an incident, a preclimb checklist, and an unobstructed climb path so that safe access to the victim is assured, and ensure any integrated safety systems, such as vertical lifelines (e.g., cable or rail-type structure), are accessible.
(A) Requisite Knowledge. Types of structures within area of response, including self-supported, lattice-type, guyed, monopole, or nonstandard-type towers and potential structural compromise that would create additional hazards to rescuers.
(B) Requisite Skills. Perform physical inspection of accessible tower components in accordance with a preclimb checklist.

4.2.4 Recognize, identify, and utilize typical fall protection and work positioning equipment used by climbers, given a specific tower structure, so that the victim can be transferred to the rescue system.
(A) Requisite Knowledge. Review tower rescue preplan to gain familiarity with tower climber safety and work positioning equipment.
(B) Requisite Skills. Operate tower climber safety and work positioning equipment.

4.2.5 Perform an ascent using proper PPE and safe climbing technique equipment, given an incident, so that access to the level of the victim is achieved.
(A) Requisite Knowledge. Determine proper PPE given the type of tower structure and integrated temporary or permanent safety systems to perform safe climbing techniques.
(B) Requisite Skills. Don appropriate PPE, including but not limited to fall protection, helmet, and gloves as appropriate, and use 100 percent tie off or vertical lifeline equipment systems ascend the tower structure.

4.2.6 Perform transfer between the ladder or climbing peg safety system, given an incident, so that tie off is maintained, equipment is utilized, and procedures are followed as part of identified rescue plan.
(A) Requisite Knowledge. Familiarity with the engagement and disengagement procedures from vertical lifeline cable or rope grabs and the use of Y-lanyard and work positioning lanyards.
(B) Requisite Skills. Perform safe transfer between integrated vertical lifeline systems and climb and maneuver on the tower structure while maintaining tie off.

4.2.7 Access a victim in a tower environment according to the rescue preplan, given an incident, so that the risks from a fall are minimized or eliminated, the patient is accessed, and the objective is achieved.
(A) Requisite Knowledge. Tactics identified in the rescue preplan. An understanding of fall factors and methods for reducing them for a rescuer performing tower climbing operations.
(B) Requisite Skills. The ability to implement the tactics and employ the tools identified in the preplan to achieve the objective.

4.2.8 Perform the removal of a victim from a preplanned tower environment, given an incident, a rescue preplan, and a prescribed means of removal of the victim to the objective, so that risks to victims and rescuers are minimized, all the elements of the preplan are complied with, and the objective is achieved.

(A) Requisite Knowledge. Tactics identified in the rescue preplan for the removal of a victim on a tower.
(B) Requisite Skills. Employ tactics identified in the rescue preplan for the removal of a victim on a tower.

4.2.9 Direct a team in removal of a victim from a preplanned tower environment, given an incident, a rescue preplan, and a prescribed means of removal of the victim to the objective, so that risks to victims and rescuers are minimized, all the elements of the preplan are complied with, and the objective is achieved.
(A) Requisite Knowledge. Tactics identified in the rescue preplan for the removal of a victim on a tower.
(B) Requisite Skills. Direct the employment of tactics identified in the rescue preplan for the removal of a victim on a tower.

4.2.10 Develop and adhere to contingency plans for when inclement weather or other factors make operations-level response ineffective or dangerous to rescuers, given an incident, so that a risk/benefit decision can be made.
(A) Requisite Knowledge. AHJ policies and procedures, risk versus benefit analysis application, site safety and hazard control techniques, and pre-incident rescue action planning.
(B) Requisite Skills. Apply policies and protocols, risk versus benefit analysis information, and pre-incident planning data, risk management, and site safety control techniques.

4.2.11 * Terminate an incident, given PPE specific to the incident, isolation barriers, and tool kit, so that rescuers and bystanders are protected and accounted for during termination operations, the party responsible is notified of any modification or damage created during the operational period, documentation of loss or material use is accounted for, scene documentation is performed, scene control is transferred to a responsible party, potential or existing hazards are communicated to that responsible party, debriefing and post incident analysis and critique are considered, and command is terminated.
A.4.2.11 *The committee recognizes that due to incident complexity, technician-level skills might be required to terminate some incidents. Examples would be complex stabilization issues, multiple concurrent hazards, industrial processes involved, presence of fatalities or multiple injuries, or chemical releases.*
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.
(B) Requisite Skills. Selection and use of hazard-specific PPE, decontamination, barrier protection techniques, data collection and record-keeping/reporting protocols, and post-incident analysis activities.

4.3 Technician Level.

The job performance requirements defined in Sections 4.2 and 4.3 shall be met prior to or during technician-level qualification in tower rescue.

4.3.1 Direct a tower rescue team, given a tower rescue scenario, incident action plan, pre-incident plan data, and resources from the tower rescue tool kit, so that resources are deployed to best advantage, the incident action plan is supported, and objectives are attained.

(A) Requisite Knowledge. AHJ policies and procedures, incident management, site safety and hazard control techniques, and preplan usage.
(B) Requisite Skills. Interpret and apply policies and protocols, initiate and operate within the IMS, situational awareness, interpret and apply pre-incident planning data, risk management, and site safety control techniques.

4.3.2 * Develop an incident action plan for a tower rescue incident on a structure whose size, shape, or configuration would accommodate only one rescuer, given a tower rescue scenario, so that a climbing path plan is established, hazardous energy sources are identified and managed, fall protection is maintained throughout the event, anchor points are identified and utilized to best advantage, and the incident action plan objectives are met.
A.4.2.11 *The committee recognizes that due to incident complexity, technician-level skills might be required to terminate some incidents. Examples would be complex stabilization issues, multiple concurrent hazards, industrial processes involved, presence of fatalities or multiple injuries, or chemical releases.*
(A) Requisite Knowledge. AHJ policies and procedures, data gathering and collection methods, climbing plan elements, anchor point identification and construction methods, hazardous energy source recognition, identification and control methods, free climb ascent and descent techniques, and fall protection methods.
(B) Requisite Skills. Size-up and assessment, hazard identification and control, identification and control of hazardous energy sources, use of monitoring equipment to detect hazardous energy sources, construction of anchor and belay systems, and selection of PPE and other resources from the tower rescue tool kit.

4.3.3 * Ascend a simulated or actual tower to conduct a rescue, given an incident action plan and a preclimb checklist, so that the preclimb checklist and hazard control measures are implemented; fall protection systems are utilized; and the rescuer moves both horizontally and vertically between structural elements of the tower, with or without the benefit of climbing pegs, ladders, or vertical lifelines, to achieve the objectives of the incident action plan.
A.4.3.3 It is the intent of the committee that the distances traveled to demonstrate competency for this JPR be reasonable and not present undue risk to either the candidate or evaluator(s) yet still present a sufficiently challenging obstacle to overcome.
(A) Requisite Knowledge. Incident action plan, preclimb checklist, identification of site-specific tower features and components, type- and hazard-specific PPE selection, and climbing plan.
(B) Requisite Skills. Use of incident action plans, development and use of preclimbing checklists and site safety plans, types of fall protection and lifeline systems, tower anatomy and features, climbing techniques and methods.

4.3.4 Perform a ground-based tower rescue requiring the rescue of a suspended victim from an elevated position, given an incident action plan, climbing plan, hazard-specific PPE, and resources from the tower rescue tool kit, so that the victim is released/transferred from an existing fall arrest system to one created by the rescuer, and the victim is moved both horizontally and vertically a distance representative of the rescue environment.
(A) Requisite Knowledge. Incident action plan, hazard and risk assessment, climbing plan elements, PPE selection and use, types of fall protection systems, fall protection system transfer procedures, and horizontal and vertical movement methods.
(B) Requisite Skills. Scene assessment, hazard control techniques, PPE use and application, fall protection system operation, horizontal and vertical climbing and movement techniques.

4.3.5 Perform a rescue requiring the rescue of a victim suspended from a tower at a height beyond the scope of a ground-based rope rescue system, given an incident action plan, climbing plan, hazard-specific PPE, and resources from the tower rescue tool kit, so that the victim is transferred to the rescue system and is moved both horizontally and vertically a distance representative of the rescue environment.
(A) Requisite Knowledge. Incident action plan, hazard and risk assessment, climbing plan elements, PPE selection and use, types of fall protection systems, fall protection system transfer procedures, and horizontal and vertical movement methods.
(B) Requisite Skills. Scene assessment, hazard control techniques, PPE use and application, fall protection system operation, horizontal and vertical climbing and movement techniques, and tower-based rescue techniques.

4.3.6 Perform a lowering operation of a victim from a tower or elevated structure where the travel path or height of the objective requires the establishment of multiple sets of sequential rope systems, given a tower rescue scenario and a tower rescue tool kit, so that the victim is protected from a fall, rope movement is managed without entanglement, and the objective is achieved.
(A) Requisite Knowledge. Incident action plan, hazard and risk assessment, climbing plan elements, PPE selection and use, types of fall protection systems, fall protection system transfer procedures, and horizontal and vertical movement methods.
(B) Requisite Skills. Scene assessment, hazard control techniques, PPE use and application, fall protection system operation, horizontal and vertical climbing and movement techniques, and multi-pitch tower-based rescue techniques.

NFPA 2021 1006 Chapter 5 Rope Rescue

5.1 Awareness Level.

Prior to qualification at the awareness level in rope rescue, the individual shall meet the requirements defined in Section 5.1.

5.1.1 Assist a team in operation of the haul line of a rope mechanical advantage system raising operation, given rescue personnel, an established rope rescue system, a load to be moved, and an anchor system, so that the movement is controlled; a reset is accomplished; the load can be held in place when needed; commands are followed in direction of the operation; and potential problems are identified, communicated, and managed.
(A) Requisite Knowledge. Principles of mechanical advantage, operation of a haul line in a raising operation, personnel assignments, and operational commands.
(B) Requisite Skills. The ability to recognize operational commands and identify safety concerns during raising operations.

5.1.2 Size up a rope rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the

size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for rope rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

5.1.3 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

5.1.4 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

5.1.5 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

5.2 Operations Level.

The job performance requirements defined in Sections 5.1 and 5.2 shall be met prior to or during operations-level qualification in rope rescue.
5.2.1 Perform size up of a rescue incident, given background information and applicable reference materials, 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.

(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an action plan and related information, relationship of size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, relay information, and use information gathering sources.

5.2.2 * Maintain hazard-specific PPE, given clothing or equipment for the protection of the rescuers, inspection procedures, cleaning and sanitation supplies, maintenance logs or records, and such tools and resources as are indicated by the manufacturer's guidelines for assembly or disassembly of components during repair or maintenance, so that 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.
A.5.2.2 Technical rescuers should limit their activities in this section to field-level maintenance only. Field-level maintenance generally describes those procedures performed on a given piece of equipment that does not require disassembly, repair, or component replacement except where provided for in manufacturers' user instructions. Where it is recognized that many agencies perform their own maintenance and repair of equipment based on manufacturers' technical training, this capability is beyond that of the technical rescuer and not addressed within the scope of this standard.
(A) Requisite Knowledge. Functions, construction, and operation of PPE; use of record-keeping systems of the AHJ; requirements and procedures for cleaning, sanitizing, and infectious disease control; use of provided assembly and disassembly tools; manufacturer and department recommendations; pre-use inspection procedures; and ways to determine operational readiness.
(B) Requisite Skills. The ability to identify wear and damage indicators for PPE; evaluate operational readiness of PPE; complete logs and records; use cleaning equipment, supplies, and reference materials; and select and use tools specific to the task.

5.2.3 * Maintain rescue equipment, 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, so that 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.
A.5.2.3 Rescue equipment should be inspected and maintained in accordance with manufacturers' recommendations, and inspection and maintenance should be recorded in an appropriate record-keeping system. Technical rescuers should be capable of establishing a schedule of inspection and maintenance requirements for all rescue-specific equipment in their inventory to ensure operational readiness and have these activities documented in an appropriate manner as determined by the AHJ.
(A) Requisite Knowledge. Functions and operations of rescue equipment, use of record-keeping systems, manufacturer and organizational care and maintenance requirements, selection and use of maintenance tools, replacement protocol and procedures, disposal methods, and organizational standard operating procedures.
(B) Requisite Skills. The ability to identify wear and damage indicators for rescue equipment, evaluate operation readiness of equipment, complete logs and records, and select and use maintenance tools.

5.2.4 * Demonstrate knots, bends, and hitches, given ropes, webbing, and a list of knots used by the agency, so that the knots are dressed, recognizable, and backed up as required.
A.5.2.4 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. Knot efficiency, knot utilization, rope construction, and rope terminology.
(B) Requisite Skills. The ability to tie representative knots, bends, or hitches for the following purposes: (1) End-of-line loop
(2) Midline loop
(3) Securing rope around desired objects
(4) Joining rope or webbing ends together
(5) Gripping rope

5.2.5 Construct a single-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, 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.
(A) Requisite Knowledge. Application of knots, rigging principles, anchor selection criteria, system safety check procedures, rope construction, and rope rescue equipment applications and limitations.
(B) Requisite Skills. The ability to select rope and equipment; tie knots; rig systems; evaluate anchor points for required strength, location, and surface contour; and perform a system safety check.

5.2.6 Construct a multiple-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, the system strength meets or exceeds the expected load and does not interfere with rescue operations, equipment is visually inspected prior to being put in service, the most appropriate anchor points are chosen, the anchor system is system safety checked prior to being placed into service, the integrity of the system is maintained throughout the operation, and the force will be distributed — proportionally or disproportionally — between more than one anchor point.
(A) * Requisite Knowledge. Relationship of angles to forces created in the rigging of multiple-point anchor systems, safety issues in choosing anchor points, system safety check methods that allow for visual and physical assessment of system components, methods to evaluate the system during operations, integrity concerns, weight distribution issues and methods, knots and applications, selection and inspection criteria for hardware and software, formulas needed to calculate safety factors for load distribution, and the concepts of static loads versus dynamic loads.
A.5.2.6(A) For the purposes of this document, the term static loads relates to forces applied within a system when the load is not moving. The term dynamic loads is intended to address

those forces created by moving loads as well as those caused by the sudden cessation of that movement (shock loads).
With reference to the relationship between angles and force within multiple-point anchor systems: When a rope (web) is connected between two anchor points and a load placed in between, an angle is formed. This interior angle acts as a force multiplier. As the angle increases, the force directed along the rope (web) is amplified, increasing the force felt on the anchors. For example, at 120 degrees, the force on each anchor is equivalent to the load. As the angle continues to increase, the force on each anchor rapidly increases [see Table A.5.2.6(A) and Figure A.5.2.6(A)].
In Table A.5.2.6(A), assume a load mass of 200 lb (91 kg) creating a force of approximately 200 lbf (0.89 kN) at the point of attachment. ***SEE PICTURE IN TABLE***
(B) Requisite Skills. The ability to determine incident needs as related to choosing anchor systems, select effective knots, determine expected loads, evaluate incident operations as related to interference concerns and setup, choose anchor points, perform a system safety check, and evaluate system components for compromised integrity.

5.2.7 Conduct a system safety check, given a rope rescue system and rescue personnel, 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.
(A) Requisite Knowledge. System safety check procedures, construction and operation of rope rescue systems and their individual components, use of PPE, equipment inspection criteria, signs of equipment damage, principles of rigging, and equipment replacement criteria.
(B) Requisite Skills. The ability to apply and use PPE, inspect rope rescue system components for damage, assess a rope rescue system for configuration, secure equipment components, inspect all rigging, and perform a system safety check.

5.2.8 Place edge protection, given life safety rope or webbing traversing a sharp or abrasive edge, edge protection, and other auxiliary rope rescue equipment, 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.
(A) Requisite Knowledge. Materials and devices that can be used to protect ropes or webbing from sharp or abrasive edges, fall protection measures, dangers associated with sharp or abrasive edges, and methods for negotiation of sharp or abrasive edges.
(B) Requisite Skills. The ability to select protective devices for rope and webbing, protect personnel from falls while working near edges, secure edge protection, and secure ropes or webbing in a specific location.

5.2.9 * Construct a system intended to provide belay within a single- or two-tensioned rope system, given life safety rope, anchor systems, PPE, and rope rescue equipment, so that the system is capable of arresting a fall, 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 belay operator is not rigged into the equipment components of the system, and the system is suitable to the site and is connected to an anchor system and the load.
A.5.2.9 Belay systems are a component of single-tensioned rope systems that apply a tensioned main system on which the entire load is suspended and a nontensioned system with minimal slack (i.e., belay) designed, constructed, and operated to arrest a falling load in the event of a main system malfunction or failure. While these traditional systems used for lowering

and raising are in common use, two-tensioned rope systems can also be used to suspend the load while maintaining near equal tension on each rope, theoretically reducing the fall distance and shock force in the event of a singular rope failure. To be effective, two-tensioned rope systems must utilize devices that will compensate appropriately for the immediate transfer of additional force associated with such failures.
This document is not intended to limit a rescue team to the use of either a single- or two-tensioned rope system, because either can be utilized in rope-based lowering or mechanical advantage systems. In either case, redundancy is important to compensate for potential system equipment or operational failures.
(A) Requisite Knowledge. Principles of belay systems, capabilities and limitations of various devices used to provide belay, application of knots, rigging principles, and system safety check procedures.
(B) Requisite Skills. The ability to select a system, tie knots, perform rigging, attach to anchor system and load, don and use hazard-specific PPE, and perform a system safety check.

5.2.10 Operate a system intended to provide belay within a single- or two-tensioned rope system during a lowering or raising operation, given an operating lowering or raising mechanical advantage system, a specified minimum travel distance for the load, a system, and a load, so that the potential fall factor is minimized, the belay is not actuated during normal lowering and raising operations, the belay system is prepared for actuation at all times during the operation, the belay operator is attentive at all times during the operation, the load's position is continually monitored, and the belay operator moves rope through the belay device as designed.
(A) Requisite Knowledge. Application and use of belay devices, proper operation of systems in conjunction with normal lowering and raising operations, and operational commands.
(B) Requisite Skills. The ability to tend a belay device as designed, tie approved knots, assess system effectiveness, properly attach a rope to a belay device, don and use hazard-specific PPE, perform a system safety check, and manage and communicate belay system status effectively.

5.2.11 * Belay a falling load in a high-angle environment, given a belay and a failed line creating a dropped load, 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 device as designed, and the belay operator is not injured or otherwise incapacitated during actuation of the belay system.
A.5.2.11 The intent of the JPR is to assess the ability of the rescuer to arrest a falling load effectively, whether within a single- or two-tensioned rope system. This can be accomplished by having a person perform a hard, unexpected jerk on the distal end of the belay system or other methods to simulate the sudden addition of force due to a system failure. Testing methods should not include the use of people or persons as live loads.
(A) Requisite Knowledge. Application and use of belay devices, effective emergency operation of belay devices to arrest falls, use of PPE, and operating procedures.
(B) Requisite Skills. The ability to operate a belay system as designed, tie approved knots, use hazard-specific PPE, recognize and arrest a falling load, and communicate belay system actuation.

5.2.12 Construct a fixed rope system, given an anchor system, a life safety rope, and rope rescue equipment, 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.

(A) Requisite Knowledge. Knot selection, calculating expected loads, incident evaluation operations as related to interference concerns and setup, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.
(B) Requisite Skills. The ability to select effective knots, calculate expected loads, use rigging principles, evaluate incident operations as related to interference concerns and setup, perform a system safety check, and evaluate system components for compromised integrity.

5.2.13 Construct a lowering system, given an anchor system, life safety rope(s), descent control device, and auxiliary rope rescue equipment, 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.
(A) Requisite Knowledge. Capabilities and limitations of various descent control devices, capabilities and limitations of various lowering systems, application of knots, rigging principles, and system safety check procedures.
(B) Requisite Skills. The ability to tie knots; perform rigging; attach to descent control device, anchor system, and load; and perform a system safety check.

5.2.14 * Direct a lowering operation in a high-angle environment, given rescue personnel, an established lowering system, a specified minimum travel distance for the load, and a load to be moved, so that 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, rope commands are used to direct the operation, and potential problems are identified, communicated, and managed.
A.5.2.14 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, descent control). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle raising operation might be 30 ft to 50 ft (9.15 m to 15.25 m), while the minimum for the wilderness/cave environment might be considerably more at 10 ft to 20 ft (3.05 m to 6.1 m).
(A) Requisite Knowledge. Application and use of descent control devices, capabilities and limitations of various lowering systems in a high-angle environment, operation of lowering systems in a highangle environment, personnel assignments, and operational commands.
(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the load in a high-angle environment, identify safety concerns in a high-angle environment, and perform a system safety check.

5.2.15 Construct a simple rope mechanical advantage system, given life safety rope, carabiners, pulleys, rope grab devices, and auxiliary rope rescue equipment, so that the system constructed can accommodate the load, is efficient, and is connected to an anchor system and the load.
(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems, application of knots, rigging principles, and system safety check procedures.
(B) Requisite Skills. The ability to select rope and equipment, tie knots, choose and rig systems, attach the mechanical advantage system to the anchor system and load, and perform a system safety check.

5.2.16 * Direct a team in the operation of a simple rope mechanical advantage system in a high-angle raising operation, given rescue personnel, an established rope rescue system incorporating a simple rope mechanical advantage system, a specified minimum travel distance for the load, a load to be moved, and an anchor system, so that 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 operation, and potential problems are identified, communicated, and managed.

A.5.2.16 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle raising operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems and high-angle raising operations, correct operation of simple rope mechanical advantage systems, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel effectively, use operational commands, analyze system efficiency, identify safety concerns, and perform a system safety check.

5.2.17 Construct a compound rope mechanical advantage system, given a load, an anchor system, life safety rope, carabiners, pulleys, rope grab devices, and rope rescue equipment, 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, and the system is connected to an anchor system and the load.

(A) Requisite Knowledge. Determination of incident needs as related to choosing compound rope systems, the elements of efficient design for compound rope systems, knot selection, methods for reducing excessive force to system components, evaluation of incident operations as related to interference concerns and setups, rope commands, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.

(B) Requisite Skills. The ability to determine incident needs as related to choosing compound rope systems, select effective knots, calculate expected loads, evaluate incident operations as related to interference concerns and setups, perform a system safety check, and evaluate system components for compromised integrity.

5.2.18 * Direct the operation of a compound rope mechanical advantage system in a high-angle environment, given a rope rescue system incorporating a compound rope mechanical advantage system and a load to be moved, and a specified minimum travel distance for the load, so that a system safety check is performed; 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.

A.5.2.18 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill. For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment

for descending a fixed rope system might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Methods to determine incident needs, types of interference concerns, rope commands, system safety check protocol, procedures for continued evaluation of system components for compromised integrity, common personnel assignments and duties, common commands, methods for controlling a load's movement, system stress issues during operations, and management methods for common problems.

(B) Requisite Skills. The ability to determine incident needs, evaluate incident operations as related to interference concerns, complete a system safety check, continually evaluate system components for compromised integrity, direct personnel effectively, communicate commands, analyze system efficiency, manage load movement, and identify concerns.

5.2.19 Negotiate an edge while attached to a rope rescue system during a high-angle lowering and raising operation, 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, 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.

(A) Requisite Knowledge. Techniques and practices for negotiating existing projections and edges along the travel path while suspended from operating rope-based lowering and raising mechanical advantage systems and common hazards imposed by those projections and edges.

(B) Requisite Skills. The ability to select and use rescuer harness and PPE for common environments, attach the life safety harness to the rope rescue system, maneuver across existing projections and an edge along the travel path, and evaluate surroundings for potential hazards.

5.2.20 Prepare for transfer of victims, given diagnostic and packaging equipment and an actual or simulated EMS agency, so that rescuers and victims are protected from hazards, victim injuries or illnesses are managed, and victims are delivered to the EMS provider with information regarding the history of the rescue activity and victim conditions.

(A) Requisite Knowledge. Victim and scene assessment methods; victim treatment, immobilization, and packaging methods; and medical information management and communication methods.

(B) Requisite Skills. The ability to use victim immobilization, packaging, and treatment methods appropriate to the situation and provide victim transfer reports, both verbally and in written format.

5.2.21 Direct a litter-lowering and litter-raising operation in a low-angle environment, given rescue personnel, litter tender(s), an established lowering/mechanical advantage system, a specified minimum travel distance for the load and a victim packaged in a litter to be moved, 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.

(A) Requisite Knowledge. Application and use of lowering and mechanical advantage system in the low-angle environment, capabilities and limitations of various lowering and mechanical advantage systems in a low-angle environment, litter tender functions and limitations in the

low-angle environment, management of a litter in a low-angle environment during raises and lowers, personnel assignments, and operational commands.
(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the litter in a high-angle environment, identify safety concerns in a low-angle litter operation, and perform a system safety check.

5.2.22 * Operate as a litter tender in a low-angle lowering or raising operation, 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, 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.
A.5.2.22 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a low-angle lowering or raising operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).
(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses, PPE selection criteria, variations in litter design and intended purpose, low-angle litter attachment principles, techniques and practices for low-angle environments, and common hazards imposed by the terrain.
(B) Requisite Skills. The ability to select and use rescuer harness and PPE for common environments, attach the life safety harness to the rope rescue system, maneuver across the terrain, manage the litter while suspended from the rope rescue system, and evaluate surroundings for potential hazards.

5.2.23 * Direct a litter-lowering or litter-raising operation in a high-angle environment, 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, so that the litter is attached to the lowering/raising and belay systems, an edge is negotiated during a lower and raise; tag lines 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.
A.5.2.23 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, descent control). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle lowering operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).
(A) Requisite Knowledge. Application and use of lowering and mechanical advantage system in the high-angle environment, capabilities and limitations of various lowering and mechanical advantage systems in a high-angle environment, use of tag lines for management of litter

position during high-angle lowers and raises, personnel assignments, and operational commands.
(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the litter in a high-angle environment, identify safety concerns in a high-angle environment, and perform a system safety check.

5.2.24 * Terminate a technical rescue operation, given an incident scenario, assigned resources, and site safety data, 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, record keeping and documentation occur, and post event analysis is conducted.
A.5.2.24 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. Incident Command functions and resources, hazard identification and risk management strategies, logistics and resource management, personnel accountability systems, and AHJ-specific procedures or protocols related to personnel rehab.
(B) Requisite Skills. Hazard recognition, risk analysis, use of site control equipment and methods, use of data collection and management systems, and use of asset and personnel tracking systems.

5.3 Technician Level.

The job performance requirements defined in Sections 5.2 and 5.3 shall be met prior to or during technician-level qualification in rope rescue.

5.3.1 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*, 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, 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 and brought to a safe area for transfer to EMS.
(A) Requisite Knowledge. Techniques and systems for safe transfer of stranded victims from a natural or man feature, various techniques for handling stranded victims without inducing a fall.
(B) Requisite Skills. Select and construct systems for rapid removal of stranded victims from natural or manmade features, manage operation of the selected system, determine condition of the stranded victim, reduce hazards for rescuers and victims, and determine specialized equipment needs for victim movement.

5.3.2 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*, given a victim *suspended by a harness attached to anchored rope or webbing*, systems for removal of the victim from the rope or webbing, and a means of removal of the victim to the ground or other safe area, 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, and the victim is brought to a safe area for transfer to EMS.
(A) * Requisite Knowledge. Techniques and systems for safe transfer of suspended victims from an existing anchored rope or webbing to a rope rescue system, various techniques for handling suspended victims, and principles of suspension-induced injuries.
A.5.3.2(A) The urgency of performing transfers of patients suspended from fall protection lanyards (pick offs) has received much attention due to increased awareness of the profound effects and rapid onset of suspension induced shock syndrome. Rescuers should recognize the need for rapid removal of persons from these potentially life-threatening situations.
(B) Requisite Skills. Select and construct systems for rapid removal of victims from lanyards or rope or webbing, manage operation of the selected system, determine condition of the suspended victim, reduce hazards for rescuers and victims, and determine specialized equipment needs for victim movement.

5.3.3 * While suspended from a rope rescue system, perform the transfer of a victim suspended from rope or webbing in a high-angle environment to a separate rope rescue lowering or mechanical advantage system, given a rope rescue system, a specified minimum travel distance for the victim, victim transfer systems, and specialized equipment necessary for the environment, so that risks to victims and rescuers are minimized, undesirable victim movement during the transfer is minimized, the means of attachment to the rope rescue system is maintained, 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.
A.5.3.3 This statement is intended to require individual rescuers to perform connections or procedures necessary for completion of a victim transfer while suspended from the rope rescue system in coordination with team operations. The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for moving a victim with a rope system might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).
(A) Requisite Knowledge. Task-specific selection criteria for victim transfer systems, various physical and psychological victim management techniques, PPE selection criteria, design characteristics and intended purpose of various transfer systems, rigging principles, cause and effects of suspension-induced injuries, methods to minimize common environmental hazards, and hazards created in high-angle environments.
(B) Requisite Skills. The ability to choose victim transfer systems, select and use PPE appropriate to the conditions, perform a transfer of the victim from a static line to the lowering or mechanical advantage system, reduce hazards for rescuers and victims, and determine specialized equipment needs for victim movement.

5.3.4 * Perform the activities of a litter tender in a high-angle lowering or raising operation, 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, 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.

A.5.3.4 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle lowering or raising operation might be 10 ft to 20 ft (3.05 m to 6.1 m) while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses, PPE selection criteria, variations in litter design and intended purpose, high-angle litter attachment principles, techniques and practices for high-angle environments, and common hazards imposed by the various structures and terrain.
(B) Requisite Skills. The ability to select and use rescuer harness and PPE for common environments, attach the life safety harness to the rope rescue system, maneuver the litter past obstacles or natural structural features, manage the litter while attached to the rope rescue system, and evaluate surroundings for potential hazards.

5.3.5 * Participate as a member of a team in the construction of a rope rescue system intended to move a suspended rescue load along a horizontal path to avoid an obstacle, given rescue personnel, life safety rope, rope rescue equipment, and a suitable anchor capable of supporting the load, 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 on the load is efficient; and loads can be held in place or moved with minimal effort over the required distance.
A.5.3.5 This JPR is intended to include, but is not restricted to, systems such as high lines, two-rope offsets, deflection, tracking, and guiding lines. A rope or similar line that is connected directly to the load being raised or lowered (often referred to as a tag line), and effectively managed by a rescuer to pull the load out and away from simple inline projections or obstructions, is not intended to be a technician-level function.
(A) Requisite Knowledge. Determination of incident needs as related to operation of a system, capabilities and limitations of various systems (including capacity ratings), methods for limiting excessive force to system components, incident site evaluation as related to interference concerns and obstacle negotiation, rigging principles, system safety check protocol, common personnel assignments and duties, common and critical operational commands, and common problems and ways to minimize these problems during construction.
(B) Requisite Skills. The ability to determine incident needs as related to construction of a system, evaluate an incident site as related to interference concerns and setup, identify the obstacles or voids to be negotiated, select a system for defined task, perform system safety checks, use rigging principles that will limit excessive force to system components, and communicate with personnel effectively.

5.3.6 * Direct a team in the operation of a rope system to move a suspended rescue load along a horizontal path, given rescue personnel, an established system, a target for the load, a load to be moved, and PPE, so that the movement is controlled; the load is held in place when needed; operating methods do not stress the system to the point of failure; personnel assignments are made; tasks are communicated; and potential problems are identified, communicated, and managed.

A.5.3.6 This JPR is intended to include, but is not restricted to, systems such as high lines, two-rope offsets, deflection, tracking, and guiding lines. A rope or similar line that is connected directly to the load being raised or lowered (often referred to as a tag line), and effectively managed by a rescuer to pull the load out and away from simple inline projections or obstructions, is not intended to be a technician-level function.

(A) Requisite Knowledge. Determination of incident needs as related to the operation of a system, capabilities and limitations of various systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, common and critical operational commands, common problems and ways to minimize or manage those problems, and ways to increase the efficiency of load movement.

(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel effectively, manage movement of the load, and evaluate for any potential problems.

5.3.7 Climb and traverse natural features or man-made structures that require the use of climbing aids, positioning equipment, or fall protection systems to prevent the fall or unwanted movement of the rescuer, given the equipment used by the agency, and a task that reflects the anticipated rescue environment so that the objective is achieved, the rescuer can perform the required task, and fall protection is maintained.

(A) * Requisite Knowledge. The application and limitations of climbing, positioning, and fall protection systems and equipment commensurate with the organization's needs.

A.5.3.7(A) Equipment of this type can include, but is not limited to, travel limiters, flip lines, buck off straps, climbing lanyards, and lead climb slings.

(B) Requisite Skills. The ability to climb vertical or near-vertical paths using the surfaces provided by the environment or climbing aids used by the agency and the use of positioning equipment to support the weight of the rescuer in a vertical or near-vertical environment permitting the rescuer to perform a task.

5.3.8 * Interact with a person at height who is in an emotional or psychological crisis given an environment consistent with the mission of the agency, the policies and procedures of the organization, and a person in a crisis scenario 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.

A.5.3.8 These incidents are most commonly associated with persons who wish to harm themselves or attract attention by jumping, or threatening to jump, from high places. It is recognized that until the subject has an expressed or implied desire to be removed or rescued that these incidents are primarily a law enforcement or public health issue and as such should be managed by agencies that have been identified as having responsibility for these incidents. If the AHJ does not provide these services directly, the AHJ should have a list of resources equipped with the necessary training and expertise to assist with managing people in emotional or psychological crisis. However, the position and location of the subject can make it difficult to determine the state of mind of the subject until a rescuer can access them, placing the rescuer in the position of performing the initial assessment of the mental and emotional state of the subject. All members of the team who might be expected to perform initial contact with the subject should have basic training in recognizing people in crisis and have the necessary skills to protect themselves and, when possible, prevent the situation from degrading.

(A) Requisite Knowledge. Indicators of a person in emotional crisis, typical triggers that can cause individuals to become agitated or anxious, methods of interacting to prevent harm to the rescuer and the subject, and best practices to de-escalate incidents involving persons in crisis.
(B) Requisite Skills. Methods of approach that minimize the risk to the rescuer from subjects whose psychological or emotional state is unknown, interview techniques that provide insight to the motives and state of mind of the subject, and communicating and interacting with the subject in a manner that does not escalate the incident.

5.3.9 * Ascend a fixed rope in a high-angle environment, 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, so that the person ascending is secured to the fixed rope in a manner that will not allow him or her 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 his or her harness, the system will not be stressed to the point of failure, the person ascending can convert his or her ascending system to a descending system, obstacles are negotiated, the system is suitable for the site, and the objective is reached.
A.5.3.9 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a raising operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).
(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses and systems for ascending a fixed rope, PPE selection criteria, design and intended purpose of ascent control devices utilized, rigging principles, techniques for high-angle environments, converting ascending systems to descending systems, and common hazards posed by maneuvering and harnessing.
(B) Requisite Skills. The ability to select and use rescuer harness, a system for ascending a fixed rope, and PPE for common environments; attach the life safety harnesses to the rope rescue system; configure ascent control devices to form a system for ascending a fixed rope; make connections to the ascending system; maneuver around existing environment and system-specific obstacles; convert the ascending system to a descending system while suspended from the fixed rope; and evaluate surroundings for potential hazards.

5.3.10 * Descend a fixed rope in a high-angle environment, 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, so that the person descending is attached to the fixed rope in a manner that will not allow him or her 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 his or her harness, the system will not be stressed to the point of failure, the system is suitable for the site, and the objective is reached.
A.5.3.10 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical

distance that would be experienced by the person performing the skill. For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for ascending rope might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).
(A) Requisite Knowledge. Task-specific selection criteria for life safety harnesses and systems for descending a fixed rope; PPE selection criteria; design, intended purpose, and operation of descent control devices utilized; safe rigging principles; techniques for high-angle environments; and common hazards posed by maneuvering and harnessing.
(B) Requisite Skills. The ability to select and use rescuer harnesses, a system for descending a fixed rope, and PPE for common environments; attach the life safety harness to the rope rescue system; make attachment of the descent control device to the rope and life safety harness; operate the descent control device; maneuver around existing environment and system-specific obstacles; and evaluate surroundings for potential hazards.

5.3.11 Demonstrate the ability to escape from a jammed or malfunctioning device during a fixed-rope descent in a high-angle environment, 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, so that the person descending is attached to the fixed rope in a manner that will not allow him or her 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.
(A) Requisite Knowledge. Task-specific selection criteria for escape equipment and methods used for escape from a malfunctioning descent control device; PPE selection criteria; design, intended purpose, and operation of escape systems utilized; safe rigging principles; techniques for high-angle environments; and common hazards posed by malfunctioning descent control devices.
(B) Requisite Skills. The ability to select and use rescuer harnesses, a system for escaping a malfunctioning descent control device, and PPE for common environments; attach the life safety harness to the rope rescue system; make attachment of the descent control device to the rope and life safety harness; attach and operate the escape system to remove the rescuer from the malfunctioning descent control device while maintaining patent attachment to the fixed rope and belay; use the escape system to maneuver upward or downward from the malfunctioning descent control device; and evaluate surroundings for potential hazards.

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6.1 Awareness Level.

Prior to qualification at the awareness level in structural collapse rescue, the individual shall meet the requirements defined in Section 6.1.
6.1.1 Identify incident hazards, given a specific type of collapse incident, so that construction type is determined, all associated hazards are identified, and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations, types and nature of incident hazards, isolation terminology, methods and equipment, implementation techniques, operational requirement concerns, common risks in collapse incidents, risk/benefit analysis methods and

practices, construction types and collapse characteristics, 13 building collapse types, subsequent collapse potential and causes, and associated types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards based on construction type, identify collapse zones, assess victim viability based on collapse type and access (risk/benefit), utilize technical references, and operate control and mitigation equipment.

6.1.2 Initiate a search, given PPE, an incident location, and victim investigative information, so that search parameters are established and include surface and nonentry void search, the information found is updated and relayed to command, the personnel assignments match their expertise, all victims are located as quickly as possible, risks to searchers are minimized, and accountability is achieved.
(A) Requisite Knowledge. Local policies and procedures, basic sight and hailing search techniques, and operational techniques necessary to operate in the search environment.
(B) Requisite Skills. The ability to use hailing techniques, PPE, and triangulation methods, and to provide for and perform self-escape/self-rescue.

6.1.3 Apply the building marking system given a structural collapse incident, so that the search phase of the floor or structure is marked, victim locations and condition are applied to the area, hazards are noted on the structure, and the access and egress points are marked.
(A) Requisite Knowledge. FEMA and United Nations International Search and Rescue Advisory Group (INSARAG) search marking systems, victim marking systems, structural marking systems, and the location criteria for application of each system.
(B) Requisite Skills. The ability to use marking materials, and recognize hazards.

6.1.4 Move a victim, given victim transport equipment, litters, other specialized equipment, and victim removal systems specific to the rescue environment, so that the victim is moved without further injuries, risks to rescuers are minimized, the victim is secured to the transfer device, and the victim is removed from the hazard.
(A) Requisite Knowledge. Types of transport equipment and removal systems, selection factors with regard to specific rescue environments, methods to reduce and prevent further injuries, types of risks to rescuers, ways to secure the victim to transport devices, and transport techniques.
(B) Requisite Skills. The ability to secure a victim to transport equipment, assemble and operate environment-specific victim removal systems, and choose an incident-specific transport device.

6.1.5 Perform collapse support operations at a rescue incident, given an assignment and available resources, so that scene lighting is provided for the tasks to be undertaken, environmental concerns are addressed, personnel rehabilitation is facilitated, and the support operations facilitate rescue operational objectives.
(A) Requisite Knowledge. Resource management protocols, principles for establishing lighting, environmental control methods, and rescuer rehabilitation protocols.
(B) Requisite Skills. The ability to access resources, setup lights, initiate environmental controls, and setup rehabilitation for rescuers.

6.1.6 Size up a structural collapse rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting

parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and the information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for structural collapse rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

6.1.7 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

6.2 Operations Level.

The job performance requirements defined in Sections 6.1 and 6.2 shall be met prior to or during operations-level qualification in structural collapse rescue.
6.2.1 * Conduct a size-up of a light frame or unreinforced masonry (URM) collapsed structure, given an incident and specific incident information, so that existing and potential conditions within the structure and the immediate periphery are evaluated, needed resources are defined, hazards are identified, construction and occupancy types are determined, collapse type is identified if possible, the need for rescue is assessed, a scene security perimeter is established, and the size-up is conducted within the scope of the incident management system.
A.6.2.1 The size-up should include, but not be limited to, the initial and continuous evaluation of the following:

- *(1) Scope and magnitude of the incident*
- *(2) Risk/benefit analysis*
- *(3) Number and size of structures affected*
- *(4) Integrity and stability of structures affected*
- *(5) Occupancy types (e.g., residential, mercantile, commercial)*
- *(6) Number of known and potential victims*
- *(7) Access to the scene*
- *(8) Environmental factors*
- *(9) Available and necessary resources*

(A) Requisite Knowledge. Identification of light frame and URM construction types, characteristics, and probable occupant locations; methods to assess rescue needs; expected behavior of light frame and URM construction in a structural collapse incident; causes and associated effects of structural collapses; types and capabilities of resources; general hazards associated with structural collapse and size-up; and procedures for implementing site control and scene management.

(B) Requisite Skills. The ability to categorize light frame and URM construction types, evaluate structural stability and hazards, and implement resource and security (scene management) protocols.

6.2.2 Determine potential victim locations in light frame and URM construction collapse incidents, given size-up information, a structural collapse tool kit, the type of construction and occupancy, time of day, and collapse pattern, so that search areas are established and victims can be located.
(A) Requisite Knowledge. Capabilities and limitation of search instruments and resources, types of building construction, occupancy classifications, collapse patterns, victim behavior, and potential areas of survivability.
(B) Requisite Skills. The ability to use size-up information, occupancy classification information, and search devices, and assess and categorize type of collapse.

6.2.3 Develop a collapse rescue incident action plan, given size-up information and a light frame and URM construction collapsed structure, so that initial size-up information is utilized, an incident management system is incorporated, existing and potential conditions within the structure and the immediate periphery are included, specialized resource needs are identified, work perimeters are determined, collapse type/category and associated hazards are identified, construction and occupancy types are determined, incident objectives are established, and scene security measures are addressed.
(A) Requisite Knowledge. Incident-specific size-up information, incident management system components, dynamics of incident conditions and peripheral areas, incident-specific resources in a given geographical area, construction and occupancy types, scene security requirements, personnel needs and limitations, and rescue scene operational priorities.
(B) Requisite Skills. The ability to utilize size-up information, implement an incident management system, monitor changing conditions specific to the incident, identify potential specialized resources, determine construction and occupancy types, identify specific incident security requirements, and create written documentation.

6.2.4 Implement a collapse rescue incident action plan, given an action plan and a light frame and URM construction collapsed structure, so that pertinent information is used, an incident management system is established and implemented, monitoring of dynamic conditions internally and externally is established, specialized resources are requested, hazards are mitigated, victim rescue and extraction techniques are consistent with collapse and construction type, and perimeter security measures are established.
(A) Requisite Knowledge. Components of an action plan specific to collapse incidents, incident management systems, dynamics of incident conditions and peripheral areas, identification of specialized resource lists, hazard identification, rescue and extrication techniques consistent with each collapse and construction type, perimeter security measures, and personnel needs and limitations.
(B) Requisite Skills. The ability to implement the components of an action plan in a collapse incident, implement an incident management system, initiate hazard mitigation objectives, request specialized resources, initiate rescue objectives, and demonstrate perimeter security measures.

6.2.5 Search a light frame and URM construction collapsed structure, given PPE, the structural collapse tool kit, an assignment, operational protocols, and size-up information, so that all victim

locations and potential hazards are identified, marked, and reported; protocols are followed; the mode of operation can be determined; and rescuer safety is maintained. **(See also Annex G.)**
(A) Requisite Knowledge. Concepts and operation of the incident management system as applied to the search function, application of specialty tools and locating devices, application of recognized marking systems, voice sounding techniques, potential victim locations as related to the type of structure and occupancy, building construction, collapse types and their influence on the search function, operational protocols, and various hazards and their recognition.
(B) Requisite Skills. The ability to implement an incident management system, apply search techniques, use marking systems, identify and mitigate hazards, and select and use victim locating devices.

6.2.6 * Stabilize a collapsed light frame and URM construction structure as a member of a team, given size-up information, a specific pattern of collapse, a basic structural collapse tool kit, and an assignment, so that strategies to effectively minimize the movement of structural components are identified and implemented; hazard warning systems are established and understood by participating personnel; hazard-specific PPE is identified, provided, and utilized; physical hazards are identified; confinement, containment, and avoidance measures are discussed; and a rapid intervention team is established and staged.
A.6.2.6 Emergency shoring operations for urban search and rescue incidents provide a safe and efficient atmosphere while conducting search and rescue operations for trapped victims. The intent is to provide a relatively safe and reduced-risk environment for both the victim and the trained rescue forces. The process includes stabilizing adjacent structures or objects that might have been affected by the initial incident. Figure A.6.2.6(a) through Figure A.6.2.6(j) depict operations-level shores that rescuers working at the operations level should be able to construct and properly install. They include T shore, double T shore, two-post vertical shore, multiple-post vertical shore, door and window shore, horizontal shore, flying raker shore, split sole raker shore, solid sole raker shore, and box cribbing stacks.
(A) Requisite Knowledge. Identification and required care of PPE; structural load calculations for shoring system requirements; shoring systems for stabilization; specific hazards associated with light frame and URM construction structural collapse; strategic planning for collapse incidents; communications and safety protocols; atmospheric monitoring equipment needs; identification, characteristics, expected behavior, type, causes, and associated effects of light frame and URM construction structural collapses; and recognition of, potential for, and signs of impending secondary collapse.
(B) Requisite Skills. The ability to select and construct shoring systems for collapses in light frame and URM construction structures, use PPE, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and safety protocols, and mitigate specific hazards associated with shoring tasks.

6.2.7 Release a victim from entrapment by components of a light frame and URM construction collapsed structure, given PPE and resources for breaching, breaking, lifting, prying, shoring, and/or otherwise moving or penetrating the offending structural component, so that hazards to rescue personnel and victims are minimized, considerations are given to compartment syndrome due to crush injuries, techniques enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing structure or structural support systems.
(A) Requisite Knowledge. Identification, utilization, and required care of PPE; general hazards associated with each type of structural collapse; methods of evaluating structural integrity;

compartment syndrome protocols; identification of construction types and collapse characteristics of light-frame and URM construction structures; causes and associated effects of structural collapses; potential signs of impending secondary collapse; selection and application of rescue tools and resources; and risk/benefit assessment techniques for extrication methods and time constraints.
(B) Requisite Skills. The ability to select, use, and care for PPE, operate rescue tools and stabilization systems, recognize compartment syndrome indicators, and complete risk/benefit assessments for selected methods of rescue and time constraints.

6.2.8 * Remove a victim from a light-frame and URM construction collapse incident, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required, victim is evaluated for signs of compartment syndrome due to crush injuries, advanced life support is called if needed, methods and packaging devices selected are compatible with intended routes of transfer, universal precautions are employed to protect personnel from bloodborne pathogens, and extraction times meet time constraints for medical management.
A.6.2.8 Utilization of the victim transfer devices authorized by the AHJ should include horizontal and vertical applications, proper patient securing methods, and rigging attachments.
(A) Requisite Knowledge. Identification, utilization, and required care of PPE resources for structural collapse incidents; general hazards associated with structural collapse; identification of light-frame and URM construction types; characteristics and expected behavior of each type in a structural collapse incident; causes and associated effects of structural collapses; recognition of potential for and signs of impending secondary collapse; characteristic mechanisms of compartment syndrome due to crush injuries and basic life support; and patient packaging principles.
(B) Requisite Skills. Selection, use, and care of PPE, basic prehospital care of soft-tissue injuries, fracture stabilization, airway maintenance techniques, and cardiopulmonary resuscitation; and selection and use of patient packaging equipment.

6.2.9 * Lift a heavy load as a team member, given a structural collapse tool kit and a load to be lifted, so that the load is lifted; control and stabilization are maintained before, during, and after the lift; and access can be gained.
A.6.2.9 When lifting a load by utilizing basic hand tools (prybars), jacks, and airbags available in the tool kits, the load should be stabilized during the lifting operation using a recognized cribbing stabilization system so that movement of the load is controlled throughout the lift.
(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic, mechanical, and manual lifting tools; how to calculate the weight of the load; safety protocols; and stabilization systems.
(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, the operations of lifting tools, the application of a lever, and the application of load stabilization systems.

6.2.10 * Move a heavy load as a team member, given a structural collapse tool kit, so that the load is moved the required distance to gain access and so that control is constantly maintained.
A.6.2.10 The load should be moved utilizing pipes as rollers. This process includes maintaining constant control of the load and its direction of travel and application of any necessary rigging to negotiate existing obstacles.
(A) Requisite Knowledge. Applications of rigging systems, applications of levers, classes of levers, inclined planes, gravity and load balance, friction, mechanics of load stabilization and

load lifting, capabilities and limitations of lifting tools, how to calculate the weight of the load, and safety protocols.
(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, operate required tools, construct and use levers and incline planes, utilize rigging systems, and stabilize the load.

6.2.11 Breach light frame and URM construction structural components, given an assignment, PPE, various types of construction materials, and a structural collapse tool kit, so that the opening supports the rescue objectives, the necessary tools are selected, structural stability is maintained, and the methods utilized are safe and efficient.
(A) Requisite Knowledge. Effective breaching techniques; types of building construction and characteristics of materials used in each; the selection, capabilities, and limitations of tools; safety protocols for breaching operations; calculation of weight; and anticipation of material movement during breaching and stabilization techniques.
(B) Requisite Skills. Select and use breaching tools, implement breaching techniques based on building frame and URM construction types, use PPE, and apply stabilization where required.

6.2.12 * Construct cribbing systems, given an assignment, PPE, a structural collapse tool kit, various lengths and dimensions of lumber, wedges, and shims, so that the cribbing system will safely support the load, the system is stable, and the assignment is completed.
A.6.2.12 Cribbing systems should consist of the following five basic configurations of cribbing, shown in Figure A.6.2.12:

(1) Two-piece layer crosstie
(2) Three-piece layer crosstie
(3) Platform crosstie
(4) Triangle crosstie
(5) Modified crosstie

Included in this section are the knowledge of the advantages, disadvantages, and limitations of each type of system.
Figure A.6.2.12 Five Basic Configurations of Cribbing.
(A) Requisite Knowledge. Different types of cribbing systems and their construction methods, limitations of construction lumber, load calculations, principles of and applications for cribbing, and safety protocols.
(B) Requisite Skills. The ability to select and construct cribbing systems, evaluate the structural integrity of the system, determine stability, and calculate loads.

6.2.13 Maintain hazard-specific PPE, given clothing or equipment for the protection of the rescuers, including respiratory protection, cleaning and sanitation supplies, maintenance logs or records, inspection procedures, and such tools and resources as are indicated by the manufacturer's guidelines for assembly or disassembly of components during repair or maintenance, so that 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.
(A) Requisite Knowledge. Functions, construction, and operation of PPE; use of record-keeping systems of the AHJ; requirements and procedures for cleaning, sanitizing, and infectious disease control; use of provided assembly and disassembly tools; manufacturer and department recommendations; preuse inspection procedures; and ways to determine operational readiness.
(B) Requisite Skills. The ability to identify wear and damage indicators for PPE; evaluate operational readiness of PPE; complete logs and records; use cleaning equipment, supplies, and reference materials; and select and use tools specific to the task.

6.2.14 Maintain rescue equipment, 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, so that 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 are correctly disposed of and changed out.
(A) Requisite Knowledge. Functions and operations of rescue equipment, use of record-keeping systems, manufacturer and organizational care and maintenance requirements, selection and use of maintenance tools, replacement protocol and procedures, disposal methods, and organizational standard operating procedures.
(B) Requisite Skills. The ability to identify wear and damage indicators for rescue equipment, evaluate operation readiness of equipment, complete logs and records, and select and use maintenance tools.

6.2.15 * Terminate an incident, given PPE specific to the incident, isolation barriers, and tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modification or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed, scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and post incident analysis and critique are considered, and command is terminated.
A.6.2.15 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, post incident analysis techniques.
(B) Requisite Skills. Selection and use of hazard-specific PPE, decontamination, use of barrier protection techniques, data collection and record-keeping/reporting protocols, post incident analysis activities.

6.3 Technician Level.

The job performance requirements defined in Sections 6.2 and 6.3 shall be met prior to or during technician-level qualification in structural collapse rescue.
6.3.1 Conduct a size-up of a collapsed heavy construction–type structure, given an incident and specific incident information, so that existing and potential conditions within the structure and the immediate periphery are evaluated, needed resources are defined, hazards are identified, construction and occupancy types are determined, collapse type is identified if possible, the need for rescue is assessed, a scene security perimeter is established, and the size-up is conducted within the scope of the incident management system. **(See Annexes E, G, and F for additional information.)**

(A) Requisite Knowledge. Identification of heavy construction types, characteristics, and probable occupant locations; methods to assess rescue needs; expected behavior of heavy construction in a structural collapse incident; causes and associated effects of structural collapses; types and capabilities of resources; general hazards associated with structural collapse and size-up; and procedures for implementing site control and scene management.
(B) Requisite Skills. The ability to categorize heavy construction types, evaluate structural stability and hazards, and implement resource and security (scene management) protocols.

6.3.2 Determine potential victim locations in a heavy construction–type incident, given size-up information, a structural collapse tool kit, the type of construction and occupancy, time of day, and collapse pattern, so that search areas are established and victims can be located.
(A) Requisite Knowledge. Capabilities and limitation of search instruments and resources, types of building construction, occupancy classifications, collapse patterns, victim behavior, and potential areas of survivability.
(B) Requisite Skills. The ability to use size-up information, occupancy classification information, and search devices, and assess and categorize type of collapse.

6.3.3 Develop a collapse rescue incident action plan, given size-up information and a heavy collapsed structure, so that initial size-up information is utilized, an incident management system is incorporated, existing and potential conditions within the structure and the immediate periphery are included, specialized resource needs are identified, work perimeters are determined, collapse type/category and associated hazards are identified, construction and occupancy types are determined, incident objectives are established, and scene security measures are addressed.
(A) Requisite Knowledge. Incident-specific size-up information, incident management system components, dynamics of incident conditions and peripheral areas, incident-specific resources in a given geographical area, construction and occupancy types, scene security requirements, personnel needs and limitations, and rescue scene operational priorities.
(B) Requisite Skills. The ability to utilize size-up information, implement an incident management system, monitor changing conditions specific to the incident, identify potential specialized resources, determine construction and occupancy types, identify specific incident security requirements, and create written documentation.

6.3.4 Implement a collapse rescue incident action plan, given an action plan and a heavy construction–type collapsed structure, so that pertinent information is used, an incident management system is established and implemented, monitoring of dynamic conditions internally and externally is established, specialized resources are requested, hazards are mitigated, victim rescue and extraction techniques are consistent with collapse and construction type, and perimeter security measures are established.
(A) Requisite Knowledge. Components of an action plan specific to collapse incidents, incident management systems, dynamics of incident conditions and peripheral areas, identification of specialized resource lists, hazard identification, rescue and extrication techniques consistent with each collapse and construction type, perimeter security measures, and personnel needs and limitations.
(B) Requisite Skills. The ability to implement the components of an action plan in a collapse incident, implement an incident management system, initiate hazard mitigation objectives, request specialized resources, initiate rescue objectives, and demonstrate perimeter security measures.

6.3.5 Search a heavy construction–type collapsed structure, given PPE, the structural collapse tool kit, an assignment, operational protocols, and size-up information, so that all victim locations and potential hazards are identified, marked, and reported; protocols are followed; the mode of operation can be determined; and rescuer safety is maintained. **(See also Annex F.)**
(A) Requisite Knowledge. Concepts and operation of the incident management system as applied to the search function, application of specialty tools and locating devices, application of recognized marking systems, voice sounding techniques, potential victim locations as related to the type of structure and occupancy, building construction, collapse types and their influence on the search function, operational protocols, and various hazards and their recognition.
(B) Requisite Skills. The ability to implement an incident management system, apply search techniques, use marking systems, identify and mitigate hazards, and select and use victim locating devices.

6.3.6 * Stabilize a collapsed heavy construction–type structure as a member of a team, given size-up information, a specific pattern of collapse, a basic structural collapse tool kit, and an assignment, so that strategies to effectively minimize the movement of structural components are identified and implemented; hazard warning systems are established and understood by participating personnel; hazard-specific PPE is identified, provided, and utilized; physical hazards are identified; confinement, containment, and avoidance measures are discussed; and a rapid intervention team is established and staged.
A.6.3.6 Emergency shoring operations for urban search and rescue incidents provide a safe and efficient atmosphere while conducting search and rescue operations for trapped victims. The intent is to provide a relatively safe and reduced-risk environment for both the victim and the trained rescue force. The process includes stabilizing adjacent structures or objects that might have been affected by the initial incident. Figure A.6.3.6(a) through Figure A.6.3.6(f) depict technician-level shores that rescuers working at the technician level should be able to construct and properly install. They include all operations-level shores as well as laced post shore, plywood laced post shore, sloped floor shores (Type 2 and Type 3), double and triple raker shores, flying shore, and combination shores designed by a structural engineer.
(A) Requisite Knowledge. Identification and required care of PPE; structural load calculations for shoring system requirements; shoring systems for stabilization; specific hazards associated with heavy structural collapse; strategic planning for collapse incidents; communications and safety protocols; atmospheric monitoring equipment needs; identification, characteristics, expected behavior, type, causes, and associated effects of heavy structural collapses; and recognition of, potential for, and signs of impending secondary collapse.
(B) Requisite Skills. The ability to select and construct shoring systems for collapses in heavy structures, use PPE, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and safety protocols, and mitigate specific hazards associated with shoring tasks.

6.3.7 Release a victim from entrapment by components of a heavy construction–type collapsed structure, given PPE and resources for breaching, breaking, lifting, prying, shoring, and/or otherwise moving or penetrating the offending structural component, so that hazards to rescue personnel and victims are minimized, considerations are given to compartment syndrome due to crush injuries, techniques enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing structure or structural support systems.
(A) Requisite Knowledge. Identification, utilization, and required care of PPE; general hazards associated with each type of structural collapse; methods of evaluating structural integrity;

compartment syndrome protocols; identification of construction types and collapse characteristics of heavy construction–type structures; causes and associated effects of structural collapses; potential signs of impending secondary collapse; selection and application of rescue tools and resources; and risk/benefit assessment techniques for extrication methods and time constraints.
(B) Requisite Skills. The ability to select, use, and care for PPE, operate rescue tools and stabilization systems, recognize compartment syndrome signs and symptoms, and complete risk/benefit assessments for selected methods of rescue and time constraints.

6.3.8 Remove a victim from a heavy construction–type collapse incident, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required, victim is evaluated for signs of compartment syndrome, advanced life support is called if needed, methods and packaging devices selected are compatible with intended routes of transfer, universal precautions are employed to protect personnel from bloodborne pathogens, and extraction times meet time constraints for medical management.
(A) Requisite Knowledge. Identification, utilization, and required care of PPE resources for structural collapse incidents; general hazards associated with structural collapse; identification of heavy construction types; characteristics and expected behavior of each type in a structural collapse incident; causes and associated effects of structural collapses; recognition of, potential for, and signs of impending secondary collapse; characteristic mechanisms of injury and basic life support; and patient packaging principles.
(B) Requisite Skills. Selection, use, and care of PPE; basic prehospital care of soft-tissue injuries; fracture stabilization; airway maintenance techniques and cardiopulmonary resuscitation; signs and symptoms of compartment syndrome; and selection and use of patient packaging equipment.

6.3.9 Lift a heavy load as a team member, given a structural collapse tool kit and a load to be lifted, so that the load is lifted; control and stabilization are maintained before, during, and after the lift; and access can be gained.
(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic, mechanical, and manual lifting tools; how to calculate the weight of the load; safety protocols; and stabilization systems.
(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, the operations of lifting tools, the application of a lever, and the application of load stabilization systems.

6.3.10 Move a heavy load as a team member, given a structural collapse tool kit, so that the load is moved the required distance to gain access and so that control is constantly maintained.
(A) Requisite Knowledge. Applications of rigging systems, applications of levers, classes of levers, inclined planes, gravity and load balance, friction, mechanics of load stabilization and load lifting, capabilities and limitations of lifting tools, how to calculate the weight of the load, and safety protocols.
(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, operate required tools, construct and use levers and incline planes, utilize rigging systems, and stabilize the load.

6.3.11 Breach heavy structural components, given an assignment, PPE, various types of construction materials, and a structural collapse tool kit, so that the opening supports the rescue objectives, the necessary tools are selected, structural stability is maintained, and the methods utilized are safe and efficient.

(A) Requisite Knowledge. Effective breaching techniques; types of building construction and characteristics of materials used in each; the selection, capabilities, and limitations of tools; safety protocols for breaching operations; calculation of weight; and anticipation of material movement during breaching and stabilization techniques.
(B) Requisite Skills. Select and use breaching tools, implement breaching techniques based on building construction type, use PPE, and apply stabilization where required.

6.3.12 Construct cribbing systems, given an assignment, PPE, a structural collapse tool kit, various lengths and dimensions of lumber, wedges, and shims, so that the cribbing system will safely support the load, the system is stable, and the assignment is completed.
(A) Requisite Knowledge. Different types of cribbing systems and their construction methods, limitations of construction lumber, load calculations, principles of and applications for cribbing, and safety protocols.
(B) Requisite Skills. The ability to select and construct cribbing systems, evaluate the structural integrity of the system, determine stability, and calculate loads.

6.3.13 * Stabilize a collapsed heavy construction–type structure as a member of a team, given size-up information, hazard-specific PPE, an assignment, a specific pattern of collapse, a structural collapse tool kit, specialized equipment necessary to complete the task, and engineering resources if needed, so that hazard warning systems are established and understanding by team members is verified, all unstable structural components that can impact the work and egress routes are identified, alternative egress routes are established when possible, expert resource needs are determined and communicated to command, load estimates are calculated for support system requirements, all shoring systems meet or exceed load-bearing demands, shoring systems are monitored continuously for integrity, safety protocols are followed, a rapid intervention crew (RIC) is established and staged to aid search and rescue personnel in the event of entrapment, an accountability system is established, atmospheric monitoring is ongoing, and progress is communicated as required.
A.6.3.13 Application of the methods, materials, and devices necessary to shore windows, doors, floors/roofs, and walls in heavy construction–type structures should include the usage of the Ellis clamp systems, Ellis post screw jacks, pneumatic/mechanical shores, Lace post shoring systems, horizontal shores, and cross-tied Raker shores (single, double, and triple diagonal).
(A) Requisite Knowledge. Identification and required care of PPE, structural load calculations for shoring system requirements, shoring systems for stabilization, specific hazards associated with heavy structural collapse, hazard warning systems, specialized resource and equipment needs, communications and rescuer safety protocols, atmospheric monitoring equipment needs, identification of construction types, characteristics and expected behavior of each type in a structural collapse incident, causes and associated effects of structural collapses, and recognition of potential for and signs of impending secondary collapse.
(B) Requisite Skills. The ability to select and construct shoring systems for heavy construction–type collapses, use PPE, perform structural load calculations, determine resource needs, select and operate basic and specialized tools and equipment, implement communications and rescuer safety protocol, and mitigate specific hazards associated with shoring tasks.

6.3.14 Cut through structural steel, given a structural collapse tool kit, PPE, and an assignment, so that the steel is efficiently cut, the victim and rescuer are protected, fire control measures are in place, and the objective is accomplished.

(A) Requisite Knowledge. Safety considerations; the selection, capabilities, and limitations of steel cutting tools; cutting tool applications; types of potential and actual hazards and mitigation techniques; and characteristics of steel used in building construction.
(B) Requisite Skills. The ability to assess tool needs, use cutting tools, implement necessary extinguishment techniques, mitigate hazards, and stabilize heavy loads.

6.3.15 Coordinate the use of heavy equipment, given PPE, means of communication, equipment and operator, and an assignment, so that common communications are established, equipment usage supports the operational objective, hazards are avoided, and rescuer and operator safety protocols are followed.
(A) Requisite Knowledge. Types of heavy equipment, capabilities, application and hazards of heavy equipment and rigging, safety protocols, and types and methods of communication.
(B) Requisite Skills. The ability to use hand signals and radio equipment, recognize hazards, assess for operator and rescuer safety, and use PPE.

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7.1 Awareness Level.

Prior to qualification at the awareness level in confined space rescue, the individual shall meet the requirements defined in Section 7.1.
7.1.1 Initiate isolation procedures for a specific confined space incident, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; unauthorized entry to the confined space and adjacent areas are controlled; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations, hazard recognition, isolation methods and terminology, methods for controlling access to the scene, and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify potential hazards to rescuers and bystanders, identify potential paths for entry to the confined space and its adjacent areas, utilize scene entry control methods, place scene control barriers, and operate control and mitigation equipment.

7.1.2 Initiate a search in areas immediately adjacent to the confined space, given hazard-specific PPE, equipment pertinent to search mission, a confined space incident location, and victim investigative information, so that search parameters are established, the victim survival profile is established, the access and egress of all people either involved in the search or already within the search area are questioned and the information is updated and relayed to command, the personnel assignments match their expertise, all victims in the adjacent areas to the confined space are located as quickly as possible, applicable technical rescue concerns are managed, risks to searchers are minimized, and all searchers are accounted for.
(A) Requisite Knowledge. Local policies and procedures and how to operate in the environment surrounding the area of the confined space access area.
(B) Requisite Skills. The ability to enter, maneuver in, and exit the adjacent areas to the confined space incident and perform escape from the area if conditions become untenable.

7.1.3 * Communicate with victim(s), given a clear environment and a confined space, so that victim communication is established when possible and information relative to patient condition is documented and conveyed to incoming confined space rescue resources.
A.7.1.3 This statement applies to nonentry methods of victim communication only. Awareness-level personnel cannot enter a space for rescue.
(A) Requisite Knowledge. Victim communication methods appropriate to confined spaces and use of information acquired for initial victim assessment.
(B) Requisite Skills. Use communication methods that are effective from the outside to the inside of a confined space, identify victim communication needs and use methods for documentation and transfer of victim information.

7.1.4 Perform nonentry rescue, given PPE; an anchored retrieval system attached to a victim located inside a confined space with a clear interior; safety, communication, and operational protocols; and a confined space rescue tool kit, so that the retrieval system is operated to extract the victim, the rescuer is protected from fall hazards when working near unprotected edges, victim communication is established and maintained, the victim is managed through the portal and patient care is initiated on extraction.
(A) Requisite Knowledge. Principles of operation for retrieval equipment; methods for fall prevention; and safety, communication, medical, and operational protocols.
(B) Requisite Skills. The ability to use and apply PPE and fall prevention methods, operate nonentry rescue (retrieval) systems and equipment; implement safety, communication, and operational protocols; and use methods for assuring victim passage through the portal without obstruction.

7.1.5 Size up a confined space rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for confined space rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

7.1.6 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

7.1.7 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

7.2 Operations Level.

The job performance requirements defined in Sections 5.2, 7.1, and 7.2 shall be met prior to or during operations-level qualification in confined space rescue.
7.2.1 * Initiate a search inside a confined space in those areas immediately visible from the confined space entry portal, given hazard-specific PPE, equipment pertinent to search mission, a confined space, and victim investigative information, so that search parameters are established; the victim profile is established; the people in or around the search area are questioned and the information is updated and relayed to command; the personnel assignments match their expertise; all victims inside the space that are immediately visible from outside the portal are located and identified quickly; applicable technical rescue concerns are managed; risks to searchers are minimized; and all searchers are accounted for.
(A) Requisite Knowledge. Local policies and procedures and how to operate in the environment surrounding the area of the confined space access area.
(B) Requisite Skills. The ability to work in the immediate area of the confined space entry portal and perform immediate escape from the area if conditions become untenable.
A.7.2.1 It should be noted that areas immediately adjacent to the confined space entry portal could also be affected by conditions within the space. For example, a vertically oriented space containing atmospheric hazards with a vapor density of less than 1 (lighter than air) could create an atmospheric hazard for personnel outside of the space as well. Personnel at the awareness level should be aware of the potential for these conditions and approach cautiously assuring appropriate assessment, hazard isolation, and personal protective procedures are in place.
7.2.2 Perform size-up of a confined space rescue incident, given background information and applicable reference materials, 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.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an action plan and related information, relationship of size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, relay information, and use information gathering sources.

7.2.3 * Conduct monitoring of the environment, given monitoring equipment reference material, PPE, accurately calibrated detection and monitoring equipment, and size-up information, so that a representative sample of the space is obtained, accurate readings are made, readings are documented, and effects of ventilation in determining atmospheric conditions and the conditions of the space have been determined for exposures to existing or potential environmental hazards.
A.7.2.3 Rescue entrants must be cautious to protect themselves from the potential for exposure to atmospheric hazards. During a rescue incident, as a rule of thumb, regardless of monitor

readings, if the cause of the incident cannot be proven to be unrelated to the atmosphere, rescuer entrants should wear atmosphere supplying respirators (i.e., self-contained breathing apparatus or supplied air respirators with egress cylinder). This assures that atmospheric hazards related to dead-air space, built-up scale encapsulation of hazardous vapors, and so on will not create an untenable condition for rescue entrants. Rescuers should evaluate the space interior to assure that they are using appropriate PPE for the given exposure. Atmosphere supplying respirators will protect a rescue entrant from the respiratory and ingestion modes of transmission into the body only. Some contaminants might pose exposure hazards requiring chemical protective clothing to protect from injection and absorption modes of transmission into the body. Assessment of the space should consider all potentially dangerous forms of energy to assure a rescue entrant is appropriately protected before entry. The necessity for assessment and isolation of dangerous forms of energy could include more than the atmosphere. Some spaces can contain environments that are unacceptable for entry. Acceptable entry conditions for atmospheric hazards within confined spaces are as follows:

(1) Acceptable limits for oxygen concentration in air should be within 19.5 percent and 23.5 percent. An oxygen-enriched atmosphere is considered to be greater than 23.5 percent and poses a flammability hazard. An oxygen-deficient atmosphere is considered to be lower than 19.5 percent and can lead to asphyxiation without fresh air breathing apparatus.

(2) Flammability is measured as a percentage of a material's lower explosive limit (LEL) or LFL. Rescuers should not enter confined spaces containing atmospheres greater than 10 percent of a material's LEL, regardless of the PPE worn. There is no adequate protection for an explosion within a confined space.

(3) Acceptable toxicity levels are specific to the hazardous material involved, and chemical properties have to be assessed to determine the level of the hazard for a given environment and time frame. The confined space technical rescuer should have available resources capable of understanding the assessment tools necessary for analysis and identification of hazardous conditions within confined spaces and interpretation of that data. This capability should include at least the following steps:

(1) Identification of the hazards found within confined spaces and an understanding of how those hazards influence victim viability and rescue/recovery operations

(2) Selection and use of monitoring equipment to assess the following hazards:

(a) Oxygen-deficient atmospheres
(b) Oxygen-enriched atmospheres
(c) Flammable environments
(d) Toxic exposures
(e) Radioactive exposures
(f) Corrosive exposures

The confined space technical rescuer should understand the limiting factors associated with the selection and use of the atmospheric and chemical monitoring equipment provided by the AHJ for confined space emergencies. This equipment can include, but is not limited to, the following:

(1) Calorimetric tubes
(2) Oxygen concentration monitor (continuous reading, remote sampling)
(3) Combustible gas monitor (continuous reading, remote sampling)
(4) Specific toxicity monitor (continuous reading, remote sampling)
(5) Multigas atmospheric monitors (continuous reading, remote sampling)
(6) Passive dosimeter
(7) pH papers, pH meters, and pH strips
(8) Radiation detection instruments

Skills relating to use of such equipment include, but are not limited to, calibration, proper operation, response time, detection range, relative response, sensitivity, selectivity, inherent safety, environmental conditions, and nature of hazard. "Limitations of detection and monitoring equipment" [see 7.2.3(A)] refers to the extent to which the equipment can provide specific readings and how external factors influence the instrument readings and reliability. For example, the following factors should be considered:

(1) Temperature extremes
(2) Cross-sensitivity
(3) Calibration
(4) Power
(5) Time of sampling period
(6) Location of sample
(7) Condition of instrument sensors

Utilization and evaluation of reference terms and resources should include, but not be limited to, the following:

(1) Lethal concentration-50 (LC)
(2) Lethal dose-50 (LD)
(3) Permissible exposure limit (PEL)
(4) Threshold limit value (TLV)
(5) Threshold limit value — short-term exposure limit (TLVSTEL)
(6) Threshold limit value — time-weighted average (TLVTWA)
(7) IDLH
(8) Chemical information documents (e.g., SDS)
(9) Reference manuals
(10) Computerized reference databases
(11) Technical information centers
(12) Technical information specialists and monitoring equipment

A confined space rescue on-scene prioritized action plan is a plan used to mitigate the incident. The components of the plan are as follows:

(1) Priority 1: Make the scene safe.
(a) Hazard assessment: Approach to the space and entrance into the space
(b) Hazard mitigation: Control or remove the hazard 50 50
(c) De-energize and protect the sources of electricity, fluids, hydraulics, and so forth

(2) Priority 2: Victim contact by primary responder.
(a) Establish victim location
(b) Primary medical survey (ABCs)
(c) Determine mode of injury
(d) Begin psychological first aid
(e) Determine feasibility of safe retrieval and retrieve if possible

(3) Priority 3: Size-up.
(a) Information gathering
(b) Resource identification
(c) Primary responder report
(d) Brainstorm strategy: risk/reward
(e) Incident management system (IMS)
(f) Team member assignments

(4) Priority 4: Preparation.
(a) Rescuer personal protective equipment

(b) Anchoring and rigging rescue equipment
(c) Authorized entrant review
(5) Priority 5: Access patient.
(a) Designate access team leader: one team leader for each group of two or more
(b) Utilize rescuer retrieval (high-point)
(c) Designate backup personnel
(6) Priority 6: Stabilize and package patient.
(a) First aid to life-threatening injuries
(b) Secure packaging for rescue transport
(7) Priority 7: Evacuate.
(a) Move victim to a safe location
(b) Provide medical report to EMS
(c) Remove rescuers
(d) Emergency retrievals
(8) Priority 8: Response termination.
(a) Pick up and inventory gear
(b) Decontaminate (if necessary)
(c) Rebuild gear packages for the next call
(d) Field-evaluate rescuer mental state

(A) Requisite Knowledge. Capabilities and limitations of detection and monitoring equipment, ways to confirm calibration, defining confined space configuration as it applies to obtaining a representative sample of space, basic physical properties of contaminants, and how to determine contents of a confined space.
(B) Requisite Skills. The ability to use and confirm calibration of detection and monitoring equipment and acquire representative samples of space.

7.2.4 * Assess the incident, given size-up information, information from technical resources, monitoring equipment, and PPE required to perform the assessment, so that general area and space-specific hazards are identified, bystanders and victims are interviewed, immediate and ongoing monitoring of the space is performed, the victims' conditions and location are determined, a risk/benefit analysis is performed, methods of ingress and egress for rescuer and victims are identified, rescue systems for victim removal are determined, and an emergency means of retrieval for rescue entrants is established.
A.7.2.4 Printed information resources can include, but are not limited to, entry permits, chemical information documents (e.g., SDS), and site plans or drawings. The size-up should include, but not be limited to, the initial and continuous evaluation of the following:
(1) Scope, magnitude, and nature of the incident
(2) Location, number, and condition of victims
(3) Risk/benefit analysis (body recovery versus rescue)
(4) Access to the scene
(5) Environmental factors
(6) Available and necessary resources
(7) Establishment of a control perimeter
It is the intent of the committee that safety and operational protocols include some form of checklist or "permit" for technical rescue teams operating at a confined space emergency. These checklists should be used to confirm completion of procedures necessary to allow safe entry into a confined space to perform rescue. Hazards can include, but are not limited to, the following:

(1) Atmospheric hazards
(2) Chemical hazards
(3) Temperature extremes
(4) Engulfment and entrapment
(5) Any other recognized safety or health hazard

Some methods of recognition and assessment of hazards associated with confined spaces include, but are not limited to, the following:

(1) Assessment of the perimeter surrounding the confined space incident to determine the presence of, or potential for, a hazardous condition that could pose a risk to rescuers during approach

(2) Recognition of the need for decontamination of a patient or responder who might have been exposed to a hazardous material as per NFPA 472

(3) Recognition of the need for a confined space rescue service or additional resources when nonentry retrieval is not possible

(4) Notification of the designated rescue service and other resources necessary for initiation of confined space rescue

(5) Recognition of hazardous atmospheres or materials through visual assessment and information received from on-site personnel Specific procedures for mitigating hazards at confined space rescue can include, but are not limited to, consideration of the following:

(1) PPE
(2) Fall protection
(3) Harnesses
(4) Lockout/tagout procedures
(5) Hazard assessment
(6) Scene assessment

Procedures to perform a confined space hazard assessment include, but are not limited to, the following:

(1) Identification of the important industrial documentation, where available, that is useful in hazard assessment, including entry permits, lockout/tagout procedures and checklists, and hot work permits

(2) Selection of all applicable information necessary for emergency responders from chemical information documents (e.g., SDS)

(3) Selection of the proper PPE for the hazard per NFPA 472 Procedures to perform a scene assessment to determine the magnitude of the problem in terms of life safety can include, but are not limited to, the following:

(1) Type, size, access, and internal configuration of the confined space
(2) Information regarding current and potential hazards that threaten victims and rescuers
(3) Risk/benefit analysis concerning the threat to rescuers in relation to the viability of victims

The assessment at this level should include, but not be limited to, the initial and continuous evaluation of the following:

(1) Hazards such as engulfment potential, environmental factors (chemical, atmospheric, temperature, etc.), harmful forms of energy (electrical, mechanical, movement due to gravity, hydraulic, etc.), and configuration hazards (diverging walls, entrapment, obstructions, trip/fall hazards, etc.)

(2) Risk/benefit analysis (body recovery versus rescue)
(3) Available and necessary additional resources
(4) Establishment of control zones

(5) Magnitude of the hazard and isolation procedures
(6) Effectiveness of the nonentry or qualifying entry-type rescue
(7) Overall safety of rescue operations
(8) Level of rescue response (appropriate for the type of rescue being attempted)
(9) Current and projected status of the planned response
(10) Personnel accountability

The AHJ should address the possibility of members of the organization having physical and/or psychological disorders that can impair their ability to perform technical rescue in confined spaces (e.g., physical disabilities, fear of heights, fear of enclosed spaces). Roles, functions, and responsibilities for these team positions should be consistent with the organization's standard operating guidelines for confined space rescue.

Some methods of isolation include blanking or blinding of pipes (see Figure A.7.2.4); misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Figure A.7.2.4 Blanking or Blinding.

(A) Requisite Knowledge. Use of size-up information and interview techniques; types of PPE; monitoring equipment protocols; rescue and retrieval systems; permit programs; types of and uses for available resources; risk/benefit analysis methods; common hazards and their influence on the assessment; methods to identify egress from and ingress into the space; and processes to identify size, type, and configuration of the opening(s) and internal configuration of the space.

(B) Requisite Skills. The ability to select and interpret size-up information, conduct interviews, choose and utilize PPE, operate monitoring equipment, identify hazard mitigation options, identify probable victim location, perform risk/benefit analysis, recognize characteristics and hazards of confined spaces, and evaluate specific rescue systems for confined space entry and retrieval of rescuers and victims during confined space incidents.

7.2.5 Control hazards, given PPE and a confined space tool kit, so that the rescue area is established; access to the incident scene is controlled; rescuers are protected from exposure to hazardous materials and atmospheres, all forms of harmful energy releases, and physical hazards; and victims are protected from further harm.

(A) Requisite Knowledge. PPE; safety protocols; monitoring equipment and procedures; ventilation equipment and procedures; incident hazards; types of hazardous materials exposure risks; forms, sources, and control of harmful energy and physical hazards in the confined space.

(B) Requisite Skills. The ability to utilize PPE, place scene control barriers, operate atmospheric monitoring equipment, ventilate a confined space, identify dangerous forms of energy, and mitigate physical and atmospheric hazards.

7.2.6 * Apply and use self-contained breathing apparatus (SCBA) as a rescue entrant, given a confined space incident requiring respiratory protection, a rescue assignment, a means of entry into and exit from the space, a rescue attendant outside the space, SCBA, breathing apparatus cylinders, and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be seen easily from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection, the rescue entrant passes through the portal without removal of the SCBA, the assigned rescue duty is performed, the rescue entrant frequently assesses the level of air remaining in the

cylinder and communicates this level to rescuers outside of the space, and the rescue entrant exits the space prior to activation of the low-pressure alarm on the SCBA.

A.7.2.6 While SCBA are specifically addressed within the operations-level section of this chapter, it is recognized that many confined space rescues within the scope of the operations level might be better suited with the use of supplied-air respirators (SAR) based on the conditions of the space and the incident. It is not the intent of the committee to exclude the use of SAR at the operations-level but to emphasize the need for skill evaluation regarding SCBA since spaces at the operations-level are generally large enough and configured so that this larger, self-contained unit can be used effectively.

(A) Requisite Knowledge. Capabilities and limitations of SCBA in confined space rescue, breathing air conservation and communication methods appropriate to breathing apparatus use in confined spaces.

(B) Requisite Skills. The ability to use SCBA in a confined space entry for rescue, use of breathing techniques that will conserve the air supply and use of communication methods that effectively convey information between rescuers inside and outside of the space.

7.2.7 * Apply an atmosphere-supplying respirator to a victim, given a confined space incident requiring respiratory protection, a live victim, an atmosphere-supplying respirator and associated equipment, and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement; the victim can be easily seen from the outside of the space's primary access opening; rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer; the space can accommodate two or more rescuers in addition to the victim; all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection; the apparatus face piece is applied rapidly, positioned properly on the face and without air leakage; application of the face piece can be performed simultaneously with spinal precautions; the breathing apparatus unit is securely placed during victim movement so the face piece will not be pulled from the victim's face during movement; the level of air remaining in the victim's breathing apparatus is frequently accessed and communicated; and the victim is removed from the space without interruption of the air supply.

A.7.2.7 Atmosphere supplying respirators include either SCBA or SAR (Class C airline respirators with an adequate emergency egress cylinder). Self-contained facial bag units or nonentry units designed for rapid egress from a hazardous atmosphere should not be used for victims in confined space emergencies due to their limited air supply. During confined space rescues requiring placement of breathing air systems on victims, caution must be taken to assure there is no interruption of the breathing air supply, which could cause asphyxiation. Rescue entrants must continuously check air systems for proper application and operation to assure the victim's safety during movement within a space. Failure to recognize an issue could result in the victim's death. During training exercises, it is recommended that live victims have access to their facepieces so that they can remove the regulator or facepiece should accidental cessation of air supply occur. If a victim cannot access a facepiece due to packaging methods used or other conditions associated with the rescue simulation, it is highly recommended that the facepiece regulator be removed from the facepiece during that segment of the evolution.

(A) Requisite Knowledge. Capabilities and limitations of atmosphere supplying respirators (SCBA or SAR) for victims in confined space rescue, expected victim air usage, methods for application of face pieces to victims wearing helmets and for those with spinal injuries, methods for securement of a victim's breathing apparatus unit when packaged in litters, attached to rope

rescue systems, or being dragged along a horizontal plane; and communication methods in confined spaces.
(B) Requisite Skills. The ability to apply a patent air supply to a victim in a confined space rescue, move the victim wearing breathing apparatus without interruption or compromise of their air supply or face piece seal; continuous monitoring of the victim's air supply during operations and use of communication methods that effectively convey information between rescuers inside and outside of the space.

7.2.8 * Perform full spinal immobilization of a victim inside a confined space, given a confined space incident requiring spinal precautions, a victim, full spinal immobilization equipment, a second rescuer to assist, and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be easily seen from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that the victim's cervical spine is manually maintained in a neutral position immediately on contact and maintained until the body and head are completely immobilized and secure, victim movement onto the spinal immobilization device creates minimal manipulation of the spine, void spaces between the victim and immobilization device are padded as appropriate, victim securement to the immobilization device will prevent spinal manipulation during movement, and applicable local treatment protocols are followed.
A.7.2.8 While many local treatment protocols allow clearance of the victim's spine in certain situations, due to the potential for significant manipulation associated with movement of victims within confined spaces and the potential severity and long-term effects of spinal injuries, it is highly recommended that spinal precautions be instituted aggressively for those victims who have any indicator of the potential for spinal injury. This could be as simple as an unwitnessed fall within a space or any other injury suspected to create enough force to produce spinal pain or injury. While long spine immobilization is specifically addressed within the operations-level section of this chapter, it is recognized that many confined space rescues within the scope of the operations-level could be better suited with the use of short spine immobilizers based on the conditions of the space and the incident. It is not the intent of the committee to exclude the use of short spine immobilizers at the operations-level but to emphasize the need for skill evaluation regarding long spine immobilization since spaces at the operations-level are generally large enough and configured so that the larger, full-length devices, can be used effectively.
(A) Requisite Knowledge. Capabilities and limitations of long spine immobilization equipment for victims in confined space rescue, methods for movement of a victim onto a long spine immobilizer with minimum spinal manipulation, methods for securement of a victim's body on a long spine immobilizer, methods for securement of a victim's head on a long spine immobilizer and other long spinal immobilization treatment modalities and procedures.
(B) Requisite Skills. The ability to maintain manual immobilization of a victim's head during the immobilization process, assist in moving the victim to a long spine immobilizer with only two persons with minimal spinal manipulation, apply void space padding as needed based on the immobilization device and apply and secure the victim's body and head to a long spinal immobilization device.

7.2.9 Prepare for entry into horizontally oriented confined space, given a confined space rescue tool kit and a confined space, so that the internal configuration of the space is clear and

unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be easily seen from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that victim communication is established when possible, continuous atmospheric monitoring is initiated, rescuer readiness is verified, rescuers' limitations are identified and evaluated, rescuers unsuitable to confined space entry operations are reassigned and replaced, route and methods of entry are determined, and rescuer evacuation is planned.
(A) Requisite Knowledge. Effects of hazardous atmospheres on victims and rescuers, types and operation of required hazard-specific monitoring equipment, organization protocol for medical and psychological evaluation related to confined space entry, methods of entry into confined spaces in accordance with operational protocols, and rescuer evaluation methods.
(B) Requisite Skills. The ability to operate monitoring equipment, perform rescuer pre-entry medical exam, evaluate rescuer capabilities and limitations, identify victim communication needs, evaluate for point and route of confined space entry, and select evacuation methods.

7.2.10 Enter a horizontally oriented confined space for rescue, given PPE; safety, communication, and operational protocols; portable lighting; and a confined space rescue tool kit; a retrieval system; and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be easily seen from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that the victim is contacted, controlled confined space entry is established and maintained, atmosphere is monitored continuously, the victim's mental and physical conditions are assessed further, the rescue entrant is aided by portable lighting, rescue entrants are attached to retrieval lines at all times, patient care is initiated, the patient is packaged to restrictions of the space, and patient removal can be initiated.
(A) Requisite Knowledge. Principles of operation for atmospheric monitoring equipment; methods for patient care in confined spaces; portable lighting methods; safety, communication, medical, and operational protocols; and controlled confined space entry and egress procedures for confined spaces.
(B) Requisite Skills. The ability to use and apply PPE and rescue-related systems and equipment; use portable lighting in a darkened environment; implement safety, communication, and operational protocols; use medical protocols to determine treatment priorities; use medical equipment specific to confined space victim needs; and reassess and confirm mode of operation.

7.2.11 * Package the victim in a litter for removal from a horizontally oriented confined space, given a confined space rescue tool kit, a litter and associated rigging equipment, a space that provides enough internal and external clearance to maneuver a litter in and around the space, so that the victim is secured to the litter, the litter is secured to the rescue system if needed, the litter will pass through the portal, the victim is protected during the extraction, and further harm to the victim is minimized.

A.7.2.11 Packaging devices that can be used in confined spaces include, but are not limited to, the following:

(1) Full spine immobilization devices
(2) Short spine immobilization devices
(3) Cervical spine immobilization devices
(4) Litters

(A) Requisite Knowledge. Spinal management techniques, victim packaging techniques, how to use low-profile packaging devices and equipment, methods to reduce or avoid damage to equipment, and the similarities and differences between packaging for confined spaces and for other types of rescue.

(B) Requisite Skills. The ability to immobilize a victim's spine; package victims in litters, low-profile devices, and litters; recognize and perform basic management of various traumatic injuries and medical conditions; support respiratory efforts; and perform local treatment modalities as required based on the environment.

7.2.12 Assemble a portable anchor system for application of a high point of attachment to a confined space rescue system given a portable anchor device, additional rescuers to assist in the assembly, and a vertically oriented space with a portal above which to set the portable anchor, so that the portable anchor is assembled in accordance with the manufacturer's recommendations, rescue systems are attached and secured to the anchor device and the portable anchor provides enough clearance above the portal to fully extract a victim packaged in a vertically oriented litter.

(A) Requisite Knowledge. Capabilities and limitations of portable anchor devices in confined space rescue, assembly procedures for the portable anchor utilized, methods for stabilization of portable anchors to prevent unnecessary movement, force application to portable anchors and proper direction of that force to prevent movement or collapse.

(B) Requisite Skills. The ability to assemble the portable anchor device with assistance of other rescuers, attach the rescue system to the portable anchor, position the device high enough to provide adequate clearance area above the portal to allow removal of a vertically oriented litter, and operate the system in a way that will keep the portable anchor stable while lifting a load.

7.2.13 Prepare for entry into vertically oriented confined space, given a confined space rescue tool kit and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be easily seen from the outside of the space's primary access opening rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that victim communication is established when possible, continuous atmospheric monitoring is initiated, rescuer readiness is verified, rescuers' limitations are identified and evaluated, rescuers unsuitable to entry operations are reassigned and replaced, route and methods of confined space entry are determined, and rescuer evacuation is planned.

(A) Requisite Knowledge. Effects of hazardous atmospheres on victims and rescuers, types and operation of required hazard-specific monitoring equipment, organization protocol for medical and psychological evaluation related to entry, methods of entry into confined spaces in accordance with operational protocols, and rescuer evaluation methods.

(B) Requisite Skills. The ability to operate monitoring equipment, perform rescuer pre-entry medical exam, evaluate rescuer capabilities and limitations, identify victim communication needs, evaluate for point and route of confined space entry, and select evacuation methods.

7.2.14 Enter a vertically oriented confined space for rescue, given PPE; safety, communication, operational protocols; a confined space rescue tool kit; and a confined space, so that the internal configuration of the space is clear and unobstructed so retrieval systems can be utilized for rescuers without possibility of entanglement, the victim can be easily seen from the outside of the space's primary access opening, rescuers can pass easily through the access/egress opening(s) with room to spare when PPE is worn in the manner recommended by the manufacturer, the space can accommodate two or more rescuers in addition to the victim, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that the victim is contacted, controlled confined space entry is established and maintained, atmosphere is continuously monitored, the victim's mental and physical conditions are further assessed, patient care is initiated, the patient is packaged to restrictions of the space, and patient removal can be initiated.
(A) Requisite Knowledge. Principles of operation for atmospheric monitoring equipment; methods for patient care in confined spaces; safety, communication, medical, and operational protocols; and controlled confined space entry and egress procedures for confined spaces.
(B) Requisite Skills. The ability to use and apply PPE and rescue-related systems and equipment; implement safety, communication, and operational protocols; use medical protocols to determine treatment priorities; use medical equipment specific to confined space victim needs; and reassess and confirm mode of operation.

7.2.15 * Package the victim in a litter for removal from a vertically oriented confined space, given a confined space rescue tool kit, a vertically oriented litter and associated rigging equipment, a work area that provides enough vertical clearance to extract a vertically oriented litter and a victim, so that the victim is secured to the litter, the litter is secured to the rescue system in a vertically configuration, the litter will pass through the portal, the litter can be raised high enough to clear the portal, the victim is protected during the extraction, and further harm to the victim is minimized.
A.7.2.15 Packaging devices that can be used in confined spaces include, but are not limited to, the following:

(1) Full spine immobilization devices
(2) Short spine immobilization devices
(3) Cervical spine immobilization devices
(4) Litters

(A) Requisite Knowledge. Spinal management techniques, victim packaging techniques, how to use low-profile packaging devices and equipment, methods to reduce or avoid damage to equipment, and the similarities and differences between packaging for confined spaces and for other types of rescue.
(B) Requisite Skills. The ability to immobilize a victim's spine; package victims in litters, low-profile devices, and litters; recognize and perform basic management of various traumatic injuries and medical conditions; support respiratory efforts; and perform local treatment modalities as required based on the environment.

7.2.16 * Remove a victim from a vertically oriented confined space, given a confined space rescue tool kit, victim harnesses and rigging, a victim who has been discovered to be in respiratory arrest, and conditions inside the space requiring immediate extraction to prevent

imminent death of the victim, so that the victim is rapidly secured in an extraction harness, the harness is secured to the rescue system, and the victim is removed from the space.
A.7.2.16 It should be noted that situations posing imminent danger to victims should be rapidly but carefully evaluated to assure that they warrant rapid extraction. Rapid extractions place priority on movement of the victim to a clear environment where more definitive care can be provided, regardless of underlying injuries. Making a decision for rapid extraction when it is not appropriate could unnecessarily harm the victim.
(A) Requisite Knowledge. Rapid victim harness application techniques, methods to reduce or avoid damage to equipment, and the similarities and differences between packaging for conditions of imminent danger as compared to those that are stable.
(B) Requisite Skills. The ability to recognize the immediate threat and need for rapid extraction, and rapid application of victim harnesses and rigging to rescue systems.

7.2.17 Remove all entrants from a confined space, given PPE, rope and related rescue and retrieval systems, personnel to operate rescue and retrieval systems, and a confined space rescue tool kit, so that internal obstacles and hazards are negotiated, all persons are extricated from a space in the selected transfer device, the victim and rescuers are decontaminated as necessary, and the victim is delivered to the EMS provider.
(A) Requisite Knowledge. Personnel and equipment resource lists, specific PPE, types of confined spaces and their internal obstacles and hazards, rescue and retrieval systems and equipment, operational protocols, medical protocols, EMS providers, and decontamination procedures.
(B) Requisite Skills. The ability to select and use PPE, select and operate rescue and retrieval systems used for victim removal, utilize medical equipment, and use equipment and procedures for decontamination.

7.2.18 * Terminate a technical rescue operation, given an incident scenario, assigned resources, and site safety data 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, record-keeping and documentation occur, and post event analysis is conducted.
A.7.2.18 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. Incident Command functions and resources, hazard identification and risk management strategies, logistics and resource management, personnel accountability systems, and AHJ-specific procedures or protocols related to personnel rehab.
(B) Requisite Skills. Hazard recognition, risk analysis, use of site control equipment and methods, use of data collection and management systems, and use of asset and personnel tracking systems.

7.3 Technician Level.

The job performance requirements defined in Sections 7.2 and 7.3 shall be met prior to or during technician-level qualification in confined space rescue.

7.3.1 Initiate a search inside a confined space in those areas not immediately visible from the confined space entry portal, given hazard-specific PPE, confined space rescue entrant(s) to perform the search, equipment pertinent to search mission, a confined space, and victim investigative information, so that search parameters are established; the victim profile is established; search result information is acquired and relayed to command; the personnel assignments match their expertise; all victims inside the space are located and identified quickly; applicable technical rescue concerns are managed; risks to searchers are minimized; and all searchers are accounted for.

(A) Requisite Knowledge. Local policies and procedures and how to operate inside the confined space.

(B) Requisite Skills. The ability to work inside the confined space; communicate with rescuers outside the confined space portal; and, when possible, perform self-rescue if conditions become untenable.

7.3.2 Preplan a confined space incident, given applicable guidelines and regulations and a preplan form, so that a standard approach is used during a confined space rescue emergency, hazards are recognized and documented, isolation methods are identified and documented, all accesses to the location of the confined space entry opening are identified and documented, all types of confined space entry openings are identified and documented, and internal configurations and special resource needs are documented for future rescuer use.

(A) Requisite Knowledge. Operational protocols, specific preplan forms, types of hazards common to jurisdictional boundaries, hazards that should and must be identified on preplans, isolation methods and issues related to preplanning, issues and constraints relating to the types of confined space openings, internal configuration special resource needs of a confined space, and applicable legal issues.

(B) Requisite Skills. The ability to select a specific preplan form; draft or draw a sketch of confined spaces; complete supplied forms; identify and evaluate various configurations of confined spaces, access points, confined space entry openings, isolation procedures, and energy control locations; recognize general and site-specific hazards; document all data; and apply all regulatory compliance references.

7.3.3 Apply and use supplied-air respirators (SARs) as a rescue entrant, given a confined space incident requiring respiratory protection, a rescue assignment, a means of entry into and exit from the space, a rescue attendant outside the space, personnel to manage air lines outside of the space, a SAR, a breathing air supply system with air lines to supply the SAR, breathing apparatus cylinders, personnel to monitor and maintain the air supply system, and a confined space, so that the internal configuration of the space will not create entanglement hazards when using air lines, the victim cannot be seen from the outside of the space's primary access opening, the portal size and configuration will not allow a rescuer to pass through the access/egress opening(s) using SCBA when worn in the manner recommended by the manufacturer, all hazards in and around the confined space have been identified and might be mitigated by using respiratory protection so that the rescue entrant passes through the portal without removal of the SAR and the assigned rescue duty is performed.

(A) Requisite Knowledge. Capabilities and limitations of SAR in confined space rescue, breathing air conservation, air-line management and communication methods appropriate to breathing apparatus use in confined spaces.

(B) Requisite Skills. The ability to use SAR in a confined space entry for rescue, use of breathing techniques that will conserve the air supply, manage airlines while working within the space and use of communication methods that effectively convey information between rescuers inside and outside of the space.

7.3.4 * Perform short spinal immobilization of a victim inside a confined space, given a confined space incident requiring spinal precautions, a stable victim, a short spinal immobilization device, a second rescuer to assist, and a confined space, so that the portal size or internal configuration will not allow the application of a full spine immobilization device, all hazards in and around the confined space have been identified and might be mitigated by using respiratory protection so that the victim's cervical spine is manually maintained in a neutral position immediately on contact and maintained until the short immobilization device is completely applied and secure, victim movement onto the spinal immobilization device creates minimal manipulation of the spine, void spaces between the victim and immobilization device are padded as appropriate, victim securement to the immobilization device will reduce spinal manipulation during movement, and applicable local treatment protocols are followed.

A.7.3.4 While many local treatment protocols allow clearance of the victim's spine in certain situations, due to the potential for significant manipulation associated with movement of victims within confined spaces and the potential severity and long-term effects of spinal injuries, it is highly recommended that spinal precautions be instituted aggressively for those victims who have any indicator of the potential for spinal injury. This could be as simple as an unwitnessed fall within a space or any other injury suspected to create enough force to produce spinal pain or injury.

Short spine immobilization devices should be considered a temporizing measure, and the victim should be transferred to a full spinal immobilization device as soon as possible. If a victim must be lifted vertically in a short spine immobilizer, manufacturer's recommendations should be followed for procedures associated with attachment to rescue systems and vertical lifts of the specific device.

(A) Requisite Knowledge. Capabilities and limitations of short spine immobilization equipment for victims in confined space rescue, methods for movement of a victim onto a long spine immobilizer with minimum spinal manipulation, methods for securement of a victim onto a short spine immobilizer, methods for securement of a victim's head on a short spine immobilizer, and other short spinal immobilization treatment modalities and procedures.

(B) Requisite Skills. The ability to maintain manual immobilization of a victim's head during the immobilization process, assist in moving the victim to a short spine immobilizer with only two persons with minimal spinal manipulation, apply void space padding as needed based on the immobilization device, and apply and secure the victim's upper body and head to a short spinal immobilization device.

7.3.5 Prepare for entry into the confined space with a hazardous atmosphere, given a confined space with a hazardous atmosphere, atmosphere-supplied respirators, and a confined space tool kit, so that entry can be made into a confined space that contains one or more of the following characteristics: the internal configuration of the space could create entanglement hazards and retrieval might not be effective, the victim cannot be seen from the outside of the space's primary access opening, the portal size and configuration will not allow a rescuer to pass through the access/egress opening(s) using SCBA when worn in the manner recommended by the manufacturer, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that continuous atmospheric monitoring is initiated, the atmosphere is assessed to be manageable with

atmosphere-supplying respirators, victim communication is established when possible, atmosphere-supplying respirators are used by rescue entrants while within the space, atmosphere-supplying respirators are rapidly applied to the victim, rescuer readiness is verified, rescuers' limitations are identified and evaluated, rescuers unsuitable to entry operations are reassigned and replaced, route and methods of confined space entry are determined, and rescuer evacuation is planned.
(A) Requisite Knowledge. Effects of hazardous atmospheres on victims and rescuers, types and operation of required hazard-specific monitoring equipment, types and operation of required atmosphere supplying respirators, organization protocol for medical and psychological evaluation related to confined space entry, methods of entry into confined spaces with hazardous atmospheres in accordance with operational protocols, and rescuer evaluation methods.
(B) Requisite Skills. The ability to operate monitoring equipment, perform rescuer pre-entry medical exam, evaluate rescuer capabilities and limitations, identify victim communication needs, evaluate for point and route of confined space entry, and select evacuation methods.

7.3.6 Enter a confined space with atmospheric hazards, given hazard-specific PPE; safety, communication, and operational protocols; a confined space with a hazardous atmosphere; a confined space rescue tool kit so that the victim is contacted; and a confined space, so that the internal configuration of the space could create entanglement hazards and retrieval might not be effective, the victim cannot be seen from the outside of the space's primary access opening, the portal size and configuration will not allow a rescuer to pass through the access/egress opening(s) using SCBA when worn in the manner recommended by the manufacturer, all hazards in and around the confined space have been identified and can be mitigated by using respiratory protection so that a controlled confined space entry is established and maintained, the atmosphere is continuously monitored, the rescuers and patient(s) are protected from the hazards, the victim's mental and physical conditions are further assessed, patient care is initiated, the patient is packaged to restrictions of the space, and patient removal can be initiated.
(A) Requisite Knowledge. Principles of operation for atmospheric monitoring equipment; methods for patient care in confined spaces; application of hazard-specific PPE; safety, communication, medical, and operational protocols; and controlled confined space entry and egress procedures for confined spaces.
(B) Requisite Skills. The ability to use and apply hazard-specific PPE and rescue-related systems and equipment; implement safety, communication, and operational protocols; use medical protocols to determine treatment priorities; use medical equipment specific to confined space victim needs; and reassess and confirm mode of operation.

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8.1 Awareness Level.

Prior to qualification at the awareness level in common passenger vehicle rescue, the individual shall meet the requirements defined in Section 8.1.
8.1.1 Establish scene safety zones, given a common passenger vehicle incident, scene security barriers, incident location, incident information, and personal protective equipment (PPE), so that the scene and responders are visible to approaching common passenger vehicles, safety zones are designated, zone perimeters are consistent with incident requirements, perimeter

markings can be recognized and understood by others, zone boundaries are communicated to incident command, and traffic flow is controlled.
(A) Requisite Knowledge. Use and selection of PPE, zone or area control flow and concepts, types of control devices and tools, types of existing and potential hazards, methods of hazard mitigation, organizational standard operating procedure, and staffing requirements.
(B) Requisite Skills. The ability to select and use PPE, apply crowd control concepts, position zone control devices, identify and mitigate existing or potential hazards, and maintain personal safety techniques.

8.1.2 Size up an incident, given an incident, background information and applicable reference materials, so that the operational mode is defined, resource availability and response time, types of rescues are determined, the number of victims are identified, the last reported location of all victims are 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.
(A) Requisite Knowledge. Types of reference materials and their uses, risk benefit assessment, availability and capability of the resources, elements of an action plan and related information, relationship of size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process.
(B) Requisite Skills. The ability to read specific rescue reference materials, interview and gather information, relay information, manage witnesses, and use information sources.

8.1.3 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Knowledge. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

8.1.4 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

8.1.5 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

8.2 Operations Level.

The job performance requirements defined in Sections 8.1 and 8.2 shall be met prior to or during operations-level qualification in common passenger vehicle rescue.
8.2.1 Create an incident action plan for a common passenger vehicle incident, given agency guidelines, planning forms, and an operations-level common passenger vehicle incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression and safety measures are identified, common passenger vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of common passenger vehicles within the AHJ boundaries, common passenger vehicle hazards, incident support operations and resources, common passenger vehicle anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of common passenger vehicles, identify and evaluate various types of common passenger vehicles within the AHJ boundaries, request support and resources, identify common passenger vehicle anatomy, and determine the required fire suppression and safety measures.

8.2.2 * Establish fire protection, given an extrication incident and fire control support, so that fire and explosion potential is managed and fire hazards and rescue objectives are communicated to the fire support team.
A.8.2.2 The intent of 8.2.2 is to provide fire control measures and teams at the scene of working rescue incidents. These teams should be in the ready position with a charged hose line of at least 38 mm (11⁄2 in.) diameter or greater (no booster lines) to function as a rapid intervention and extinguishment team. This section implies having an independent water source (i.e., attack pumper) with sufficient extinguishment agent on board to mitigate any unforeseen fires or explosions. Further, it is the intent of this section to have the rapid intervention personnel standing by in donned, self-contained breathing apparatus but not necessarily hooked up/into breathing air. This state of readiness should be maintained until the incident management structure authorizes de-escalation in accordance with AHJ procedures.
(A) Requisite Knowledge. Types of fire and explosion hazards, incident management system, types of extinguishing devices, agency policies and procedures, types of flammable and combustible substances and types of ignition sources, and extinguishment or control options.
(B) Requisite Skills. The ability to identify fire and explosion hazards, operate within the incident management system, use extinguishing devices, apply fire control strategies, and manage ignition potential.

8.2.3 * Stabilize a common passenger vehicle that has come to rest on its wheels on the road surface or similar flat stable environment, given a common passenger vehicle tool kit and PPE, so that the common passenger vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise common passenger vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
A.8.2.3 The five directional movements to be considered during the stabilization process are defined as follows:

(1) Horizontal Movement. Vehicle moves forward or rearward on its longitudinal axis or moves horizontally along its lateral axis.

(2) Vertical Movement. Vehicle moves up and down in relation to the ground while moving along its vertical axis.

(3) Roll Movement. Vehicle rocks side to side while rotating about on its longitudinal axis and remaining horizontal in orientation.

(4) Pitch Movement. Vehicle moves up and down about its lateral axis, causing the vehicle's front and rear portions to move left or right in relation to their original position.

(5) Yaw Movement. Vehicle twists or turns about its vertical axis, causing the vehicle's front and rear portions to move left or right in relation to their original position.

(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of common passenger vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

8.2.4 * Manage potentially harmful energy sources, including propulsion power, restraint systems, and construction materials, given a common passenger vehicle, common passenger vehicle tool kit, and PPE, so that all hazards are identified and isolated, systems are managed, beneficial system use is evaluated, and hazards to rescue personnel and victims are minimized.
A.8.2.4 It is the intent of the committee that rescue personnel control hazards by de-energizing where possible vehicle systems that pose hazards to rescuers or victims. These systems can include components such as electrical, fuel, chemical, and pneumatic systems, including fuel pumps, air bags (passive restraint devices), alternative fuel systems, and air suspension systems. Care should be taken in controlling hazards not to eliminate the potential use by rescuers of beneficial systems, such as seat adjustment or positioning controls, restraint retractors, or other powered devices that would enable more efficient operations.
(A) Requisite Knowledge. Types and uses of PPE, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.
(B) Requisite Skills. The ability to select and use hazard-specific PPE, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

8.2.5 Determine the common passenger vehicle access and egress points, given the structural and damage characteristics and potential victim location(s), so that the victim location(s) is identified; access and egress points for victims, rescuers, and equipment are designated; flows of personnel, victim, and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise vehicle stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are enforced.

(A) Requisite Knowledge. Common passenger vehicle construction/features, access and egress points, routes and hazards operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, and to assess and evaluate impact of vehicle stability on the victim.

8.2.6 Create access and egress openings for rescue from a common passenger vehicle on its wheels, given a vehicle tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal, an emergency escape route is provided, the technique chosen is expedient, victim and rescuer protection is afforded, and vehicle stability is maintained.
(A) Requisite Knowledge. Common passenger vehicle construction and features; electrical, mechanical, hydraulic, pneumatic, and alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify common passenger vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

8.2.7 Disentangle victim(s), given an operations-level extrication incident, a vehicle tool kit, PPE, and specialized equipment, so that undue victim injury is prevented; victim protection is provided; and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

8.2.8 Remove a packaged victim to a designated safe area, as a member of a team, given a victim transfer device, a designated egress route, and PPE, so that the team effort is coordinated, the designated egress route is used, the victim is removed without compromising victim packaging, undue injury is prevented, and stabilization is maintained.
(A) Requisite Knowledge. Patient handling techniques; types of immobilization, packaging, and transfer devices; types of immobilization techniques; signs and symptoms of compartment syndrome as a result of crush injuries; and uses of immobilization devices.
(B) Requisite Skills. Use of immobilization, packaging, and transfer devices for specific situations; immobilization techniques; application of medical protocols and safety features to immobilize, package, and transfer; and all techniques for lifting the patient.

8.2.9 * Terminate a vehicle incident, given PPE specific to the incident, isolation barriers, and an extrication tool kit, so that rescuers and bystanders are protected during termination operations; the party responsible for the operation, maintenance, or removal of the affected vehicle is notified of any modification or damage created during the extrication process; scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; and command is terminated.
A.8.2.9 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and

nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, post incident analysis techniques.
(B) Requisite Skills. Selection and use of hazard-specific PPE, decontamination, use of barrier protection techniques, data collection and record keeping/reporting protocols, post incident analysis activities.

8.3 Technician Level.

The job performance requirements defined in Sections 8.2 and 8.3 shall be met prior to or during technician-level qualification in common passenger vehicle rescue.
8.3.1 Create an incident action plan for an incident where a common passenger vehicle has come to rest on its roof, given agency guidelines, planning forms, and a technician-level vehicle incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression and safety measures are identified, vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of common passenger vehicles within the AHJ boundaries, vehicle hazards, incident support operations and resources, vehicle anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the position of the common passenger vehicle, identify and evaluate various types of vehicles within the AHJ boundaries, request support and resources, identify common passenger vehicles anatomy, and determine the required fire suppression and safety measures.

8.3.2 Stabilize a common passenger vehicle that has come to rest on its roof, given a common passenger vehicle, a technician-level common passenger vehicle incident or simulation, given a common passenger vehicle tool kit and PPE, so that the common passenger vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise common passenger vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of common passenger vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of common passenger vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

8.3.3 Create access and egress openings for rescue from a common passenger vehicle that has come to rest on its roof, given a technician-level common passenger vehicle incident or simulation, a common passenger vehicle tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal, an emergency escape route is provided, the technique chosen is expedient, victim and rescuer protection is afforded, and common passenger vehicle stability is maintained.

(A) Requisite Knowledge. Common passenger vehicle construction and features; electrical, mechanical, hydraulic, and pneumatic systems; alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify common passenger vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

8.3.4 Create an incident action plan for an incident where a common passenger vehicle has come to rest on its side, given agency guidelines, planning forms, and a technician-level common passenger vehicle incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression crew and safety measures are identified, common passenger vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, common passenger vehicle to the AHJ boundaries, common passenger vehicle hazards, incident support operations and resources, common passenger vehicle anatomy, and fire suppression crew and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the position of the common passenger vehicle, identify and evaluate various types of common passenger vehicle within the jurisdiction of the AHJ, request support and resources, and determine the required fire suppression crew and safety measures.

8.3.5 Stabilize a common passenger vehicle that has come to rest on its side, given a common passenger vehicle tool kit and PPE, so that the common passenger vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise common passenger vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

8.3.6 Create access and egress openings for rescue from a common passenger vehicle that has come to rest on its side, given a common passenger vehicle tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal, an emergency escape route is provided, the technique chosen is expedient, victim and rescuer protection is afforded, and common passenger vehicle stability is maintained.
(A) Requisite Knowledge. Common passenger vehicle construction and features; electrical, mechanical, hydraulic, and pneumatic systems; alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify common passenger vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply

victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

8.3.7 Create an incident action plan for an incident where a common passenger vehicle has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given agency guidelines, planning forms, and a technician-level common passenger vehicle incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression and safety measures are identified, common passenger vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, common passenger vehicle hazards, incident support operations and resources, vehicle anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the position of the common passenger vehicle, identify and evaluate various types of common passenger vehicles, request support and resources, identify anatomy, and determine the required fire suppression crew and safety measures.

8.3.8 Stabilize a common passenger vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given a vehicle tool kit and PPE, so that the vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

8.3.9 Disentangle victim(s), given an extrication incident, a vehicle tool kit, PPE, and specialized equipment, so that undue victim injury is prevented, victim protection is provided, and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety

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9.1 Awareness Level.

Prior to qualification at the awareness level in heavy vehicle rescue, the individual shall meet the requirements in Section 9.1.
9.1.1 Size up a heavy vehicle rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting

parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for heavy vehicle rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

9.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all the hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

9.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

9.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

9.2 Operations Level.

The job performance requirements defined in Sections 8.3, 9.1, and 9.2 shall be met prior to or during operations-level qualification in heavy vehicle rescue.
9.2.1 Create an incident action plan for a heavy vehicle incident, and conduct an initial and ongoing size-up, given agency guidelines, planning forms, and an operations-level vehicle

incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression and safety measures are identified, vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of vehicles common to the AHJ boundaries, vehicle hazards, incident support operations and resources, vehicle anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of vehicles, identify and evaluate various types of vehicles within the AHJ boundaries, request support and resources, identify vehicle anatomy, and determine the required fire suppression and safety measures.

9.2.2 Establish fire protection, given an extrication incident and fire control support, so that fire and explosion potential is managed and fire hazards and rescue objectives are communicated to the fire suppression crew.
(A) Requisite Knowledge. Types of fire and explosion hazards, incident management systems, types of extinguishing devices, agency policies and procedures, types of flammable and combustible substances and types of ignition sources, and extinguishment or control options.
(B) Requisite Skills. The ability to identify fire and explosion hazards, operate within the incident management system, use extinguishing devices, apply fire control strategies, and manage ignition potential.

9.2.3 Stabilize a heavy vehicle that has come to rest in its position of use on the road or other stable surface, given a vehicle tool kit and PPE, so that the vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of heavy vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

9.2.4 Isolate potentially harmful energy sources, including propulsion power, restraint systems, and construction materials, given a heavy vehicle, vehicle tool kit, and PPE, so that all hazards are identified, systems are managed, beneficial system use is evaluated, and hazards to rescue personnel and victims are minimized.
(A) Requisite Knowledge. Types and uses of PPE, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.
(B) Requisite Skills. The ability to select and use hazard-specific PPE, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

9.2.5 Determine the heavy vehicle access and egress points, given the structural and damage characteristics and potential victim location(s), so that the victim location(s) is identified; access and egress points for victims, rescuers, and equipment are designated; flows of personnel,

victims, and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise vehicle stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are followed.
(A) Requisite Knowledge. Heavy vehicle construction/features, access and egress points, routes and hazards operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, and to assess and evaluate impact of vehicle stability on the victim.

9.2.6 Create access and egress openings for rescue from a heavy vehicle on its wheels given a vehicle tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal, an emergency escape route is provided, the technique chosen is expedient, victim and rescuer protection is afforded, and vehicle stability is maintained.
(A) Requisite Knowledge. Heavy vehicle construction and features; electrical, mechanical, hydraulic, pneumatic, and alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify heavy vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

9.2.7 Disentangle victim(s), given an extrication incident, a vehicle tool kit, PPE, and specialized equipment, so that undue victim injury is prevented, victim protection is provided, and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

9.2.8 Remove a packaged victim to a designated safe area, as a member of a team, given a victim transfer device, a designated egress route, and PPE, so that the team effort is coordinated, the designated egress route is used, the victim is removed without compromising victim packaging, undue injury is prevented, and stabilization is maintained.
(A) Requisite Knowledge. Patient handling techniques; types of immobilization, packaging, and transfer devices; types of immobilization techniques; and uses of immobilization devices.
(B) Requisite Skills. Use of immobilization, packaging, and transfer devices for specific situations; immobilization techniques; application of medical protocols and safety features to immobilize, package, and transfer; and all techniques for lifting the patient.

9.2.9 Terminate a heavy vehicle incident, given PPE specific to the incident, isolation barriers, and an extrication tool kit, so that rescuers and bystanders are protected during termination operations; the party responsible for the operation, maintenance, or removal of the affected vehicle is notified of any modification or damage created during the extrication process; scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; and command is terminated.

(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, post incident analysis techniques.
(B) Requisite Skills. Selection and use of hazard-specific PPE; decontamination of PPE; use of barrier protection techniques, data collection and record keeping/reporting protocols, and post incident analysis activities.

9.3 Technician Level.

The job performance requirements defined in Sections 9.2 and 9.3 shall be met prior to or during technician-level qualification in heavy vehicle rescue.

9.3.1 Create an incident action plan for an incident where a heavy vehicle has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given agency guidelines, planning forms, and a technician-level vehicle incident or simulation, so that a standard approach is used during training and operational scenarios, emergency situation hazards are identified, isolation methods and scene security measures are considered, fire suppression and safety measures are identified, vehicle stabilization needs are evaluated, and resource needs are identified and documented for future use.
(A) Requisite Knowledge. Operational protocols, specific planning forms, common heavy vehicles, heavy vehicle hazards, incident support operations and resources, heavy vehicle anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the position of the heavy vehicle, identify and evaluate various types of common heavy vehicles, request support and resources, identify commercial/heavy vehicles anatomy, and determine the required fire suppression and safety measures.

9.3.2 Stabilize a heavy vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given a vehicle and machinery tool kit and PPE, so that the vehicle is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise vehicle stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of vehicle movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of heavy vehicle construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices on heavy vehicles.

9.3.3 Lift a heavy vehicle, given a heavy vehicle incident, a vehicle tool kit and PPE, so that unanticipated movement is prevented during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise vehicle stability; selected lift points are structurally sound; lifting equipment can be monitored; and the risk to rescuers is minimized.
(A) Requisite Knowledge. Types of lifting devices, mechanism of vehicle movement, types of lifting points, types of lifting surfaces, types of cribbing, AHJ policies and procedures, and types of vehicle construction components as they apply to lifting.

(B) Requisite Skills. The ability to deploy and operate lifting devices, ability to deploy cribbing, recognition of competent lift points, calculation of weights and center of gravity, assessment of vehicle stability, use of tools or systems to prevent unwanted movement.

9.3.4 Coordinate the use of heavy equipment as a part of a plan to lift, move, or stabilize a heavy vehicle, given a heavy vehicle incident, heavy equipment and an operator, a vehicle tool kit, and PPE, so that the objective is met and the risks to the responders are minimized.
(A) Requisite Knowledge. Methods of requesting heavy equipment, methods of communication, use of rigging.
(B) Requisite Skills. The ability to determine estimated weights to be moved or lifted and perform coordinated integrated lifting or moving operations utilizing heavy equipment.

9.3.5 Create access and egress openings for rescue from a heavy vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given a vehicle tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal, an emergency escape route is provided, the technique chosen is expedient, victim and rescuer protection is afforded, and vehicle stability is maintained.
(A) Requisite Knowledge. Heavy vehicle construction and features; electrical, mechanical, hydraulic, pneumatic, and alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify heavy vehicle construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

9.3.6 Disentangle victim(s) from a heavy vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given a heavy vehicle extrication incident, a vehicle tool kit, PPE, and specialized equipment, so that undue victim injury is prevented, victim protection is provided, and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

9.3.7 Remove a packaged victim to a designated safe area, as a member of a team from a heavy vehicle that has come to rest in a configuration or environment where multiple concurrent hazards must be managed to access or remove the occupants, given a victim transfer device, a designated egress route, and PPE, so that the team effort is coordinated, the designated egress route is used, the victim is removed without compromising victim packaging, undue injury is prevented, compartment syndrome due to crush injuries is managed, and stabilization is maintained.
(A) Requisite Knowledge. Patient handling techniques; incident management system; types of immobilization, packaging, and transfer devices; types of immobilization techniques; and uses of immobilization devices.

(B) Requisite Skills. Use of immobilization, packaging, and transfer devices for specific situations; immobilization techniques; application of medical protocols and safety features to immobilize, package, and transfer; and all techniques for lifting the patient.

NFPA 2021 1006 Chapter 12 Trench

12.1 Awareness Level.

Prior to qualification at the awareness level in trench rescue, the individual shall meet the requirements defined in Section 12.1.

12.1.1 Interview any witness or "competent person," given a specific trench collapse incident, so that potential for rapid, nonentry rescue or victim self-rescue is recognized.

(A) Requisite Knowledge. Need to secure "competent person" or witness; signs and evidence of victim involvement, number, and location.

(B) Requisite Skills. Determine severe environmental conditions with implications for secondary collapse and victim survivability; interview techniques.

12.1.2 Facilitate a nonentry rescue or victim self-rescue, given a trench collapse incident, tools used for self-rescue, and the rescue area and general area are made safe, so that the nonentry and self-rescue tactics can be initiated.

(A) Requisite Knowledge. Understand mechanics and extent of collapse effects; need to brief rescuers; criteria for rapid, nonentry rescues.

(B) Requisite Skills. Ability to implement nonentry rescue and self-rescue tactics; select and deploy tools used to facilitate nonentry and self-rescue; reduce imposed loads at or near the lip of the trench.

12.1.3 Identify hazardous areas specific to a trench environment, given a trench collapse incident, so that the scene is secured, hazards are managed, and an approach path to the trench is identified.

(A) Requisite Knowledge. Areas at risk for increased likelihood of collapse, general collapse patterns of trench's, methods of bridging and weight distribution, securing of scenes, and tactics for approaching the trench while minimizing the likelihood of collapse.

(B) Requisite Skills. Ability to identify areas of high risk for additional collapse, select and deploy tools or materials for bridging or weight distribution, communicate high-risk areas to other responders.

12.1.4 Size up a trench rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.

(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for trench rescue incidents.

(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

12.1.5 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

12.1.6 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

12.1.7 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

12.2 Operations Level.

The job performance requirements defined in Sections 5.1, 12.1, and 12.2 shall be met prior to or during operation-level qualification in trench rescue.
12.2.1 * Identify potential hazards to victims and rescuers in and around a trench excavation, given a trench collapse incident, a trench rescue toolkit so that potential areas of additional collapse in the trench are identified, utility lines are located, spoil piles are monitored, additional superimposed weight is identified, sources of atmospheric contamination are assessed, sources of water are identified, and environmental hazards are considered.
A.12.2.1 Support operations can include, but are not limited to, the following functional sectors in the incident management system:
(1) Ventilation Sector. Monitors and ventilates personnel
(2) Extrication Sector. Prepares for extrication methods and tactics
(3) EMS Sector. Plans for ongoing patient care, transfer, and transport in coordination with the incident commander and receiving hospital

(4) Support Sector. Can handle lighting, power, and environmental management
(5) Cut Station. Handles construction and fabrication of shoring materials

(A) Requisite Knowledge. Methods to distinguish soil types, collapse mechanics, and other contributing factors such as severe environmental conditions and other general hazards; effects and hazards of collapse and rescue efforts on utilities at the incident site; jurisdictional and community resource lists and agreements; atmospheric monitoring; effects of additional superimposed weight and vibrations on trench walls; effects of water in and around trench.
(B) Requisite Skills. The ability to interpret tabulated data information and tables; perform atmospheric monitoring; monitor spoil piles; assess and address the effects of water on trench stability.

12.2.2 Implement a hazard control plan given a trench collapse incident, hazard control plan and trench rescue tool kit so that provisions for ventilation, dewatering, energy control, air monitoring; and falls, and prevention of unplanned soil movement are accomplished.
(A) Requisite Knowledge. Protocols on making the general area safe, criteria for a safe zone within the trench, atmospheric monitoring and ventilation, types of collapses and techniques to stabilize, emergency procedures, selection of PPE, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. Employ hazard control plan to protect personnel inside and outside of trench, establish safe zones, perform atmospheric monitoring and initiate ventilation as needed, initiate dewatering, provide energy control, ability to select and use PPE, apply fall prevention, and implement strategies to minimize unplanned soil movement.

12.2.3 Develop a shoring plan for a nonintersecting trench no more than 8 ft (2.4 m) deep, given a trench collapse incident and trench rescue tool kit, so that the methods of potential collapse are recognized, the mechanisms of entrapment are identified, areas of the trench that are blown out or undercut are addressed, related tabulated data is consulted, the weights and hazards associated with the soils are considered, and the location of the victim and projected path for removal are incorporated.
(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, protocols on making the general area safe, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. Determine shoring strategies, designate cut station location, and material and equipment needs; establish safe zones; ability to prebrief team on shoring strategies, victim release, and projected path for removal.

12.2.4 Implement a trench shoring plan for a nonintersecting trench no more than 8 ft (2.4 m) deep, given a trench collapse incident, trench shoring plan, and a trench rescue tool kit, so that the victim is protected from additional collapse, the trench walls are supported, prior areas of collapse are addressed, shoring team members work from protected areas, and shoring systems are installed so they perform their intended function.
(A) Requisite Knowledge. Shoring and shielding, criteria for a safe zone within the trench, types of collapse and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics for extrication and victim safety.
(B) Requisite Skills. The ability to place shoring and shielding systems, install supplemental shoring, use protocols, choose methods to stabilize, establish a cut station, use personal protective equipment, anticipate extrication logistics, and create systems in trenches 8 ft (2.4 m) deep. **(See Annex I.)**

12.2.5 Release a victim from soil entrapment in a nonintersecting trench of 8 ft (2.4 m) or less in depth, given a trench collapse incident and a trench rescue tool kit, so that hazards to rescue personnel and victims are minimized; considerations are given to the victim's injuries, crush injuries related to compartment syndrome, and other injuries; techniques are used to enhance patient survivability; and techniques do not compromise the integrity of the existing trench shoring system.
(A) Requisite Knowledge. Identification, utilization, and required care of personal equipment; general hazards associated with each type of trench collapse; methods of evaluating shoring systems and trench wall stability; compartment syndrome protocols; identification of collapse characteristics; causes and associated effects of trench collapse; potential signs of subsequent collapse; selection and application of rescue tools and resources; risk/benefit assessment techniques for extrication methods; and time constraints.
(B) Requisite Skills. The ability to select, use, and care for PPE; operate rescue tools and stabilization systems; identify crush injuries related to compartment syndrome; and complete risk/benefit assessments for selected methods of rescue and time constraints.

12.2.6 Remove a victim from a trench, given a disentangled victim, a basic first aid kit, and victim packaging resources, so that basic life functions are supported as required; the victim is evaluated for signs of compartment syndrome; methods and packaging devices selected are compatible with intended routes of transfer; universal precautions are employed to protect personnel from blood-borne pathogens; and extraction times meet time constraints for medical management.
(A) Requisite Knowledge. Medical protocols, available medical resources, transfer methods and time needed to execute, universal precautions protocol, rope rescue systems, high-point anchor options, and patient ladder raise removal techniques.
(B) Requisite Skills. The ability to select and use personal protective equipment, provide basic medical care and immobilization techniques, identify the need for advanced life support and compartment syndrome management, and use a removal system that matches logistical and medical management time frame concerns.

12.2.7 Disassemble support systems at a trench emergency incident, given personal protective equipment, trench tool kit, and removal of victim(s), so that soil movement is minimized, all rescue equipment is removed from the trench, sheeting and shoring are removed in the reverse order of their placement, emergency protocols and safe zones in the trench are adhered to, rescue personnel are removed from the trench, the last supporting shores are pulled free with ropes, equipment is cleaned and serviced, reports are completed, and a post-briefing is performed.
(A) Requisite Knowledge. Selection of personal protective equipment, equipment used and its location, shoring and shielding tactics and order of placement, shoring removal protocols, criteria for a "safe zone" within the trench, personnel accountability, emergency procedures, manufacturer's recommended care and maintenance procedures, and briefing protocols.
(B) Requisite Skills. The ability to use personal protective equipment, remove equipment and protective systems, use trench safety protocols, clean and service equipment, and perform an incident debriefing.

12.2.8 * Terminate a technical rescue operation, given an incident scenario, assigned resources, and site safety data, 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; record-keeping and documentation occur; and post event analysis is conducted.

A.12.2.8 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.

(A) Requisite Knowledge. Incident command functions and resources, hazard identification and risk management strategies, logistics and resource management, personnel accountability systems, and AHJ-specific procedures or protocols related to personnel rehab.

(B) Requisite Skills. Hazard recognition, risk analysis, use of site control equipment and methods, use of data collection and management systems, and use of asset and personnel tracking systems.

12.3 Technician Level.

The job performance requirements defined in Sections 12.2 and 12.3 shall be met prior to or during technician level qualification in trench rescue.

12.3.1 Develop a shoring plan for an intersecting trench, given a trench collapse incident and trench rescue tool kit, so that the methods of potential collapse are recognized, the mechanisms of entrapment are identified, areas of the trench that are blown out or undercut are addressed, related tabulated data is consulted, the weights and hazards associated with the soils are considered, and the location of the victim and projected path for removal are incorporated.

(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, protocols on making the general area safe, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of PPE, and consideration of selected stabilization tactics for extrication and victim safety.

(B) Requisite Skills. Determine shoring strategies; designate cut station location and material and equipment needs; establish safe zones; pre-brief team on shoring strategies, victim release, and projected path for removal.

12.3.2 Implement a trench shoring plan for intersecting trench, given a trench collapse incident, trench shoring plan, and a trench rescue tool kit, so that the victim is protected from additional collapse, the trench walls are supported, prior areas of collapse are addressed, shoring team members work from protected areas, and shoring systems are installed so they perform their intended function.

(A) Requisite Knowledge. Shoring and shielding, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of PPE, and consideration of selected stabilization tactics on extrication and victim safety.

(B) Requisite Skills. Ability to place shoring and shielding systems, install supplemental shoring, use protocols, choose methods to stabilize, establish a cut station, use personal protective equipment, anticipate extrication logistics, and create shoring systems in trenches 8 ft (2.4 m) deep. **(See Annex H.)**

12.3.3 Develop a shoring plan for a trench more than 8 ft (2.4 m) deep, given a trench collapse incident, and trench rescue tool kit, so that the methods of potential collapse are recognized, the

mechanisms of entrapment are identified, areas of the trench that are blown out or undercut are addressed, related tabulated data is consulted, the weights and hazards associated with the soils are considered, the location of the victim and projected path for removal are incorporated.
(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, protocols on making the general area safe, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of PPE, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. Ability to determine shoring strategies; designate cut station location and material and equipment needs; establish safe zones; pre-brief team on shoring strategies, victim release, and projected path for removal.

12.3.4 Implement a trench shoring plan for a trench more than 8 ft (2.4 m) deep, given a trench collapse incident, trench shoring plan, and a trench rescue tool kit, so that the victim is protected from additional collapse, the trench walls are supported, prior areas of collapse are addressed, shoring team members work from protected areas, and shoring systems are installed so they perform their intended function.
(A) Requisite Knowledge. Shoring and shielding, criteria for a safe zone within the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. Ability to place shoring and shielding systems, install supplemental shoring, use protocols, choose methods to stabilize, establish a cut station, use personal protective equipment, anticipate extrication logistics, and create systems in trenches more than 8 ft (2.4 m) deep. (See Annex H.)

12.3.5 Support an intersecting trench as a member of a team, given size-up information and an action plan, a trench tool kit, and an assignment, so that strategies to minimize the further movement of soil are implemented effectively; trench walls, lip, and spoil pile are monitored continuously; rescue entry team(s) in the trench remains in a safe zone; any slough-in and wall shears are mitigated; emergency procedures and warning systems are established and understood by participating personnel; incident-specific personal protective equipment is utilized; physical hazards are identified and managed; victim protection is maximized; victim extrication methods are considered; and a rapid intervention team is staged.
(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, types of intersecting trenches and techniques to stabilize, protocols on making the general area safe, criteria for safe zones in the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, identify type of intersecting trench, use trench rescue protocols, identify types of collapse and methods to stabilize, identify hazards in a trench, use personal protective equipment, and anticipate extrication logistics.

12.3.6 Install supplemental sheeting and shoring for each 2 ft (0.61 m) of depth dug below an existing approved shoring system, given size-up information, an action plan, and a trench tool kit, so that the movement of soil is minimized effectively, initial trench support strategies are facilitated, rescue entry team safe zones are maintained, excavation of entrapping soil is continued, victim protection is maximized, victim extrication methods are considered, and a rapid intervention team is staged.

(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, methods and techniques to install supplemental sheeting and shoring, protocols on making the general area safe, criteria for safe zones in the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, identify supplemental sheeting and shoring, use all trench rescue protocols, identify types of collapse and methods to stabilize, identify exposure to hazards within the trench relative to existing safe zones, select and use personal protective equipment, and anticipate extrication logistics.

12.3.7 * Utilize spot shoring techniques to support soil without incorporating uprights or panels as part of the shoring plan, given a trench incident, trench rescue toolbox, tabulated data, and trench shoring plan, so that the soil is prevented from collapse.
A.12.3.7 Based on the soil conditions, uprights and panels may need to be implemented according to tabulated data
(A) Requisite Knowledge. Shoring and shielding, tabulated data, strategies and tactics, methods and techniques to install supplemental sheeting and shoring, protocols on making the general area safe, criteria for safe zones in the trench, types of collapses and techniques to stabilize, emergency procedures, selection of personal protective equipment, and consideration of selected stabilization tactics on extrication and victim safety.
(B) Requisite Skills. The ability to interpret tabulated data information and tables, place shoring and shielding systems, identify supplemental sheeting and shoring, use all trench rescue protocols, identify types of collapse and methods to stabilize, identify exposure to hazards within the trench relative to existing safe zones, select and use personal protective equipment, and anticipate extrication logistics.

12.3.8 Construct load stabilization systems, given an assignment, personal protective equipment, and a trench tool kit, so that the stabilization system will support the load safely, the system is stable, and the assignment is completed.
(A) Requisite Knowledge. Different types of stabilization systems and their construction methods, limitations of the system, load calculations, principles of and applications for stabilization systems, and safety considerations.
(B) Requisite Skills. The ability to select and construct stabilization systems, evaluate structural integrity of the system, determine stability, and calculate loads.

12.3.9 Lift a load, given a trench tool kit, so that the load is lifted the required distance to gain access; settling or dropping of the load is prevented; control and stabilization are maintained before, during, and after the lift; and operational objectives are attained.
(A) Requisite Knowledge. Applications of levers; classes of levers; principles of leverage, gravity, and load balance; resistance force; mechanics and types of load stabilization; mechanics of load lifting; application of pneumatic, hydraulic, mechanical, and manual lifting tools; how to calculate the weight of the load; and safety protocols.
(B) Requisite Skills. The ability to evaluate and estimate the weight of the load, operate the tools correctly, operate a lever, and apply load stabilization systems.

12.3.10 Coordinate the use of heavy equipment, given personal protective equipment, means of communication, equipment, operator, and an assignment, so that operator capabilities and

limitations for task are evaluated, common communications are maintained, equipment usage supports the operational objectives, and hazards are avoided.
(A) Requisite Knowledge. Types of heavy equipment; capabilities“, application, and hazards of heavy equipment and rigging; operator training; types of communication; and methods to establish communications.
(B) Requisite Skills. The ability to use hand signals, use radio equipment, recognize hazards, assess operator for skill and calm demeanor, assess heavy equipment for precision of movement and maintenance, monitor rescuer and victim safety, and use personal protective equipment.

12.3.11 Release a victim from entrapment by components of a collapsed trench, given personal protective equipment, a trench rescue tool kit, and specialized equipment, so that hazards to rescue personnel and victims are minimized, considerations are given to compartment syndrome related to crush injuries and other injuries, techniques are used to enhance patient survivability, tasks are accomplished within projected time frames, and techniques do not compromise the integrity of the existing trench shoring system.
(A) Requisite Knowledge. Identification, utilization, and required care of personal equipment; general hazards associated with each type of trench collapse; methods of evaluating shoring systems and trench wall stability; compartment syndrome protocols; identification of collapse characteristics; causes and associated effects of trench collapse; potential signs of subsequent collapse; selection and application of rescue tools and resources; risk/benefit assessment techniques for extrication methods; and time restraints.
(B) Requisite Skills. The ability to select, use, and care for personal protective equipment; operate rescue tools and stabilization systems; identify crush syndrome clinical settings; and complete risk/benefit assessments for selected methods of rescue and time constraints

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13.1 Awareness Level.

Prior to qualification at the awareness level in machinery rescue, the individual shall meet the requirements defined in Section 13.1.
13.1.1 Size up a machinery rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for machinery rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

13.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational

requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

13.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

13.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

13.2 Operations Level.

The job performance requirements defined in Sections 13.1 and 13.2 shall be met prior to or during operations-level qualification in machinery rescue.
13.2.1 * Preplan for a small machinery incident, given agency guidelines, planning forms, and an operations-level machinery incident or simulation, so that a standard approach is used during training and operational scenarios; initial and ongoing size-ups are being completed; emergency situation hazards are identified; isolation methods and scene security measures are considered; fire suppression and safety measures are identified; machinery stabilization needs are evaluated; and resource needs are identified and documented for future use.
A.13.2.1 Requisite Skills. To ensure a safe disentanglement or extrication operation, the AHJ should provide training on the following topics as part of the planning process:
(1) Weight estimation
(2) Construction and materials of small machinery
(3) Identification of tension and compression forces
(4) Pneumatic high-, medium-, and low-pressure lifting bags
(5) Categories of mechanical injury
(6) Various ground-based stabilization techniques

(7) Center of gravity and its relationship to rollover
(8) Use of cribbing, chocks, and box cribbing
(9) Proper use of shackles and slings (including wire rope, chain, and synthetic rope of various types and styles)
(10) Types and examples of levers for mechanical advantage
(11) Proper and effective use of hand tools, including a hammer, wrenches, sockets, screwdrivers, pry bars, saws, a cable cutter, jacks, and a come-along
(12) Disentanglement through primary access points
(13) Patient packaging prior to removal from a machine
(14) Protection of the victim during extrication or disentanglement operations
(15) Proper and effective use of power tools, such as hydraulic, pneumatic, and electrical spreading, cutting, lifting, and ram-type tools
(16) Lockout/tagout of machinery
(17) Identification and use of various sling configurations
(18) Steps to lift and/or move an object
(A) Requisite Knowledge. Operational protocols, specific planning forms, types and machinery common to the AHJ boundaries, machinery hazards, incident support operations and resources, machinery anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of machinery, identify and evaluate various types of machinery within the AHJ boundaries, request support and resources, identify machinery anatomy, and determine the required fire suppression and safety measures.

13.2.2 * Establish “scene” safety zones, given scene security barriers, incident location, incident information, and PPE, so that hot, warm, and cold safety zones are designated; zone perimeters are consistent with incident requirements; perimeter markings can be recognized and understood by others; zone boundaries are communicated to incident command; and only authorized personnel are allowed access to the rescue scene.
A.13.2.2 The intent of 13.2.2 is to establish working zones in, around, or near a working incident. It is expected that the established zones function with the AHJ incident management systems currently in place.
(A) Requisite Knowledge. Use and selection of PPE, traffic control flow and concepts, types of control devices and tools, types of existing and potential hazards, methods of hazard mitigation, organizational standard operating procedure, and types of zones and staffing requirements.
(B) Requisite Skills. The ability to select and use PPE, apply hazard control concepts, identify and mitigate existing or potential hazards, and apply zone identification and personal safety techniques.

13.2.3 * Establish fire protection, given an extrication incident and fire control support, so that fire and explosion potential is managed and fire hazards and rescue objectives are communicated to the fire suppression crew.
A.13.2.3 The intent of 13.2.3 is to provide fire control measures and teams at the scene of working rescue incidents. The type and scope of these measures will vary depending on the incident as well as any potential rescue tools and tactics used in the extrication effort. In all cases, an independent entity (such as a team, a company, or an individual) should be dedicated to identifying potential sources of explosion, fire, or thermal hazard and be equipped and positioned to immediately extinguish or mitigate the hazard.

(A) Requisite Knowledge. Types of fire and explosion hazards, IMS, types of extinguishing devices, agency policies and procedures, types of flammable and combustible substances and types of ignition sources, and extinguishment or control options.
(B) Requisite Skills. The ability to identify fire and explosion hazards, operate within the IMS, use extinguishing devices, apply fire control strategies, and manage ignition potential.

13.2.4 * Stabilize a small or simple machine, given a machinery tool kit and PPE, so that the machinery is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise machinery stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
A.13.2.4 In this case, "stabilization" is meant to imply stabilization from unintended or unwanted movement; uncontrolled movement of machinery components can cause extremely hazardous and potentially fatal situations. Responding personnel should be familiar with, and trained in, techniques for stabilizing and removing the potential for movement of machinery components. The five directional movements to be considered during the stabilization process are defined as follows:
(1) Horizontal Movement. Machine moves forward or rearward on its longitudinal axis or moves horizontally along its lateral axis.
(2) Vertical Movement. Machine moves up and down in relation to the ground while moving along its vertical axis.
(3) Roll Movement. Machine rocks side to side while rotating about on its longitudinal axis and remaining horizontal in orientation.
(4) Pitch Movement. Machine moves up and down about its lateral axis, causing the object's front and rear portions to move left or right in relation to their original position.
(5) Yaw Movement. Machine twists or turns about its vertical axis, causing the object's front and rear portions to move left or right in relation to their original position. For operations level, stabilization would include basic techniques such as cribbing, blocking, and wedging components against unwanted movement.
(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of small machinery movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of machinery construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

13.2.5 * Isolate potentially harmful energy sources, given machinery tool kit and PPE, so that all hazards are identified; systems are managed; beneficial system use is evaluated; and hazards to rescue personnel and victims are minimized.
A.13.2.5 It is the intent of the committee that rescue personnel control hazards by de-energizing or controlling, where possible, machinery power and stored energy systems that pose hazards to rescuers or victims. These systems can include components such as electrical, fuel, chemical, hydraulic, mechanical, and pneumatic systems. When controlling hazards, care should be taken not to eliminate the potential use by rescuers of beneficial systems, such as ventilation, machinery movement and positioning controls, restraint retractors, or other devices that would enable more efficient operations. These hazards include the following:
(1) Utilities. Control of the utilities in and around a machinery search and rescue incident is critical to ensure the safety of responding personnel and victims. The AHJ should provide its members with training in the control of these services to provide a safe

environment in which to operate and to ensure the safety of victims. The following utilities should be considered when providing training:

(a) Electrical services (primary and secondary)
(b) Gas, propane, fuel oil, or other alternative energy sources (primary systems)
(c) Water
(d) Sanitary systems
(e) Communications
(f) Secondary service systems (such as compressed, medical, or industrial gases)

(2) Hazardous Materials. Machinery rescue incidents might include various materials that, when released during an incident, could pose a hazard to victims and responders. The AHJ should provide members with training in the recognition of potential hazardous material releases, the determination of an existing hazard, and the methods used to contain, confine, or divert hazardous materials to conduct operations safely and effectively.

(3) Release of High-Pressure Systems. Machinery often includes high-pressure systems (e.g., hydraulic, pneumatic) that can fail without warning. Such failure can cause extremely hazardous conditions, injury, and death of victims and responders. The AHJ should provide members with training in the recognition of potential high-pressure system hazards, the determination of an existing hazard, and the methods used to contain, confine, or divert such hazards to conduct operations safely and effectively. (4) Personal Hazards. At the site of any machinery search and rescue incident, many dangers exist that pose personal injury hazards to the responders. The AHJ should train members to recognize the personal hazards they encounter and to use the methods needed to mitigate these hazards to help ensure member safety. Every member should be made aware of hazards such as trips, falls, blows, cuts, abrasions, punctures, and impalement.

(A) Requisite Knowledge. Types and uses of PPE, types of energy sources, system isolation methods, specialized system features, tools for disabling hazards, and policies and procedures of the AHJ.

(B) Requisite Skills. The ability to select and use hazard-specific PPE, identify hazards, operate beneficial systems in support of tactical objectives, and operate tools and devices for securing and disabling hazards.

13.2.6 Determine small machinery access and egress points, given the structural and damage characteristics and potential victim location(s), so that victim location(s) is identified; access and egress points for victims, rescuers, and equipment are designated; flows of personnel, victims(s), and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are enforced.

(A) Requisite Knowledge. Small machinery construction/features, access and egress points, routes and hazards operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.

(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, and to assess and evaluate impact of machine stability on the victim.

13.2.7 Create access and egress openings for rescue from a small or simple machine, given a machinery tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal; the technique chosen is expedient; victim and rescuer protection is afforded; and stability is maintained.

(A) Requisite Knowledge. Small machinery construction and features; electrical, mechanical, hydraulic, pneumatic, and alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify common small machinery construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

13.2.8 Disentangle victim(s), given an extrication involving a small or simple machine, a machinery tool kit, PPE, and specialized equipment, so that undue victim injury is prevented; victim protection is provided; and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

13.2.9 * Identify potential emergency incidents involving mechanical equipment, given the associated structural and damage characteristics, so that incident-specific resources are identified and hazard control plans are developed.
A.13.2.9 It is the intent of this standard to acquire and analyze information about mechanical equipment within a building or structure that could lend to emergency incidents. Because the type of mechanical equipment is greatly varied, it is important for rescuers to assess and understand the risks posed by the type of equipment within a given jurisdiction. While not all types of emergencies can be easily determined, a general understanding of the characteristics of the building, content, and exposure, could allow rescuers to plan for those incidents that are most likely to occur.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of machinery movement and travel, types of stabilization points, types of energy sources, system isolation and release methods, access and egress points, specialized system features, tool selection and application, and special features of unique machinery systems and accompanying subject matter experts.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, identify common energy control devices and construction, perform hazard control based on techniques selected, apply tactics and strategy based on assignment, select and operate tools and equipment specific to machinery rescue, apply victim care and stabilization devices, and demonstrate safety procedures.

13.2.10 Designate access and egress points for victim(s) and rescuer(s), given a machinery rescue tool kit and hazard-specific PPE, so that all machinery involved is stabilized and isolated, and chosen points can be protected.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of machinery movement and travel, types of stabilization points, types of energy sources, system isolation and release methods, access and egress points, specialized system features, tool selection and application, and special features of unique machinery systems.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, identify common energy control devices and construction, perform hazard control based on techniques selected, apply tactics and strategy based on assignment, select and operate tools and equipment specific to machinery rescue, apply victim care and stabilization devices, and demonstrate safety procedures.

13.2.11 Control the hazards presented by the release of fluids or mechanical release devices; given an entrapment within machinery, so that mechanical processes are secured, the position of machinery is determined to optimize the removal of victim(s), and chosen points do not compromise the removal of a victim or rescuer.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of machinery movement and travel, types of stabilization points, types of energy sources, system isolation and release methods, access and egress points, specialized system features, tool selection and application, and special features of unique machinery systems.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, identify common energy control devices and construction, perform hazard control based on techniques selected, apply tactics and strategy based on assignment, select and operate tools and equipment specific to machinery rescue, apply victim care and stabilization devices, and demonstrate safety procedures.

13.2.12 Initiate stabilization of energized equipment, given an entrapment within machinery, so that undue injury is prevented and safety guideline points are followed.
(A) Requisite Knowledge. Types of stabilization devices, mechanism of machinery movement and travel, types of stabilization points, types of energy sources, system isolation and release methods, access and egress points, specialized system features, tool selection and application, and special features of unique machinery systems.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations, identify common energy control devices and construction, perform hazard control based on techniques selected, apply tactics and strategy based on assignment, select and operate tools and equipment specific to machinery rescue.

13.2.13 * Utilize specific information from a subject matter expert (SME), given a machinery rescue event and an SME capable of supplying event- or system-specific technical guidance, so that the technical guidance supports decision making and operational considerations applied during the event.
A.13.2.13 It is the intent of the committee that the skill of identifying and applying information from an SME (on site or remotely) is essential to the successful outcome of a machinery rescue incident. An SME that is applicable to this type of event includes, but is not limited to, manufacturers, installers, specially trained mechanics or technicians, or plant maintenance personnel, all who possess specialized technical and/or institutional knowledge of the device, equipment, or process involved in the event. Identifying and keeping relevant SMEs in contact with command staff of the event is a critical component of machinery rescue incident management.
(A) Requisite Knowledge. Operational protocols, data collection, and data interpretation.
(B) Requisite Skills. Interviewing, note taking, diagram/technical drawing interpretation.

13.2.14 Remove a packaged victim to a designated safe area, as a member of a team, given a victim transfer device, a designated egress route, and PPE, so that the team effort is coordinated, the designated egress route is used, the victim is removed without compromising victim packaging, undue injury is prevented, and stabilization is maintained.
(A) Requisite Knowledge. Patient handling techniques; operation of IMS; types of immobilization, packaging, and transfer devices; types of immobilization techniques; and uses of immobilization devices.

(B) Requisite Skills. Use of immobilization, packaging, and transfer devices for specific situations; use of immobilization techniques; application of medical protocols and safety features to immobilize, package, and transfer; and use of all techniques for lifting the patient.

13.2.15 * Terminate an incident, given PPE specific to the incident, isolation barriers, and tool kit, so that rescuers and bystanders are protected and accounted for during termination operations, the party responsible is notified of any modification or damage created during the operational period, documentation of loss or material use is accounted for, scene documentation is performed, scene control is transferred to a responsible party, potential or existing hazards are communicated to that responsible party, debriefing and post incident analysis and critique are considered, and command is terminated.

A.13.2.15 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (i.e., abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.

(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.

(B) Requisite Skills. Selection and use of hazard-specific PPE, decontamination of PPE; use of barrier protection techniques, data collection and record-keeping/reporting protocols, post incident analysis activities.

13.3 Technician Level.

The job performance requirements defined in Sections 13.2 and 13.3 shall be met prior to or during technician-level qualification in machinery rescue.

13.3.1 * Plan for a large machinery incident, and conduct initial and ongoing size-up, given agency guidelines, planning forms, and operations-level machinery incident or simulation, so that a standard approach is used during training and operational scenarios; emergency situation hazards are identified; isolation methods and scene security measures are considered; fire suppression and safety measures are identified; machinery stabilization needs are evaluated; and resource needs are identified and documented for future use.

A.13.3.1 It is the intent of the committee that the differentiation between awareness level and operations level incidents correlate to both the environment in which the rescue is to be conducted as well as the level or degree of entrapment. It is recommended that provider agencies develop clear guidelines for making this determination based on the AHJ's resources and capabilities.

Awareness level rescue skills are applicable to vehicle or machinery events that involve simple or small machinery, that are limited to digital entrapment of the victim, and that involve environments where rescuer intervention does not constitute a high level of risk to either the victim or rescuers, based on the environment or other factors.

Operations level skills apply to those incidents that involve heavy machinery; the application of complex extrication processes; the presence of multiple uncommon concurrent hazards; or situations including more than digital entrapment of a victim.

(A) Requisite Knowledge. Operational protocols, specific planning forms, types of large, commercial/heavy machinery common to the AHJ boundaries, machinery hazards, incident support operations and resources, machinery anatomy, and fire suppression and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of large machinery, identify and evaluate various types of large machinery within the AHJ boundaries, request support and resources, identify large machinery anatomy, and determine the required fire suppression and safety measures. Awareness level rescue skills are applicable to vehicle or machinery events that involve simple or small machinery, are limited to digital entrapment of the victim, and involve environments where rescuer intervention does not constitute a high level of risk to either the victim or rescuers based on the environment or other factors. Operations level skills apply to those incidents that involve heavy machinery, complex extrication processes, multiple uncommon concurrent hazards, or more than digital entrapment of a victim.

13.3.2 * Stabilize large machinery, given a machinery tool kit and PPE, so that the machinery is prevented from moving during the rescue operations; entry, exit, and tool placement points are not compromised; anticipated rescue activities will not compromise machinery stability; selected stabilization points are structurally sound; stabilization equipment can be monitored; and the risk to rescuers is minimized.
A.13.3.2 Stabilization of large, heavy, or complex machines requires more advanced techniques and specialized resources, including the following:
(1) Use of commercial heavy wreckers or crane services to assist at incidents involving large machinery
(2) Use, care, and maintenance of power winches
(3) Establishment of an anchor over the responder's head
(4) Shoring
(A) Requisite Knowledge. Types and rated capacities of stabilization devices, mechanism of machinery movement, types of stabilization points, types of stabilization surfaces, AHJ policies and procedures, and types of machinery construction components as they apply to stabilization.
(B) Requisite Skills. The ability to select, operate, and monitor stabilization devices.

13.3.3 Determine large machinery access and egress points, given the structural and damage characteristics and potential victim location(s), so that victim location(s) is identified; access and egress points for victims, rescuers, and equipment are designated; flows of personnel, victim(s), and equipment are identified; existing entry points are used; time constraints are factored; selected entry and egress points do not compromise machinery stability; chosen points can be protected; equipment and victim stabilization are initiated; and AHJ safety and emergency procedures are enforced.
(A) Requisite Knowledge. Large machinery construction/features, access and egress points, routes and hazards, operating systems, AHJ standard operating procedure, and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify access and egress points and probable victim locations and to assess and evaluate impact of large machinery stability on the victim(s).

13.3.4 Create access and egress openings for rescue from large machinery, given a machinery tool kit, specialized tools and equipment, PPE, and an assignment, so that the movement of rescuers and equipment complements victim care and removal; an emergency escape route is

provided; the technique chosen is expedient; victim and rescuer protection is afforded; and stability is maintained.
(A) Requisite Knowledge. Large machinery construction and features; electrical, mechanical, hydraulic, and pneumatic systems; alternative access and egress equipment; points and routes of ingress and egress; techniques and hazards; agency policies and procedures; and emergency evacuation and safety signals.
(B) Requisite Skills. The ability to identify large machinery construction features, select and operate tools and equipment, apply tactics and strategy based on assignment, apply victim care and stabilization devices, perform hazard control based on techniques selected, and demonstrate safety procedures and emergency evacuation signals.

13.3.5 Disentangle victim(s), given an extrication incident, a machinery tool kit, PPE, and specialized equipment, so that undue victim injury is prevented; victim protection is provided; and stabilization is maintained.
(A) Requisite Knowledge. Tool selection and application, operation of stabilization systems, protection methods, disentanglement points and techniques, and dynamics of disentanglement.
(B) Requisite Skills. The ability to operate disentanglement tools, initiate protective measures, identify and eliminate points of entrapment, and maintain incident stability and scene safety.

NFPA 2021 1006 Chapter 16 Helicopter Rescue

16.1 Awareness Level.

Prior to qualification at the awareness level in helicopter rescue, the individual shall meet the requirements defined in Section 16.1.

16.1.1 Recognize a technical search and rescue incident requiring the need for helicopter assets, given a technical rescue incident, so that the selected air assets support the event's terminal objective.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, requiring aircraft hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on incidents requiring aircraft, identify and evaluate various types of hazards within the jurisdiction familiar to the AHJ that would limit aircraft usage, request support and resources, and determine the required safety measures.

16.1.2 Identify potential landing zones (LZs) and helispots, given a search and/or rescue incident, so that the rescuer can begin the mitigation of the general hazards and the use of PPE, providing for the safety of rescuers, victims, and others within the operational area.
(A) Requisite Knowledge. LZ requirements of search and rescue (SAR) helicopters used by the AHJ, effects of rotor wash on terrain and materials; manufacturers' recommendations; policies, procedures, and guidelines for the appropriate AHJ; and applicable standards.
(B) Requisite Skills. Set up an LZ for SAR helicopters used by the AHJ and removal of foreign objects and debris within the LZ and operational areas.

16.1.3 Size up an incident requiring helicopter rescue, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and

reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for incidents requiring helicopter rescue.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

16.1.4 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

16.1.5 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

16.1.6 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

16.2 Operations Level.

The job performance requirements defined in Sections 16.1 and 16.2 shall be met prior to or during operations-level qualification in helicopter rescue.

16.2.1 Operate as part of a flight crew, ground support, or other assignment in or attached to the aircraft, given an assignment, hazard-specific PPE, and an incident, so that situational awareness is maintained, safety issues are identified and communicated, and the assignment is completed.
(A) Requisite Knowledge. Roles and responsibilities of flight crew, ground support, and others assigned in or attached to the aircraft; airframe-specific operational characteristics; PPE selection and use; safe work practices; environmental hazards identification and management; and policies, procedures, and guidelines for the AHJ.
(B) Requisite Skills. Situational awareness of flight crew, ground support, and others assigned in or attached to the aircraft, hand signals, use of aircraft intercom and radio systems, operation of ingress and egress openings, operation of passenger and cargo restraint systems, and emergency procedures.

16.2.2 Select and use hazard-specific PPE, given an air transport assignment and an incident, so that hazards are identified and proactively managed, the search and rescuer and the patient are briefed on the identified hazards and PPE use, and the tasks are completed.
(A) Requisite Knowledge. Environmental-specific PPE; airframe-specific operational requirements; patient packaging equipment selection and use; manufacturers' recommendations; and policies, procedures, and guidelines for the AHJ.
(B) Requisite Skills. Select and use PPE, select and use patient packaging equipment, verbal briefing of passengers or patients, operation of airframe-specific communications systems, operation of hatches and other aircraft openings, and air crew situational awareness.

16.2.3 Select air operations resources, given an assignment and incident and a list of air operations resources, so that the type of aircraft and flight/rescue crew selected match the assignment, and operational parameters and resources meet intended tasking.
(A) Requisite Knowledge. Policies, procedures, and guidelines for the AHJ; terrain characteristics; task analysis; airframe-specific operational capabilities; capabilities of air crew, others in or attached to the aircraft and ground support; weather and environmental variables; and crew resource management.
(B) Requisite Skills. Dynamic operational assessment, resource analysis, synthesizing multiple data sets, and selection of resources based on multiple factors.

16.2.4 Demonstrate airframe-specific emergency procedures while operating as a member of a flight/rescue crew, ground support, or others in or attached to the aircraft, given an assignment and airframe, so that pre- and post-emergency operations are completed, airframe safety systems are engaged, and the aircraft is egressed within established time frames.
(A) Requisite Knowledge. Characteristics of crash profiles, roles and responsibilities of flight crew and others in or attached to the aircraft and ground crew, dynamics of a mishap, water egress procedures, environmental-specific egress procedures, distress communication devices, airframe-specific life safety systems, egress systems, policies, personal survival, procedures, and guidelines for the AHJ.
(B) Requisite Skills. Use of airframe-specific egress systems, water-bound helicopter exit procedures, land-based helicopter exit procedures, emergency escape route procedures and protocols, use of signaling devices, emergency shutdown procedures, crash rescue equipment use, fire suppression equipment use, and personal survival skills.

16.2.5 Demonstrate search observer skills while operating as a member of a flight/rescue crew, given a search assignment, so that a preflight briefing is conducted, tasks and assignments are communicated, the search mode and protocols are defined, and the task is completed.
(A) Requisite Knowledge. Observation techniques for inflight searches, helicopter configurations, passenger restraint systems, communications equipment, policies, search modes, protocols, hand signals, flight crew roles and responsibilities, use of airframe-specific search tools, procedures, and guidelines for the appropriate AHJ.
(B) Requisite Skills. Search techniques, preflight briefing, communicate via equipment and hand signals, and use of airframe-specific search tools.

16.2.6 Demonstrate landing zone management as a member of a ground crew, given an already established landing zone and an assignment, so that the area is secured, hazards are identified and controlled, movement in and around the LZ are positively controlled, and the task is completed.
(A) Requisite Knowledge. LZ physical requirements, PPE selection and use, airframe-specific operational requirements, methods of ground-to-air communications, scene security and control, hazard identification and management, policies, procedures, and guidelines for the AHJ.
(B) Requisite Skills. Control of LZ areas, hazard control and mitigation, use and selection of hazard-specific PPE, ground-to-air communications protocols, use of hand signals, aircraft ops lighting considerations, movement of people and materials, and safety.

16.2.7 Terminate an incident, given PPE specific to the incident, isolation barriers, and tool kit, so that search and rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modification or damage created during the operational period; documentation of loss or material use is accounted for; scene documentation is performed; scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and post incident analysis and critique are considered; and command is terminated.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post-incident analysis techniques.
(B) Requisite Skills. Ability to select and use hazard-specific PPE; decontamination of PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols and conduct post incident analysis activities.

16.3 Technician Level.

The job performance requirements defined in Sections 16.2 and 16.3 shall be met prior to or during technician-level qualification in helicopter rescue.

16.3.1 Manage a human and nonhuman external load to the aircraft, given an airframe, an assignment, and a load, so that all attachment points are connected, the load is lifted in a controlled manner, and the task is completed.
(A) Requisite Knowledge. Airframe-specific operational requirements, weight and balance, load and force considerations, ground crew roles and responsibilities, ground-to-air communications methods and protocols, hazard identification, scene control, emergency procedures, manufacturers' recommendations, policies, procedures, and guidelines for the appropriate AHJ.
(B) Requisite Skills. Consideration of weight and balance, select and use PPE, select and use load management components, anchor point and lift point identification, ground-to-air

communications techniques and protocols, emergency procedures, connecting life safety harness to the short haul or hoist line, and scene safety management techniques.

16.3.2 Demonstrate hoisting techniques, as a member of a flight/rescue crew, given an airframe, an assignment, a packaged load, and an incident, so that the load is moved in a controlled and safe manner, hoist activities are coordinated with flight operations, the airframe operational envelope is not exceeded, and the task is completed.
(A) Requisite Knowledge. Airframe-specific operational characteristics; weight and balance considerations; roles and responsibilities of the flight crew and others in or attached to the aircraft and ground support; operation of airframe-specific communications systems; hoist system operation; hoist specifications; load management; dynamic load factors and consideration; manufacturers' recommendations; environmental hazards; emergency procedures; communications equipment; hand signals; signaling devices; and policies, procedures, and guidelines for the appropriate AHJ.
(B) Requisite Skills. Hazard analysis, weight and balance calculation, dynamic load consideration, hoist preparation, delivery and recovery from environment-specific hazards, flight crew roles and responsibilities, situational awareness, flight crew communications protocols, and terminology specific to hoist operations.

16.3.3 Demonstrate the ability to devise and implement, given a rescue incident, so that preincident planning, primary and secondary operational rescue plans, and the selection of a properly trained, equipped, and adequately staffed rescue crew for the environment and operational conditions to be encountered are accomplished.
(A) Requisite Knowledge. Operational capabilities of the helicopter, aircrew, and rescue personnel, effects of environmental conditions, and barriers to mission success.
(B) Requisite Skills. Devise a plan and implement the plan providing for a secondary plan.

16.3.4 Demonstrate, given a helicopter search and rescue mission, so that passengers are restrained, the patient is packaged, and cargo is secured for flight operations in accordance with the AHJ.
(A) Requisite Knowledge. Inflight search techniques, helicopter configurations, passenger restraint systems, communications equipment, and policies and practices of the AHJ.
(B) Requisite Skills. Passenger, occupant, victim, and cargo restraint for the given aircraft.
16.3.5 Interpret weight and balance considerations for a specific airframe and task, given an assignment, reference materials, weather forecast, and airframe-specific operational parameters, so that the total weight of occupants, as well as the flight crew, fuel, external loads, and equipment is incorporated into the weight and balance calculations; the load does not exceed airframe operational parameters; and the task is completed.
(A) Requisite Knowledge. Helicopter operational specifications; weight and balance considerations; center of gravity determination; and policies, procedures, and guidelines for the appropriate AHJ.
(B) Requisite Skills. Weight and balance considerations and protocols, task-specific performance factors, and interpret and apply technical data.

16.3.6 * Establish a helispot or LZ, given a requirement to land a helicopter in an unimproved/undesignated area to support a technical search and rescue mission.
A.16.3.6 This is intended to support helicopter rescue missions and not for common air medical evacuations.

(A) Requisite Knowledge. Helicopter operational specifications; including minimum size for an unimproved landing zone, based on the airframe; and policies, procedures, and guidelines for the appropriate AHJ.
(B) Requisite Skills. Identify sufficient areas to support helicopter landing operations, object and debris removal, topography and composition of land.

NFPA 2021 1006 Chapter 17 Surface Water

17.1 * Awareness Level.

Prior to qualification at the awareness level in surface water rescue, the individual shall meet the requirements defined in Section 17.1.
A.17.1 This section is for rescue situations with water moving less than 1 knot. Awareness-level water rescue skills are applicable only to survival swimming skills and support of water rescue operations.
17.1.1 Size up a surface water incident, given an incident, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, and search parameters are identified.
(A) Requisite Knowledge. Information gathering techniques and how that information is used in the size-up process.
(B) Requisite Skills. The ability to interview people, gather information, relay information, manage witnesses, and use information sources.

17.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

17.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

17.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

17.2 * Operations Level.

The job performance requirements defined in Sections 17.1 and 17.2 shall be met prior to or during operations-level qualification in surface water rescue.
A.17.2 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.
17.2.1 * Develop a site survey for an existing water hazard, given historical data, specific PPE for conducting site inspections, flood insurance rate maps, tide tables, and meteorological projections, so that life safety hazards are anticipated, risk/benefit analysis is included, site inspections are completed, water conditions are projected, site-specific hazards are identified, routes of access and egress are identified, boat ramps (put-in and take-out points) are identified, the method of entrapment is considered, and areas with a high probability for victim location are determined.
A.17.2.1 Water environments can include, but are not limited to, swiftwater, still water, ice-covered water, and tidal water. Rescuers should demonstrate the requisite knowledge of each water environment anticipated within the geographical confines of the AHJ and their associated tactical and safety considerations as part of this competency.
(A) Requisite Knowledge. Requisite contents of a site survey; types, sources, and information provided by reference materials; hydrology and the influence of hydrology on rescues; types of hazards associated with water rescue practices scenarios, inspections practices, and considerations techniques; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; and environmental conditions that influence victim location.
(B) Requisite Skills. The ability to interpret reference materials, perform a scene assessment, evaluate site conditions, complete risk/benefit analysis, and select and use necessary PPE.

17.2.2 * Select water rescue PPE, given a water rescue assignment and assorted items of personal protective and life-support equipment, so that the rescuer is protected from temperature extremes and environmental hazards, correct buoyancy is maintained, AHJ protocols are complied with, swimming ability is maximized, routine and emergency communications are established between components of the team, self-rescue needs have been evaluated and provided for, and preoperation safety checks have been conducted.
A.17.2.2 Temperature extremes include both hypo- and hyperthermia. Personal protective equipment users have to be aware of the potential for either condition to develop strategies for avoidance and recognition. Adequate flotation is dependent upon the mode of operation. As an example, for surface rescue, positive buoyancy is desired, whereas for underwater operations, neutral buoyancy should be maintained. Proper fit of personal protective equipment is determined by the manufacturers' specifications and related documentation; the primary intent

is that the safety and efficiency of the rescuer is not impaired or the garments' capabilities exceeded. The AHJ should utilize personal protective equipment appropriate to the conditions present in its response area, as well as based on the scope of its operations. In considering personal protective equipment selection, the following factors should be addressed:

(1) Flotation (buoyancy)
(2) Insulation from cold water exposure
(3) Protection from physical hazards (e.g., abrasion, cuts, tears, punctures)
(4) Visibility
(5) Garment form, fit, and mobility
(6) Limited chemical and biological protection (e.g., from bloodborne pathogens) (see FEMA document FA 136, Protective Clothing and Equipment for Emergency Responders for Urban Search and Rescue Missions)
(7) Provision of "low-profile" helmets (i.e., helmets without a brim on the back) utilized in the water rescue environment to avoid possible cervical spine hyperextension or hyperflexion injuries, as well as to provide protection from blunt force trauma

(A) Requisite Knowledge. Manufacturer's recommendations for PPE; standard operating procedures; basic signals and communications techniques; selection criteria of insulating garments; buoyancy characteristics; personal escape techniques; applications for and capabilities of personal escape equipment; hazard assessment; AHJ protocols for equipment positioning; classes of personal flotation devices; selection criteria for personal protective clothing, personal flotation devices, and water rescue helmets; personal escape techniques; applications for and capabilities of personal escape equipment; and equipment and procedures for signaling distress.

(B) * Requisite Skills. The ability to use PPE according to the manufacturer's directions, don and doff equipment in an expedient manner, use preoperation checklists, select personal flotation devices, don and doff personal flotation devices, select water rescue helmets, don and doff water rescue helmets, select personal protective clothing and equipment, don and doff in water insulating garments, proficiency in emergency escape procedures, proficiency in communicating distress signals, proficiency in emergency escape procedures, and proficiency in communications.

A.17.2.2(B) Selection of water rescue personal protective equipment, so that the rescuer will be protected from temperature extremes and blunt trauma, the rescuer will have flotation for tasks to be performed, swimming ability will be maximized during rescue activities, self-rescue needs have been evaluated and provided for has been established, and a means of summoning help has been provided.

17.2.3 * Define search parameters for a water rescue incident, given topographical maps of a search area; descriptions of all missing persons and incident history; and hydrologic data, including speed and direction of current or tides, so that areas with high probability of detection are differentiated from other areas, witnesses are interviewed, critical interview information is recorded, passive and active search tactics are implemented, personnel resources are considered and used, and search parameters are communicated.

A.17.2.3 Active Search Measures: Of primary and immediate importance is locating the point last seen (PLS) of the missing subject. Sometimes the reporting person (RP) will have no direct knowledge of what happened. For example, the RP might be a family member reporting a group of canoeists overdue at a takeout. At other times the RP will have witnessed a river accident such as a raft overturning or a fisherman being swept away, and will be able to give a description of the victims, and a fairly exact PLS. RPs should be interrogated for all information they might have about the victim, to include physical description, clothing, destination,

experience, time the incident occurred, and any other details that might help the search (e.g., the type of shoes, in order to aid the trackers). Passive Search Measures: The searches at this point are detailed, formal searches, not hasty ones. It is better to have small, trained groups of searchers thoroughly search an area repeatedly than to search with large groups of untrained people, since these frequently trample more evidence than they find. As the search progresses, the incident commander should debrief team leaders frequently and revise the search plan as necessary.

(A) Requisite Knowledge. Topographical map components, hydrologic factors and wave heights, methods to determine areas of high probability of detection, critical interview questions and practices, methods to identify track traps, ways to identify spotter areas and purposes for spotters, personnel available and their effect on parameter definition, the effect of search strategy defining parameters, communication methods, and reporting requirements.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.4 Develop an action plan for a shore-based rescue of a single or multiple water-bound victim(s), given an operational plan and a water rescue tool kit, so that all information is factored, risk/benefit analysis is conducted, protocols are followed, hazards are identified and minimized, personnel and equipment resources will not be exceeded, assignments are defined, consideration is given to evaluating changing conditions, and the selected strategy and tactics fit the conditions.

(A) Requisite Knowledge. Elements of an action plan; types of information provided by reference materials and size-up; hydrology; types of hazards associated with water rescue practices; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; environmental conditions that influence victim location; safety, communications, and operational protocols; and resource capability and availability.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.5 * Deploy a water rescue reach device to a water-bound victim, given required equipment and PPE so that the deployed equipment reaches the victim(s), the rescue equipment does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the device.

A.17.2.5 Both throw-rope deployments should be conducted sequentially, to the same victim, within a span of approximately 40 seconds to a victim 12.19 m (40 ft) away from the rescuer.

(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.

(B) Requisite Skills. The ability to select PPE specific to the water environment, don PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly

related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.6 * Deploy a water rescue rope to a water-bound victim, given a water rescue rope in a throw bag, a coiled water rescue rope 50 ft to 75 ft (15.24 m to 22.86 m) in length, and PPE, so that the deployed rope lands within reach of the victim, the rescue rope does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the throw line.
A.17.2.6 See A.17.2.5.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. The ability to deploy both a water rescue rope bag and a coiled water rescue rope, select PPE specific to the water environment, don PPE, identify water hazards (e.g., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.7 * Develop and implement an action plan for the use of watercraft to support the rescue of a single or multiple water-bound victims, given watercraft, operator(s), and policies and procedures used by the AHJ, so that watercraft pre-deployment checks are completed; watercraft launch or recovery is achieved; rescuers are deployed and recovered; both onboard and rescue operations conform with watercraft operational protocols and capabilities; communications are clear and concise; and the candidate is familiar with watercraft nomenclature, operational protocols, design limitations, and launch/recovery site issues.
A.17.2.7 The committee's intent is for the candidate to know what procedures are used when using watercraft in their jurisdiction, or at least basic watercraft deployment and recovery techniques, even if the AHJ does not have its own watercraft. This includes the rescuer's role on the boat, nomenclature, and use of emergency/safety equipment (fire extinguishers, flares, flotation devices, etc.). The committee understands that not all water rescue teams have boats and not all boat operators are knowledgeable about deploying rescuers. In this case, the technician should be able to act as a liaison between the team and the boat operator.
(A) Requisite Knowledge. Entry/exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, tides, and currents.
(B) Requisite Skills. Implement access and egress procedures and communications with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

17.2.8 * Define procedures to provide support for helicopter water rescue operations within the area of responsibility for the AHJ, given a helicopter service, operational protocols, helicopter capabilities and limitations, water rescue procedures, and risk factors influencing helicopter operations, so that air-to-ground communication is established and maintained, applications are within the capabilities and skill levels of the helicopter service, the applications facilitate victim extraction from water hazards that are representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, air crew and ground personnel safety are

not compromised, landing zones are designated and secured, and fire suppression resources are available at the landing zone.

A.17.2.8 While helicopters are not universally available to water rescuers and there are many restrictions on the use of aircraft for rescue, they are nonetheless frequently drafted for improvised rescues during times of crisis. Therefore, water rescue teams and the supporting helicopter services should plan for the use of helicopters that can be called upon during these crises to identify capabilities and limitations of the team and the helicopter service, to train in those procedures that all parties agree are within their collective skill levels and for which they are equipped, and to draft protocols that will define exactly what procedures the helicopter service will be called upon to perform and the criteria for that decision.

(A) Requisite Knowledge. Local aircraft capabilities and limitations, landing zone requirements, hazards to aircraft, local protocols, procedures for operating around aircraft, dynamics of rescue options, crash survival principles, PPE limitations and selection criteria, ancillary helicopter rescue equipment, and helicopter surf rescue procedures.

(B) Requisite Skills. The ability to determine applicability of air operations, establish and control landing zones, assess fire protection needs, communicate with air crews, identify hazards, rig aircraft for anticipated rescue procedures, apply crash survival procedures, select and use PPE, and work with air crews to rescue a victim from the water.

17.2.9 * Implement procedures for performing watercraft-based rescue of an incapacitated, water-bound victim, as a member of a team, given a water hazard that is representative of the anticipated rescue environment watercraft that is available to the team (if applicable), designated victim packaging and management equipment, and water rescue PPE, so that the control and stability of the watercraft is maintained, risks to the victim and rescuers are minimized, and the victim is removed from the hazard.

A.17.2.9 It is the intent of the committee that the watercraft operator be required to perform a range of skills that demonstrate the operator's ability to control the craft in challenging or adverse conditions, to recover from a loss of power or primary means of propulsion, to right an overturned craft, to cast and recover rescuers and victims, to dock with fixed points and other watercraft, and to tow a disabled watercraft to safety. The specific evolutions required to demonstrate this level of proficiency should be defined by the AHJ. All personnel (including the operator) should be competent in the use of self-rescue practices and procedures applicable to the scope of operation, including, but not limited to, drownproofing, swiftwater self-rescue, current considerations (rip current, etc.), and basic swimming skills as identified by the AHJ. These requirements should be applied in the same manner that apparatus operators must meet specific knowledge and skill requirements based on the type of apparatus being operated (see NFPA 1002).

(A) Requisite Knowledge. Limitations and uses of available watercraft, local environmental access and egress procedures, parbuckling (rollup) techniques, dynamics of moving water and its effects on watercraft handling, conditional requirements for PPE, and the effects of extrication on watercraft handling and stability.

(B) Requisite Skills. The ability to move about in a designated watercraft in conditions representative of the anticipated rescue environment while managing the movement of a water-bound victim using techniques identified by the AHJ.

17.2.10 Demonstrate fundamental survival swimming and self-rescue skills, given safety equipment, props, and a controlled setting representative of the anticipated rescue environment, so that the risk of injury is minimized, flotation is maintained, available PPE is utilized, and egress is accomplished.

(A) Requisite Knowledge. Basic forward stroke swimming theory (surface skills).
(B) Requisite Skills. Basic swimming skills, including the ability to swim and float in different water conditions with and without flotation aids or swimming aids as required and apply water survival skills; don and doff PPE; select and use PPE, flotation aids, and swim aids; use communications systems; and evaluate water conditions to identify entry points and hazards.

17.2.11 Identify procedures for operation of rope systems particular to the water rescue needs of the AHJ, given rescue personnel, an established rope system, a load to be moved, and PPE, so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.
(A) Requisite Knowledge. Ways to determine incident needs as related to the operation of rope systems, capabilities and limitations of various rope systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, assignment considerations, common and critical operational commands, common rope system problems and ways to minimize or manage them, and ways to increase the efficiency of load movement.
(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel, manage movement of the load, and evaluate for potential problems.

17.2.12 Support operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, correct buoyancy control is maintained, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, operation support equipment, and communications issues.
(B) Requisite Skills. Basic support skills, including the ability to act as spotters and tend to water rescuers.

17.2.13 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed, and scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and post incident analysis and critique are considered; and command is terminated.
A.17.2.13 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.

(B) Requisite Skills. Select and use task and hazard-specific PPE; decontaminate PPE; use barrier protection techniques, collect data, follow record-keeping/reporting protocols, and conduct post incident analysis activities.

17.3 * Technician Level.

The job performance requirements defined in Sections 17.2 and 17.3 shall be met prior to or during technician-level qualification in surface water rescue.

A.17.3 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.

17.3.1 * Swim a designated water course, given a course designated by the AHJ as demonstrating the capabilities necessary to operate in the anticipated rescue environment, water rescue PPE, and swim aids as required, so that the specified objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are communicated, and rapid intervention for the rescuer has been staged for deployment.

A.17.3.1 A realistic evaluation of the rescuer's water survival skills should be conducted by the AHJ to meet this requirement. It is recommended that the AHJ use an annual swim test that meets or exceeds the IADRS Annual Watermanship Test. Example: Swim 91.4 m (100 yards) unassisted with any stroke, no time limit, and tread water for 10 minutes.

(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative water rescue environments (shoreline, in-water, and climatic), selection criteria for water rescue PPE and swim aids for anticipated water conditions and hazards, and swimming techniques for a representative body of water.

(B) Requisite Skills. The ability to swim and float over the required distances and for the necessary duration as outlined in the watermanship test found in Annex M with and without flotation aids or swim aids, apply water survival skills, don and doff PPE, select and use swim aids, use communications systems, and evaluate water conditions to identify entry points and hazards.

17.3.2 Perform a swimming surface water rescue, given a simulated victim, water rescue PPE, conditions representative of the anticipated rescue environment, swim aids as required, flotation aids for victims, and reach/extension devices, so that victim contact is maintained, the rescuer maintains control of the victim, the rescuer and the victim reach safety at a predetermined area, and medical conditions and treatment options are considered.

(A) Requisite Knowledge. Hydrology and specific hazards anticipated for a representative water rescue environment (shoreline, in-water, and climatic); victim behavior patterns; emergency countermeasures for combative victims; selection criteria for water rescue PPE, swim aids, and flotation aids for anticipated water conditions; victim abilities and hazards; swimming techniques for representative bodies of water; and signs, symptoms, and treatment of aquatic medical emergencies.

(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swim aids; apply water survival skills; manage combative water-bound victims; don and doff PPE; select and use PPE, flotation aids, and swim aids; utilize communications systems; select equipment and techniques for treatment of aquatic medical emergencies; and evaluate water conditions to identify entry points and hazards.

17.3.3 Demonstrate defensive tactics in the water rescue environment, given a water-bound victim in a stressed or panicked situation, so that the rescuer can maintain separation from the victim to create or maintain personal safety and can perform self-defense techniques to prevent rescuer submersion if direct contact is made between a panicked victim and the rescuer.
(A) Requisite Knowledge. Basic emergency procedures for applicable environments and situations with stressed or panicked victims at water rescues.
(B) Requisite Skills. The ability to release oneself effectively from the grasp of a panicked victim, including blocks, releases, and escapes.

17.3.4 Perform an entry surface rescue from a rescue platform (such as a vessel, boat, watercraft, or other waterborne transportation aid) while negotiating a designated surface course, given a course that is representative of the bodies of surface water existing or anticipated within the geographical confines of the AHJ, water rescue PPE, and swim aids, so that the specific objective is reached, the victim is retrieved, movement is controlled, hazards are continually assessed, distress signals are demonstrated, and rapid intervention for the rescuer has been staged for deployment.
(A) Requisite Knowledge. Watercraft operational characteristics, hydrology features, water entry and exit techniques, and water-bound victim management.
(B) Requisite Skills. Watercraft operation, watercraft stability and maneuvering techniques, rescuer entry and egress methods, capsized vessel upset recovery techniques, waterborne victim packaging and management techniques, and hand signals.

17.3.5 Direct a rescue team during operations, given incident checklists, maps, topographic surveys, and charts, so that teams are managed, personnel are supervised, hazards are assessed and identified, safety and health of the team is ensured, qualifications/abilities of rescuers are verified, pre-entry briefing is conducted, and debriefing is performed.
(A) Requisite Knowledge. Supervisory practices, emergency procedures, communications procedures, local protocols, and safety checks, and personnel accountability techniques.
(B) Requisite Skills. The ability to implement emergency procedures, communications procedures, incident management, personnel accountability, and resource management.

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18.1 Awareness Level SWIFT WATER.

Prior to qualification at the awareness level in swiftwater rescue, the individual shall meet the requirements defined in Section 18.1.
18.1.1 Size up a swiftwater rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for swiftwater rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

18.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

18.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

18.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

18.2 Operations Level SWIFT WATER.

The job performance requirements defined in ROPE **5.2.1 through 5.2.10, 5.2.12, 5.2.16, 5.2.18 through 5.2.20, 5.2.23, 5.2.24, and Sections SURFACE WATER 17.1, 17.2, 18.1, and 18.2 shall be met prior to or during operations-level qualification in swiftwater rescue.**

5.2 Operations Level. ROPE

5.2.1 Perform size up of a rescue incident, given background information and applicable reference materials, 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.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an action plan and related information, relationship of size-up to

the incident management system, and information gathering techniques and how that information is used in the size-up process.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, relay information, and use information gathering sources.

5.2.2 * Maintain hazard-specific PPE, given clothing or equipment for the protection of the rescuers, inspection procedures, cleaning and sanitation supplies, maintenance logs or records, and such tools and resources as are indicated by the manufacturer's guidelines for assembly or disassembly of components during repair or maintenance, so that 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.
A.5.2.2 Technical rescuers should limit their activities in this section to field-level maintenance only. Field-level maintenance generally describes those procedures performed on a given piece of equipment that does not require disassembly, repair, or component replacement except where provided for in manufacturers' user instructions. Where it is recognized that many agencies perform their own maintenance and repair of equipment based on manufacturers' technical training, this capability is beyond that of the technical rescuer and not addressed within the scope of this standard.
(A) Requisite Knowledge. Functions, construction, and operation of PPE; use of record-keeping systems of the AHJ; requirements and procedures for cleaning, sanitizing, and infectious disease control; use of provided assembly and disassembly tools; manufacturer and department recommendations; pre-use inspection procedures; and ways to determine operational readiness.
(B) Requisite Skills. The ability to identify wear and damage indicators for PPE; evaluate operational readiness of PPE; complete logs and records; use cleaning equipment, supplies, and reference materials; and select and use tools specific to the task.

5.2.3 * Maintain rescue equipment, 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, so that 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.
A.5.2.3 Rescue equipment should be inspected and maintained in accordance with manufacturers' recommendations, and inspection and maintenance should be recorded in an appropriate record-keeping system. Technical rescuers should be capable of establishing a schedule of inspection and maintenance requirements for all rescue-specific equipment in their inventory to ensure operational readiness and have these activities documented in an appropriate manner as determined by the AHJ.
(A) Requisite Knowledge. Functions and operations of rescue equipment, use of record-keeping systems, manufacturer and organizational care and maintenance requirements, selection and use of maintenance tools, replacement protocol and procedures, disposal methods, and organizational standard operating procedures.
(B) Requisite Skills. The ability to identify wear and damage indicators for rescue equipment, evaluate operation readiness of equipment, complete logs and records, and select and use maintenance tools.

5.2.4 * Demonstrate knots, bends, and hitches, given ropes, webbing, and a list of knots used by the agency, so that the knots are dressed, recognizable, and backed up as required.
A.5.2.4 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. Knot efficiency, knot utilization, rope construction, and rope terminology.
(B) Requisite Skills. The ability to tie representative knots, bends, or hitches for the following purposes: (1) End-of-line loop
(2) Midline loop
(3) Securing rope around desired objects
(4) Joining rope or webbing ends together
(5) Gripping rope

5.2.5 Construct a single-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, 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.
(A) Requisite Knowledge. Application of knots, rigging principles, anchor selection criteria, system safety check procedures, rope construction, and rope rescue equipment applications and limitations.
(B) Requisite Skills. The ability to select rope and equipment; tie knots; rig systems; evaluate anchor points for required strength, location, and surface contour; and perform a system safety check.

5.2.6 Construct a multiple-point anchor system, given life safety rope and other auxiliary rope rescue equipment, so that the chosen anchor system fits the incident needs, the system strength meets or exceeds the expected load and does not interfere with rescue operations, equipment is visually inspected prior to being put in service, the most appropriate anchor points are chosen, the anchor system is system safety checked prior to being placed into service, the integrity of the system is maintained throughout the operation, and the force will be distributed — proportionally or disproportionally — between more than one anchor point.
(A) * Requisite Knowledge. Relationship of angles to forces created in the rigging of multiple-point anchor systems, safety issues in choosing anchor points, system safety check methods that allow for visual and physical assessment of system components, methods to evaluate the system during operations, integrity concerns, weight distribution issues and methods, knots and applications, selection and inspection criteria for hardware and software, formulas needed to calculate safety factors for load distribution, and the concepts of static loads versus dynamic loads.
A.5.2.6(A) For the purposes of this document, the term static loads relates to forces applied within a system when the load is not moving. The term dynamic loads is intended to address

those forces created by moving loads as well as those caused by the sudden cessation of that movement (shock loads).
With reference to the relationship between angles and force within multiple-point anchor systems: When a rope (web) is connected between two anchor points and a load placed in between, an angle is formed. This interior angle acts as a force multiplier. As the angle increases, the force directed along the rope (web) is amplified, increasing the force felt on the anchors. For example, at 120 degrees, the force on each anchor is equivalent to the load. As the angle continues to increase, the force on each anchor rapidly increases [see Table A.5.2.6(A) and Figure A.5.2.6(A)].
In Table A.5.2.6(A), assume a load mass of 200 lb (91 kg) creating a force of approximately 200 lbf (0.89 kN) at the point of attachment. ***SEE PICTURE IN TABLE***
(B) Requisite Skills. The ability to determine incident needs as related to choosing anchor systems, select effective knots, determine expected loads, evaluate incident operations as related to interference concerns and setup, choose anchor points, perform a system safety check, and evaluate system components for compromised integrity.
5.2.7 Conduct a system safety check, given a rope rescue system and rescue personnel, 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.
(A) Requisite Knowledge. System safety check procedures, construction and operation of rope rescue systems and their individual components, use of PPE, equipment inspection criteria, signs of equipment damage, principles of rigging, and equipment replacement criteria.
(B) Requisite Skills. The ability to apply and use PPE, inspect rope rescue system components for damage, assess a rope rescue system for configuration, secure equipment components, inspect all rigging, and perform a system safety check.

5.2.8 Place edge protection, given life safety rope or webbing traversing a sharp or abrasive edge, edge protection, and other auxiliary rope rescue equipment, 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.
(A) Requisite Knowledge. Materials and devices that can be used to protect ropes or webbing from sharp or abrasive edges, fall protection measures, dangers associated with sharp or abrasive edges, and methods for negotiation of sharp or abrasive edges.
(B) Requisite Skills. The ability to select protective devices for rope and webbing, protect personnel from falls while working near edges, secure edge protection, and secure ropes or webbing in a specific location.

5.2.9 ***** Construct a system intended to provide belay within a single- or two-tensioned rope system, given life safety rope, anchor systems, PPE, and rope rescue equipment, so that the system is capable of arresting a fall, 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 belay operator is not rigged into the equipment components of the system, and the system is suitable to the site and is connected to an anchor system and the load.
A.5.2.9 Belay systems are a component of single-tensioned rope systems that apply a tensioned main system on which the entire load is suspended and a nontensioned system with minimal slack (i.e., belay) designed, constructed, and operated to arrest a falling load in the event of a main system malfunction or failure. While these traditional systems used for lowering and raising are in common use, two-tensioned rope systems can also be used to suspend the

load while maintaining near equal tension on each rope, theoretically reducing the fall distance and shock force in the event of a singular rope failure. To be effective, two-tensioned rope systems must utilize devices that will compensate appropriately for the immediate transfer of additional force associated with such failures.
This document is not intended to limit a rescue team to the use of either a single- or two-tensioned rope system, because either can be utilized in rope-based lowering or mechanical advantage systems. In either case, redundancy is important to compensate for potential system equipment or operational failures.
(A) Requisite Knowledge. Principles of belay systems, capabilities and limitations of various devices used to provide belay, application of knots, rigging principles, and system safety check procedures.
(B) Requisite Skills. The ability to select a system, tie knots, perform rigging, attach to anchor system and load, don and use hazard-specific PPE, and perform a system safety check.

5.2.10 Operate a system intended to provide belay within a single- or two-tensioned rope system during a lowering or raising operation, given an operating lowering or raising mechanical advantage system, a specified minimum travel distance for the load, a system, and a load, so that the potential fall factor is minimized, the belay is not actuated during normal lowering and raising operations, the belay system is prepared for actuation at all times during the operation, the belay operator is attentive at all times during the operation, the load's position is continually monitored, and the belay operator moves rope through the belay device as designed.
(A) Requisite Knowledge. Application and use of belay devices, proper operation of systems in conjunction with normal lowering and raising operations, and operational commands.
(B) Requisite Skills. The ability to tend a belay device as designed, tie approved knots, assess system effectiveness, properly attach a rope to a belay device, don and use hazard-specific PPE, perform a system safety check, and manage and communicate belay system status effectively.

5.2.12 Construct a fixed rope system, given an anchor system, a life safety rope, and rope rescue equipment, 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.
(A) Requisite Knowledge. Knot selection, calculating expected loads, incident evaluation operations as related to interference concerns and setup, rigging principles, system safety check procedures, and methods of evaluating system components for compromised integrity.
(B) Requisite Skills. The ability to select effective knots, calculate expected loads, use rigging principles, evaluate incident operations as related to interference concerns and setup, perform a system safety check, and evaluate system components for compromised integrity.

5.2.16 ***** Direct a team in the operation of a simple rope mechanical advantage system in a high-angle raising operation, given rescue personnel, an established rope rescue system incorporating a simple rope mechanical advantage system, a specified minimum travel distance for the load, a load to be moved, and an anchor system, so that 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 operation, and potential problems are identified, communicated, and managed.
A.5.2.16 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational

components of the entire system should be utilized fully (i.e., commands, progress capture, reset mechanisms). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle raising operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Principles of mechanical advantage, capabilities and limitations of various simple rope mechanical advantage systems and high-angle raising operations, correct operation of simple rope mechanical advantage systems, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel effectively, use operational commands, analyze system efficiency, identify safety concerns, and perform a system safety check.

5.2.18 ***** Direct the operation of a compound rope mechanical advantage system in a high-angle environment, given a rope rescue system incorporating a compound rope mechanical advantage system and a load to be moved, and a specified minimum travel distance for the load, so that a system safety check is performed; 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.

A.5.2.18 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill. For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for descending a fixed rope system might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Methods to determine incident needs, types of interference concerns, rope commands, system safety check protocol, procedures for continued evaluation of system components for compromised integrity, common personnel assignments and duties, common commands, methods for controlling a load's movement, system stress issues during operations, and management methods for common problems.

(B) Requisite Skills. The ability to determine incident needs, evaluate incident operations as related to interference concerns, complete a system safety check, continually evaluate system components for compromised integrity, direct personnel effectively, communicate commands, analyze system efficiency, manage load movement, and identify concerns.

5.2.20 Prepare for transfer of victims, given diagnostic and packaging equipment and an actual or simulated EMS agency, so that rescuers and victims are protected from hazards, victim injuries or illnesses are managed, and victims are delivered to the EMS provider with information regarding the history of the rescue activity and victim conditions.

(A) Requisite Knowledge. Victim and scene assessment methods; victim treatment, immobilization, and packaging methods; and medical information management and communication methods.

(B) Requisite Skills. The ability to use victim immobilization, packaging, and treatment methods appropriate to the situation and provide victim transfer reports, both verbally and in written format.

5.2.23 ***** Direct a litter-lowering or litter-raising operation in a high-angle environment, 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, so that the litter is attached to the lowering/raising and belay systems, an edge is negotiated during a lower and raise; tag lines 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.

A.5.2.23 The specified minimum travel distance will vary based on the response area and the discipline-specific application. The distance traveled should depict accurately the typical distance that would be experienced by the person performing the skill, and the operational components of the entire system should be utilized fully (i.e., commands, progress capture, descent control). For example, an appropriate minimum travel distance for a technical rescuer in the urban/industrial environment for a high-angle lowering operation might be 10 ft to 20 ft (3.05 m to 6.1 m), while the minimum for the wilderness/cave environment might be considerably more at 30 ft to 50 ft (9.15 m to 15.25 m).

(A) Requisite Knowledge. Application and use of lowering and mechanical advantage system in the high-angle environment, capabilities and limitations of various lowering and mechanical advantage systems in a high-angle environment, use of tag lines for management of litter position during high-angle lowers and raises, personnel assignments, and operational commands.

(B) Requisite Skills. The ability to direct personnel, use operational commands, analyze system efficiency, manage movement of the litter in a high-angle environment, identify safety concerns in a high-angle environment, and perform a system safety check.

5.2.24 * Terminate a technical rescue operation, given an incident scenario, assigned resources, and site safety data, 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, record keeping and documentation occur, and post event analysis is conducted.

A.5.2.24 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.

(A) Requisite Knowledge. Incident Command functions and resources, hazard identification and risk management strategies, logistics and resource management, personnel accountability systems, and AHJ-specific procedures or protocols related to personnel rehab.

(B) Requisite Skills. Hazard recognition, risk analysis, use of site control equipment and methods, use of data collection and management systems, and use of asset and personnel tracking systems.

17.1 * Awareness Level Surface Water.

Prior to qualification at the awareness level in surface water rescue, the individual shall meet the requirements defined in Section 17.1.

A.17.1 This section is for rescue situations with water moving less than 1 knot. Awareness-level water rescue skills are applicable only to survival swimming skills and support of water rescue operations.

17.1.1 Size up a surface water incident, given an incident, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, and search parameters are identified.

(A) Requisite Knowledge. Information gathering techniques and how that information is used in the size-up process.

(B) Requisite Skills. The ability to interview people, gather information, relay information, manage witnesses, and use information sources.

17.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.

(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.

(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

17.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.

(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.

(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

17.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.

(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.

(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

17.2 * Operations Level Surface Water.

The job performance requirements defined in Sections 17.1 and 17.2 shall be met prior to or during operations-level qualification in surface water rescue.

A.17.2 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.

17.2.1 * Develop a site survey for an existing water hazard, given historical data, specific PPE for conducting site inspections, flood insurance rate maps, tide tables, and meteorological projections, so that life safety hazards are anticipated, risk/benefit analysis is included, site inspections are completed, water conditions are projected, site-specific hazards are identified, routes of access and egress are identified, boat ramps (put-in and take-out points) are identified, the method of entrapment is considered, and areas with a high probability for victim location are determined.

A.17.2.1 Water environments can include, but are not limited to, swiftwater, still water, ice-covered water, and tidal water. Rescuers should demonstrate the requisite knowledge of each water environment anticipated within the geographical confines of the AHJ and their associated tactical and safety considerations as part of this competency.

(A) Requisite Knowledge. Requisite contents of a site survey; types, sources, and information provided by reference materials; hydrology and the influence of hydrology on rescues; types of hazards associated with water rescue practices scenarios, inspections practices, and considerations techniques; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; and environmental conditions that influence victim location.

(B) Requisite Skills. The ability to interpret reference materials, perform a scene assessment, evaluate site conditions, complete risk/benefit analysis, and select and use necessary PPE.

17.2.2 * Select water rescue PPE, given a water rescue assignment and assorted items of personal protective and life-support equipment, so that the rescuer is protected from temperature extremes and environmental hazards, correct buoyancy is maintained, AHJ protocols are complied with, swimming ability is maximized, routine and emergency communications are established between components of the team, self-rescue needs have been evaluated and provided for, and pre-operation safety checks have been conducted.

A.17.2.2 Temperature extremes include both hypo- and hyperthermia. Personal protective equipment users have to be aware of the potential for either condition to develop strategies for avoidance and recognition. Adequate flotation is dependent upon the mode of operation. As an example, for surface rescue, positive buoyancy is desired, whereas for underwater operations, neutral buoyancy should be maintained. Proper fit of personal protective equipment is determined by the manufacturers' specifications and related documentation; the primary intent is that the safety and efficiency of the rescuer is not impaired or the garments' capabilities exceeded. The AHJ should utilize personal protective equipment appropriate to the conditions present in its response area, as well as based on the scope of its operations. In considering personal protective equipment selection, the following factors should be addressed:

(1) Flotation (buoyancy)
(2) Insulation from cold water exposure
(3) Protection from physical hazards (e.g., abrasion, cuts, tears, punctures)
(4) Visibility
(5) Garment form, fit, and mobility
(6) Limited chemical and biological protection (e.g., from bloodborne pathogens) (see FEMA document FA 136, Protective Clothing and Equipment for Emergency Responders for Urban Search and Rescue Missions)

(7) Provision of "low-profile" helmets (i.e., helmets without a brim on the back) utilized in the water rescue environment to avoid possible cervical spine hyperextension or hyperflexion injuries, as well as to provide protection from blunt force trauma

(A) Requisite Knowledge. Manufacturer's recommendations for PPE; standard operating procedures; basic signals and communications techniques; selection criteria of insulating garments; buoyancy characteristics; personal escape techniques; applications for and capabilities of personal escape equipment; hazard assessment; AHJ protocols for equipment positioning; classes of personal flotation devices; selection criteria for personal protective clothing, personal flotation devices, and water rescue helmets; personal escape techniques; applications for and capabilities of personal escape equipment; and equipment and procedures for signaling distress.

(B) * Requisite Skills. The ability to use PPE according to the manufacturer's directions, don and doff equipment in an expedient manner, use pre-operation checklists, select personal flotation devices, don and doff personal flotation devices, select water rescue helmets, don and doff water rescue helmets, select personal protective clothing and equipment, don and doff in water insulating garments, proficiency in emergency escape procedures, proficiency in communicating distress signals, proficiency in emergency escape procedures, and proficiency in communications.

A.17.2.2(B) Selection of water rescue personal protective equipment, so that the rescuer will be protected from temperature extremes and blunt trauma, the rescuer will have flotation for tasks to be performed, swimming ability will be maximized during rescue activities, self-rescue needs have been evaluated and provided for has been established, and a means of summoning help has been provided.

17.2.3 * Define search parameters for a water rescue incident, given topographical maps of a search area; descriptions of all missing persons and incident history; and hydrologic data, including speed and direction of current or tides, so that areas with high probability of detection are differentiated from other areas, witnesses are interviewed, critical interview information is recorded, passive and active search tactics are implemented, personnel resources are considered and used, and search parameters are communicated.

A.17.2.3 Active Search Measures: Of primary and immediate importance is locating the point last seen (PLS) of the missing subject. Sometimes the reporting person (RP) will have no direct knowledge of what happened. For example, the RP might be a family member reporting a group of canoeists overdue at a takeout. At other times the RP will have witnessed a river accident such as a raft overturning or a fisherman being swept away, and will be able to give a description of the victims, and a fairly exact PLS. RPs should be interrogated for all information they might have about the victim, to include physical description, clothing, destination, experience, time the incident occurred, and any other details that might help the search (e.g., the type of shoes, in order to aid the trackers). Passive Search Measures: The searches at this point are detailed, formal searches, not hasty ones. It is better to have small, trained groups of searchers thoroughly search an area repeatedly than to search with large groups of untrained people, since these frequently trample more evidence than they find. As the search progresses, the incident commander should debrief team leaders frequently and revise the search plan as necessary.

(A) Requisite Knowledge. Topographical map components, hydrologic factors and wave heights, methods to determine areas of high probability of detection, critical interview questions and practices, methods to identify track traps, ways to identify spotter areas and purposes for spotters, personnel available and their effect on parameter definition, the effect of search strategy defining parameters, communication methods, and reporting requirements.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.4 Develop an action plan for a shore-based rescue of a single or multiple water-bound victim(s), given an operational plan and a water rescue tool kit, so that all information is factored, risk/benefit analysis is conducted, protocols are followed, hazards are identified and minimized, personnel and equipment resources will not be exceeded, assignments are defined, consideration is given to evaluating changing conditions, and the selected strategy and tactics fit the conditions.
(A) Requisite Knowledge. Elements of an action plan; types of information provided by reference materials and size-up; hydrology; types of hazards associated with water rescue practices; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; environmental conditions that influence victim location; safety, communications, and operational protocols; and resource capability and availability.
(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.5 ***** Deploy a water rescue reach device to a water-bound victim, given required equipment and PPE so that the deployed equipment reaches the victim(s), the rescue equipment does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the device.
A.17.2.5 Both throw-rope deployments should be conducted sequentially, to the same victim, within a span of approximately 40 seconds to a victim 12.19 m (40 ft) away from the rescuer.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. The ability to select PPE specific to the water environment, don PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.6 ***** Deploy a water rescue rope to a water-bound victim, given a water rescue rope in a throw bag, a coiled water rescue rope 50 ft to 75 ft (15.24 m to 22.86 m) in length, and PPE, so that the deployed rope lands within reach of the victim, the rescue rope does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the throw line.
A.17.2.6 See A.17.2.5.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims,

water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. The ability to deploy both a water rescue rope bag and a coiled water rescue rope, select PPE specific to the water environment, don PPE, identify water hazards (e.g., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.7 * Develop and implement an action plan for the use of watercraft to support the rescue of a single or multiple water-bound victims, given watercraft, operator(s), and policies and procedures used by the AHJ, so that watercraft pre-deployment checks are completed; watercraft launch or recovery is achieved; rescuers are deployed and recovered; both onboard and rescue operations conform with watercraft operational protocols and capabilities; communications are clear and concise; and the candidate is familiar with watercraft nomenclature, operational protocols, design limitations, and launch/recovery site issues.
A.17.2.7 The committee's intent is for the candidate to know what procedures are used when using watercraft in their jurisdiction, or at least basic watercraft deployment and recovery techniques, even if the AHJ does not have its own watercraft. This includes the rescuer's role on the boat, nomenclature, and use of emergency/safety equipment (fire extinguishers, flares, flotation devices, etc.). The committee understands that not all water rescue teams have boats and not all boat operators are knowledgeable about deploying rescuers. In this case, the technician should be able to act as a liaison between the team and the boat operator.
(A) Requisite Knowledge. Entry/exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, tides, and currents.
(B) Requisite Skills. Implement access and egress procedures and communications with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

17.2.8 * Define procedures to provide support for helicopter water rescue operations within the area of responsibility for the AHJ, given a helicopter service, operational protocols, helicopter capabilities and limitations, water rescue procedures, and risk factors influencing helicopter operations, so that air-to-ground communication is established and maintained, applications are within the capabilities and skill levels of the helicopter service, the applications facilitate victim extraction from water hazards that are representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, air crew and ground personnel safety are not compromised, landing zones are designated and secured, and fire suppression resources are available at the landing zone.
A.17.2.8 While helicopters are not universally available to water rescuers and there are many restrictions on the use of aircraft for rescue, they are nonetheless frequently drafted for improvised rescues during times of crisis. Therefore, water rescue teams and the supporting helicopter services should plan for the use of helicopters that can be called upon during these crises to identify capabilities and limitations of the team and the helicopter service, to train in those procedures that all parties agree are within their collective skill levels and for which they are equipped, and to draft protocols that will define exactly what procedures the helicopter service will be called upon to perform and the criteria for that decision.
(A) Requisite Knowledge. Local aircraft capabilities and limitations, landing zone requirements, hazards to aircraft, local protocols, procedures for operating around aircraft, dynamics of rescue

options, crash survival principles, PPE limitations and selection criteria, ancillary helicopter rescue equipment, and helicopter surf rescue procedures.
(B) Requisite Skills. The ability to determine applicability of air operations, establish and control landing zones, assess fire protection needs, communicate with air crews, identify hazards, rig aircraft for anticipated rescue procedures, apply crash survival procedures, select and use PPE, and work with air crews to rescue a victim from the water.

17.2.9 * Implement procedures for performing watercraft-based rescue of an incapacitated, water-bound victim, as a member of a team, given a water hazard that is representative of the anticipated rescue environment watercraft that is available to the team (if applicable), designated victim packaging and management equipment, and water rescue PPE, so that the control and stability of the watercraft is maintained, risks to the victim and rescuers are minimized, and the victim is removed from the hazard.
A.17.2.9 It is the intent of the committee that the watercraft operator be required to perform a range of skills that demonstrate the operator's ability to control the craft in challenging or adverse conditions, to recover from a loss of power or primary means of propulsion, to right an overturned craft, to cast and recover rescuers and victims, to dock with fixed points and other watercraft, and to tow a disabled watercraft to safety. The specific evolutions required to demonstrate this level of proficiency should be defined by the AHJ. All personnel (including the operator) should be competent in the use of self-rescue practices and procedures applicable to the scope of operation, including, but not limited to, drownproofing, swiftwater self-rescue, current considerations (rip current, etc.), and basic swimming skills as identified by the AHJ. These requirements should be applied in the same manner that apparatus operators must meet specific knowledge and skill requirements based on the type of apparatus being operated (see NFPA 1002).
(A) Requisite Knowledge. Limitations and uses of available watercraft, local environmental access and egress procedures, parbuckling (rollup) techniques, dynamics of moving water and its effects on watercraft handling, conditional requirements for PPE, and the effects of extrication on watercraft handling and stability.
(B) Requisite Skills. The ability to move about in a designated watercraft in conditions representative of the anticipated rescue environment while managing the movement of a water-bound victim using techniques identified by the AHJ.

17.2.10 Demonstrate fundamental survival swimming and self-rescue skills, given safety equipment, props, and a controlled setting representative of the anticipated rescue environment, so that the risk of injury is minimized, flotation is maintained, available PPE is utilized, and egress is accomplished.
(A) Requisite Knowledge. Basic forward stroke swimming theory (surface skills).
(B) Requisite Skills. Basic swimming skills, including the ability to swim and float in different water conditions with and without flotation aids or swimming aids as required and apply water survival skills; don and doff PPE; select and use PPE, flotation aids, and swim aids; use communications systems; and evaluate water conditions to identify entry points and hazards.

17.2.11 Identify procedures for operation of rope systems particular to the water rescue needs of the AHJ, given rescue personnel, an established rope system, a load to be moved, and PPE, so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.
(A) Requisite Knowledge. Ways to determine incident needs as related to the operation of rope systems, capabilities and limitations of various rope systems, incident site evaluation as related

to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, assignment considerations, common and critical operational commands, common rope system problems and ways to minimize or manage them, and ways to increase the efficiency of load movement.
(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel, manage movement of the load, and evaluate for potential problems.

17.2.12 Support operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, correct buoyancy control is maintained, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, operation support equipment, and communications issues.
(B) Requisite Skills. Basic support skills, including the ability to act as spotters and tend to water rescuers.

17.2.13 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed, and scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and post incident analysis and critique are considered; and command is terminated.
A.17.2.13 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.
(B) Requisite Skills. Select and use task and hazard-specific PPE; decontaminate PPE; use barrier protection techniques, collect data, follow record-keeping/reporting protocols, and conduct post incident analysis activities.

18.2 Operations Level SWIFT WATER cont.

18.2.1 Construct rope systems particular to the swiftwater rescue needs of the AHJ, given rescue personnel, rope equipment, a load to be moved, and personal protective equipment (PPE), so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.
(A) Requisite Knowledge. Rope systems specific to the swiftwater environment, capabilities and limitations of various rope systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system

components for compromised integrity, common personnel assignments and duties, common and critical operational commands, and methods to increase the efficiency of load movement.
(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel, manage movement of the load, and evaluate for potential problems.

18.2.2 Support swiftwater operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, personnel accountability is maintained, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, equipment setup, operation support equipment, and communications issues.
(B) Requisite Skills. Basic support skills, including the ability to serve as an upstream or downstream safety spotter, and the ability to implement personnel accountability systems and tend toan inwater rescuer.

18.2.3 * Assess moving water conditions, characteristics, and features in terms of hazards to the rescuer and victims, given an incident scenario and swiftwater tool kit, so that the flow and conditions are estimated accurately, mechanisms of entrapment are considered, hazards are assessed, the depth and surrounding terrain are evaluated, and findings are documented.
A.18.2.3 A hazard and risk analysis is needed when operating as a rescuer when applying shore-based rescue techniques. The rescuer might need to enter the hot zone (i.e., moving or standing water) to assist a distressed victim for removal purposes. Without proper consideration of the water's edge topography, water conditions, depth, current flow, and the ability of the rescuer to swim, there is potential for the rescuer to become a victim. Not every shore-based rescue will be mitigated from land-based operational zones.
(A) Requisite Knowledge. Flow calculation methods, map or chart reading, local water hazards and conditions, entrapment mechanisms, and human physiology and survival factors.
(B) Requisite Skills. Determination of the flow and environmental factors, the effects on victims and rescuers, and interpretation of maps or charts.

18.2.4 * Perform a non-water entry rescue in the swiftwater and flooding environment, given an incident scenario, PPE, and swiftwater rescue tool kit, so that rescue is accomplished, and adopted policies and safety procedures are followed.
A.18.2.4 In the water rescue environment, a non-water entry rescue might be performed from a watercraft, placing the rescuers on, but not directly in the hazard. Rescuers should ensure they use proper PPE, that rapid intervention crews are in place, and should be trained in the operation, parameters, and emergency procedures of the watercraft and accidental immersion.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies/procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. Select and use task-specific PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

18.2.5 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the operational period; documentation of loss or material use is accounted for; scene documentation is performed; and control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing, post incident analysis, and critique are conducted; and command is terminated.

A.18.2.5 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner by which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.

(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.

(B) Requisite Skills. Ability to select and use hazard-specific PPE; decontaminate PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols; and participate in conduct post incident analysis activities.

18.3 Technician Level.

The job performance requirements defined in 5.3.5, 5.3.6, 17.3.1 through 17.3.5 and Sections 18.2 and 18.3 shall be met prior to or during technician-level qualification in swiftwater rescue.

5.3 Technician Level ROPE

5.3.5 * Participate as a member of a team in the construction of a rope rescue system intended to move a suspended rescue load along a horizontal path to avoid an obstacle, given rescue personnel, life safety rope, rope rescue equipment, and a suitable anchor capable of supporting the load, 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 on the load is efficient; and loads can be held in place or moved with minimal effort over the required distance.

A.5.3.5 This JPR is intended to include, but is not restricted to, systems such as high lines, two-rope offsets, deflection, tracking, and guiding lines. A rope or similar line that is connected directly to the load being raised or lowered (often referred to as a tag line), and effectively managed by a rescuer to pull the load out and away from simple inline projections or obstructions, is not intended to be a technician-level function.

(A) Requisite Knowledge. Determination of incident needs as related to operation of a system, capabilities and limitations of various systems (including capacity ratings), methods for limiting excessive force to system components, incident site evaluation as related to interference concerns and obstacle negotiation, rigging principles, system safety check protocol, common personnel assignments and duties, common and critical operational commands, and common problems and ways to minimize these problems during construction.

(B) Requisite Skills. The ability to determine incident needs as related to construction of a system, evaluate an incident site as related to interference concerns and setup, identify the

obstacles or voids to be negotiated, select a system for defined task, perform system safety checks, use rigging principles that will limit excessive force to system components, and communicate with personnel effectively.

5.3.6 * Direct a team in the operation of a rope system to move a suspended rescue load along a horizontal path, given rescue personnel, an established system, a target for the load, a load to be moved, and PPE, so that the movement is controlled; the load is held in place when needed; operating methods do not stress the system to the point of failure; personnel assignments are made; tasks are communicated; and potential problems are identified, communicated, and managed.
A.5.3.6 This JPR is intended to include, but is not restricted to, systems such as high lines, two-rope offsets, deflection, tracking, and guiding lines. A rope or similar line that is connected directly to the load being raised or lowered (often referred to as a tag line), and effectively managed by a rescuer to pull the load out and away from simple inline projections or obstructions, is not intended to be a technician-level function.
(A) Requisite Knowledge. Determination of incident needs as related to the operation of a system, capabilities and limitations of various systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, common and critical operational commands, common problems and ways to minimize or manage those problems, and ways to increase the efficiency of load movement.
(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel effectively, manage movement of the load, and evaluate for any potential problems.

17.3 * Technician Level Surface Water

17.3.1 * Swim a designated water course, given a course designated by the AHJ as demonstrating the capabilities necessary to operate in the anticipated rescue environment, water rescue PPE, and swim aids as required, so that the specified objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are communicated, and rapid intervention for the rescuer has been staged for deployment.
A.17.3.1 A realistic evaluation of the rescuer's water survival skills should be conducted by the AHJ to meet this requirement. It is recommended that the AHJ use an annual swim test that meets or exceeds the IADRS Annual Watermanship Test. Example: Swim 91.4 m (100 yards) unassisted with any stroke, no time limit, and tread water for 10 minutes.
(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative water rescue environments (shoreline, in-water, and climatic), selection criteria for water rescue PPE and swim aids for anticipated water conditions and hazards, and swimming techniques for a representative body of water.
(B) Requisite Skills. The ability to swim and float over the required distances and for the necessary duration as outlined in the watermanship test found in Annex M with and without flotation aids or swim aids, apply water survival skills, don and doff PPE, select and use swim aids, use communications systems, and evaluate water conditions to identify entry points and hazards.

17.3.2 Perform a swimming surface water rescue, given a simulated victim, water rescue PPE, conditions representative of the anticipated rescue environment, swim aids as required, flotation

aids for victims, and reach/extension devices, so that victim contact is maintained, the rescuer maintains control of the victim, the rescuer and the victim reach safety at a predetermined area, and medical conditions and treatment options are considered.
(A) Requisite Knowledge. Hydrology and specific hazards anticipated for a representative water rescue environment (shoreline, in-water, and climatic); victim behavior patterns; emergency countermeasures for combative victims; selection criteria for water rescue PPE, swim aids, and flotation aids for anticipated water conditions; victim abilities and hazards; swimming techniques for representative bodies of water; and signs, symptoms, and treatment of aquatic medical emergencies.
(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swim aids; apply water survival skills; manage combative water-bound victims; don and doff PPE; select and use PPE, flotation aids, and swim aids; utilize communications systems; select equipment and techniques for treatment of aquatic medical emergencies; and evaluate water conditions to identify entry points and hazards.

17.3.3 Demonstrate defensive tactics in the water rescue environment, given a water-bound victim in a stressed or panicked situation, so that the rescuer can maintain separation from the victim to create or maintain personal safety and can perform self-defense techniques to prevent rescuer submersion if direct contact is made between a panicked victim and the rescuer.
(A) Requisite Knowledge. Basic emergency procedures for applicable environments and situations with stressed or panicked victims at water rescues.
(B) Requisite Skills. The ability to release oneself effectively from the grasp of a panicked victim, including blocks, releases, and escapes.

17.3.4 Perform an entry surface rescue from a rescue platform (such as a vessel, boat, watercraft, or other waterborne transportation aid) while negotiating a designated surface course, given a course that is representative of the bodies of surface water existing or anticipated within the geographical confines of the AHJ, water rescue PPE, and swim aids, so that the specific objective is reached, the victim is retrieved, movement is controlled, hazards are continually assessed, distress signals are demonstrated, and rapid intervention for the rescuer has been staged for deployment.
(A) Requisite Knowledge. Watercraft operational characteristics, hydrology features, water entry and exit techniques, and water-bound victim management.
(B) Requisite Skills. Watercraft operation, watercraft stability and maneuvering techniques, rescuer entry and egress methods, capsized vessel upset recovery techniques, waterborne victim packaging and management techniques, and hand signals.

17.3.5 Direct a rescue team during operations, given incident checklists, maps, topographic surveys, and charts, so that teams are managed, personnel are supervised, hazards are assessed and identified, safety and health of the team is ensured, qualifications/abilities of rescuers are verified, pre-entry briefing is conducted, and debriefing is performed.
(A) Requisite Knowledge. Supervisory practices, emergency procedures, communications procedures, local protocols, and safety checks, and personnel accountability techniques.
(B) Requisite Skills. The ability to implement emergency procedures, communications procedures, incident management, personnel accountability, and resource management.

18.3 Technician Level SWIFT WATER cont.

18.3.1 Perform an entry rescue in the swiftwater and flooding environment, given an incident scenario, PPE, and swiftwater rescue tool kit, so that rescue is accomplished and adopted policies and safety procedures are followed.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, personnel accountability protocols, and information on local water environments.
(B) Requisite Skills. Select and utilize task-specific PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate victim packaging and removal techniques, and use a personnel accountability system.

18.3.2 Negotiate a designated swiftwater course, given a course that is representative of the bodies of swiftwater existing or anticipated within the geographic confines of the AHJ, water rescue PPE, and swim aids as required, so that the specified objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are demonstrated, and rapid intervention for the rescuer has been staged for deployment.
(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative water rescue environments (shoreline, in-water, and climatic), selection criteria for water rescue PPE and swim aids for anticipated water conditions and hazards, and swimming techniques for a representative body of water, and personnel accountability methods.
(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swim aids as required, apply water survival skills, don and doff PPE, select and use swim aids, utilize communications systems, implement personnel accountability protocols, and evaluate water conditions to identify entry points and hazards.

18.3.3 Perform an entry swiftwater rescue from a rescue platform such as a vessel, boat, watercraft, or other waterborne transportation aid while negotiating a designated swiftwater course, given a course that is representative of the bodies of swiftwater existing or anticipated within the geographical confines of the AHJ, water rescue PPE, and swim aids as required, so that the specific objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are demonstrated, personnel accountability is implemented, and rapid intervention for the rescuers has been staged for deployment.
(A) Requisite Knowledge. The operator and/or crew of any waterborne transportation aid must be knowledgeable in the application and safe operation of the waterborne transportation device and its limitations, and follow all manufacturers' recommendations. The operator and crew of the waterborne transportation aid must comply with all the regulatory and applicable laws of safe water transportation according to the AHJ and understand personnel accountability methods.
(B) Requisite Skills. The ability to locate water entry and egress methods from the platform used, assess swiftwater conditions, recover capsized vessels, move vessels in swiftwater conditions, implement personnel accountability methods, and understand patient packaging and handling techniques.

20.1 Awareness Level.

Prior to qualification at the awareness level in ice rescue, the individual shall meet the requirements defined in Section 20.1.

20.1.1 Size up an ice rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.
(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for ice rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

20.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

20.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

20.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.

(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

20.2 Operations Level.

The job performance requirements defined in Section 20.1 and 20.2.1 through 20.2.6 shall be met prior to or during operations-level qualification in ice rescue.

20.2.1 Support ice rescue technician-level operations, given a designated mission, safety equipment, props, and a water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are assessed continually, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, equipment setup, operation support equipment, personnel accountability systems, and communications issues.
(B) Requisite Skills. Basic support skills, personnel accountability protocol implementation, and tending to an in-water rescuer.

20.2.2 Assess ice and water conditions, characteristics, and features in terms of hazards to the rescuer and victims, given an incident scenario and ice rescue tool kit, so that conditions are estimated accurately, mechanisms of entrapment are considered, hazards are assessed, the depth and surrounding terrain are evaluated, and findings are documented.
(A) Requisite Knowledge. Ice assessment, flow calculation methods, map or chart reading, local water hazards and conditions, entrapment mechanisms, and human physiology and survival factors.
(B) Requisite Skills. The ability to determine flow and environmental factors and their effect on victims and rescuers and to interpret maps and charts.

20.2.3 Perform a self-rescue in the ice rescue environment, given an incident scenario and personal protective equipment (PPE), so that a self-rescue is achieved.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers, hydrology and characteristics of water, physiological effects of immersion and cold water neardrowning, methods of effective movement onto or through ice, incident-specific hazard identification, self-rescue techniques, and information on local water environments.
(B) Requisite Skills. The ability to select PPE and equipment specific to the water/ice environment, don and use PPE, identify hazards directly related to the specific self-rescue, and demonstrate appropriate self-rescue techniques.

20.2.4 Perform a shore-based rescue in the ice rescue environment, given an incident scenario, PPE, and ice rescue tool kit, so that rescue is accomplished and adopted policies and safety procedures are followed.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion and cold water near-drowning, hydrology and characteristics of the water/ice interface, behaviors of victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water/ice environment and conditions, hazards and limitations of shore-based rescue, local policies/procedures for rescue team activation, environmental conditions, and limitations of shore-based rescue.

(B) Requisite Skills. The ability to select PPE specific to the ice rescue environment, don and use PPE, identify water hazards (e.g., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

20.2.5 * Perform a non-entry rescue in an ice rescue environment, given an incident scenario, PPE, an ice rescue tool kit, and waterborne transportation aid, so that rescue is accomplished and adopted policies and safety procedures are followed.
A.20.2.5 In the ice rescue environment, a nonentry rescue might be performed from a watercraft, placing the rescuers on, but not directly in the hazard. Rescuers should ensure proper PPE, that rapid intervention crews are in place, and should be trained in the operation, parameters, and emergency procedures of the watercraft and accidental immersion.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion and cold water near-drowning, hydrology and characteristics of water/ice, behaviors of victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on environmental conditions, hazards, and information on local water environments.
(B) Requisite Skills. The ability to select PPE specific to the ice rescue environment, don and use PPE, identify water hazards (e.g., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

20.2.6 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed and scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing, post incident analysis, and critique are considered; and command is terminated.
A.20.2.6 The committee recognizes that due to incident complexity, technician-level skills might be required to terminate some incidents. Examples would be complex stabilization issues, multiple concurrent hazards, industrial processes, presence of fatalities or multiple injuries, or chemical releases.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post incident analysis techniques.
(B) Requisite Skills. Select and use task and hazard-specific PPE; decontaminate PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols; and participate in post incident analysis activities.

20.3 Technician Level.

The job performance requirements defined in Section 20.2 and 20.3.1 through 20.3.2 shall be met prior to or during technician-level qualification in ice rescue.

20.3.1 Demonstrate techniques for movement on ice, given an ice formation that is representative of the bodies of water and ice existing or anticipated within the geographic confines of the AHJ, ice rescue PPE, and swim aids as required, so that the specified objective

is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are communicated, and rapid intervention for the rescuer has been staged for deployment.
(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative ice rescue environments (shoreline, in-water, and climatic), selection criteria for ice rescue PPE and swim aids for anticipated water conditions and hazards, and swimming techniques for representative body of water.
(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swim aids as required, apply water survival skills, self-rescue with and without use of grip aids in the event of breakthrough, don and doff PPE, select and use swim aids, utilize communications systems, use task-specific equipment, and evaluate water/ice conditions to identify entry points and hazards.

20.3.2 Perform an entry rescue in the ice rescue environment, given an incident scenario, PPE, and ice rescue tool kit, so that independent positive buoyancy is established for the victim, rescue is accomplished, and adopted policies and safety procedures are followed.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of victims, physiological effects of immersion and cold water near-drowning, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on water environment and conditions, hazards and limitations of entry rescue, local policies/procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. The ability to select PPE specific to the water/ice environment, don PPE, identify water/ice hazards (i.e., upstream or downstream, current or tides), identify hazards directly related to the specific rescue, and demonstrate appropriate victim removal techniques.

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22.1 * Awareness Level.

Prior to qualification at the awareness level in watercraft rescue, the individual shall meet the requirements defined in Section 22.1.
A.22.1 Chapter 22 outlines the requirement for use of both powered and nonpowered watercraft to perform rescue operations. The AHJ should ensure its members that meet the requirements of Section 22.1 do so in conditions representative of the waters and weather typical to the jurisdiction.
For Chapter 22, a rescue watercraft includes powered and nonpowered vessels and craft that are intended to carry rescuers and victims. It is not intended to include rescue devices such as swim aids, paddle boards, and rescue boards that might accommodate a victim but are typically not classified as vessels or watercraft.
Section 22.1 is for rescue situations with water moving less than 1 knot. Awareness-level water rescue skills are applicable only to survival swimming skills and support of water rescue operations.

22.1.1 Initiate a discipline-specific search, given hazard-specific PPE, equipment pertinent to the search mission, an incident location, and victim investigative information, so that search parameters are established, the victim profile is established, the access and egress of all people either involved in the search or already within the search area are questioned and the information is updated and relayed to command; the personnel assignments match their

expertise, all victims are located as quickly as possible, applicable technical rescue concerns are managed, risks to searchers are minimized, and all searchers are accounted for.
(A) Requisite Knowledge. Local policies and procedures and how to operate in the site-specific search environment.
(B) Requisite Skills. The ability to enter, maneuver in, and exit the search environment and provide for and perform self-escape and self-rescue.

22.1.2 * Perform ground support operations for helicopter activities, given a rescue scenario/incident, helicopter, operational plans, PPE, requisite equipment, and available specialized resources, so that rescue personnel are aware of the operational characteristics of the aircraft and demonstrate operational proficiency in establishing and securing landing zones and communicating with aircraft personnel until the assignment is complete.
A.22.1.2 Technical rescuers should be familiar with the types of aircraft or helicopter services available to assist in their area, including operational standard operating procedure, equipment carried on the aircraft, safety and onboard aircraft systems and hazards associated with type-specific aircraft, and the ability to communicate via an established radio system with aircrews to complete a task or assignment (e.g., air medical evacuation or search). It is also expected that technical rescuers be aware of and provide for fire suppression in the event of an aircraft mishap while on location. (See Figure A.7.2.4.)

(A) Requisite Knowledge. Ground support operations relating to helicopter use and deployment, operation plans for helicopter service activities, type-specific PPE, aircraft familiarization and hazard areas specific to helicopters, scene control and landing zone requirements, aircraft safety systems, and communications protocols.
(B) Requisite Skills. The ability to provide ground support operations, review standard operating procedures for helicopter operations, use PPE, establish and control landing zones, and communicate with aircrews.

22.1.3 Select hazard-specific PPE, given PPE, including personal flotation devices (PFDs), helmets, and exposure garments that are consistent with the needs of the incident and type of watercraft, so that the wearer is protected from the effects of accidental immersion, exposure to the elements, and injury from unanticipated movement of the watercraft.
(A) Requisite Knowledge. Hazards present on and near the water and aboard watercraft used by the AHJ including those presented by weather, current, water conditions, and the capacities.
(B) Requisite Skills. Ability to locate, identify, and don PPE and flotation devices.

22.1.4 Maintain watercraft stability, given a selected watercraft used by the AHJ, so that the stability of the craft is not compromised, the possibility of a fall is minimized, and the rescuer is protected from harm.
(A) Requisite Knowledge. Elements that affect the stability of watercraft, including mass, center of gravity, weight distribution, impact loads, current, sail area, and wind and water conditions.
(B) Requisite Skills. Boarding and exiting a watercraft in a manner that prevents injury and minimizes the impact on the stability of the watercraft.

22.1.5 Size up a watercraft rescue incident, given background information and applicable reference materials, so that the scope of the rescue is determined, the number of victims is identified, the last reported location of all the victims is established, witnesses and reporting parties are identified and interviewed, resource needs are assessed, primary search parameters are identified, and information required to develop an initial incident action plan is obtained.

(A) Requisite Knowledge. Types of reference materials and their uses, availability and capability of the resources, elements of an incident action plan and related information, relationship of the size-up to the incident management system, information gathering techniques and how that information is used in the size-up process, and basic search criteria for watercraft rescue incidents.
(B) Requisite Skills. The ability to read technical rescue reference materials, gather information, use interview techniques, relay information, and use information-gathering sources.

22.1.6 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment, and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

22.1.7 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

22.1.8 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

22.2 * Operations Level.

The job performance requirements defined in Sections 22.1 and 22.2 shall be met prior to or during operations-level qualification in watercraft rescue.
A.22.2 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.

22.2.1 Identify the types of watercraft, given a list of watercraft used by the organization, so that their limitations, capabilities, load ratings, performance criteria, and considerations for their deployment and recovery in the intended environment are identified.
(A) Requisite Knowledge. Types of watercraft used by the organization and the qualities and attributes of each craft that affect how it is utilized in the intended environment; inherent conditions of the intended environment including wind, current, and water conditions that affect vessel selection and use; mission scope and tactical objectives that affect watercraft selection.
(B) Requisite Skills. Identify watercraft characteristics such as draft, sail area, method of propulsion, size, weight, method of deployment, and configuration that affect its selection for use in a specific environment for a specific mission.

22.2.2 Identify the configuration of watercraft given a watercraft available to the agency so that the location of access and egress points, propulsion system components, steering controls, communication equipment, emergency equipment, through hull and deck fittings, portals, and fittings necessary for water- and weathertight integrity are located.
(A) Requisite Knowledge. Location of equipment, watercraft components, and configuration of watercraft.
(B) Requisite Skills. Identify fittings, portals, and other equipment.

22.2.3 Use the available methods of communicating between the watercraft and other rescuers in the water, on shore, in other watercraft, and in aircraft as applicable given communication tools, so that routine mission-related information and emergency messages are communicated to the intended recipient.
(A) Requisite Knowledge. Methods of communication available to rescuer and their limitations given specific weather conditions, visibility, and distances from the intended recipient.
(B) Requisite Skills. Select utilize available communication tools such as radios, hand signals, lights, audible signals, and loud hailers for the specific environment to communicate information.

22.2.4 Identify conditions that require the notification of local and federal authorities, given conditions that require their involvement, including vessels in distress, hazards to navigation, release of hazardous or toxic substances, and other conditions that affect the health and safety of those in and around navigable waters, so that the proper agency is notified and relevant information is communicated.
(A) Requisite Knowledge. Laws, regulations, and standards the identify conditions that require notification of outside agencies, the method of notification, and required other actions.
(B) Requisite Skills. Identification of specific conditions that require notification of outside agencies and perform methods for their notification.

22.2.5 Interpret navigational aids given marine lights, structures and markings on land, other vessels, or on the water, so that nautical landmarks and other vessels are identified, intended course is selected, and collisions are avoided.
(A) Requisite Knowledge. Appearance and color of visual aids and navigation markers and their meaning.
(B) Requisite Skills. Interpret markers, lights, and signals to determine a course that will avoid other vessels.

22.2.6 Perform self-rescue and survival swimming skills so that flotation is maintained, body heat is conserved, and egress is accomplished.
(A) Requisite Knowledge. Effects of hypothermia and cold water immersion and survival skills.

(B) Requisite Skills. Performing techniques to float and move through the water to reach a point of egress or await rescue while conserving body heat.

22.2.7 Use of hazard-specific PPE, given a watercraft rescue incident/scenario, so that the PPE is used in accordance with AHJ policies relative to the specific incident/scenario, PPE emergency escape procedures are followed, and distress signals are communicated.
(A) Requisite Knowledge. The capabilities and limitations of hazard-specific PPE and personal flotation devices, distress signals, emergency escape procedures, and preoperational checklists for the PPE.
(B) Requisite Skills. Ability to don and doff PPE and personal flotation devices, including water rescue helmets and water insulating garments; communicate distress signals; follow emergency escape procedures for the PPE; use preoperational checklists for the PPE.

22.2.8 Navigate a watercraft as a helmsman given a watercraft, navigation tools, and a plotted course, so that the course is followed, obstacles and other vessels are avoided, wind and currents accounted for, awareness of position is maintained, and the destination is reached.
(A) Requisite Knowledge. Operation of the controls relevant to the watercraft and how they affect speed and direction of the vessel; how the associated navigational tools, such as compass and GPS devices, function and are interpreted; marking on charts or plotters and their meanings; and the effects of local water, wind, and weather conditions on the direction and speed of the watercraft.
(B) Requisite Skills. Operate the controls of the watercraft and use the navigational tools and indicators on the watercraft, and select a heading and speed for the vessel for the existing conditions so that it follows its intended course.

22.2.9 Perform docking or watercraft recovery operations given a watercraft and an operator so that communication is maintained with the operator, current and wind are accounted for mooring lines and fenders are rigged, the dock or slip and watercraft are protected from impacts, and the vessel is positioned properly at the slip and secured from unintended movement.
(A) Requisite Knowledge. Methods for securing a watercraft and rigging fenders to prevent damage and minimize undesired movement of the watercraft; means of maneuvering a watercraft using lines or other external systems to position the watercraft as desired; how wind, weather, and water conditions affect watercraft movement as it approaches the slip and after being secured; and considerations for specialized tools or conveyances used to recover watercraft such as trailers, jet docks, and davits.
(B) Requisite Skills. Rigging lines and tying knots, bends, and hitches related to mooring; securing and maneuvering vessels into or at a moorage location or conveyance; predicting direction and speed of approach to a moorage conveyance based on the boat operator actions; and the effects of wind, weather, and wave actions.

22.2.10 Launch a watercraft from a pier, dock, slip, trailer, or other conveyance, given a watercraft and an operator, so that communication is maintained with the operator, current and wind are accounted for, mooring lines are managed, and equipment is secured against unintended movement.
(A) Requisite Knowledge. Methods for launching or deploying a watercraft and rigging, and securing equipment to prevent damage and minimize undesired movement of the watercraft; means of maneuvering a watercraft using lines or other external systems to position the watercraft as desired; how wind, weather, and water conditions affect watercraft movement as it

leaves the slip and after being deployed; and considerations for specialized tools or conveyances used to deploy watercraft such as trailers, jet docks, and davits.
(B) Requisite Skills. Rigging lines and tying knots, bends, and hitches related to mooring and maneuvering vessels into or at a moorage location or conveyance; predicting direction and speed of vessel departing from a moorage or conveyance based on the boat operator actions; and the effects of wind, weather, and wave action.

22.2.11 Perform anchoring operations given a watercraft, an operator, and anchoring equipment, so that the anchor is deployed to prevent vessel movement; and anchor swing, weather, and current and tide change is are accounted for.
(A) Requisite Knowledge. Techniques for setting anchor, requirements for anchor size, line length for the vessel and weather conditions, and the effects of vessel movement while at anchor.
(B) Requisite Skills. Set an anchor to minimize the potential for drag, and pay out anchor line to ensure proper scope is achieved for weather and tide changes.

22.2.12 Perform procedures for a crew overboard (COB) event so that the incident is communicated to the operator, visual location of the subject is maintained, the location is marked, and recovery of the subject is accomplished.
(A) Requisite Knowledge. Vessel procedures for man overboard, methods of communication of COB event to operator, crew tactics for marking location to assist with returning to location of event, and effects of immersion and hypothermia.
(B) Requisite Skills. Deploy a surface marker or utilize other methods for marking the location of the COB event, deploy flotation aid to the member, perform operations specific to maneuvering the vessel and preparing to recover the subject, and perform recovery operations.

22.2.13 Perform procedures for launching and recovery of in-water rescuers given a watercraft available to the agency, in-water rescuers and a watercraft operator so that the watercraft is not broached, control of the watercraft is maintained so that the rescuers are deployed and recovered at the designated location and are protected from injury.
(A) Requisite Knowledge. Watercraft specific procedures for deploying and recovering rescuers, including methods for avoiding contact with propulsion elements of the watercraft and uncontrolled falls or potential for entanglement on entry or exit.
(B) Requisite Skills. Rig or configure elements of the watercraft required for launching or recovery of rescuers, manage the operation of propulsion systems and other mechanical elements of the watercraft, and coordinate vessel movement and location so the rescuers are deployed and recovered at the desired location.

22.2.14 Perform a watercraft-based rescue of an incapacitated water bound victim given a watercraft that is available to the team, a water rescue tool kit, a means of securement, and water rescue PPE, so that the watercraft is not broached; control of the watercraft is maintained; risks to the victim and rescuers are minimized; and the victim is removed from the hazard.
(A) Requisite Knowledge. Watercraft-specific procedures for recovering victims, including methods for avoiding contact with propulsion elements of the watercraft and uncontrolled falls or potential for entanglement on recovery.
(B) Requisite Skills. Rig or configure elements of the watercraft required for recovery of a victim, manage the operation of propulsion systems and other mechanical elements of the watercraft, and coordinate vessel movement and location so the victim is recovered at the desired location.

22.2.15 Perform procedures to take another watercraft under tow so that the relative sizes of both watercraft are considered; neither vessel is broached; wind, weather, and water conditions are accounted for; lines are connected between the vessels; maneuverability and control are maintained; and the watercraft is protected from damage.
(A) Requisite Knowledge. Watercraft-specific procedures for taking a vehicle under tow, including rigging methods, anchor locations, methods for chafe and impact protection; watercraft handling dynamics while towing; propulsion capacities and impact of wind, weather, and water conditions on combined mass and surface area of both vessels; limitations on size and weight of vessel being towed.
(B) Requisite Skills. Rig lines; impact and chafe protection; control movement and direction of watercraft under tow; monitor position and condition of vessel under tow; and communicate with watercraft operator to maneuver the watercraft.

22.2.16 Perform emergency procedures for a watercraft, given a watercraft available to the agency and emergency equipment so that help is summoned, emergency actions are taken, and risks to the occupants of the vessel are minimized.
(A) Requisite Knowledge. Location of emergency equipment such as signaling devices, fire extinguishers, distress beacons, life rafts, PFDs, exposure suits, and other related equipment and how to operate and deploy them.
(B) Requisite Skills. Deploy and activate life safety and emergency equipment.

22.2.17 Conduct dewatering operations, given a watercraft available to the jurisdiction and dewatering equipment so that undesired water is reduced or eliminated in the watercraft, vessel stability is maintained, and damage to the watercraft is prevented.
(A) Requisite Knowledge. Watercraft specific dewatering plan, operation of onboard dewatering equipment, and effects of excessive water on stability and seaworthiness of the watercraft.
(B) Requisite Skills. Operate onboard dewatering equipment to remove water from the vessel.

22.2.18 * Terminate an incident, given PPE specific to the incident, isolation barriers, and tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modification or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed, and scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and postincident analysis and critique are considered; and command is terminated.
A.22.2.18 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (i.e., abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and postincident analysis techniques.
(B) Requisite Skills. Ability to select and use of hazard-specific PPE; decontamination of PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols; and postincident analysis activities.

22.3 * Technician Level.

The job performance requirements defined in Sections 22.2 and 22.3 shall be met prior to or during technician-level qualification in watercraft rescue.

22.3.1 Prepare a watercraft to get underway, given a watercraft available to the agency so that preoperational checks are performed, systems are energized, propulsions systems started, functional checks are conducted, and the watercraft is ready to be deployed.
(A) Requisite Knowledge. Watercraft system operational procedures and readiness checks.
(B) Requisite Skills. Check proper fluid levels, charges, connections, and lubrication of systems and connections.

22.3.2 Operate a watercraft to perform tasks typical of the mission defined by the AHJ in conditions representative of the waters and weather common to the jurisdiction, given a watercraft available to the agency so that the objectives are achieved, the occupants and crew are protected from harm, and damage to the watercraft is prevented.
(A) Requisite Knowledge. Vessel-specific policies and procedures for operating the watercraft; capabilities and limitations of the watercraft; common wind, weather, and water conditions for the jurisdiction.
(B) Requisite Skills. Operate the controls of the watercraft and maneuver to achieve the objective while preventing damage to the watercraft or other vessels.

22.3.3 Plot a course given navigational tools and charts so that heading, speed, and course are determined and wind, weather, current, and water conditions are taken into account.
(A) Requisite Knowledge. How to operate conventional and electronic navigation tools used by the agency.
(B) Requisite Skills. Determine location, heading, and speed to achieve the desired course.

22.3.4 Operate the watercraft while performing docking or watercraft recovery operations, given a watercraft and watercraft crewmember(s) so that communication is maintained with the crew, current and wind are accounted for, and the vessel is positioned properly at the slip and secured from unintended movement.
(A) Requisite Knowledge. Methods for maneuvering or approaching moorage; how wind, weather, and water conditions affect watercraft movement as it approaches the slip and after being secured; and considerations for specialized tools or conveyances used to recover watercraft such as trailers, jet docks, and davits.
(B) Requisite Skills. Control and maneuver vessel into or at a moorage location or conveyance, predicting direction and speed of approach to a moorage conveyance based on the boat operator actions and the effect of wind, weather, and wave actions.

22.3.5 Operate a watercraft as it is launched or deployed from a pier, dock, slip, trailer, or other conveyance, given a watercraft and watercraft crewmember(s) so that communication is maintained with the crew, current and wind are accounted for, and damage to the watercraft is prevented.
(A) Requisite Knowledge. Methods for maneuvering and operating the watercraft while launching or deploying a watercraft so it is positioned as desired, how wind, weather, and water conditions affect watercraft movement as it leaves the slip and after being deployed; and considerations for specialized tools or conveyances used to deploy watercraft such as trailers, jet docks, and davits.

(B) Requisite Skills. Maneuvering while departing the moorage location, predicting direction and speed of departure from a moorage or conveyance based on conditions, the characteristics of the watercraft, and the effect of wind weather and wave action.

22.3.6 Operate a watercraft to conduct anchoring operations, given a watercraft, watercraft crewmember(s), and anchoring equipment so that the anchor is deployed to prevent vessel movement; and anchor swing, weather, current, and tide change are accounted for.
(A) Requisite Knowledge. Techniques for setting anchor, requirements for anchor size and line length for the vessel, weather conditions, and the impact of vessel movement while at anchor.
(B) Requisite Skills. Set an anchor to minimize the potential for drag, and pay out anchor line to ensure proper scope is achieved for weather and tide changes.

22.3.7 Operate a watercraft in response to a COB event, given a watercraft available to the agency and watercraft crewmember(s) so that the incident is communicated to the operator, visual location of the subject is maintained, the location is marked, and recovery of the subject is accomplished.
(A) Requisite Knowledge. Vessel procedures for man overboard, methods of communication of COB event to the crew and tactics for noting COB locations to assist with returning to location of event, methods of quickly maneuvering the watercraft back to the COB location.
(B) Requisite Skills. Note location of the COB event using traditional or electronic methods, maneuvering the vessel to return to the COB location, and approaching the target area to recover the subject.

22.3.8 Operate a watercraft to deploy and recover in-water rescuers, given a watercraft available to the agency, in-water rescuers and watercraft crewmember(s) so that the watercraft is not broached; control of the watercraft is maintained so that the rescuers are deployed and recovered at the designated location and are protected from injury.
(A) Requisite Knowledge. Watercraft-specific procedures for deploying and recovering rescuers, including methods for avoiding contact with propulsion elements of the watercraft and uncontrolled falls or potential for entanglement on entry or exit.
(B) Requisite Skills. Maneuver and control a watercraft, manage the operation of propulsion systems and other mechanical elements of the watercraft, coordinate vessel movement and location so the rescuers are deployed and recovered at the desired location.

22.3.9 Operate a watercraft to perform a rescue of an incapacitated water-bound victim, given a watercraft that is available to the team, a water rescue tool kit, watercraft crew member(s), a means of securement, and water rescue PPE, so that the watercraft is not broached; control of the watercraft is maintained; risks to the victim and rescuers are minimized; and the victim is removed from the hazard.
(A) Requisite Knowledge. Watercraft-specific procedures for recovering victims, including methods for approach, avoiding contact with propulsion elements of the watercraft, and communication methods with crew.
(B) Requisite Skills. Maneuver watercraft while approaching water-bound victim, manage the operation of propulsion systems and other mechanical elements of the watercraft, coordinate vessel movement and location so the victim is recovered at the desired location.

22.3.10 Operate a watercraft with another watercraft under tow, given a watercraft available to the agency and water rescue crewmember(s) so that the relative sizes of both watercraft are considered,; neither vessel is broached; wind, weather, and water conditions are accounted for;

lines are connected between the vessels; maneuverability and control are maintained; and the watercraft is protected from damage.
(A) Requisite Knowledge. Watercraft-specific procedures for taking a vehicle under tow; watercraft handling dynamics while towing; propulsion capacities and impact of wind, weather, and water conditions on combined mass and surface area of both vessels; limitations on size and weight of vessel being towed.
(B) Requisite Skills. Control movement and direction of the watercraft and the watercraft under tow, monitor position and condition of vessel under tow, and communicate with crewmembers to maneuver the watercraft.

22.3.11 Operate ancillary navigation and electronic systems given a watercraft available to the agency so that the objective is achieved and the desired information is obtained.
(A) Requisite Knowledge. Watercraft- and agency-specific procedures for the use of radar, plotters, and visual aids.
(B) Requisite Skills. Operate equipment specific to the watercraft and the agency, such as radar, plotters, and forward-looking infrared radar (FLIR).

22.3.12 Shut down a watercraft, given a watercraft available to the agency, so that post-shutdown checks are conducted, and the craft is secured and protected from damage and tampering.
(A) Requisite Knowledge. Agency-specific procedures for watercraft operations; shutdown procedures for propulsion and ancillary systems; methods of securing craft from unwanted movement, theft, and vandalism; connecting and ensuring shore systems are operational.
(B) Requisite Skills. Tie knots, bends, and hitches required to moor or secure craft for long-term storage; use conveyances such as trailers, davits, or jet docks that the agency might use for storing or securing the craft; activate or operate systems that control or maintain the environment inside the craft, such as climate control and bilge monitoring systems; and connect and verify operation of shore support systems such as ac power

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23.1 Awareness Level.
Prior to qualification at the awareness level in floodwater rescue, the individual shall meet the requirements defined in Section 23.1.

23.1.1 Size up a floodwater rescue incident, given an incident, background information, and applicable reference materials, so that the operational mode is defined; resource availability, response times, and types of rescues are determined; the number of victims is identified; the last reported locations of all the 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.
(A) Requisite Knowledge. Types of reference materials and their uses, risk/benefit assessment, availability and capability of the resources, elements of an action plan and related information, relationship of the size-up to the incident management system, and information gathering techniques and how that information is used in the size-up process and basic search criteria for floodwater rescue incidents.
(B) Requisite Skills. The ability to read specific rescue reference materials, interview people, gather information, relay information, manage witnesses, and use information sources.

23.1.2 Recognize incident hazards and initiate isolation procedures, given scene control barriers, personal protective equipment (PPE), requisite equipment, and available specialized resources, so that all hazards are identified; resource application fits the operational requirements; hazard isolation is considered; risks to rescuers, bystanders, and victims are minimized; and rescue time constraints are taken into account.
(A) Requisite Knowledge. Resource capabilities and limitations; types and nature of incident hazards; equipment types and their use; isolation terminology, methods, equipment and implementation; operational requirement concerns; common types of rescuer and victim risks; risk/benefit analysis methods and practices; hazard recognition, isolation methods, and terminology; methods for controlling access to the scene; and types of technical references.
(B) Requisite Skills. The ability to identify resource capabilities and limitations, identify incident hazards, assess potential hazards to rescuers and bystanders, place scene control barriers, and operate control and mitigation equipment.

23.1.3 Recognize the need for technical rescue resources at an operations- or technician-level incident, given AHJ guidelines, 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.
(A) Requisite Knowledge. Operational protocols, specific planning forms, types of incidents common to the AHJ, hazards, incident support operations and resources, and safety measures.
(B) Requisite Skills. The ability to apply operational protocols, select specific planning forms based on the types of incidents, identify and evaluate various types of hazards within the AHJ, request support and resources, and determine the required safety measures.

23.1.4 Support an operations- or technician-level incident, given an incident, an assignment, an incident action plan, and resources from the tool kit, 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.
(A) Requisite Knowledge. AHJ operational protocols, hazard recognition, incident management, PPE selection, resource selection and use, and scene support requirements.
(B) Requisite Skills. The ability to apply operational protocols, function within an incident management system, follow and implement an incident action plan, and report the task progress status to a supervisor or incident command.

23.2 * Operations Level.

The job performance requirements defined in Sections 17.2 (Surface), 18.2 (Swift Water), 23.1, and 23.2 shall be met prior to or during operations-level qualification in floodwater rescue.
A.23.2 Rescuers performing functions in or around structures or vehicles should have appropriate training in the related disciplines. Although not all floodwater events have swiftwater conditions, many do, and the presence of moving water should always be considered.

17.2 * Operations Level Surface Water.

The job performance requirements defined in Sections 17.1 and 17.2 shall be met prior to or during operations-level qualification in surface water rescue.
A.17.2 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.

17.2.1 * Develop a site survey for an existing water hazard, given historical data, specific PPE for conducting site inspections, flood insurance rate maps, tide tables, and meteorological projections, so that life safety hazards are anticipated, risk/benefit analysis is included, site inspections are completed, water conditions are projected, site-specific hazards are identified, routes of access and egress are identified, boat ramps (put-in and take-out points) are identified, the method of entrapment is considered, and areas with a high probability for victim location are determined.

A.17.2.1 Water environments can include, but are not limited to, swiftwater, still water, ice-covered water, and tidal water. Rescuers should demonstrate the requisite knowledge of each water environment anticipated within the geographical confines of the AHJ and their associated tactical and safety considerations as part of this competency.

(A) Requisite Knowledge. Requisite contents of a site survey; types, sources, and information provided by reference materials; hydrology and the influence of hydrology on rescues; types of hazards associated with water rescue practices scenarios, inspections practices, and considerations techniques; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; and environmental conditions that influence victim location.

(B) Requisite Skills. The ability to interpret reference materials, perform a scene assessment, evaluate site conditions, complete risk/benefit analysis, and select and use necessary PPE.

17.2.2 * Select water rescue PPE, given a water rescue assignment and assorted items of personal protective and life-support equipment, so that the rescuer is protected from temperature extremes and environmental hazards, correct buoyancy is maintained, AHJ protocols are complied with, swimming ability is maximized, routine and emergency communications are established between components of the team, self-rescue needs have been evaluated and provided for, and pre-operation safety checks have been conducted.

A.17.2.2 Temperature extremes include both hypo- and hyperthermia. Personal protective equipment users have to be aware of the potential for either condition to develop strategies for avoidance and recognition. Adequate flotation is dependent upon the mode of operation. As an example, for surface rescue, positive buoyancy is desired, whereas for underwater operations, neutral buoyancy should be maintained. Proper fit of personal protective equipment is determined by the manufacturers' specifications and related documentation; the primary intent is that the safety and efficiency of the rescuer is not impaired or the garments' capabilities exceeded. The AHJ should utilize personal protective equipment appropriate to the conditions present in its response area, as well as based on the scope of its operations. In considering personal protective equipment selection, the following factors should be addressed:

(1) Flotation (buoyancy)
(2) Insulation from cold water exposure
(3) Protection from physical hazards (e.g., abrasion, cuts, tears, punctures)
(4) Visibility
(5) Garment form, fit, and mobility
(6) Limited chemical and biological protection (e.g., from bloodborne pathogens) (see FEMA document FA 136, Protective Clothing and Equipment for Emergency Responders for Urban Search and Rescue Missions)
(7) Provision of "low-profile" helmets (i.e., helmets without a brim on the back) utilized in the water rescue environment to avoid possible cervical spine hyperextension or hyperflexion injuries, as well as to provide protection from blunt force trauma

(A) Requisite Knowledge. Manufacturer's recommendations for PPE; standard operating procedures; basic signals and communications techniques; selection criteria of insulating

garments; buoyancy characteristics; personal escape techniques; applications for and capabilities of personal escape equipment; hazard assessment; AHJ protocols for equipment positioning; classes of personal flotation devices; selection criteria for personal protective clothing, personal flotation devices, and water rescue helmets; personal escape techniques; applications for and capabilities of personal escape equipment; and equipment and procedures for signaling distress.

(B) * Requisite Skills. The ability to use PPE according to the manufacturer's directions, don and doff equipment in an expedient manner, use pre-operation checklists, select personal flotation devices, don and doff personal flotation devices, select water rescue helmets, don and doff water rescue helmets, select personal protective clothing and equipment, don and doff in water insulating garments, proficiency in emergency escape procedures, proficiency in communicating distress signals, proficiency in emergency escape procedures, and proficiency in communications.

A.17.2.2(B) Selection of water rescue personal protective equipment, so that the rescuer will be protected from temperature extremes and blunt trauma, the rescuer will have flotation for tasks to be performed, swimming ability will be maximized during rescue activities, self-rescue needs have been evaluated and provided for has been established, and a means of summoning help has been provided.

17.2.3 * Define search parameters for a water rescue incident, given topographical maps of a search area; descriptions of all missing persons and incident history; and hydrologic data, including speed and direction of current or tides, so that areas with high probability of detection are differentiated from other areas, witnesses are interviewed, critical interview information is recorded, passive and active search tactics are implemented, personnel resources are considered and used, and search parameters are communicated.

A.17.2.3 Active Search Measures: Of primary and immediate importance is locating the point last seen (PLS) of the missing subject. Sometimes the reporting person (RP) will have no direct knowledge of what happened. For example, the RP might be a family member reporting a group of canoeists overdue at a takeout. At other times the RP will have witnessed a river accident such as a raft overturning or a fisherman being swept away, and will be able to give a description of the victims, and a fairly exact PLS. RPs should be interrogated for all information they might have about the victim, to include physical description, clothing, destination, experience, time the incident occurred, and any other details that might help the search (e.g., the type of shoes, in order to aid the trackers). Passive Search Measures: The searches at this point are detailed, formal searches, not hasty ones. It is better to have small, trained groups of searchers thoroughly search an area repeatedly than to search with large groups of untrained people, since these frequently trample more evidence than they find. As the search progresses, the incident commander should debrief team leaders frequently and revise the search plan as necessary.

(A) Requisite Knowledge. Topographical map components, hydrologic factors and wave heights, methods to determine areas of high probability of detection, critical interview questions and practices, methods to identify track traps, ways to identify spotter areas and purposes for spotters, personnel available and their effect on parameter definition, the effect of search strategy defining parameters, communication methods, and reporting requirements.

(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.4 Develop an action plan for a shore-based rescue of a single or multiple water-bound victim(s), given an operational plan and a water rescue tool kit, so that all information is factored, risk/benefit analysis is conducted, protocols are followed, hazards are identified and minimized, personnel and equipment resources will not be exceeded, assignments are defined, consideration is given to evaluating changing conditions, and the selected strategy and tactics fit the conditions.
(A) Requisite Knowledge. Elements of an action plan; types of information provided by reference materials and size-up; hydrology; types of hazards associated with water rescue practices; risk/benefit analysis; identification of hazard-specific PPE; factors influencing access and egress routes; behavioral patterns of victims; environmental conditions that influence victim location; safety, communications, and operational protocols; and resource capability and availability.
(B) Requisite Skills. The ability to interpret and correlate reference and size-up information; evaluate site conditions; complete risk/benefit analysis; apply safety, communications, and operational protocols; specify PPE requirements; and determine rescue personnel requirements.

17.2.5 * Deploy a water rescue reach device to a water-bound victim, given required equipment and PPE so that the deployed equipment reaches the victim(s), the rescue equipment does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the device.
A.17.2.5 Both throw-rope deployments should be conducted sequentially, to the same victim, within a span of approximately 40 seconds to a victim 12.19 m (40 ft) away from the rescuer.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, physiological effects of immersion, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. The ability to select PPE specific to the water environment, don PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.6 * Deploy a water rescue rope to a water-bound victim, given a water rescue rope in a throw bag, a coiled water rescue rope 50 ft to 75 ft (15.24 m to 22.86 m) in length, and PPE, so that the deployed rope lands within reach of the victim, the rescue rope does not slip through the rescuer's hands, the victim is moved to the rescuer's shoreline, the victim is not pulled beneath the surface by rescuer efforts, the rescuer is not pulled into the water by the victim, and neither the rescuer nor the victim is tied to or entangled in the throw line.
A.17.2.6 See A.17.2.5.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies and procedures for rescue team activation, and information on local water environments.

(B) Requisite Skills. The ability to deploy both a water rescue rope bag and a coiled water rescue rope, select PPE specific to the water environment, don PPE, identify water hazards (e.g., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

17.2.7 * Develop and implement an action plan for the use of watercraft to support the rescue of a single or multiple water-bound victims, given watercraft, operator(s), and policies and procedures used by the AHJ, so that watercraft pre-deployment checks are completed; watercraft launch or recovery is achieved; rescuers are deployed and recovered; both onboard and rescue operations conform with watercraft operational protocols and capabilities; communications are clear and concise; and the candidate is familiar with watercraft nomenclature, operational protocols, design limitations, and launch/recovery site issues.
A.17.2.7 The committee's intent is for the candidate to know what procedures are used when using watercraft in their jurisdiction, or at least basic watercraft deployment and recovery techniques, even if the AHJ does not have its own watercraft. This includes the rescuer's role on the boat, nomenclature, and use of emergency/safety equipment (fire extinguishers, flares, flotation devices, etc.). The committee understands that not all water rescue teams have boats and not all boat operators are knowledgeable about deploying rescuers. In this case, the technician should be able to act as a liaison between the team and the boat operator.
(A) Requisite Knowledge. Entry/exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, tides, and currents.
(B) Requisite Skills. Implement access and egress procedures and communications with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

17.2.8 * Define procedures to provide support for helicopter water rescue operations within the area of responsibility for the AHJ, given a helicopter service, operational protocols, helicopter capabilities and limitations, water rescue procedures, and risk factors influencing helicopter operations, so that air-to-ground communication is established and maintained, applications are within the capabilities and skill levels of the helicopter service, the applications facilitate victim extraction from water hazards that are representative of the bodies of water existing or anticipated within the geographic confines of the AHJ, air crew and ground personnel safety are not compromised, landing zones are designated and secured, and fire suppression resources are available at the landing zone.
A.17.2.8 While helicopters are not universally available to water rescuers and there are many restrictions on the use of aircraft for rescue, they are nonetheless frequently drafted for improvised rescues during times of crisis. Therefore, water rescue teams and the supporting helicopter services should plan for the use of helicopters that can be called upon during these crises to identify capabilities and limitations of the team and the helicopter service, to train in those procedures that all parties agree are within their collective skill levels and for which they are equipped, and to draft protocols that will define exactly what procedures the helicopter service will be called upon to perform and the criteria for that decision.
(A) Requisite Knowledge. Local aircraft capabilities and limitations, landing zone requirements, hazards to aircraft, local protocols, procedures for operating around aircraft, dynamics of rescue options, crash survival principles, PPE limitations and selection criteria, ancillary helicopter rescue equipment, and helicopter surf rescue procedures.
(B) Requisite Skills. The ability to determine applicability of air operations, establish and control landing zones, assess fire protection needs, communicate with air crews, identify hazards, rig

aircraft for anticipated rescue procedures, apply crash survival procedures, select and use PPE, and work with air crews to rescue a victim from the water.

17.2.9 * Implement procedures for performing watercraft-based rescue of an incapacitated, water-bound victim, as a member of a team, given a water hazard that is representative of the anticipated rescue environment watercraft that is available to the team (if applicable), designated victim packaging and management equipment, and water rescue PPE, so that the control and stability of the watercraft is maintained, risks to the victim and rescuers are minimized, and the victim is removed from the hazard.

A.17.2.9 It is the intent of the committee that the watercraft operator be required to perform a range of skills that demonstrate the operator's ability to control the craft in challenging or adverse conditions, to recover from a loss of power or primary means of propulsion, to right an overturned craft, to cast and recover rescuers and victims, to dock with fixed points and other watercraft, and to tow a disabled watercraft to safety. The specific evolutions required to demonstrate this level of proficiency should be defined by the AHJ. All personnel (including the operator) should be competent in the use of self-rescue practices and procedures applicable to the scope of operation, including, but not limited to, drownproofing, swiftwater self-rescue, current considerations (rip current, etc.), and basic swimming skills as identified by the AHJ. These requirements should be applied in the same manner that apparatus operators must meet specific knowledge and skill requirements based on the type of apparatus being operated (see NFPA 1002).

(A) Requisite Knowledge. Limitations and uses of available watercraft, local environmental access and egress procedures, parbuckling (rollup) techniques, dynamics of moving water and its effects on watercraft handling, conditional requirements for PPE, and the effects of extrication on watercraft handling and stability.

(B) Requisite Skills. The ability to move about in a designated watercraft in conditions representative of the anticipated rescue environment while managing the movement of a water-bound victim using techniques identified by the AHJ.

17.2.10 Demonstrate fundamental survival swimming and self-rescue skills, given safety equipment, props, and a controlled setting representative of the anticipated rescue environment, so that the risk of injury is minimized, flotation is maintained, available PPE is utilized, and egress is accomplished.

(A) Requisite Knowledge. Basic forward stroke swimming theory (surface skills).

(B) Requisite Skills. Basic swimming skills, including the ability to swim and float in different water conditions with and without flotation aids or swimming aids as required and apply water survival skills; don and doff PPE; select and use PPE, flotation aids, and swim aids; use communications systems; and evaluate water conditions to identify entry points and hazards.

17.2.11 Identify procedures for operation of rope systems particular to the water rescue needs of the AHJ, given rescue personnel, an established rope system, a load to be moved, and PPE, so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.

(A) Requisite Knowledge. Ways to determine incident needs as related to the operation of rope systems, capabilities and limitations of various rope systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, assignment considerations, common and critical operational commands, common rope

system problems and ways to minimize or manage them, and ways to increase the efficiency of load movement.
(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel, manage movement of the load, and evaluate for potential problems.

17.2.12 Support operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, correct buoyancy control is maintained, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, operation support equipment, and communications issues.
(B) Requisite Skills. Basic support skills, including the ability to act as spotters and tend to water rescuers.

17.2.13 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the operational period; documentation of loss or material use is accounted for, scene documentation is performed, and scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing and post incident analysis and critique are considered; and command is terminated.
A.17.2.13 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner in which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.
(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post-incident analysis techniques.
(B) Requisite Skills. Select and use task and hazard-specific PPE; decontaminate PPE; use barrier protection techniques, collect data, follow record-keeping/reporting protocols, and conduct post-incident analysis activities.

18.2 Operations Level SWIFT WATER.

18.2.1 Construct rope systems particular to the swiftwater rescue needs of the AHJ, given rescue personnel, rope equipment, a load to be moved, and personal protective equipment (PPE), so that the movement is controlled, the load is held in place when needed, and operating methods do not stress the system.
(A) Requisite Knowledge. Rope systems specific to the swiftwater environment, capabilities and limitations of various rope systems, incident site evaluation as related to interference concerns and obstacle negotiation, system safety check protocol, procedures to evaluate system components for compromised integrity, common personnel assignments and duties, common and critical operational commands, and methods to increase the efficiency of load movement.

(B) Requisite Skills. The ability to determine incident needs, complete a system safety check, evaluate system components for compromised integrity, select personnel, communicate with personnel, manage movement of the load, and evaluate for potential problems.

18.2.2 Support swiftwater operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, personnel accountability is maintained, and emergency procedures are demonstrated.
(A) Requisite Knowledge. Support procedures, including search patterns, equipment setup, operation support equipment, and communications issues.
(B) Requisite Skills. Basic support skills, including the ability to serve as an upstream or downstream safety spotter, and the ability to implement personnel accountability systems and tend to an in-water rescuer.

18.2.3 * Assess moving water conditions, characteristics, and features in terms of hazards to the rescuer and victims, given an incident scenario and swiftwater tool kit, so that the flow and conditions are estimated accurately, mechanisms of entrapment are considered, hazards are assessed, the depth and surrounding terrain are evaluated, and findings are documented.
A.18.2.3 A hazard and risk analysis is needed when operating as a rescuer when applying shore-based rescue techniques. The rescuer might need to enter the hot zone (i.e., moving or standing water) to assist a distressed victim for removal purposes. Without proper consideration of the water's edge topography, water conditions, depth, current flow, and the ability of the rescuer to swim, there is potential for the rescuer to become a victim. Not every shore-based rescue will be mitigated from land-based operational zones.
(A) Requisite Knowledge. Flow calculation methods, map or chart reading, local water hazards and conditions, entrapment mechanisms, and human physiology and survival factors.
(B) Requisite Skills. Determination of the flow and environmental factors, the effects on victims and rescuers, and interpretation of maps or charts.

18.2.4 * Perform a non-water entry rescue in the swiftwater and flooding environment, given an incident scenario, PPE, and swiftwater rescue tool kit, so that rescue is accomplished, and adopted policies and safety procedures are followed.
A.18.2.4 In the water rescue environment, a non-water entry rescue might be performed from a watercraft, placing the rescuers on, but not directly in the hazard. Rescuers should ensure they use proper PPE, that rapid intervention crews are in place, and should be trained in the operation, parameters, and emergency procedures of the watercraft and accidental immersion.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on the water environment and conditions, hazards and limitations of shore-based rescue, local policies/procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. Select and use task-specific PPE, identify water hazards (i.e., upstream or downstream, current or tide), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

18.2.5 * Terminate an incident, given PPE specific to the incident, isolation barriers, and a tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; the party responsible is notified of any modifications or damage created during the

operational period; documentation of loss or material use is accounted for; scene documentation is performed; and control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing, post incident analysis, and critique are conducted; and command is terminated.

A.18.2.5 The committee recognizes that technical rescue incidents pose unique challenges in terms of safely concluding or demobilizing an event. The sequence and manner by which resources are transitioned out of an event require careful analysis to ensure that scene and rescuer safety are not compromised. Risk management strategies can include both active and nonintervention strategies, such as not removing (abandoning in place) equipment, denying entry to a site, and so forth. A large number of catastrophic events have occurred during the end or termination stages of such events when personnel are fatigued and resources are in a state of transition from active event participation to a return to service.

(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post-incident analysis techniques.

(B) Requisite Skills. Ability to select and use hazard-specific PPE; decontaminate PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols; and participate in conduct post-incident analysis activities.

23.2 * Operations Level FLOOD Cont.

23.2.1 Support technician-level floodwater rescue operations, given a designated mission, safety equipment, props, and water body, so that skills are demonstrated in a controlled environment, performance parameters are achieved, hazards are continually assessed, and emergency procedures are demonstrated.

(A) Requisite Knowledge. Support procedures, including search patterns, equipment setup, operating support equipment, and communications systems.

(B) Requisite Skills. Basic support skills, including the ability to serve as a safety or spotter and tend an in-water rescuer.

23.2.2 * Assess floodwater conditions, characteristics, and features in terms of hazards to the rescuer and victims, given an incident scenario and a floodwater tool kit, so that flow and conditions are estimated, depth and surrounding terrain are evaluated, and findings are documented.

A.23.2.2 Moving water has an impact on the human body both in its mechanical effects and accelerated heat transfer properties. The ability to gauge its speed is a key factor in determining the risks moving water poses to both the rescuer and victims. The contours of the terrain under the water can give indicators as to the best means of access as well as areas that might pose increased risks to the responder. The resources available to the rescuer for obtaining this necessary information include topo maps, charts, weather forecasts, local irrigation data, and flood control information.

Methods of flow calculations include putting markers in the water and measuring distance traveled over time. A list of basic calculations is shown in Table A.23.2.2.

Table A.23.2.2 Basic Calculations for a Marker Float Traveling 100 ft Down Current

(A) Requisite Knowledge. Flow calculation methods, characteristics of floodwater events, map reading, interpreting local terrain data, local water hazards and conditions, entrapment mechanisms, weather forecasts, human physiology and survival factors.

(B) Requisite Skills. Assessment of water flow and environmental factors, the ability to acquire and interpret weather forecasts and local terrain data, and evaluate their impact on victims and rescuers.

23.2.3 Perform a nonentry rescue in the floodwater environment, given an incident scenario, PPE, and a floodwater rescue tool kit, so that rescue is accomplished, and adopted policies and safety procedures are followed.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on water environment and conditions, hazards and limitations of shore-based rescue, local policies/procedures for rescue team activation, and information on local water environments.
(B) Requisite Skills. Select PPE specific to the water environment, don PPE, identify water hazards (i.e., upstream or downstream, current or tides), identify hazards directly related to the specific rescue, and demonstrate appropriate shore-based victim removal techniques.

23.2.4 Implement an incident action plan, as a member of a team, for the use of watercraft to support floodwater search and rescue operations, given an incident action plan and defined resources, so that operational objectives are achieved.
(A) Requisite Knowledge. Incident management techniques, entry and exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, characteristics of floodwater events, and specific hazards presented by floodwater events in the potential rescue environment.
(B) Requisite Skills. Implement access and egress procedures and communication with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

23.2.5 Implement an action plan for the use of air assets to support floodwater search and rescue operations, given an action plan, access to air assets, policies, and procedures used by the AHJ, so that floodwater-specific hazards are addressed; rescuers are deployed and recovered as required; both onboard and rescue operations conform with aircraft operational protocols and capabilities; communications are clear and concise; and the candidate is familiar with aircraft nomenclature, operational protocols, and design limitations.
(A) Requisite Knowledge. Means of contacting and accessing agencies with air assets, the role of aircraft in the support of floodwater events, the limitations of the available aircraft in the conditions associated with the rescue environment, and the role of the rescuer as part of an aviation team.
(B) Requisite Skills. Implement a notification plan to request air assets, develop a list of tactical objectives to be achieved by the aircraft, and communicate mission priorities with the aircrew or operator of the aircraft.

23.2.6 * Implement measures identified by the AHJ to limit exposure of victims and rescuers to potentially contaminated floodwater given a floodwater event, a flood rescue tool kit, protocols and practices identified by the AHJ, and access to the required engineering controls and decontamination tools so that the sources of potential contamination are identified and their effects and those of cross-contamination are minimized.
A.23.2.6 Floodwaters typically contain human or animal sewage, dead or decomposing animal matter, and other biological factors and pathogens. Populated areas can also have household,

agricultural, or industrial chemicals present in the water. While working in the floodwater environment, rescuers should limit their exposure to potentially contaminated water and practice good housekeeping methods to limit the potential for skin contact or ingestion. All rescuers who work in or around floodwaters should follow basic hand- and face-washing protocols after completion of their duties prior to entering living, sleeping, or eating areas. It is the intent of this chapter that, when engaged in protracted operations in floodwater rescue operations, the AHJ engage local hazardous materials teams or health departments to assess contamination hazards and provide decontamination services.

(A) Requisite Knowledge. Sources of contamination, indicators of the presence of contaminants, methods to limit exposure to contaminated water, and decontamination methods targeted at the potential specific contaminants.

(B) Requisite Skills. The ability to use related engineering controls and personal protective equipment (PPE), determine the practices that limit an individual's likelihood of exposure to contaminants, and implement methods for the removal of potential contaminants or to render them inert.

23.2.7 * Identify locations at a floodwater search and rescue incident that have a high probability of containing victims, given a flood rescue scenario, and a tool kit, so that all accessible areas of the incident are surveyed and the victim locations are marked.

A.23.2.7 As structures flood, occupants instinctively seek higher elevations, often ending up in attics or upper stories with no way to exit the structure. They might also seek refuge under or on highway overpasses, trees, towers, power poles, roofs, or vehicles. Victims could also find themselves trapped inside vehicles that become partially submerged or float.

(A) Requisite Knowledge. Locations that are typically associated with areas of entrapment or refuge during floodwater events, including the interior of vehicles and attic spaces of structures, and human behavior during flood events.

(B) Requisite Skills. Conducting a search, marking victim locations, using search marking systems, and using communications systems to share findings.

23.2.8 * Manage the hazards unique to the terrain and environment when covered with floodwater or subject to differential pressures, given an incident consistent with a predicted floodwater environment and a floodwater search and rescue toolkit, so that all hazards are recognized and potential control measures are implemented.

A.23.2.8 Differential pressure can build up as water is drawn or forced through confined spaces such as manholes, storm sewers, and drainage pipes. These situations might create conditions that cause rapid water movement and a suction effect that can trap rescuers. A good example of differential pressure is a typical bathtub drain. Mechanical hazards might include signs, fences, vehicles, energy sources, and utilities that can continue to function even while submerged. Local wildlife and domestic animals that might not normally pose a hazard to rescuers might pose a risk when displaced by the floodwaters. This could include poisonous snakes, alligators, or crocodiles. Normally occupied flooded areas might pose challenges with respect to the security and safety of the rescuers from individuals with criminal or harmful intent. Making provisions for the security of the team using law enforcement or military assets should be considered.

(A) Requisite Knowledge. Specific hazards that could be present in a floodwater environment that are hidden or covered by water and hazard mitigation measures.

(B) Requisite Skills.

The ability to survey the rescue environment for indicators of potential hazards and avoid, isolate, or control identified hazards.

23.2.9 * Navigate terrain covered in floodwater, given a floodwater incident, a floodwater rescue tool kit, and practices identified by the AHJ, so that the positions of the rescuers are known, hazards are avoided, search progress is documented, and geographic baselines are established.

A.23.2.9 Floodwater incidents often eradicate, displace or cover landmarks such as buildings, roads, and signs typically used to provide orientation to search teams and to document the progress of the search. Rescuers might need to rely on improvised means of determining their location and marking their progress. Conventionally available GPS devices can be very useful tools in accomplishing these objectives. Teams can also use improvised markers such as posts or poles inserted into the ground or use what local features are still present, such as trees or power poles. Rescuers might also need to adopt specialized techniques, such as using a pole to determine the location of submerged features, including curbs, holes, vehicles, and such.

(A) Requisite Knowledge. The use and implementation of a GPS and alternate mapping techniques.

(B) Requisite Skills. The ability to establish a baseline location using a GPS or other improvised method from which to conduct a search or coordinate the movement of resources and use of methods to determine the location of submerged hazards and geographical features.

23.2.10 Terminate an incident, given PPE specific to the incident and a floodwater rescue tool kit, so that rescuers and bystanders are protected and accounted for during termination operations; scene documentation is performed; scene control is transferred to a responsible party; potential or existing hazards are communicated to that responsible party; debriefing, post-incident analysis, and critique are considered; and command is terminated.

(A) Requisite Knowledge. PPE characteristics, hazard and risk identification, isolation techniques, statutory requirements identifying responsible parties, accountability system use, reporting methods, and post-incident analysis techniques.

(B) Requisite Skills. The ability to select and use hazard-specific PPE; decontaminate PPE; use barrier protection techniques, data collection, and record-keeping/reporting protocols; and conduct post-incident analysis activities.

23.2.11 Perform a nonentry floodwater rescue from a rescue platform such as a vessel, boat, watercraft, or other waterborne transportation aid, given an operator, a simulated flood environment, water rescue PPE, and a floodwater rescue tool kit, so that the assignment is completed, all performance parameters are achieved, movement is controlled, hazards are continually assessed, and any related distress signals are communicated.

(A) Requisite Knowledge. Limitations, manufacturer's recommendations, and operation of the waterborne transportation device and regulatory and applicable laws of safe water transportation according to the AHJ.

(B) Requisite Skills. The ability to enter and exit the waterborne transportation aid in a floodwater condition, correct a capsized waterborne transportation aid, and apply packaging and movement techniques to water-bound victims.

23.3 Technician Level.

The job performance requirements defined in Sections 17.3(Surface), 23.2, and 23.3 shall be met prior to or during technician-level qualification in floodwater rescue.

17.3 * Technician Level Surface.

The job performance requirements defined in Sections 17.2 and 17.3 shall be met prior to or during technician-level qualification in surface water rescue.

A.17.3 This section is for rescue situations with water moving less than 1 knot. Operations-level water rescue skills are applicable only to basic swimming and support of technician-level water rescue.

17.3.1 * Swim a designated water course, given a course designated by the AHJ as demonstrating the capabilities necessary to operate in the anticipated rescue environment, water rescue PPE, and swim aids as required, so that the specified objective is reached, all performance parameters are achieved, movement is controlled, hazards are continually assessed, distress signals are communicated, and rapid intervention for the rescuer has been staged for deployment.

A.17.3.1 A realistic evaluation of the rescuer's water survival skills should be conducted by the AHJ to meet this requirement. It is recommended that the AHJ use an annual swim test that meets or exceeds the IADRS Annual Watermanship Test. Example: Swim 91.4 m (100 yards) unassisted with any stroke, no time limit, and tread water for 10 minutes.

(A) Requisite Knowledge. Hydrology and specific hazards anticipated for representative water rescue environments (shoreline, in-water, and climatic), selection criteria for water rescue PPE and swim aids for anticipated water conditions and hazards, and swimming techniques for a representative body of water.

(B) Requisite Skills. The ability to swim and float over the required distances and for the necessary duration as outlined in the watermanship test found in Annex M with and without flotation aids or swim aids, apply water survival skills, don and doff PPE, select and use swim aids, use communications systems, and evaluate water conditions to identify entry points and hazards.

17.3.2 Perform a swimming surface water rescue, given a simulated victim, water rescue PPE, conditions representative of the anticipated rescue environment, swim aids as required, flotation aids for victims, and reach/extension devices, so that victim contact is maintained, the rescuer maintains control of the victim, the rescuer and the victim reach safety at a predetermined area, and medical conditions and treatment options are considered.

(A) Requisite Knowledge. Hydrology and specific hazards anticipated for a representative water rescue environment (shoreline, in-water, and climatic); victim behavior patterns; emergency countermeasures for combative victims; selection criteria for water rescue PPE, swim aids, and flotation aids for anticipated water conditions; victim abilities and hazards; swimming techniques for representative bodies of water; and signs, symptoms, and treatment of aquatic medical emergencies.

(B) Requisite Skills. The ability to swim and float in different water conditions with and without flotation aids or swim aids; apply water survival skills; manage combative water-bound victims; don and doff PPE; select and use PPE, flotation aids, and swim aids; utilize communications systems; select equipment and techniques for treatment of aquatic medical emergencies; and evaluate water conditions to identify entry points and hazards.

17.3.3 Demonstrate defensive tactics in the water rescue environment, given a water-bound victim in a stressed or panicked situation, so that the rescuer can maintain separation from the victim to create or maintain personal safety and can perform self-defense techniques to prevent rescuer submersion if direct contact is made between a panicked victim and the rescuer.

(A) Requisite Knowledge. Basic emergency procedures for applicable environments and situations with stressed or panicked victims at water rescues.

(B) Requisite Skills. The ability to release oneself effectively from the grasp of a panicked victim, including blocks, releases, and escapes.

17.3.4 Perform an entry surface rescue from a rescue platform (such as a vessel, boat, watercraft, or other waterborne transportation aid) while negotiating a designated surface course, given a course that is representative of the bodies of surface water existing or anticipated within the geographical confines of the AHJ, water rescue PPE, and swim aids, so that the specific objective is reached, the victim is retrieved, movement is controlled, hazards are continually assessed, distress signals are demonstrated, and rapid intervention for the rescuer has been staged for deployment.
(A) Requisite Knowledge. Watercraft operational characteristics, hydrology features, water entry and exit techniques, and water-bound victim management.
(B) Requisite Skills. Watercraft operation, watercraft stability and maneuvering techniques, rescuer entry and egress methods, capsized vessel upset recovery techniques, waterborne victim packaging and management techniques, and hand signals.

17.3.5 Direct a rescue team during operations, given incident checklists, maps, topographic surveys, and charts, so that teams are managed, personnel are supervised, hazards are assessed and identified, safety and health of the team is ensured, qualifications/abilities of rescuers are verified, pre-entry briefing is conducted, and debriefing is performed.
(A) Requisite Knowledge. Supervisory practices, emergency procedures, communications procedures, local protocols, and safety checks, and personnel accountability techniques.
(B) Requisite Skills. The ability to implement emergency procedures, communications procedures, incident management, personnel accountability, and resource management.

23.3 Technician Level FLOOD Cont.

23.3.1 * Perform an entry rescue in the floodwater environment, given an incident scenario, PPE, and floodwater rescue tool kit, so that rescue is accomplished, and adopted policies and safety procedures are followed.
A.23.3.1 Entry type rescue in this context might include rescuers entering the water to remove a victim or entering a structure to perform a search. Rescuers should be cognizant of the potential requirement to breach and/or search inside flooded structures. Basic search techniques can be utilized, including the use of accountability systems, oriented searches, or search ropes. Rescuers should also be aware of the potential need for backup or rapid intervention crews.
(A) Requisite Knowledge. Types and capabilities of PPE, effects of hydrodynamic forces on rescuers and victims, hydrology and characteristics of water, behaviors of water-bound victims, water rescue rope-handling techniques, incident-specific hazard identification, criteria for selecting victim retrieval locations based on water environment and conditions, hazards and limitations of shore-based rescue, local policies/procedures for rescue team activation, information on local water environments, and methods of breaching or defeating structural components of vehicle or structures.
(B) Requisite Skills. Select PPE specific to the water environment, don PPE, identify water hazards (i.e., upstream or downstream, current or tides), identify hazards directly related to the specific rescue, and demonstrate appropriate victim removal techniques.

23.3.2 Develop an incident action plan for the use of watercraft to support floodwater search and rescue operations, given a watercraft, operator(s), policies, and procedures used by the AHJ, so that floodwater-specific hazards are addressed; watercraft predeployment checks are

completed; watercraft launch or recovery is achieved; rescuers are deployed and recovered; both onboard and rescue operations conform with watercraft operational protocols and capabilities; communications are clear and concise; and the candidate is familiar with watercraft nomenclature, operational protocols, design limitations, and launch/recovery site issues.

(A) Requisite Knowledge. Entry/exit procedures, communications techniques, boat operation techniques, design limitations, climactic conditions, characteristics of floodwater events, and specific hazards presented by floodwater events in the potential rescue environment.

(B) Requisite Skills. Ability to implement access and egress procedures and communications with watercraft crew, use emergency/safety equipment, identify hazards, and operate within the rescue environment.

Tower Rescue – Operational Capability

(Aligned with NFPA 2500 Chapter 23)

Purpose

This section establishes Central Pierce Fire & Rescue's operational capability for tower rescue incidents. It defines the expectations, competencies, and operational framework required to safely and effectively manage tower-based rescue events.

Tower rescue is not a standalone discipline, but an application of rope rescue technician skills performed in a high-risk, elevated environment with unique hazards and access challenges.

Capability Statement

CPFR personnel assigned to technical rescue operations shall be capable of safely and effectively operating at tower rescue incidents, including:

- Identifying and mitigating tower-specific hazards
- Accessing tower structures using appropriate methods (climbing or rope systems)
- Performing rescues involving:
    - Suspended workers
    - Incapacitated or injured subjects
    - Subjects in crisis at height
- Constructing and operating rope rescue systems for:
    - Lowering
    - Raising
    - Pickoff and load transfer
- Managing patients in elevated environments
- Operating within an organized command structure during extended-duration incidents

All operations shall be conducted in accordance with CPFR Technical Rescue protocols and within the training and competency levels established through NFPA 1006-aligned JPR completion.

Operational Scope

Tower rescue operations may include, but are not limited to:

- Communications towers
- Utility towers
- Industrial structures
- Wind turbines
- Ski lift and gondola systems

These incidents may involve complex access, limited working space, and prolonged operations requiring disciplined system management and crew rotation.

Core Operational Capabilities

Personnel shall demonstrate proficiency in the following areas:

1. Hazard Identification and Risk Management

- Fall protection and exposure hazards
- Structural integrity considerations
- Environmental conditions (wind, weather, visibility)
- Electrical and mechanical hazards

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2. Access and Movement

- Climbing using fixed ladder or fall protection systems
- Rope-based access and positioning
- Transitioning between structural and rope systems
- Maintaining continuous tie-off and fall protection

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3. Rescue Operations

- High-angle rescue of stranded or clinging victims
- Removal of suspended workers from fall arrest systems
- Pickoff and load transfer operations
- Controlled lowering and raising of rescuers and patients

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4. Patient Management

- Communication with conscious or distressed subjects
- Physical control and stabilization of patients at height
- Packaging for vertical or horizontal movement
- Coordination of patient movement to ground

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5. System Operations

- Construction of rope systems (mainline and belay)
- Operation of lowering and raising systems
- System safety checks and redundancy
- Management of rope systems under load

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6. Incident Management

- Establishment of Incident Command and functional divisions
- Coordination of multiple rescue teams
- Crew rotation and fatigue management
- Accountability and communication

JPR Alignment (NFPA 1006)

Tower rescue capability is primarily supported through the following technician-level JPRs:

- **5.3.7** – Climb and traverse structures
- **5.3.8** – Manage subject at height
- **5.3.9** – Ascend rope systems
- **5.3.10** – Descend rope systems
- **5.3.11** – Escape from system failure

Supporting JPRs include:

- **5.3.1–5.3.6** – High-angle rescue, pickoff, litter operations, and horizontal systems

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Training and Implementation

Tower rescue capabilities are developed and evaluated through:

- **September – Rope Technician Month**
  - Core skill development (5.3.1–5.3.6)
- **May – Tower / Gondola Operations**
  - Application of movement and rescue skills (5.3.7–5.3.11)
  - Integration into real-world scenarios, including gondola evacuation

Training emphasizes:

- Repetition and system proficiency
- Realistic scenario-based problem solving
- Integration with CPFR Technical Rescue protocols

Operational Expectations

Personnel operating at tower incidents are expected to:

- Operate within established protocols and system design
- Maintain situational awareness and hazard control

- Communicate effectively within the team and command structure
- Execute operations with precision, discipline, and safety

Tower rescue operations require deliberate execution, strong technical proficiency, and disciplined coordination across all team members.

Helicopter Operations – Operational Capability

(Aligned with NFPA 2500 Chapter 15)

Purpose

This section establishes CPFR's operational capability for helicopter-assisted rescue operations. It defines expectations for personnel operating in and around rotary-wing aircraft during technical rescue incidents.

Helicopter operations are an application of rope rescue and patient management skills performed in a dynamic, high-risk environment requiring strict coordination with aviation resources.

Capability Statement

CPFR personnel assigned to technical rescue operations shall be capable of safely supporting and participating in helicopter-assisted rescue operations, including:

- Identifying and mitigating helicopter-specific hazards
- Establishing and managing landing zones (LZ)
- Communicating and coordinating with flight crews
- Performing rescue operations involving:
    - Hoist operations
    - Short-haul (where applicable)
    - Ground-based support of aerial operations
- Packaging and preparing patients for aerial transport
- Operating within established aviation safety protocols

All operations shall be conducted in accordance with CPFR Technical Rescue protocols and in coordination with the supporting aviation agency.

Operational Scope

Helicopter operations may include:

- Hoist-based rescue operations
- Patient extraction from remote or inaccessible locations
- Short-haul operations (where approved and coordinated)
- Ground support operations for aviation assets

These incidents require strict adherence to aviation safety practices and coordination with aircrew.

Core Operational Capabilities

1. Hazard Identification and Risk Management

- Rotor wash and debris hazards
- Noise and communication limitations
- Aircraft movement and clearance zones
- Environmental factors (wind, visibility, terrain)

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2. Landing Zone (LZ) Operations

- Selection and preparation of landing zones
- Establishment of safety perimeters
- Communication with pilot/crew
- Crowd and scene control

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3. Coordination with Aircrew

- Understanding roles and responsibilities
- Clear communication and signaling
- Following direction of pilot/crew at all times

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4. Rescue Operations

- Supporting hoist operations
- Managing tag lines and patient movement
- Assisting with rescuer/victim transitions

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5. Patient Packaging and Movement

- Packaging appropriate for aerial transport
- Securing patient for hoist or flight
- Maintaining patient stability during movement

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6. Ground Support Operations

- Assisting with aircraft approach/departure
- Managing equipment and personnel on scene
- Supporting extended or repeated operations

JPR Alignment (NFPA 1006)

Helicopter operations are supported through the following JPRs:

Primary:

- **5.3.1–5.3.4** – High-angle rescue, pickoff, litter operations

Supporting:

- **5.2.x** – Rope systems and operations
- Patient packaging JPRs (rope/confined integration)

Training and Implementation

Helicopter-related capabilities are developed through:

- Rope technician training (September)
- Application scenarios (May and integrated drills)

- Coordination exercises with aviation partners (e.g., hoist training)

Training emphasizes:

- Safety and hazard awareness
- Clear communication with aircrew
- Controlled, deliberate operations

Operational Expectations

Personnel operating around helicopters are expected to:

- Follow all aviation safety protocols
- Maintain situational awareness at all times
- Communicate clearly and concisely
- Operate only within trained and authorized capabilities

Helicopter operations require strict discipline, coordination, and adherence to safety procedures.