



PENNSYLVANIA STATE FIRE ACADEMY TRENCH RESCUE TECHNICIAN SKILL STATIONS

****Attention:** All certification candidates are required to have an established and up to date user portal account in the PA State Fire Academy 's Acadis Learning Management System prior to participating in ANY certification testing opportunity. Please log in to your Acadis portal account and update all personal information before submitting your certification application. (Access can be gained through the OSFC website – Training and Certification Portal).

Skill Stations

NFPA 1006 Trench Rescue Technician – Chapter 12 (2021 Edition)

Station A	Trench Shoring: Intersecting & Lift (2 Evaluators)	Mandatory Station
Station B	Trench Shoring: Intersecting & Deep, IC (1 Evaluator)	Mandatory Station
Station C	Trench Shoring: Intersecting & Deep, SO (1 Evaluator)	Mandatory Station
Station D	Trench Shoring: Deep Trench (>8') (2 Evaluators)	Mandatory Station

All skills in the Trench Rescue Technician Level Skills Menu are Mandatory. All skills in the Trench Rescue Technician level **MUST** be passed with 100% of tasks being checked "YES" Any task checks "NO" in a skill station is a failure of that skill.

HOWEVER, skills A and B are broken into " SECTIONS. " Candidates who are unsuccessful at completing a section of skill A or B will only have to retest on the section that they failed.

Candidates who are unsuccessful at three or more sections in Skill Station A, "Trench Shoring: Intersecting" or two or more in Skill Station B, "Trench Shoring: Deep Trench (>8')," will have to retest the entire skill station.

AT NO TIME will a candidate, evaluator, participant, facility staff, etc., approach any edge where a fall of more than three (3) feet is possible without being attached to a fall protection system or a travel restraint system, unless they are attached to the main line and belay line or a twin tensioned system. Failure to follow these instructions will be an automatic failure of the station.

Minimum PPE for Trench Rescue Testing:

- Helmet/hardhat with chinstrap
- ANSI/ASTM eye protection
- Gloves
- Safety toed footwear



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Skills A, B, and C

Skills A, B, and C are all tested in association with each other. The rescue squad will be a group of eight to twelve individuals. All team members except for two will act as Rescue Specialists. One will act as the IC, and one will act as the ISO. The Rescue Specialists will be graded on Skill A, where the IC will be graded on Skill B, and the ISO will be graded on Skill C. Each candidate will act as either the IC or the ISO during a portion of the skill scenario. The rotation is detailed in the “Evaluator Note” directly below.

Evaluator NOTE: Teams will be made up of ten personnel. Each person MUST perform the duties of one of the Essential Job Positions (EJP) – Either the IC or the SO. At the start of the evolution, each team member will choose one card from a deck of cards. Candidates will be assigned their roles based on the card drawn. The evolution will be broken into five sections. (Section 1) Size-up & Hazard Control, (Section 2) Shoring Operations, (Section 3) Lifting an Object, (Section 4) Victim Removal, and (Section 5) Termination.

There will be a new draw of assignment cards at each section change. Those candidates who have acted as the IC and SO during any portion of the scenario will not be assigned as the IC or ISO for another rotation.

The card draws will occur at the following times:

Start of the evolution/Skill A Section 1 – “Size-Up & Hazard Control,” -- One card will say “Incident Commander,” one card will say “Safety Officer,” one card will say “Air Monitoring,” one card will say “Ventilation,” two cards will say “Spoil Pile,” and two cards will say “Ground Pads.”

Start of Section 2 – “Shoring Operations” – One card will say “Incident Commander,” one card will say “Safety Officer,” two cards will say “Shoring Entry Team,” two cards will say “Panel Set Team,” and two cards will say “Logistics.”

Start of Section 3 – “Lifting an Object” – Each member of the team will draw cards. One card will say “Incident Commander,” one card will say “Safety Officer,” two will say “Entry Team” – these candidates will enter the trench and prepare the object for lifting, and four cards will say “Rigging Team.”

Start of Section 4 – “Victim Package & Removal” --. Again, each member of the team will draw cards. One card will say “Incident Commander,” one card will say “Safety Officer,” two will say “Victim Package & Removal” – these candidates will enter the trench and package the patient, and four cards will say “Rigging Team.” This card draws and assignments will be for the rest of the scenario to include Section 4 – “Incident Termination.”

Start of Section 5 – “Termination” – Cards will be drawn, The final two candidates that have not acted as the Incident Commander or the Safety Officer will draw cards. Only these two will draw, and the cards will have either "Incident Commander," or "Safety Officer" on them. These candidates will conduct the Incident termination and debriefing.



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

STATION A – Trench Shoring: Intersecting & Lift		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8, 12.3.9, 12.3.10, 12.3.11	
Test Site	Test Date	Candidate #	Check the Test Type ____Initial ____Retest

Evaluator Note: Station scenario will require the candidates to shore an intersecting trench and to lift an object to free and remove a victim from an intersecting trench <8’.

All skills in the Trench Rescue Technician Level Skills Menu are Mandatory. All skills in the Trench Rescue Technician level MUST be passed with 100% of tasks being checked "YES" Any task checks "NO" in a skill station is a failure of that skill.

HOWEVER, Skill Station A is broken into " SECTIONS. " Candidates who are unsuccessful at completing a section of Skill Station A will only have to retest on the section that they failed. Candidates who are unsuccessful at three or more sections in Skill Station A, will have to retest the entire skill station.

Directions: Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, lifting equipment, heavy equipment with an operator, trench panels, whaler system, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, support the release of a single victim from a component entrapment, will lift an object off of an entrapped victim, coordinate the use of heavy equipment as needed, release a single victim from trench component entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit a tactical worksheet or ICS forms so that the operation is safe and effectively facilitated a victim rescue from an intersecting trench.

- *See above rotation comments for skills rotations for Skills A, B, and C*

Performance Outcome: Pass / Fail is determined by ALL tasks correctly performed.

No.	Tasks	Yes	No
Section 1: Size-up & Hazard Control			
1	Identifies and controls the hazards and exposures that threaten the safety of the victim(s) and responders; establishes works zones		
2	Performs atmospheric monitoring continuously around and within the trench; initiates proper ventilation within the trench		
3	Positions ground pads around the trench; marks trip, fall, and collapse hazards		
4	Calculates “total L” force; controls and moves spoil piles as required		
5	Dons required PPE and respiratory equipment (if needed) prior to entry		
6	Completes operation in a safe and controlled manner		
Section 2: Shoring Operations			
7	Establishes required workstations and staging areas		

Continued on Next Page



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Continued from Previous Page

STATION A – Trench Shoring: Intersecting & Lift (Page 2)		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8, 12.3.9, 12.3.10, 12.3.11	
Test Site	Test Date	Candidate #	Check the Test Type _____ Initial _____ Retest
8	Places and secures trench panels, struts, supplemental sheeting, spot shoring, and walers within the trench		
9	Strut and inside wale spacing is appropriate for trench depth		
10	Rescuers stayed within the safe areas/zones during shoring operation (one (1) per panel set)		
11	Provides a minimum of two (2) ingress/egress points		
12	Completes operation in a safe and controlled manner		
Section 3: Lifting an Object			
13	Enters the trench, assesses the entrapped victim, and reports condition and mechanism of injuries to IC		
14	Selects and positions rescue equipment for lifting the object while recognizing hazards; utilizing radio and/or hand signals; assessing operator skill/demeanor		
15	Prevents object from falling or shifting during lifting and release operation		
16	Coordinate an object lift enough to free the victim		
17	Provides resources to the rescue team to support victim removal		
18	Completes operation in a safe and controlled manner		
Section 4: Victim Removal			
19	Locates victim; communicates victim location to IC		
20	Removes soil carefully and cautiously from the victim, while treating for signs of compartment syndrome		
21	Briefs rescue team and implements rescue plan		
22	Provides resources to the rescue team to support victim removal		
23	Completes operation in a safe and controlled manner		
Section 5: Termination			
24	Safely completes incident termination and participates in debriefing; confirms PAR		
Please indicate skill outcome		PASS	FAIL

Evaluator Comments: _____

Evaluator Signature: _____ **Evaluator #** _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

STATION B – Intersecting Trench or Deep Trench Shoring, Incident Commander		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8	
Test Site	Test Date	Candidate #	Check the Test Type _____ Initial _____ Retest

Evaluator Note: Skill B is conducted in association with Skills A and C. The rescue squad will be a group of eight to twelve individuals. All team members except for two will act as Rescue Specialists. One will act as the IC, and one will act as the ISO. The Rescue Specialists will be graded on Skill A, where the IC will be graded on Skill B, and the ISO will be graded on Skill C. Each candidate will act as either the IC or the ISO during a portion of the skill scenario.

All skills in the Trench Rescue Technician Level Skills Menu are Mandatory. All skills in the Trench Rescue Technician level MUST be passed with 100% of tasks being checked "YES" Any task checks "NO" in a skill station is a failure of that skill.

Directions for Intersecting Trench: Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, lifting equipment, heavy equipment with an operator, trench panels, whaler system, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, support the release of a single victim from a component entrapment, will lift an object off of an entrapped victim, coordinate the use of heavy equipment as needed, release a single victim from trench component entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit a tactical worksheet or ICS forms so that the operation is safe and effectively facilitated a victim rescue from an intersecting trench.

OR

Direction for Deep Trench <8': Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, whalers, trench panels, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, release a single victim from soil entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit on scene a tactical worksheet or ICS forms so that a victim is assessed, packaged, and safely removed from a non-intersecting trench (>8').

Performance Outcome: Pass / Fail is determined by **ALL** correctly performed.

No.	Tasks	Yes	No
1	Gathers relevant information from on-scene competent person		
2	Identifies the number of victims, victim condition, and victim location(s)		
3	Establishes required workstations and staging areas within the proper work zone		
4	Identifies mechanism of entrapment		
5	Develop shoring plan		
6	Ensures that shoring system is in place and secure prior to entry		
7	Ensures that atmospheric monitoring around and inside the trench area is on-going; ensures ventilation is in place		
8	Selects and utilizes PPE and respiratory protection as required		
9	Conducts briefing prior to initiating rescue plan; Briefs rescue team; implements a rescue plan		

Continued on Next Page



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Continued from Previous Page

STATION B – Intersecting Trench or Deep Trench Shoring, Incident Commander (Page 2)		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8	
Test Site	Test Date	Candidate #	Check the Test Type _____Initial _____Retest
10	Completes the tactical worksheet or ICS forms		
11	Completes an incident size-up		
12	Conducts incident briefing; identifies hazards; communicates shoring plan		
13	Calculates “total L” force; controls and has the spoil pile(s) moved as required		
14	Identifies and controls the hazards and exposures that threaten the safety of the victim(s) and responders; establishes works zones		
15	Provides resources to the rescue team to support operations		
16	Terminates incident; conducts debriefing; confirms PAR		
17	Completes operation in a safe and controlled manner		
Please indicate skill outcome			PASS FAIL

Evaluator Comments: _____

Evaluator Signature: _____ **Evaluator #** _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

STATION C – Intersecting Trench or Deep Trench Shoring, Safety Officer		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8, 12.3.9, 12.3.10, 12.3.11	
Test Site	Test Date	Candidate #	Check the Test Type _____Initial _____Retest

Evaluator Note: Skill C is conducted in association with Skills A and B. The rescue squad will be a group of eight to twelve individuals. All team members except for two will act as Rescue Specialists. One will act as the IC, and one will act as the ISO. The Rescue Specialists will be graded on Skill A, where the IC will be graded on Skill B, and the ISO will be graded on Skill C. Each candidate will act as either the IC or the ISO during a portion of the skill scenario.

Directions for Intersecting Trench: Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, lifting equipment, heavy equipment with an operator, trench panels, whaler system, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, support the release of a single victim from a component entrapment, will lift an object off of an entrapped victim, coordinate the use of heavy equipment as needed, release a single victim from trench component entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit a tactical worksheet or ICS forms so that the operation is safe and effectively facilitated a victim rescue from an intersecting trench.

OR

Direction for Deep Trench <8': Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, whalers, trench panels, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, release a single victim from soil entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit on scene a tactical worksheet or ICS forms so that a victim is assessed, packaged, and safely removed from a non-intersecting trench (>8').

Performance Outcome: Pass / Fail is determined by ALL correctly performed.

No.	Tasks	Yes	No
1	Identifies and documents the hazards and exposures that threaten the safety of the victim(s) and responders; establishes works zones		
2	Develops and implements site safety plan as part of Incident Command Staff, utilizing all worksheet or ICS forms, tabulated data, and other resources.		
3	Receives and documents atmospheric monitoring conditions continuously around and within the trench; initiates proper ventilation within the trench		
4	Develop plans for pending changes to the scene caused by weather or daylight		
5	Provide safety briefing to entire team		
6	In conjunction with IC, Calculates “total L” force; controls and directs movement of spoil piles as required		

Continued Next Page



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Continued from Previous Page

STATION C – Intersecting Trench or Deep Trench Shoring, Safety Officer (Page 2)		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.1, 12.3.2, 12.3.3, 12.3.4, 12.3.5, 12.3.6, 12.3.7, 12.3.8, 12.3.9, 12.3.10, 12.3.11	
Test Site	Test Date	Candidate #	Check the Test Type _____ Initial _____ Retest
7	Identifies required PPE and respiratory equipment (if needed) for all personnel		
8	Monitors or assigns monitors for ingress and egress, and keeps PAR of personnel		
9	Monitors, makes corrections or ALL STOPS, all aspects of safety, including support operations, such as Ventilation, Dewatering, Cut Station, Lifting, Lowering, EMS and any Specialized Equipment Operations,		
10	Monitor patient condition, with consideration to elapsed time since event and compartment syndrome related to crush injury		
11	Terminates incident; conducts debriefing; confirms PAR		
12	Completes operation in a safe and controlled manner		
Please indicate skill outcome			PASS FAIL

Evaluator Comments: _____

Evaluator Signature: _____ **Evaluator #** _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

STATION D – Deep Trench Shoring (>8')		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.3, 12.3.4, 12.3.6, 12.3.7, 12.3.8	
Test Site	Test Date	Candidate #	Check the Test Type ____ Initial ____ Retest

Evaluator Note: Station scenario will require the candidates to develop and implement a plan to shore a trench greater than eight (8) feet in depth.

All skills in the Trench Rescue Technician Level Skills Menu are Mandatory. All skills in the Trench Rescue Technician level MUST be passed with 100% of tasks being checked "YES" Any task checks "NO" in a skill station is a failure of that skill.

HOWEVER, Skill Station D is broken into " SECTIONS. " Candidates who are unsuccessful at completing a section of Skill Station D will only have to retest on the section that they failed. Candidates who are unsuccessful at two or more in Skill Station D, "Trench Shoring: Deep Trench (>8')," will have to retest the entire skill station.

Directions: Given trench rescue equipment, atmospheric monitoring equipment, PPE, ladders, ground pads, supplemental sheeting, spot shoring, struts, walers, trench panels, a spinal immobilization device, and patient transfer device/litter, the candidates, working as a team, will manage identified hazards, develop and implement a shoring plan, release a single victim from soil entrapment, remove a single victim from a shored and secure trench, and terminate the rescue incident, complete and submit on scene a tactical worksheet or ICS forms so that a victim is assessed, packaged, and safely removed from a non-intersecting trench (>8').

- *Candidates who did not act as either the Incident Commander or as the Incident Safety Officer while testing Trench Rescue Technician, Skill Station A, they will act in the capacity as one of these positions for this skill station*
- *Candidates will draw cards for position assignments. Positions for Skill D are*
 - *Incident Commander*
 - *Safety Officer*
 - *Rescue Team Member*
- *Team members will remain in their assigned positions for the entire scenario.*

Performance Outcome: Pass / Fail is determined by ALL tasks correctly performed.

No.	Tasks	Yes	No
Section 1: Hazard Control			
1	Completes incident size-up		
2	Identifies and controls the hazards and exposures that threaten the safety of the victim(s) and responders; establishes works zones		
3	Performs atmospheric monitoring continuously around and within the trench; initiates proper ventilation within the trench		
4	Positions ground pads around the trench; marks trip, fall, and collapse hazards		
5	Calculates "total L" force; controls and moves spoil piles as required		
6	Completes operation in a safe and controlled manner		
Section 2: Shoring Operations			
7	Establishes required workstations and staging areas		

Continued on Next Page



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Continued from Previous Page

STATION D – Deep Trench Shoring (>8') (Page 2)		Reference NFPA 1006 (2021 Edition), Chapter 12 Mandatory Station: JPRs 12.3.3, 12.3.4, 12.3.6, 12.3.7, 12.3.8			
Test Site	Test Date	Candidate #	Check the Test Type _____ Initial _____ Retest		
8	Places and secures trench panels, supplemental sheeting and or spot shoring within the trench, to support >8' depth				
9	Strut and wale size, spacing, and positioning is appropriate for trench depth and width				
10	Rescuers stayed within the safe areas/zones during shoring operation (one (1) per panel set)				
11	Provides a minimum of two (2) ingress/egress points				
12	Shoring operation supports a victim rescue from a deep trench >8' depth				
13	Completes operation in a safe and controlled manner				
Please indicate skill outcome			<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 5px;">PASS</td> <td style="padding: 5px;">FAIL</td> </tr> </table>	PASS	FAIL
PASS	FAIL				

Evaluator Comments: _____

Evaluator Signature: _____ **Evaluator #** _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Trench Rescue Tactical Worksheet

Page 1 of 2

INITIAL ON-SCENE OPERATIONS

APPROACH FROM HEAD OF TRENCH ☐ Ladders ☐ Edge Protection ☐ Clear Spoil (2' Back) ☐ Assign Safety Officer
Date _____ Start Time _____ Incident # _____
Number of Victims _____ Time Last Seen _____ Shut Down All Equipment/Evaluate Workers _____
Purpose of Trench _____ Depth of Trench _____
Site Location _____
Victim Location _____ Victim Marking _____ Victim Protection _____ Victim Condition _____

TRENCH HAZARDS

☐ Spoil-In ☐ Shear-In ☐ Slough-In ☐ Lip-In ☐ Shoring Failure ☐ Other _____
☐ Water ☐ Vibration ☐ Soil Conditions ☐ Hazmat ☐ Utilities ☐ USA Markings
☐ Atmospheric Monitoring: % O₂ _____ % LEL _____ CO _____ H₂S _____

PRE-ENTRY OPERATIONS

☐ Pre-Entry Briefing ☐ Fall Protection ☐ PPE ☐ Clear Spoil ☐ LOTO
Edge Protection: ☐ Planks (2" x 12") ☐ Plywood ☐ OSB ☐ Other _____
☐ Ladders ☐ Monitoring ☐ Ventilation ☐ Lighting ☐ Bridges ☐ Perimeter

PROTECTIVE SYSTEMS

☐ Trench Data Worksheets ☐ Panels ☐ Struts ☐ Walers ☐ Hogsheads ☐ Supplemental Sheeting and Shoring ☐ 2-4-2
Shoring Type: ☐ Timber ☐ Pipe/Post Screw ☐ Pneumatic ☐ Hydraulic ☐ Box/Shield

VICTIM RESCUE AND RECOVERY

Soil Removal: ☐ Shovels ☐ Buckets ☐ Air Knife ☐ Vacuum Truck ☐ Other _____
Victim Packaging: ☐ Backboard ☐ Rescue Litter ☐ LSP Half-Back ☐ Spec Pak ☐ Wristlets ☐ SKED ☐ Victim Harness
☐ Hasty Chest Harness ☐ Other _____
Victim Extrication: ☐ Ladder Slide ☐ Moving Ladder Slide ☐ High Point Anchor

SCENE MANAGEMENT

Incident Commander _____
Operations _____
Rescue Group Supervisor _____
Site Safety Officer _____
Cutting Station _____
Rescue Squad 1 Leader _____ Rescue Squad 2 Leader _____
Rescue Squad 3 Leader _____ Rescue Squad 4 Leader _____
Logistics _____
Medical Group _____
Industry or Contractor's Name _____
Company Address _____ City/State _____
Phone _____ Reporting Party/Contact Person _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Trench Rescue Tactical Worksheet

Page 2 of 2

INCIDENT TERMINATION

☐ Personnel Accountability ☐ Equipment Removed ☐ Scene Secured ☐ Debriefing ☐ OSHA Contacted
Time _____ Date _____ Rescue Group Supervisor Signature _____

MONITOR LOG

TIME	LEVEL	%O ₂	%LEL	CO	H ₂ S

Monitoring Officer _____

SCENE DIAGRAM/NOTES

Rescue Group Supervisor Signature: _____

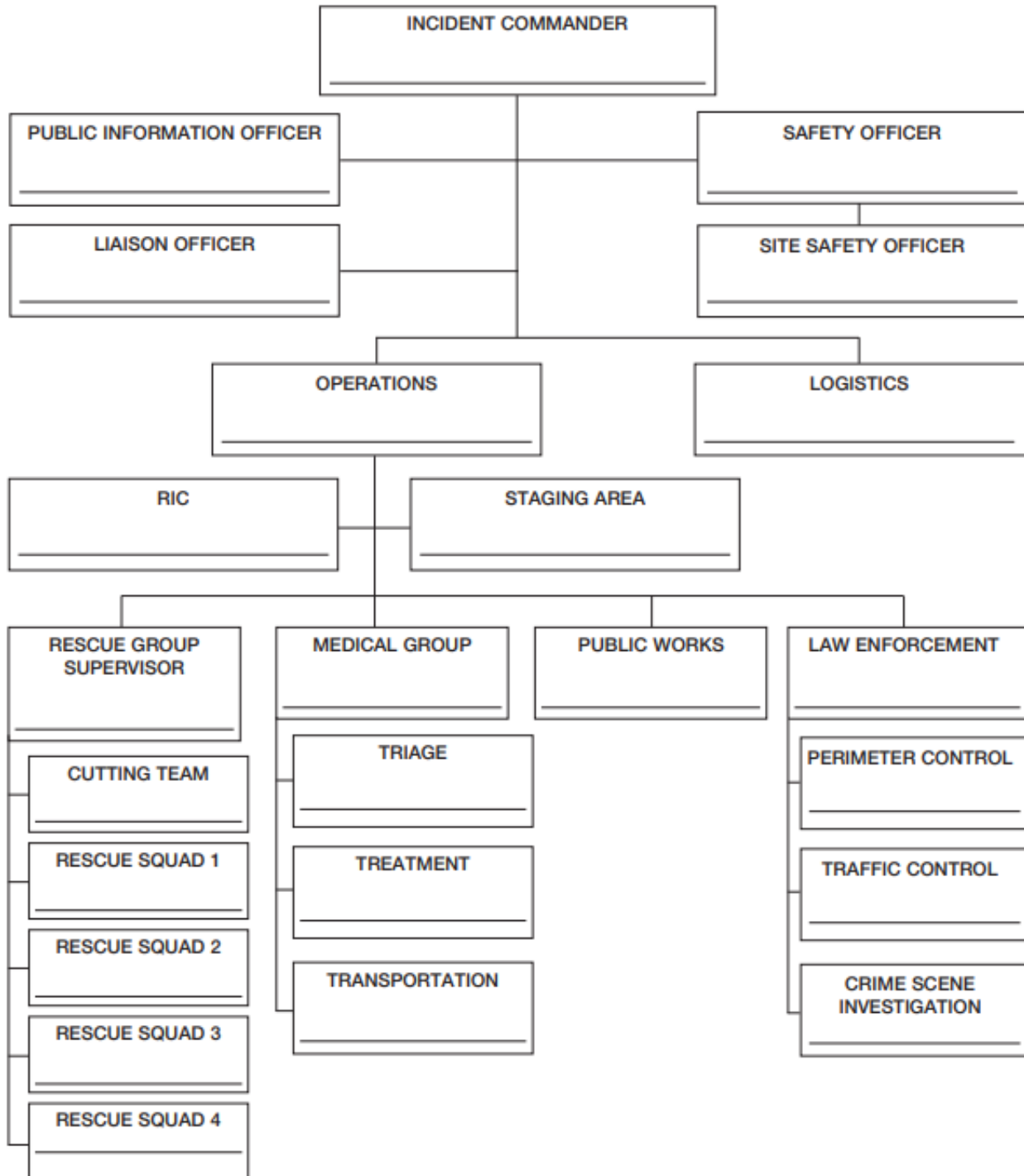


PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Incident Command Organizational Chart

INCIDENT: _____ DATE: _____ LOCATION: _____





PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Trench Scenario Critique Worksheet

Type of trench _____

Rescue group supervisor _____

RESPONSIBLE PARTY:

What type of work? _____

What happened? _____

How many workers? _____

How long buried? _____

Where buried? _____

How deep? _____

Hazards? _____

Resources at site? _____

☐ Size-up: ☐ Approach:
six sided Trench End/Head

☐ Trench/Soil Conditions

PRE-ENTRY OPERATIONS:

- ☐ Pre-entry briefing
- ☐ Monitor
- ☐ Ventilation
- ☐ Mark/protect victim
- ☐ Mark/secure Hazards
- ☐ Ladders: time _____
- ☐ Clear spoil: time _____
- ☐ Edge protection: time _____
- ☐ Assign safety officer: time _____

TRENCH OPERATIONS:

- ☐ Assign rescue squads
- ☐ Shoring system plan:
 - ☐ Placement
 - ☐ All squads notified
 - ☐ Good teamwork
- ☐ Arriving Units:
 - ☐ Hazard communication
 - ☐ Assignments
- ☐ Logistics:
 - ☐ Resources
 - ☐ Cutting station

SHORING SYSTEM CONSTRUCTION:

- ☐ Standard systems: 2-4-2
- ☐ Waler systems
- ☐ End shore systems
- ☐ Supplemental sheeting/shoring
- ☐ Positive connections/nailing
- ☐ Backfill:
 - ☐ Wedges/cribbing ☐ Air cushions
 - ☐ Sandbags ☐ Salvage cover/spoil

VICTIM RECOVERY:

- ☐ Soil removal
- ☐ Victim packaging
- ☐ Victim extrication
- ☐ Victim #1: time out _____
- ☐ Victim #2: time out _____
- Time completed _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

INCIDENT BRIEFING (ICS 201)

1. Incident Name:	2. Incident Number:	3. Date/Time Initiated: Date: _____ Time: _____
9. Current Organization (fill in additional organization as appropriate):		
Incident Commander(s) Liaison Officer Safety Officer Public Information Officer Operations Section Chief Planning Section Chief Logistics Section Chief Finance/Admin Section Chief		
6. Prepared by: Name: _____ Position/Title: _____ Signature: _____		
ICS 201, Page 3		Date/Time: _____



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

ICS 201 Incident Briefing

Purpose. The Incident Briefing (ICS 201) provides the Incident Commander (and the Command and General Staffs) with basic information regarding the incident situation and the resources allocated to the incident. In addition to a briefing document, the ICS 201 also serves as an initial action worksheet. It serves as a permanent record of the initial response to the incident.

Preparation. The briefing form is prepared by the Incident Commander for presentation to the incoming Incident Commander along with a more detailed oral briefing.

Distribution. Ideally, the ICS 201 is duplicated and distributed before the initial briefing of the Command and General Staffs or other responders as appropriate. The "Map/Sketch" and "Current and Planned Actions, Strategies, and Tactics" sections (pages 1–2) of the briefing form are given to the Situation Unit, while the "Current Organization" and "Resource Summary" sections (pages 3–4) are given to the Resources Unit.

Notes:

- The ICS 201 can serve as part of the initial Incident Action Plan (IAP).
- If additional pages are needed for any form page, use a blank ICS 201 and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Incident Number	Enter the number assigned to the incident.
3	Date/Time Initiated • Date, Time	Enter date initiated (month/day/year) and time initiated (using the 24-hour clock).
4	Map/Sketch (include sketch, showing the total area of operations, the incident site/area, impacted and threatened areas, overflight results, trajectories, impacted shorelines, or other graphics depicting situational status and resource assignment)	Show perimeter and other graphics depicting situational status, resource assignments, incident facilities, and other special information on a map/sketch or with attached maps. Utilize commonly accepted ICS map symbology. If specific geospatial reference points are needed about the incident's location or area outside the ICS organization at the incident, that information should be submitted on the Incident Status Summary (ICS 209). North should be at the top of page unless noted otherwise.
5	Situation Summary and Health and Safety Briefing (for briefings or transfer of command): Recognize potential incident Health and Safety Hazards and develop necessary measures (remove hazard, provide personal protective equipment, warn people of the hazard) to protect responders from those hazards.	Self-explanatory.
6	Prepared by • Name • Position/Title • Signature • Date/Time	Enter the name, ICS position/title, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).
7	Current and Planned Objectives	Enter the objectives used on the incident and note any specific problem areas.



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Block Number	Block Title	Instructions
8	Current and Planned Actions, Strategies, and Tactics • Time • Actions	Enter the current and planned actions, strategies, and tactics and time they may or did occur to attain the objectives. If additional pages are needed, use a blank sheet or another ICS 201 (Page 2), and adjust page numbers accordingly.
9	Current Organization (fill in additional organization as appropriate) • Incident Commander(s) • Liaison Officer • Safety Officer • Public Information Officer • Planning Section Chief • Operations Section Chief • Finance/Administration Section Chief • Logistics Section Chief	• Enter on the organization chart the names of the individuals assigned to each position. • Modify the chart as <u>necessary</u>, and add any lines/spaces needed for Command Staff Assistants, Agency Representatives, and the organization of each of the General Staff Sections. • If Unified Command is being used, split the Incident Commander box. • Indicate agency for each of the Incident Commanders listed if Unified Command is being used.
10	Resource Summary	Enter the following information about the resources allocated to the incident. If additional pages are needed, use a blank sheet or another ICS 201 (Page 4), and adjust page numbers accordingly.
	• Resource	Enter the number and appropriate category, kind, or type of resource ordered.
	• Resource Identifier	Enter the relevant agency designator and/or resource designator (if any).
	• Date/Time Ordered	Enter the date (month/day/year) and time (24-hour clock) the resource was ordered.
	• ETA	Enter the estimated time of arrival (ETA) to the incident (use 24-hour clock).
	• Arrived	Enter an "X" or a checkmark upon arrival to the incident.
	• Notes (location/assignment/status)	Enter notes such as the assigned location of the resource and/or the actual assignment and status.



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

ICS 208 Safety Message/Plan

Purpose. The Safety Message/Plan (ICS 208) expands on the Safety Message and Site Safety Plan.

Preparation. The ICS 208 is an optional form that may be included and completed by the Safety Officer for the Incident Action Plan (IAP).

Distribution. The ICS 208, if developed, will be reproduced with the IAP and given to all recipients as part of the IAP. All completed original forms must be given to the Documentation Unit.

Notes:

- The ICS 208 may serve (optionally) as part of the IAP.
- Use additional copies for continuation sheets as needed, and indicate pagination as used.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Operational Period • Date and Time From • Date and Time To	Enter the start date (month/day/year) and time (using the 24-hour clock) and end date and time for the operational period to which the form applies.
3	Safety Message/Expanded Safety Message, Safety Plan, Site Safety Plan	Enter clear, concise statements for safety message(s), priorities, and key command emphasis/decisions/directions. Enter information such as known safety hazards and specific precautions to be observed during this operational period. If needed, additional safety message(s) should be referenced and attached.
4	Site Safety Plan Required? Yes ☐ No ☐	Check whether or not a site safety plan is required for this incident.
	Approved Site Safety Plan(s) Located At	Enter where the approved Site Safety Plan(s) is located.
5	Prepared by • Name • Position/Title • Signature • Date/Time	Enter the name, ICS position, and signature of the person preparing the form. Enter date (month/day/year) and time prepared (24-hour clock).



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

ICS 215A Incident Action Plan Safety Analysis

Purpose. The purpose of the Incident Action Plan Safety Analysis (ICS 215A) is to aid the Safety Officer in completing an operational risk assessment to prioritize hazards, safety, and health issues, and to develop appropriate controls. This worksheet addresses communications challenges between planning and operations, and is best utilized in the planning phase and for Operations Section briefings.

Preparation. The ICS 215A is typically prepared by the Safety Officer during the incident action planning cycle. When the Operations Section Chief is preparing for the tactics meeting, the Safety Officer collaborates with the Operations Section Chief to complete the Incident Action Plan Safety Analysis. This worksheet is closely linked to the Operational Planning Worksheet (ICS 215). Incident areas or regions are listed along with associated hazards and risks. For those assignments involving risks and hazards, mitigations or controls should be developed to safeguard responders, and appropriate incident personnel should be briefed on the hazards, mitigations, and related measures. Use additional sheets as needed.

Distribution. When the safety analysis is completed, the form is distributed to the Resources Unit to help prepare the Operations Section briefing. All completed original forms must be given to the Documentation Unit.

Notes:

- This worksheet can be made into a wall mount, and can be part of the IAP.
- If additional pages are needed, use a blank ICS 215A and repaginate as needed.

Block Number	Block Title	Instructions
1	Incident Name	Enter the name assigned to the incident.
2	Incident Number	Enter the number assigned to the incident.
3	Date/Time Prepared	Enter date (month/day/year) and time (using the 24-hour clock) prepared.
4	Operational Period • Date and Time From • Date and Time To	Enter the start date (month/day/year) and time (24-hour clock) and end date and time for the operational period to which the form applies.
5	Incident Area	Enter the incident areas where personnel or resources are likely to encounter risks. This may be specified as a Branch, Division, or Group.
6	Hazards/Risks	List the types of hazards and/or risks likely to be encountered by personnel or resources at the incident area relevant to the work assignment.
7	Mitigations	List actions taken to reduce risk for each hazard indicated (e.g., specify personal protective equipment or use of a buddy system or escape routes).
8	Prepared by (Safety Officer and Operations Section Chief) • Name • Signature • Date/Time	Enter the name of both the Safety Officer and the Operations Section Chief, who should collaborate on form preparation. Enter date (month/day/year) and time (24-hour clock) reviewed.



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

SHORING NOTES

These shoring systems contained herein provide a minimum factor of safety of 2 to 1. These rescue shoring systems and charts are conditional upon the following soil and shoring system conditions:

1. Water level that is below the bottom of the trench
2. The bottom of the excavation is not "boiling"
3. The soil is not oversaturated and/or flowing
4. Surcharged loads (spoil piles and equipment) that are within the Simple L area must be added to the Total L in accordance with the Surcharge chart.
5. Tight sheeting selected from the shoring panel chart
6. Struts must be placed within 10 degrees of level and 10 degrees of perpendicular (horizontal) to the trench walls except when shoring angled walls.
7. Use swivel bases on both ends of Paratech struts secured with (2) 16d nails in each foot
8. Do not use for trench widths greater than indicated in the chart
9. 80% of panel in contact with trench wall and or backfill this does not apply to panels that utilize back shoring or buttresses
10. Do not place any vertical loads on struts or wales (do not hang items from them, stand on them, climb them or cross shore to them)
11. Horizontal shoring distances should exceed the depth of the trench.
12. This shoring chart is not designed for soil that will not stand up long enough to install shoring
13. Struts must be within 1 foot minimum and 2 feet maximum (below) the trench lip and within 1 foot minimum and 2 feet maximum (above) the trench floor.
14. Maximum vertical strut spacing is 4 feet.
15. Horizontal strut spacing is 4 feet.
16. After placement, warning signs to be aware of:
 - a. Cracking and popping of the wood panels after installation is a sign of increasing loads
 - b. The strong back will break before the panel breaks
 - c. If a strong back begins to break, evacuate the trench.
From outside of the trench add a strut at the break location and monitor the panels closely for signs of increasing load (increasing deflection) or instability
 - d. The interface between the strut feet and strong back must be monitored for excessive crushing of the wood
 - e. If the panel deflection exceeds 1" between struts
evacuate the trench and add an intermediate strut. Monitor panels to assure the deflection has stopped before reentering.
 - f. Monitor the lip of the trench for widening or growing cracks and fissures.



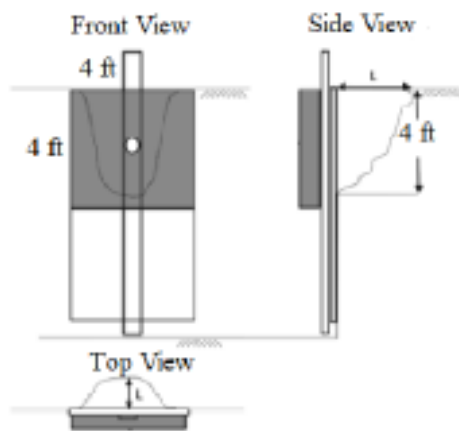
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TRENCH RESCUE TECHNICIAN SKILL STATIONS

ESTIMATING LATERAL SOIL FORCES

LATERAL FORCE- For rescue situations (trench collapse) with trench walls that can be shored with panels and struts an accurate estimation of the lateral force on the shoring by using the following (T-L) method.

ESTIMATING LATERAL EARTH PRESSURE: The maximum lateral force on a 4ft x 4ft section of a shoring panel is a function of the distance from the original (pre-collapse) face of trench to the back of the farthest failure or to the farthest tension crack. That distance, measured in feet, is called the Simple L.



Definitions

Simple L (SL): The distance (length) measured in feet from the original trench wall perpendicular to the furthest point of soil failure or signs of failure (cracks/fissures).

Surcharged L (ScL): Surcharged loads (spoil piles/equipment), that are within the area that is between the original trench faces and the furthest point of soil failure (SL). Measured in feet perpendicular to the trench wall.

Total L (L): The Simple L (SL) plus the Surcharge L (ScL) if one exists.



PENNSYLVANIA STATE FIRE ACADEMY TRENCH RESCUE TECHNICIAN SKILL STATIONS

A tape measure is used to find the distance (SL) from the original trench face (wall) to the farthest point of soil failure and to measure the amount of surcharge (ScL) within the affected area.

Common failures include:



Open Lip Failure



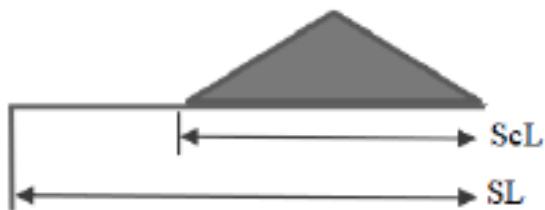
Closed Lip Failure



Fissure

SURCHARGE CALCULATIONS FOR EARTH PRESSURES

SURCHARGED LOADS- Surcharged loads at a trench site usually include the spoil pile and/or construction equipment and materials. Construction equipment and materials can include but are not limited to excavators, dump trucks, trench boxes, pipes, and gravel.



SPOIL PILE- Measure the amount of spoil (ScL) that is within the Simple L (SL). Round the measurement up to the next foot to determine the ScL.

EQUIPMENT- Measure the amount of equipment (ScL) that is within the simple L (SL). Round the measurement up to the next foot to determine the (ScL).



PENNSYLVANIA STATE FIRE ACADEMY TRENCH RESCUE TECHNICIAN SKILL STATIONS

SURCHARGE CHART

SURCHARGE (ScL)- Feet within Simple L (SL)				
SPOIL	Add to SL		EQUIP.	Add to SL
1	1		1	1
2	1		2	2
3	1		3	3
4	2		4	5
5	3		5	8
6	4		6	11
7	5		7	N/A
8	7		8	N/A
9	9		9	N/A
10	10		10	N/A

Note: Total L (L)=Simple L (SL) plus Surcharge L (ScL)
 Charts are valid for Total L of 20 or less

DEPTH CONVERSION CHART

DEPTH TO SIMPLE L (SL) CONVERSION GUIDE		
Trench Depth		SL Equivalent
4- 8 feet		SL- 6
9 feet		SL- 7
10 feet		SL- 7
11 feet		SL- 8
12 feet		SL- 9
13 feet		SL- 10
14 feet		SL- 10
15 feet		SL- 11
16 feet		SL- 12
17 feet		SL- 12
18 feet		SL- 13
19 feet		SL- 14
20 feet		SL- 14

Note: Total L (L)=Simple L (SL) plus Surcharge L (ScL)

In the unlikely event of a rescue in a trench that has not had a soil failure you need to measure the depth of the trench (measured in feet and rounded up) and use this chart to convert the depth to a Simple L.



PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

OPERATIONS LEVEL

TRENCH RESCUE SHORING SYSTEMS

NON-ENTRY SHORING

This shoring system may be used to provide stabilization of trench wall to depths of 8ft. Non-entry shoring at the Operations Level, includes panels, wales, and back-fill techniques. For straight run trenches deeper than 8 feet see (Deep Trench Shoring)

Rescue Shoring must provide:

- 1) Primary Shoring- rapidly protect the victim
- 2) Secondary Shoring- create a Safe Zone for rescuers

1) Primary Shoring

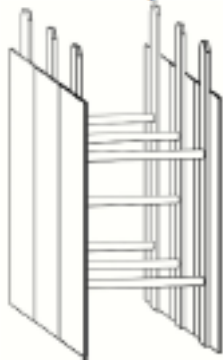


Positioning strut

Backfill strut

Compliance strut

2) Secondary Shoring



Panels and Struts



Panels, Struts and Wales



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TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

WALE with STRUT and PLYWOOD SYSTEM															
TABULATED DATA FOR TRENCH RESCUE SHORING (Note 1)															
OSHA TYPE C-60 (Note 3)															
Max Depth (ft)	Upright	Maximum Vertical Strut Spacing (ft)	Maximum Horizontal Strut Spacing and Trench Width (ft) (Note 2)									Sheeting			
			Strut Spacing (ft)			Allowable Trench Width (ft)			Strut Spacing (ft)				Allowable Trench Width (ft)		
			Wale Size		Strut	Wale Size		Strut	Wale Size		Strut				
			2 x 12	4x4	4x4	2x4+4x4	2-4x4	6x6	4x4	2x4+4x4	2-4x4				
6	2x12	4	5	6	8	9	11	10	5	6	8	3/4" CDX plywood			
8	2x12	4	4	5	7	9	10	10	5	6	7				
10	2x12	4	3	4	7	9	10	9	5	6	7				
12	2x12	4	3	4	7	8	9	8	5	6	7				
14	2x12	4	3	4	6	7	9	7	0	5	6				
16	2x12	4	3	4	6	7	8	7	0	5	6				
18	2x12	3	3	4	6	7	9	7	0	5	6				
20	2x12	3	3	4	6	7	8	7	0	5	6				
OSHA TYPE C-80 (Note 4)															
Max Depth (ft)	Upright	Maximum Vertical Strut Spacing (ft)	Maximum Horizontal Strut Spacing and Trench Width (ft) (Note 2)									Sheeting			
			Strut Spacing (ft)			Allowable Trench Width (ft)			Strut Spacing (ft)				Allowable Trench Width (ft)		
			Wale Size		Strut	Wale Size		Strut	Wale Size		Strut				
			2 x 12	4x4	4x4	2x4+4x4	2-4x4	6x6	4x4	2x4+4x4	2-4x4				
6	2x12	4	3	4	8	9	11	7	5	6	7	3/4" CDX plywood			
8	2x12	4	2.5	3	7	9	10	6	4	5	6				
10	2x12	4	2.5	3	7	9	10	6	4	5	6				
12	2x12	4	2	2.5	7	8	9	5	4	5	6				
14	2x12	4	2	2.5	6	7	9	5	0	4	5				
16	2x12	4	2	2.5	6	7	8	5	0	4	5				
18	2x12	3	2	2.5	6	7	9	5	0	5	5				
20	2x12	3	2	2.5	6	7	8	5	0	5	5				

highlighted green = standard "2-4-2" system

WALE with STRUT and PLYWOOD

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PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

WALE with STRUT and PLYWOOD SYSTEM						
TABULATED DATA FOR TRENCH RESCUE SHORING						
Wall Elevation						
2-4x4 strut						
2x4 + 4x4 strut						
Typical strut w/ Hoghead						
Section A						
Section B @ upright						
Framing Notes- 1) Use only 1 wedge set, do not stack them. 2) General rule for nailing strut connections-use two toe-nails (total 4 nails) on both sides of strut. 3) Struts may also be cut-to-fit and driven in without wedges, or Ellis post screw jacks may be used. 4) Struts may also be manufactured, see Note 11.						
Installation Notes 1) Uprights may be nailed to plywood before or after setting plywood into excavation. 2) Move spoil pile and obstructions a minimum of 2 ft from trench edge and place edge protection before installing shoring. 3) Place ladder within 25 ft of work. Ladder must be secure and accessible. 4) While working off a ladder and until top strut is secured, workers may only work within waist level to lip of trench and must be tied off. 5) Remove struts from bottom to top. If there is sheeting movement when bottom strut is removed, leave shoring in place and bury or remove with power equipment from outside the trench						
California State Fire Training 1131 S. Street Sacramento, Ca. 95811		CER, Inc. Construction Engineering Resource, Inc. 1837 Wright Street Santa Rosa, Ca. 95404 <table border="1"><tr><td>Job #1373-2</td><td>10/1/2013</td></tr><tr><td>Drawn by: JT</td><td>Sheet 2 of 3</td></tr></table>	Job #1373-2	10/1/2013	Drawn by: JT	Sheet 2 of 3
Job #1373-2	10/1/2013					
Drawn by: JT	Sheet 2 of 3					





PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

WALE with STRUT and PLYWOOD SYSTEM	
TABULATED DATA FOR TRENCH RESCUE SHORING	
Notes 1) This shoring system is in accordance with Cal OSHA Article 6, Section 1541.1(c)(3) Option 3-Designs Using Other Tabulated Data. This tabulation is for the purpose of protecting rescue personnel from cave-ins while rescuing victims of collapsed excavations and trenches, and training and for no other purpose. 2) In order to use these tabulations the soil must first be classified as Type C-60 or C-80. The soil loading configuration is rectangular. This means that the soil pressure at the top of the excavation is the same as at the ultimate depth of the excavation. Read all element size and spacing requirements from the line at the depth the final excavation is expected to be ("original trench depth"). 3) C-60 Soil includes all soil types that will stand long enough to install shoring and have a water level at or below the bottom of the excavation. 4) Type C-80 soil is soil that will not stand up long enough to install shoring. Generally shoring in C-80 soil has to be installed in short increments or driven into the soil as excavation is taking place. Prior to reaching 12 ft deep in marine clays such as San Francisco "Bay Mud", Gulf States Swamp Mud, etc" an engineer should be consulted. If there is any additional deflection or movement after elements are installed additional upright and strutting may be required. 5) Minimum shoring system length is 2 sets. The general rule for shoring system length is that it should be at least as long as the shoring system is deep. 6) This tabulation includes loading from a spoil pile set back 2 feet from edge of trench and no higher than 4 ft and foot traffic. All heavy equipment and vehicles to be set back at least the depth of the trench. 7) Wood members shall be minimum Douglas fir #2 and better, S4S. 8) Plywood shall be minimum 3/4" CD X. Decrease horizontal spacing, double up plywood or decrease upright spacing if deflection is occurring due to soil movement. 9) Install strutting from top to bottom. Nailing can be done in stages by first using enough nails to stabilize shoring and then following through to make sure that required nail quantity is achieved. 10) This shoring system may be used in conjunction with Upright with Strut and Plywood System, and Trench End Shore System. 11) Alternative manufactured strut systems such as screw jacks, pneumatic struts, and single/double cylinder hydraulic jacks may be substituted for timber struts installed in accordance with their tabulated data. 12) If plywood is 3/4" Finform it is OK to eliminate the 2x12 upright and use struts at the tabulated spacing nailed directly to the Finform. 13) Two 3/4" CDX plywood sheets may be used in lieu of one sheet of 3/4" CDX with a 2x12 upright. 14) Aluminum fire service ladders with 4x4 cribbing may be used as an upright or waler. (see CMC Trench Rescue Manual)	
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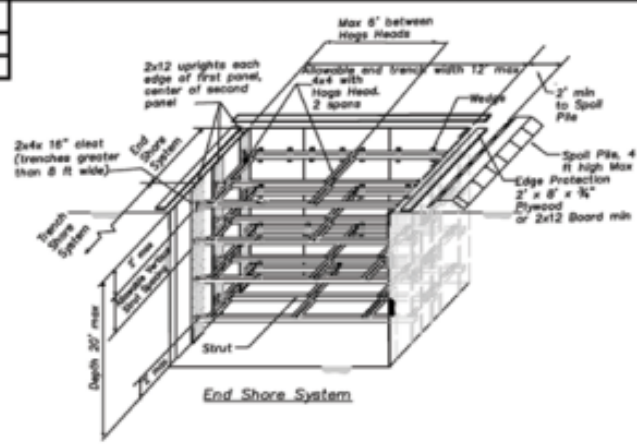
TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

TRENCH END SHORE SYSTEM															
TABULATED DATA FOR TRENCH RESCUE SHORING (Note 1)															
OSHA TYPE C-60 (Note 3)															
Max Depth (ft)	Wale / Strut Vertical Spacing (ft) Trench Width														
	5 ft			6 ft			8 ft			10 ft			12 ft		
	Strut			Strut			Strut			Strut			Strut		
	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4
6	4	4	4	4	4	4	2	3	4	1	2	4	0	1	4
8	4	4	4	4	4	4	2	3	4	1	1	4	0	1	3
10	4	4	4	4	4	4	2	2	4	1	1	4	0	0	3
12	4	4	4	3	4	4	1	2	4	1	1	4	0	0	2
14	3	4	4	2	3	4	1	1	4	1	0	3	0	0	2
16	3	4	4	2	3	4	1	1	4	0	0	3	0	0	1
18	2	3	4	1	2	4	1	1	4	0	0	2	0	0	1
20	2	3	4	1	2	4	1	1	3	0	0	2	0	0	1

OSHA TYPE C-80 (Note 4)															
Max Depth (ft)	Wale / Strut Vertical Spacing (ft) Trench Width														
	5 ft			6 ft			8 ft			10 ft			12 ft		
	Strut			Strut			Strut			Strut			Strut		
	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4	4x4	2x4+4x4	2-4x4
6	4	4	4	3	4	4	2	4	4	0	2	4	0	1	2
8	4	4	4	2	4	4	2	4	4	0	1	3	0	1	2
10	3	4	4	2	4	4	1	3	4	0	1	2	0	0	2
12	2	4	4	1	4	4	1	2	4	0	0	2	0	0	2
14	2	4	4	1	4	4	1	2	3	0	0	2	0	0	1
16	1	4	4	1	3	4	1	1	3	0	0	1	0	0	1
18	1	3	4	1	3	3	0	1	2	0	0	1	0	0	1
20	1	2	4	1	2	3	0	1	2	0	0	1	0	0	1

Sheeting (Note 5) C-60 and C-80	
end wall	3/4" CDX with shims at each wale/strut
side wall	3/4" CDX with 2x12 upright



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Job #1373-3
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10/1/2013
Sheet 1 of 3





PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

TRENCH END SHORE SYSTEM		
TABULATED DATA FOR TRENCH RESCUE SHORING		
Details		
Plan View End Shore System	Detail 1	
Typical Hog's Head Strut		
2-4x4 strut 2x4 + 4x4 strut		
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Job #1373-3 Drawn by: JT		10/1/2013 Sheet 2 of 3

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TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

TRENCH END SHORE SYSTEM					
TABULATED DATA FOR TRENCH RESCUE SHORING					
Notes 1) This shoring system is in accordance with Cal OSHA Article 6, Section 1541.1(c)(3) Option 3-Designs Using Other Tabulated Data. This tabulation is for the purpose of protecting rescue personnel from cave-ins while rescuing victims of collapsed excavations and trenches, training and for no other purpose. 2) In order to use these tabulations the soil must first be classified as Type C-60 or C-80. The soil loading configuration is rectangular. This means that the soil pressure at the top of the excavation is the same as at the ultimate depth of the excavation. Read all element size and spacing requirements from the line at the depth the final excavation is expected to be ("original trench depth"). 3) C-60 Soil includes all soil types that will stand long enough to install shoring and have a water level at or below the bottom of the excavation. 4) Type C-80 soil is soil that will not stand up long enough to install shoring. Generally shoring in C-80 soil has to be installed in short increments or driven into the soil as excavation is taking place. Prior to reaching 12 ft deep in marine clays such as San Francisco "Bay Mud", Gulf States Swamp Mud, etc" an engineer should be consulted. If there is any additional deflection or movement after elements are installed additional upright and strutting may be required. 5) Minimum shoring system length is 2 sets. The general rule for shoring system length is that it should be at least as long as the shoring system is deep. 6) This tabulation includes loading from a spoil pile set back 2 feet from edge of trench and no higher than 4 ft and foot traffic. All heavy equipment and vehicles to be set back at least the depth of the trench. 7) Wood members shall be minimum Douglas fir #2 and better, S4S. 8) Plywood shall be minimum 3/4" CD X. Decrease horizontal spacing, double up plywood or decrease upright spacing if deflection is occurring due to soil movement. 9) Install strutting from top to bottom. Nailing can be done in stages by first using enough nails to stabilize shoring and then following through to make sure that required nail quantity is achieved. 10) This shoring system may be used in conjunction with Upright with Strut and Plywood, and Wale with Strut and Plywood System. 11) Alternative manufactured strut systems such as screw jacks, pneumatic struts, and single/double cylinder hydraulic jacks may be substituted for timber struts installed in accordance with their tabulated data. 12) If plywood is 1/2" Finform it is OK to eliminate the 2x12 upright and use struts at the tabulated spacing nailed directly to the Finform. 13) Two 1/2" CDX plywood sheets may be used in lieu of one sheet of 1/2" CDX with a 2x12 upright. 14) Aluminum fire service ladders with 4x4 cribbing may be used as an upright or wale. (see CMC Trench Rescue Manual) Framing Notes- 1) Use only 1 wedge set, do not stack them. 2) General rule for nailing strut connections-use two toe-nails (total 4 nails) on both sides of strut. 3) Struts may also be cut-to-fit and driven in without wedges, or Ellis post screw jacks may be used. 4) Struts may also be manufactured, see Note 11. Installation Notes 1) Uprights may be nailed to plywood before or after setting plywood into excavation. 2) Move spoil pile and obstructions a minimum of 2 ft from trench edge and place edge protection before installing shoring. 3) Place ladder within 25 ft of work. Ladder must be secure and accessible. 4) While working off a ladder and until top strut is secured, workers may only work within waist level to tip of trench and must be tied off. 5) Remove struts from bottom to top. If there is sheeting movement when bottom strut is removed, leave shoring in place and bury or remove with power equipment from outside the trench.					
California State Fire Training 1131 S. Street Sacramento, Ca. 95811	 CER, Inc. Construction Engineering Resource 1837 Wright St. Santa Rosa, Ca. 95404 <table border="1"><tr><td>Job #1373-3</td><td>10/1/2013</td></tr><tr><td>Drawn by: JT</td><td>Sheet 3 of 3</td></tr></table>	Job #1373-3	10/1/2013	Drawn by: JT	Sheet 3 of 3
Job #1373-3	10/1/2013				
Drawn by: JT	Sheet 3 of 3				

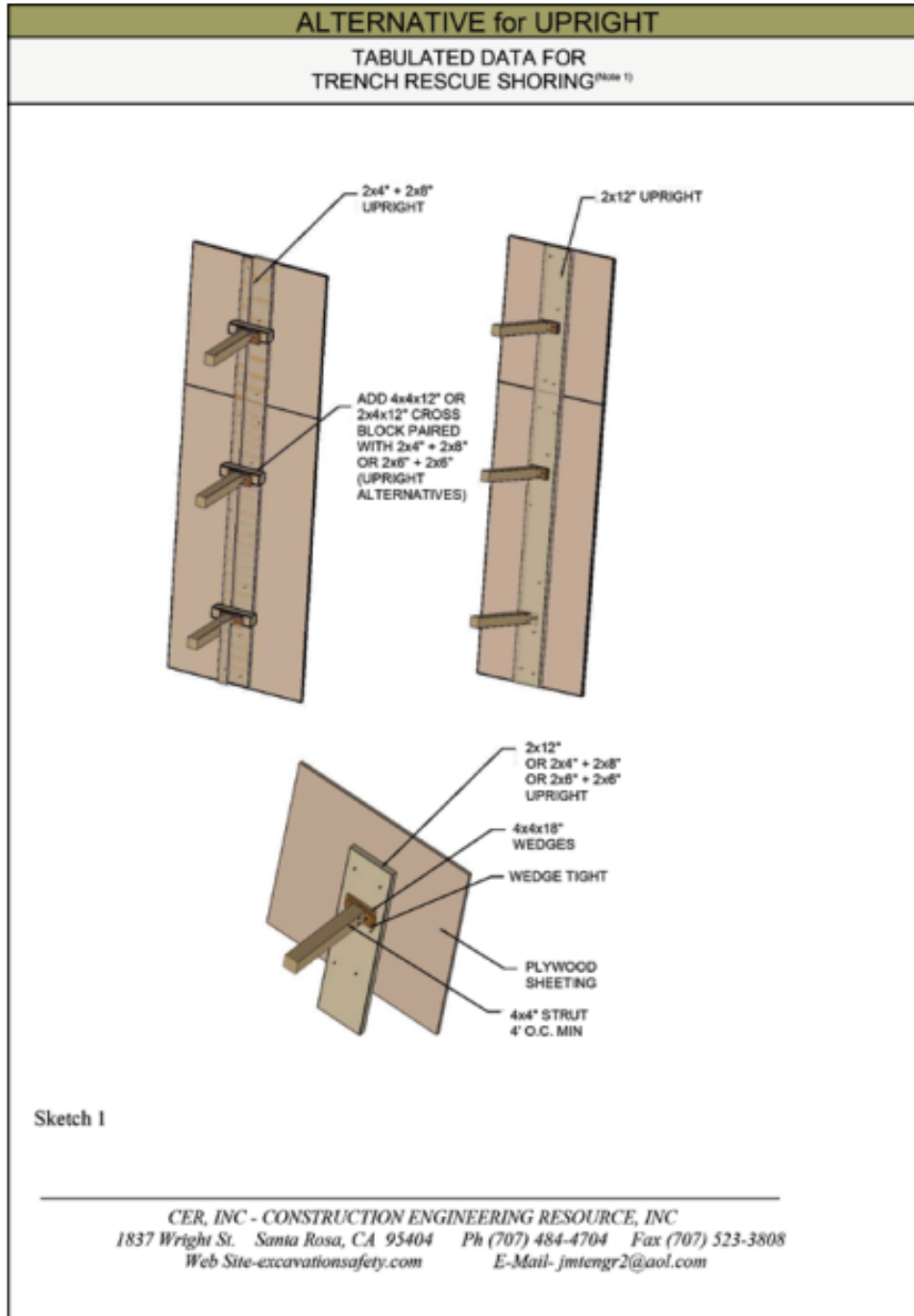




PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring





PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

CER, INC

Engineering Consulting

CONSTRUCTION ENGINEERING RESOURCE, INC

Construction Management

Claims Analysis

July 3, 2012

To: Firescope US&R Specialist Working Group

Attn: Battalion Chief Mark Brown, Chair

Re: 2x12 uprights and OSHA Subpart P Options 3 and Option 4

Question-Why is the use of the rescue shoring application tabulated data used under OSHA Option 3-other tabulated data instead of Option 4 design by a registered civil engineer.

The short answer is:

Under option 3 designs utilizing tabulated data are configured by a competent person at the site utilizing tabulated information. The tabulated information can be utilized to develop a shoring system at any location. The tabulated data is developed and stamped by a registered engineer but the engineer is not necessarily involved in deciding the configuration of the shoring system.

Under option 4 design by a civil engineer the plan and shoring configuration is developed by a registered engineer and is specific to the site. The person constructing the shoring system follows the plan. Under this option there would have to be a civil engineer called in for every trench rescue situation. Also it is important to note that if the trench rescue shoring configuration needs to be altered or different than shown on the tabulated data an engineer must approve the changes.

From the OSHA oversight perspective with option 3 they look to see that the person that configured the shoring system adhered to the tabulated data and under option 4 they look to see if the engineered plan was adhered to.

I am attaching a document, **CALIFORNIA TRENCH RESCUE SHORING, DRAFT DEVELOPMENT OF TABULATED DATA**. I have been developing this document as this project has proceeded and is intended to be the basis for the shoring system we are developing.

Question-Can we use 2x8 uprights instead of 2x12 uprights.

Timber strutted trench shoring systems are based on soil arching between rigid elements of the shoring. The plywood sheeting is the least rigid and the timber or metal strut is the most rigid. The rigidity of the upright affects the rigidity of the sheeting and the effectiveness of the soil arching to transmit the loads ultimately to the struts. The following are the factors that determine that a 2x12 is required and a 2x8 is insufficient.

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PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

CER, INC

Engineering Consulting

CONSTRUCTION ENGINEERING RESOURCE, INC

Construction Management

Claims Analysis

April 30, 2014

To: Stan Klopfenstein
Executive Director
Regional Training Group
Los Angeles Area Fire Chiefs Assn.

Attn: Stan Klopfenstein

Re: Letter of 6/3/12-Firescope US&R Specialist Working Group
2x12 uprights and OSHA Subpart P Options 3 and Option 4

Stan;

This is in further response to the referenced letter and questions.

As stated in the letter the upright should be minimum 2x12. As shown in attached sketch it is also ok to use a 2x8 and 2x4 or 2-2x6 with a 4x4 or 2x4 cross block. This configuration provides equivalent shear and bending strength as the 2x12.

The tabulated data for this project was developed utilizing allowable stress design with timber values from the National Design Specifications for Wood Construction, 2005 edition, NDS developed by the The American Forest and Paper Association. These are the same standards adopted by all US building codes.

The soil loading values are developed utilizing apparent earth pressure theories developed by Terzaghi, Peck and Hanson. Engineering judgement is applied and drawn from over 25 years of experience in excavation shoring system design.

Best Regards

Joe Turner



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PENNSYLVANIA STATE FIRE ACADEMY

TRENCH RESCUE TECHNICIAN SKILL STATIONS

Tabulated Data for Trench Rescue Shoring

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- The 2x12 cuts the plywood free span to 18.25" and the 2x8 provides a free span of 20.25". The rigidity of the plywood is increased by 25% with the 2x12 upright.
- The upright must have sufficient shear and bending strength to with stand soil loading. Utilizing allowable bending and shear strength for Douglas Fir boards a 2x12 has sufficient section strength to support a C-80 soil load between the struts and a 2x8 does not.

Also as a durability issue the 2x12 will not fail during lifting and shore installation while it is possible for a 2x8 to break in two during lifting of a long shoring set.

You are welcome to contact me at this e-mail or my phone (707) 484-4704 if you have further questions regarding this.

Best Regards

Joe Turner

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