# Pennsylvania State Fire Academy

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# Minimum Standard for Accreditation (MSA)

June 1996

**Course Title:** Structural Collapse Operations - Level II (SCOF)

**Length of Course:** 16-Hours **Lecture/Lab Breakdown:** 3.75/12

**Prerequisites:** Confined Space Rescue (CSR) or Building Construction: Non-Combustible & Fire Resistive (BCN) or Building Construction: Wood and Ordinary (BCP) AND Structural Collapse Operations I (SCOA).

**Referenced Texts:** Rescue System l; Rescue 1993; Virginia Beach, VA; Fire Engineering Magazine, Collapse Rescue Series, John O'Connel, Harrisburg, PA; NFPA 1470; Harrisburg Bureau of Fire, Rescue 1, Standard Operating Procedures for Structural Collapse.

Federal Emergency Management Agency: *Urban Search and Rescue Response System, Operational System/Description and Mission Operational Procedures; *Urban Search and Rescue Response System, Rescue Specialist; Training Course, Volumes I, & II.

**Course Goal:** This course is designed to teach students the skills necessary to perform at the operational level at structural collapse incidents involving light frame and heavy wall structures.

**Description of Course:** This course gives fire department and rescue personnel the knowledge and skills · necessary to operate effectively at incidents involving the collapse of light frame and heavy wall structures. Students are given extensive hands on instruction in structure assessment, emergency shoring and stabilization, breaching building materials and patient packaging and extrication.

**Description of Methodology to be used: (Brief)** Lecture, with extensive hands on; demonstrated instruction.

**Student Equipment/Supply Needs:** Head, hand, eye, ear, foot protection and coveralls.

**Equipment/Audiovisual/Supply requirements:** Overhead projector, slide projector, viewing screen, chalkboard and copies of handouts for students, as well as the following: **Note:** All handout materials will remain in student's possession at conclusion of class.

**continued**

**Equipment Supply requirements:**

| QUANTITY | ITEM | QUANTITY | ITEM |
|---|---|---|---|
| 17 | 4x4x12 boards | 4 | 25'tape measures |
| 4 | 4x4x8 boards | 4 | tool pouches |
| 6 | 2x6x12 boards | 4 | framing hammers |
| 8 | 2x4x12 boards | 2 | speed squares |
| 1 | 4x8x3/4 plywood | 2 | framing squares |
| 25 lbs. | 16d duplex nails | 2 | 4'levels |
| 25 lbs. | 8d duplex nails | 2 | crow bars |
| 2 | circular saws | 1 | sawzall |
| 2 | electric chain saws | 4 | 100' extension cords |
| 1 | 4500K generator | 1 | 14" rotary saw with carbide tip blade |
| 1 | box carpenter pencil | 1 | Shovel |
| 2 | hydraulic jacks | 2 | Ellis clamps with ratchet |
| 1 | air bag system | 2 | screw jacks |
| 1 | airshore | 2 | long pry bars |
| 1 | hammer drill | 1 | SKED |
| | anchor bolts, rebar | 1 | Stokes |
| | utility rope | 1 | short board (LSP, KED) |

Maximum class size: 20-24 students; Minimal staffing for all offerings: 3 accredited instructors who will be employed the entire time on either delivery or equipment set up.

**COURSE OUTLINE**
**(General - Not Detailed)**

| Time | Content | Instructor Notes |
|---|---|---|
| :05 | I. Introduction | |
| :05 | II. Structure Review | OH |
| | BUILDING HAZARDS | |
| :10 | I. Six sided Survey | OH/Discuss |
| :05 | II. Light Frame | OH |
| :15 | III. Heavy Wall URM/TU | OH |
| :10 | IV. Monitoring Stability | Chalkboard |
| | SHORING | |
| :05 | I. Double Funnel Principal | OH |
| | II. Qualities | OH |
| | SHORING CONSIDERATIONS | |
| :10 | I. General | OH |
| :10 | II. Light Frame | OH |
| :10 | III. URM | OH |
| :10 | IV. Weight Estimates | OH |

**continued**

**COURSE OUTLINE continued**
**(General - Not Detailed)**

| Time | Content | Instructor Notes |
|---|---|---|
| :45 | SHORING SYSTEMS | |
| | I. Vertical Shore | OH/Slides |
| | II. Horizontal Shore | |
| | III. Window and Door Shores | |
| | IV. Raker Shores | |
| | V. Cribbing | |
| | Vl. Tiebacks | |
| | Vll. Interior Shores/Manufactured Shores | |
| :20 | BREACHING OPERATIONS | |
| | I. Light Frame/Heavy Wall | Chalkboard |
| | II. Lifting | |
| | III. Patient Treatment/Packaging | Discuss |
| :10 | SAFETY | |
| | I. Debris Removal | Discuss |
| | II. Secondary Collapse | |
| | III. Safety Officer | |
| :05 | TOOLS&EQUIPMENT | Slides |
| :05 | LOGISTICS | |
| | I. Tool and Equipment Cache Management | Discuss |
| :20 | II. Teams | OH |
| | A. Shore Assembly Team | |
| | B. Cutting Team | |
| | C. Search and Rescue Team | |
| Lunch | | |

**HANDS ON INSTRUCTIONAL SESSION**

*Break class into four squads *2 for small class

Station 1 Lifting and Cribbing
Station 2 Breaching and Void Expansion
Station 3 Cutting Station Station4 Patient Packaging Instructors should rotate their squad to the next station after 45 min. to 1 hr.

**END FIRST DAY SESSION-**

**SECOND DAY**
**HANDS ON INSTRUCTIONAL SESSION**

Station 1 Temporary, Door and Window Shores
Station 2 Raker Shores
Station 3 Horizontal Shores, Tiebacks
Station 4 Vertical Shores, Diagonal Braces

Instructors should rotate their squads to the next station after 1 to 1.25 hrs. **continued**

**PRACTICAL EVOLUTION**
**3.5 TO 4 HOURS**

**PREPARATION:**

1. With crayon or paint, mark areas of instability on the structure, such as; broken jousts and headers, walls out of plumb, etc.
2. Acquire a sufficient amount of debris such as discarded building materials, pallets, and furniture. Select a room or area remote from the point of entry to the structure, place a dummy, and pile debris to simulate a victim buried in rubble. A false wall, or panel built of common light frame materials should be placed at the point of entry to the room or area to necessitate a breaching operation. A single large or heavy item should be placed directly on top of the victim to necessitate an air bag operation.
3. Have all necessary tools and equipment placed in a staging area, i.e.; on a tarp.

EVOLUTION:

1. Select Rescue, and Shoring sector officers from the class.
2. Have students perform a structure assessment, and mark the structure accordingly.
3. Have student develop an operational plan, and institute it.
4. Have students delegate responsibility, and assign teams as necessary.
5. Have students perform all operations, such as shoring, breaching, lifting, and packaging, in a real incident, real time manner.

INSTRUCTORS:

1. Dedicate one instructor to be "real world" incident safety officer.
2. Other instructors to facilitate the process, filling out the evolution checklist to ensure operations are carried out in a satisfactory manner.
3. All instructors and students to hold a post incident critique.

**Competency Evaluation Mechanism (Brief description-attach copy):** Skill check off sheets, and practical evaluation.

**Course Objectives (specific):** Upon completion the student should be able to:

A. describe the six sided survey.
B. state the principal weakness of light frame and heavy wall URM structures.
C. state 3 methods to monitor a structures stability.
D. state the two main objectives of a shoring system. B. state at least three areas where shoring placement should be considered. C. calculate the estimated weight of a given rubble pile.

**continued**

**Course Objectives (specific):** Upon completion the student should be able to:

E. Upon completion the student should be able to when shown an overhead, state the name of the individual components of a given shoring system.
F. state the greatest safety concern when performing breaching of lifting operations. describe in laymans terms, crush injury syndrome.
G. state possible indicators of secondary collapse.
H. state the duties of a given team assignment.

## First Day Stations

STATION 1: Upon completion the student should be able to demonstrate lifting an object, using pneumatic rescue bags, consistent with principals of lifting and cribbing.

STATION 2: Upon completion the student should be able to demonstrate safe and effective use of powered hand tools while performing a simulated breaching operation.

STATION 3: Upon completion the student should be able to demonstrate safe and effective use of powered hand tools while operating the cutting stating.

STATION 4: Upon completion the student should be able to:
A. demonstrate the needle and thread, and 3 web tie in on a stokes basket.
B. demonstrate proper packaging methods, per the manufacturers instructions, for the LSD and SKED or similar device.

## SECOND DAY

STATION 1: Upon completion the student should be able to demonstrate the proper construction and placement of manufactured, and door and window shores.

STATION 2: Upon completion the student should be able to demonstrate the proper construction and placement of the flying, solid sole, and split sole raker shores.

STATION 3: Upon completion the student should be able to demonstrate the proper construction and placement of the horizontal shore, and the tieback system.

STATION 4: Upon completion the student should be able to demonstrate the proper construction and placement of the vertical shore, and diagonal brace.

**Questions/Comments: Contact: Rita Wessel, Curriculum Specialist: Extension 106**
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