

**Excavation presentation
for
Minnesota OSHA
Construction Seminar
March 19, 2019**

Presented by MNOSHA

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National emphasis program



Excavation inspections



Trenching safety

“The time to think about worker protection in trenches is before the digging even begins.”



Consider the risks

The trenching fatality rate is *112%* greater than that for all construction accidents.



Consider the risks

Fifty percent of those who perish in cave-ins were people attempting a rescue.



Consider the risks

The majority of trench fatalities occur in trenches five to 15 feet deep.



Consider the risks

One cubic yard of soil weighs approximately 3,000 pounds.



=



Trench inspections

- Determine what protective system is being used: sloping, shielding or shoring.
- Sloping and shielding (trench boxes) are the most common forms of protection.
- Sloping is dependent on the soil type and must meet the following angle/ratio:
 - class “C” soil = 3x or 1.5:1, which is = to 33°;
 - class “B” soil = 2x or 1:1, which is = to 45°;
 - class “A” soil = 1.5x or .75:1, which is = to 53°.

Trench inspections

Competent persons should know what type of soil it is by completing the following:

- a visual analysis; and
- a manual test, such as a thumb penetration, pentrometer or plasticity test.

Soil classification

However, no soil is type A if:

- the soil is fissured;
- the soil is subject to vibration; or
- the soil has been previously disturbed.

Inspection example

What does the OSHI see as they approach?

OSHIs will take pictures as they approach.

Find the person or C.P. in charge.



Inspection example

OSHI will ask employees to exit the trench and have the operator stop moving dirt.

Determine the soil type.



Inspection example

- Class “C” soil – sand/gravel or uncohesive soil
- Class “B” soil will stick together.



Inspection example

- Class “A” – employers will tell OSHIs class “A.” A majority of the soil in Minnesota is disturbed.
- OSHIs will take a soil sample; and measurements.

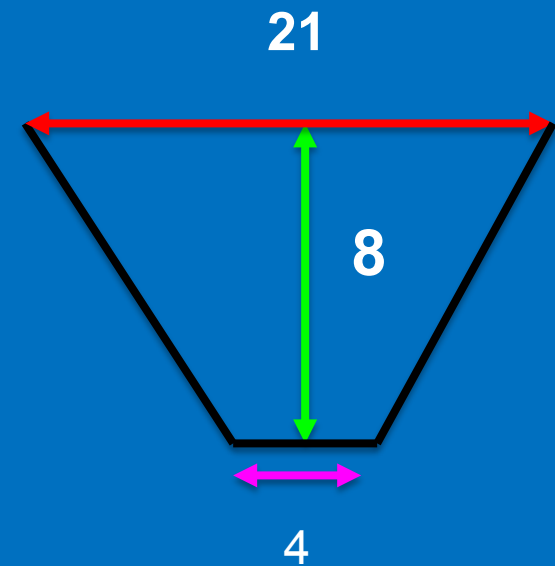


Inspection example

Measurements needed:

- top width (red);
- depth (green);
- bottom width (pink); and
- soil type.

With these measurements, you can determine compliance.



Measurements

- Depth = 8 feet
- Bottom width = 4 feet
- Top width = 21 feet

Which type of soils are in compliance?

- Class “C” soil = 3x or 1.5:1, which is = to 33°
- Class “B” soil = 2x or 1:1, which is = to 45°
- Class “A” soil = 1.5x or .75:1, which is = to 53°

Measurements

- Class “A” soil = $1.5 \times (\text{depth}) + \text{bottom width} = \text{top width}$
- Class “B” soil = $2 \times (\text{depth}) + \text{bottom width} = \text{top width}$
- Class “C” soil = $3 \times (\text{depth}) + \text{bottom width} = \text{top width}$

Measurements

If you have an eight-foot deep, class “C” soil excavation, with a bottom width of four feet – $8' \times 3 + 4' = 28'$.

If you have an eight-foot deep, class “B” soil excavation, with a bottom width of four feet – $8' \times 2 + 4' = 20'$.

- The correct answer is “B” and “A.”

Example continued

Evaluate the excavation to determine where measurements can be taken from (look for cracks along the top).

The OSHI will have the foreman or C. P. assist with measurements.



Example continued

The OSHI may have to ask what the bottom width is because it cannot be measured.

The OSHI will ask for agreement on the numbers.



Sloping

Table 1: Maximum allowable slopes for excavations fewer than 20 feet

Soil type or rock type	Maximum slope (H:V)	Maximum slope (degrees)
Stable rock	Vertical	90
Type A	.75:1	53
Type B	1:1	45
Type C	1.5:1	34



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Mobile equipment warning systems

When an equipment operator does not have a clear and direct view of the edge of the excavation:

- use a warning system;
- barricades;
- hand or mechanical signals; or
- stop logs.





Additional items

Employees working around earth-moving equipment must wear a high-visibility vest.

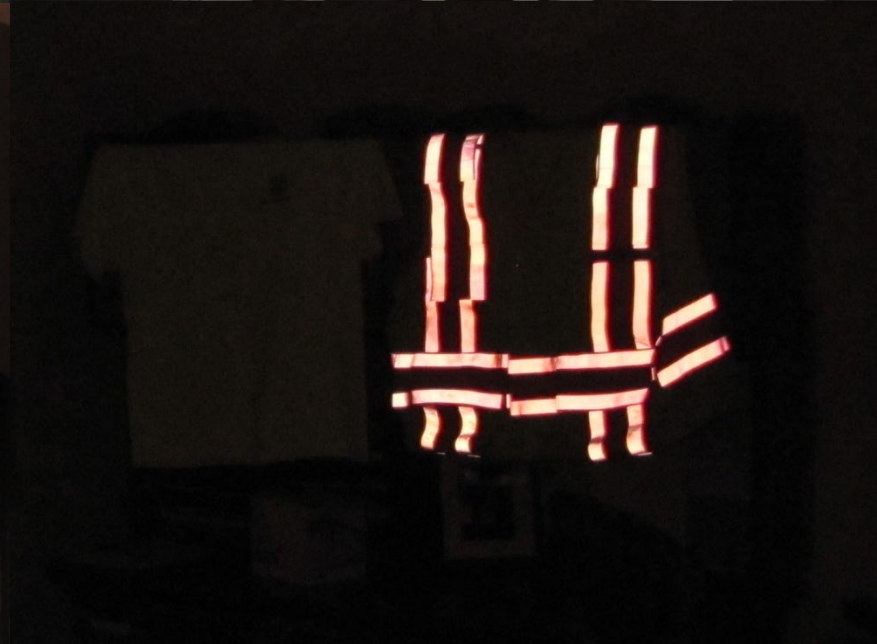
Employees with overhead hazards or working around equipment need to wear hardhats.

Spoil piles and equipment must be located at least two feet from the edge of the excavation.

Class 2 high-visibility warning vest



Look for a label stating "This garment meets or exceeds ANSI/ISEA 107-1999 standard for **Class 2 garments**" or, for small sizes, "... greater than or exceeding ANSI/ISEA 107-1999 standard for **Class I garments**."



Competent person

A competent person:

- is designated by the employer and has the authority to take appropriate actions;
- by way of training and experience, is knowledgeable of applicable standards; and
- is capable of identifying commonly foreseeable workplace hazards, inspections of excavations.

Competent person

The competent person is the key to a safe trench excavation. The decisions he or she makes will determine the safety of all employees working in and around trenches.

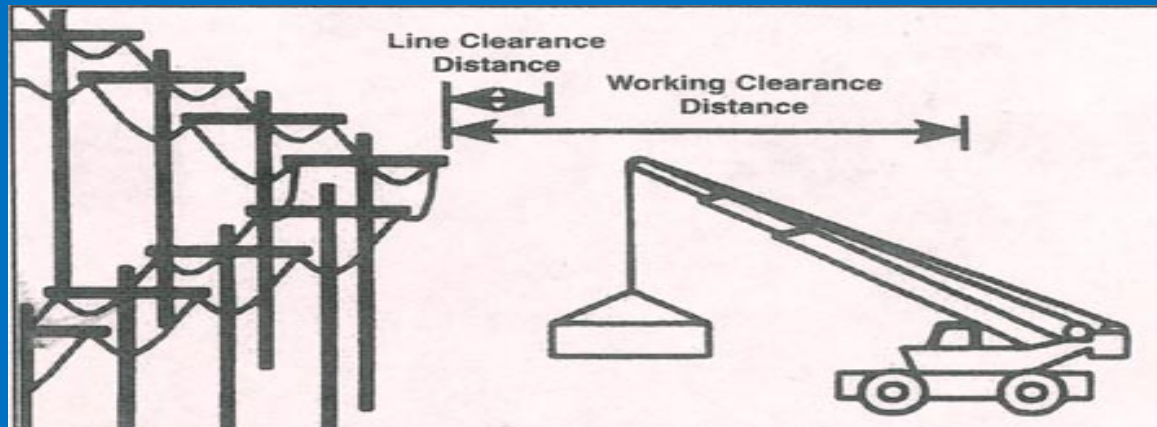
Powerline clearance

50 kV or less

10 feet

Greater than 50 kV

10 feet + (.4") (number of kV over 50 kV)



Powerline clearance





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WARNING

Automatic two speed travel system changes travel speed automatically and can adversely affect machine control when descending a slope and loading or unloading on a trailer. Personal injury can occur from sudden change in machine control. Put travel speed select switch in LOW speed position when descending a slope and loading or unloading on a trailer.

YN20T01048P1 02

WARNING



Extreme high pressure in track adjustment cylinder can cause personal injury when adjusting crawler tension. Loosen grease nipple with care to relieve pressure gradually.

2432T6110 02



HEAVY LIFT SWITCH
ON
OFF

while lifting a load can cause unexpected lowering of load, resulting in severe injury or death. Never turn off heavy lift switch while lifting a load.

YN20T01340P1

NOTICE

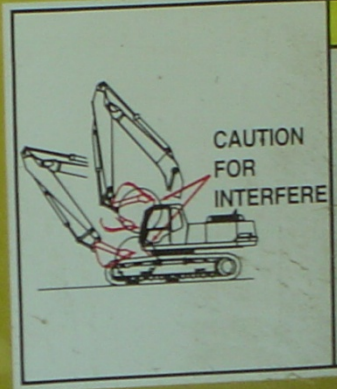
Stopping engine without allowing it to cool can result in overheating and a shortened engine life. Before stopping engine, run at low idle for at least 5 minutes to allow engine and turbo charger to gradually cool down.

YN20T01007P1

WARNING

Read and understand Operator Manual before operating or performing maintenance on this machine. Failure to follow or pay attention to instructions in Operator Manual can result in injury or death. It is your responsibility to be aware of and follow all local laws and regulations. Before starting machine, make sure hydraulic control lever is in lockout position and all control levers are in neutral. Sound horn to alert people. Ensure bystanders and obstacles are clear of machine before moving machine or its attachments. Do not carry riders on machine. Before leaving operators compartment, park on level ground, lower attachments to ground, make sure hydraulic control lever is in lockout position and stop engine.

YN20T01018P1 02



CAUTION FOR INTERFERE

CAUTION

Bucket can contact and damage cab when machine is equipped with some attachments. Check clearance between bucket and cab before operation. Exercise caution when operating bucket near cab.

2432P3380 01



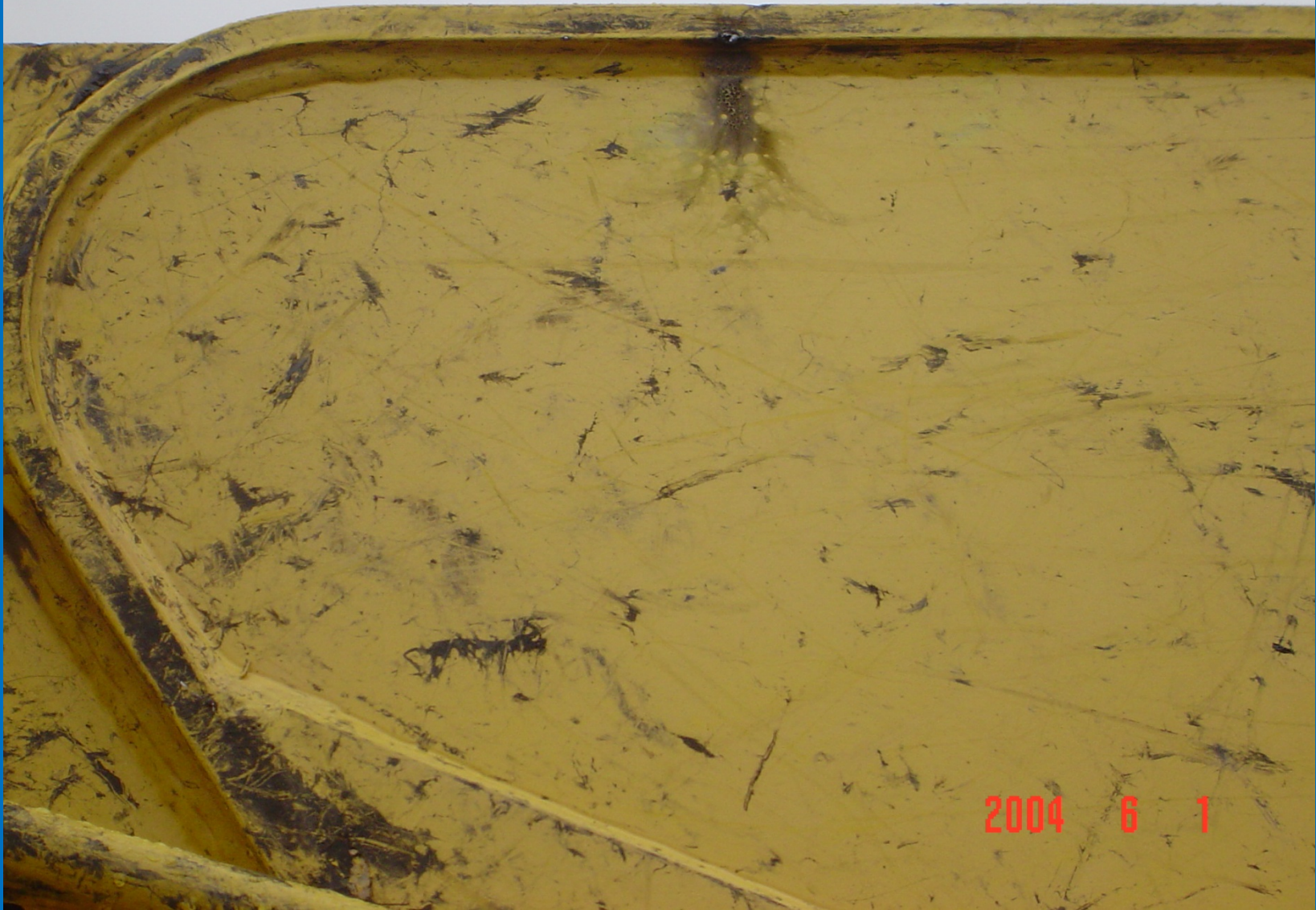
DANGER

Contact with electrical power lines will result in injury or death. Keep machine attachment a safe distance from electrical power lines. Following instructions:

VOLTAGE(Volts)	DISTANCE
50K or LESS	10FT
50K to 200K	15FT
200K to 350K	20FT
350K to 500K	25FT
500K to 750K	30FT
750K or OVER	35FT

YN20T01018P1 02

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Egress and access

Required in trench excavations more than four feet in depth

Must be within 25 feet lateral travel distance

Examples include ladders, ramps



Ladders and ramps

Ladders:

- side rails of ladders must extend at least three feet above the landing surface; and
- must be inside of trench boxes when used.

Ramps: The excavation may be sloped so people can walk out in an upright manner (cannot use tools or hands to climb out).



OCT 8 2003

Hazard identification

















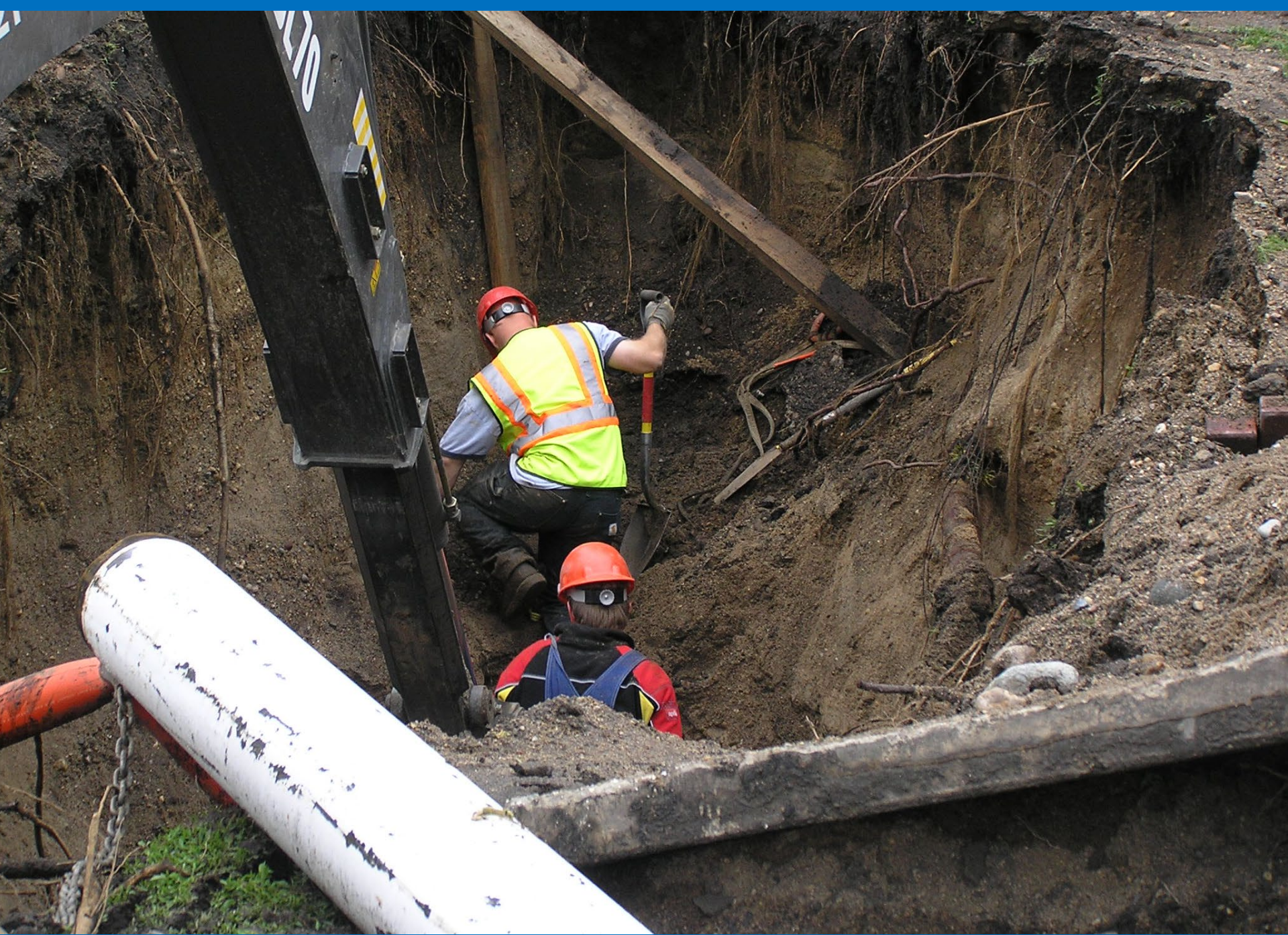












Most frequently cited standards in construction federal-fiscal0-year 2018

Standard	Description	Frequency
1926.501	Fall protection	150
Minnesota Statutes 182.653, subd. 8	A Workplace Accident and Injury Reduction (AWAIR) program	68
1910.1200	Hazard communication	46
1926.1053	Ladders	41
1926.451	General requirements for scaffolds	35
Minnesota Rules 5207.1100	Elevating work platform equipment	31
1926.503	Fall protection training requirements	29
1926.405	Electrical wiring, components and equipment	26
1926.652	Protective systems for excavations	19
1926.651	Specific requirements for excavations	17

Common excavation standards cited

- 1926.651(c)(2) – Means of egress from excavations
- 1926.651(j)(2) – Excavated material or equipment not retained at least two feet from edge

Common excavation standards cited

- 1926.651(k)(1) or (k)(2) – Inspections by a competent person or inspected but failed to abate hazards
- 1926.652(a)(1) – Unprotected excavation or trench

**Minnesota OSHA
Excavation Safety Stand-down
April 15-19, 2019**

Excavation Safety Stand-down

MNOSHA conducted its first Excavation Safety Stand-down in 2017. The topic of excavation safety was selected because:

- there are many hazards when working in excavations or trenches;
- excavation accidents resulted in three fatalities to Minnesota workers since 2015; and
- the excavation season was starting

Excavation Safety Stand-down

The purpose of this stand-down was to raise awareness among employers and workers about preventing excavation accidents.


Excavation Safety Stand-down

A excavation safety stand-down is a way for employers and workers to pause during the workday and talk about excavation safety.

Types of events used:

- job-safety analysis talks;
- lunch and learn events;
- toolbox talks.

April 17th 2017 9:30 a.m.

 **JSA SAFETY TALK**
RUSHFORD-PETERSON: New Early Childhood K-12 School

Task Name and Action Items for this Week:


- Terrazzo on second floor commons area
- 2nd floor classroom flooring
- 1st Floor District office case work
- Gym Equipment in Big Gym
- Lights & wiring in small gym

Safety:

- Minnesota OSHA—Excavation Safety Stand down
 - Reviewed 10 Trench Excavation Safety Rules
 - Open Discussion – Personal Experiences
- PPE must be worn at all times.
- With weather getting nicer, no shorts or cut-offs allowed
- If performing any welding, soldering, grinding must have hot work permit
- Stay off the top 2 stops of step ladders & DO NOT use leaned up against walls
- Keep up on inspections of your electrical cords

Other Notes:

- Make sure you clean up after yourself
- Be aware of finish products
- Safety orientation at 12:30 in office trailer
- Attendance 50 workers

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SAFETY DEPARTMENT

Excavation Safety Stand-down

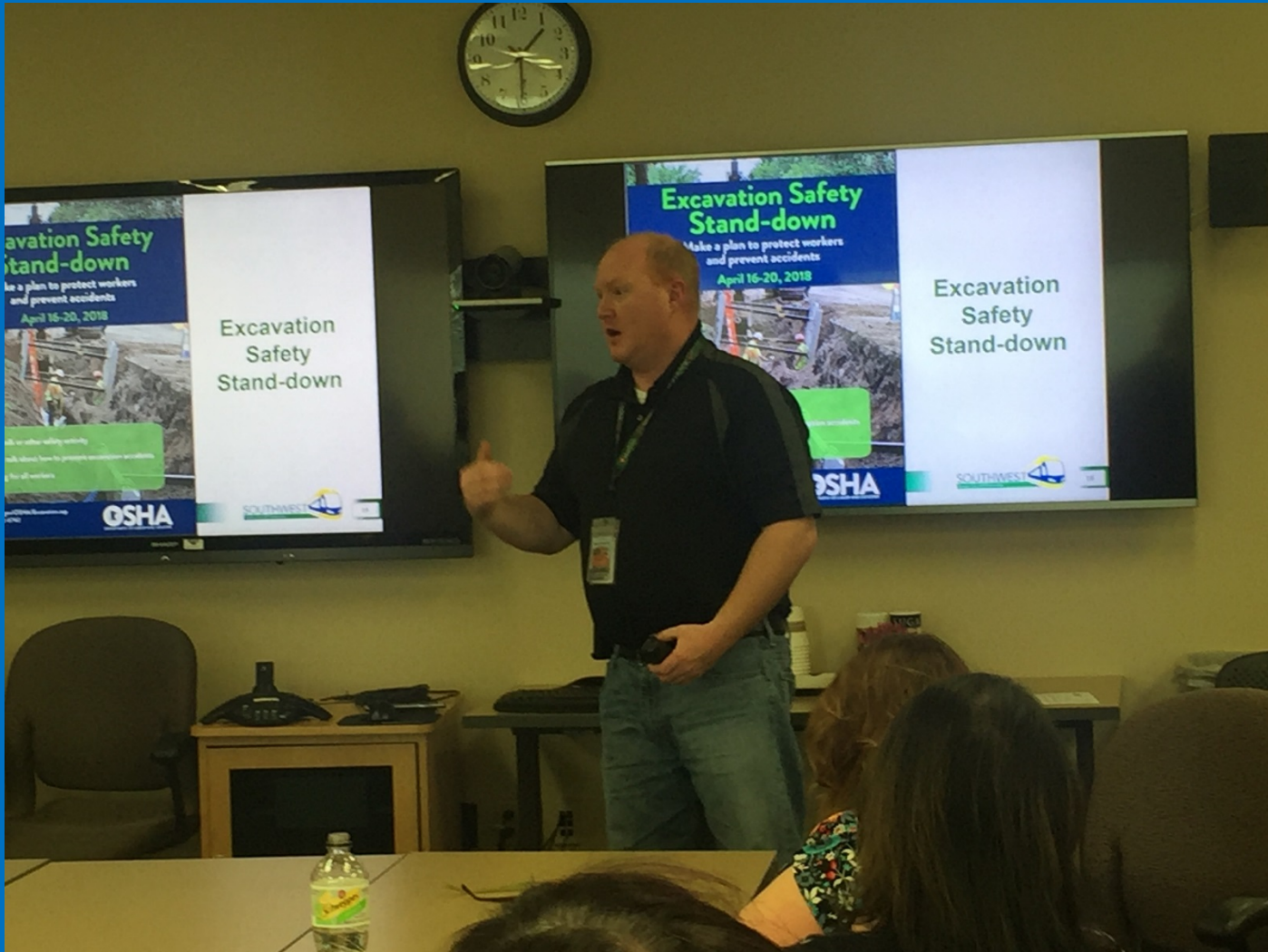
The first excavation safety stand-down was a great success. Nine companies and 106 employees participated.



Stand-down participant certificate







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