Trench and Excavation Hazards: Insight on Newly Acquired Data and Managing the Risks
Session: 113

Trench and Excavation Hazards: Insight on Newly Acquired Data and Managing the Risks

Speakers:

Joe Wise, Regional Customer Training Manager, United Rentals

Eileen Betit, Research to Practice Director, CPWR-The Center for Construction Research and Training
Topics

Department of Labor Directive
Underground Construction Safety Overview
The Competent Person
Required Training & Compliant Solutions
Discoveries from CPWR Trench Survey
Department of Labor Directive

- OSHA is targeting workplaces of potential trench and excavation hazards for not only site inspections, but also for safety training outreach
- OSHA is working with industry associations and public utilities to create a public/private effort to impact worker safety
- OSHA will be updating their information system (OIS) to track abated trench and excavation hazards
Underground Construction Safety Overview

- Cave-Ins Are Preventable
- Injuries/Fatalities Occur Due To Lack Of Knowledge
- Injuries/Fatalities Occur Due To Willful Disregard
- Owners/Engineers/Supervisors/Foremen/Competent Persons Are Held Accountable
- The Competent Person
The Competent Person

Definition 1926.650

The competent person is defined as one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous or dangerous to employees and who has the authorization to take prompt corrective measures to eliminate them.
Competent Person - Responsibilities

- Responsible for ensuring OSHA compliance
- Understand the standards and any and all data provided
- Select proper protective system based on the soil type
- Locate underground installations / utilities
- Conduct air test for hazardous atmospheres
- Monitor Water Removal
- Properly inspect and evaluate protective systems
- Recognize and reclassify soil after changing conditions
Competent Person - Duties

• All employees shall be protected from cave-ins (1926.652)(a)
  • Protective system mandatory at 5’ or more
  • Shallower if inspection yields potential for cave-in

• Protective system must have capacity to resist loads without failure

• Shield systems must not be subjected to loads exceeding design
...One who does not have such training or knowledge cannot possibly be capable of identifying existing and predictable hazards in excavation work or taking prompt corrective measures...
5 OSHA Compliant Solutions

Charts and Tables
1. Sloping and Benching
   Appendix B
2. Timber Shoring
   Appendix C
3. Aluminum Hydraulics
   Appendix D

Registered Professional Engineer
4. Manufacturer’s Tabulated Data
5. Site-Specific Engineering

OSHA Charts valid only to 20’
Any deviation to OSHA Charts or Tabulated Data requires written PE approval regardless of depth
Trench Survey

OSHA-NIOSH-CPWR r2p Working Group

• OSHA Construction Directorate
• NIOSH Office of Construction Safety and Health
• CPWR Research to Practice (r2p) Program

Ruth Ruttenberg & Associates

United Rentals

Speed Shore, Inc.
## Trench Survey Responses

<table>
<thead>
<tr>
<th>Sample</th>
<th># Surveyed</th>
<th># Responses</th>
<th>Response Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Rentals – (Excavation Safety Training Classes)</td>
<td>461</td>
<td>411</td>
<td>89.2%</td>
</tr>
<tr>
<td>CPWR Outreach Database (convenience sample)</td>
<td>3,162</td>
<td>226</td>
<td>7.1%</td>
</tr>
<tr>
<td>Total</td>
<td>3,623</td>
<td>637</td>
<td>17.6%</td>
</tr>
</tbody>
</table>
Perform Trench Work - “Industry” Group = 60.6%

“Safety & Health” Group = 35.2%
Construction establishments by employment size compared to the size of survey participants’ employers

Construction Industry

- 1-19: 90.6%
- 20 or more: 9.4%

Survey Participants

- 1-20: 79.7%
- 21 or more: 20.3%

Source: CPWR Quarterly Data Report; 3rd Q 2018, Figure 1
Participants’ industry experience

Length of time in the industry

- <1: Industry 2.9%, S & H 1.4%, All 2.4%
- 1-5: Industry 14.9%, S & H 10.1%, All 13.2%
- 6-10: Industry 13.3%, S & H 11.4%, All 12.3%
- >10: Industry 69.0%, S & H 77.2%, All 72.2%
Do you qualify as a competent person for trench work?

- Yes: 66.0% (Industry), 81.7% (S & H), 71.7% (All)
- No: 22.1% (Industry), 15.1% (S & H), 19.5% (All)
- Not Sure: 11.9% (Industry), 3.2% (S & H), 8.8% (All)
All participants engage in work that involves trenching

- Frequently:
  - All: 49.5%
  - S & H: 45.7%
  - Industry: 50.9%

- Occassionally:
  - All: 50.5%
  - S & H: 54.3%
  - Industry: 49.1%
Types of projects participants work on where trenching occurs

- Commercial: 58.8% Industry, 76.3% S & H, 65.2% All
- Industrial: 39.3% Industry, 54.3% S & H, 44.6% All
- Public Sector: 33.7% Industry, 33.3% S & H, 34.3% All
- Residential: 34.8% Industry, 24.7% S & H, 32.4% All
- Heavy & Highway: 22.7% Industry, 35.6% S & H, 27.8% All
- Other: 7.0% Industry, 7.3% S & H, 7.0% All

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Types of trench protection seen most often

- **Frequently/Always**
  - Benching/Sloping: 63.2%
  - Trench Box: 57.5%
  - Shoring: 46.0%
  - Shielding: 35.7%

- **Occasionally**
  - Benching/Sloping: 44.2%
  - Trench Box: 46.7%
  - Shoring: 36.2%
  - Shielding: 29.0%

- **Never**
  - Benching/Sloping: 7.9%
  - Trench Box: 9.8%
  - Shoring: 17.6%
  - Shielding: 6.3%
Is there sufficient pre-planning for trench work, with soil testing and trench protection needs addressed?
Do you see incidents where companies are inexperienced and new to trenching?
How often do they see no protection …

- **Frequently/Always**
  - All: 22.3%
  - S & H: 23.3%
  - Industry: 20.4%

- **Occasionally**
  - All: 55.0%
  - S & H: 58.6%
  - Industry: 54.0%

- **Never**
  - All: 22.7%
  - S & H: 18.1%
  - Industry: 25.6%
How often, when there was a collapse, did you see cross trenching or conduits or other signs that the soil had been previously disturbed?
Is there a competent person trained in trenching on the job site?

- Always: 43.1% Industry, 32.2% S & H, 38.7% All
- Frequently: 26.1% Industry, 27.7% S & H, 27.0% All
- Occasionally: 28.0% Industry, 31.2% S & H, 36.6% All
- Never: 2.9% Industry, 3.5% S & H, 3.1% All
Do you see incidents where new workers are exposed to trench/excavation work without proper competent person supervision?

![Bar chart showing the percentage of incidents where new workers are exposed to trench/excavation work without proper competent person supervision.](chart.png)

- **Always**: 3.2%, 3.9%, 3.3%
- **Frequently**: 18.1%, 25.4%, 21.4%
- **Occasionally**: 53.2%, 51.2%, 52.6%
- **Never**: 25.5%, 19.5%, 22.7%
Have you or a co-worker ever refused to enter a trench because of unsafe conditions?

<table>
<thead>
<tr>
<th></th>
<th>All</th>
<th>S &amp; H</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>45.8%</td>
<td>52.7%</td>
<td>41.0%</td>
</tr>
<tr>
<td>No</td>
<td>54.2%</td>
<td>47.3%</td>
<td>59.0%</td>
</tr>
</tbody>
</table>
Experience with trench collapses and conditions

Have you ever been involved, witnessed, or inspected a trench collapse?

Yes
- All: 33.0%
- S & H: 34.3%
- Industry: 31.8%

No
- All: 67.0%
- S & H: 65.7%
- Industry: 68.2%

(If experience with a trench collapse)
Were there conditions beyond noncompliance with the OSHA regulation?

Yes
- All: 46.0%
- S & H: 50.7%
- Industry: 41.4%

No
- All: 54.0%
- S & H: 49.3%
- Industry: 58.6%
How would you rate your understanding of the OSHA Standard?

- Excellent
  - All: 24.1%
  - S & H: 47.7%
  - Industry: 11.3%

- Good
  - All: 44.5%
  - S & H: 48.5%
  - Industry: 47.1%

- Fair
  - All: 30.6%
  - S & H: 22.5%
  - Industry: 6.9%

- Very limited
  - All: 3.5%
  - S & H: 5.1%
  - Industry: 0.9%

- I am aware, but not familiar with the standard
  - All: 2.7%
  - S & H: 0.0%
  - Industry: 4.3%

- I am not aware of the standard
  - All: 0.2%
  - S & H: 0.0%
  - Industry: 0.3%
Are there any parts of OSHA’s Trench Standard that may be confusing to those required to comply?

If yes, which of the following parts of the standard are confusing?

- **57.7%** - Trench sloping and benching safety measures (depth and width requirements)
- **43.4%** - Protective systems
- **33.7%** - Competent Person’s role and responsibilities
- **18.3%** - Access and Egress
How often do you have trouble with proper installation, understanding manufacturers’ tabulated data, and use of trench safety equipment?
Which of the following do you believe are the biggest contributors to trench incidents or collapses?

<table>
<thead>
<tr>
<th>Issue</th>
<th>Industry</th>
<th>Safety &amp; Health</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of training on trench safety (i.e., inspections, hazards)</td>
<td>66.6%</td>
<td>67.6%</td>
<td>67.0%</td>
</tr>
<tr>
<td>Trying to stay on schedule/production</td>
<td>65.2%</td>
<td>67.1%</td>
<td>66.0%</td>
</tr>
<tr>
<td>Indifference (i.e., it won’t happen on my watch)</td>
<td>50.6%</td>
<td>70.5%</td>
<td>58.1%</td>
</tr>
<tr>
<td>Lack of knowledge of the OSHA 1926.650 trenching and excavation</td>
<td>48.3%</td>
<td>58.6%</td>
<td>52.2%</td>
</tr>
<tr>
<td>standard (i.e., requirements, soil analysis, and protective system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>solutions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tight budgets (i.e., didn’t estimate into job costs)</td>
<td>29.0%</td>
<td>43.8%</td>
<td>34.5%</td>
</tr>
<tr>
<td>Language barriers</td>
<td>18.8%</td>
<td>26.2%</td>
<td>21.3%</td>
</tr>
<tr>
<td>Other</td>
<td>6.9%</td>
<td>10.0%</td>
<td>8.4%</td>
</tr>
</tbody>
</table>
What degree of impact would the following have on reducing trench fatalities and injuries and increasing compliance?

- Pay fine of $132,598: 5.8% No Impact, 28.4% Moderate, 65.8% Significant
- Criminal prosecution/jail time: 7.9% No Impact, 36.3% Moderate, 55.8% Significant
- More frequent inspections: 3.5% No Impact, 46.2% Moderate, 50.3% Significant
- Require renewal of competent person training: 10.1% No Impact, 49.4% Moderate, 50.3% Significant
- Require permitting: 13.9% No Impact, 47.1% Moderate, 39.0% Significant
What we learned…

✓ More pre-planning is needed
✓ Trenches often are unprotected and there is often not a competent person on site
✓ Incidents often involve contractors who are inexperienced or new to trench work
✓ New workers often lack proper competent person supervision
✓ There is a need to increase training and education on the standard and safe practices
What’s been done so far by OSHA…

- **Agency Priority Goal - Reduce Trenching and Excavation Hazards**
- **Trench Safety Initiative**
  - Increase awareness of hazards and requirements
- **Balanced Enforcement and Compliance Assistance**
  - Revised *National Emphasis Program for Trenching* - effective October 2, 2018
  - Onsite Consultation Program
  - Area Office Outreach Programs
  - Develop and Update Training and Outreach Materials
  - OSHA/Industry Stakeholder Outreach Events (Trench Safety Stand-Down, etc.)
By NIOSH …

**Trenching and Excavation** topic page

- NIOSH Science Blog - [Preventing Trenching Fatalities](#) (planning needs and solutions)
- Work Place Solutions - [Preventing Worker Deaths from Trench Cave-ins](#)
- NIOSH Alert - [Preventing Deaths and Injuries From Excavation Cave-Ins](#)
- Web-based training - [Trench Safety Awareness](#)
- Standard development - [Development of Draft Construction Safety Standards for Excavations](#)
- Research - [Trench safety-using a qualitative approach to understand barriers and develop strategies to improve trenching practices](#)
By CPWR…

Resources to Promote Safe Work in Trenches

- Trenches Hazard Alert (also available in Spanish)
- Trench Safety Toolbox Talk (also available in Spanish)
- No New Year -- Trench Collapse Video (also available in Spanish)
- Practice Trench Safety. It Saves Lives Infographic (also available in Spanish)
- Trench Fact Sheet
- Strategies to Prevent Trenching-Related Injuries and Deaths Report
Thank you

Questions?

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