Construction Seminar

Excavation inspections/Utilities Jobsites above and below ground; pre-inspections; daily inspections; and resources

Minnesota Occupational
Safety and Health Administration
March 2014

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Chronicle / Michael Maloney, 2004

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Panelists

- Jennifer Sweney, President
  - Gopher State One Call
- Jeff Murray, Assistant Program Manager
  - MN Office of Pipeline Safety
- Blake Pfaffendorf, Safety Director
  - Carl Bolander & Sons Co
- Stephanie Taylor, Principal Safety Investigator
  - Minnesota OSHA Compliance

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Review of Trenching/Excavation Safety

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National Emphasis Program

MNOSHA investigators can stop at any trench/excavation, to determine compliance, based on this National Emphasis Program.

High hazard industry – multiple accidents, fatalities and near misses.

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Consider:

The vast majority of our trench fatalities are occurring in trenches 5 to 15 feet deep!!!

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PRE-PLAN

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

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Competent Person

By way of training and/or experience, is knowledgeable of applicable standards;

Is capable of identifying commonly foreseeable workplace hazards;

Has <u>authority</u> to take prompt actions

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Competent Person

"The Competent Person is the key to a safe trench excavation. The decisions she makes will determine the safety of all employees working in and around trenches."

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Soil Classification

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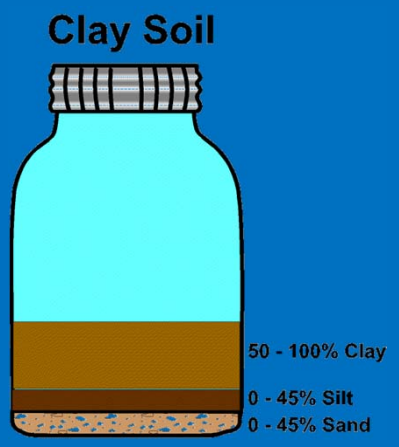
Soil Classification

"Type A" means: cohesive soils with an unconfined, compressive strength of 1.5 tons per square foot or greater.

- Clay
- Silty clay
- Sandy clay
- Clay loam
- Silty clay loam, sandy clay loam (in some cases)



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Soil Classification

However, no soil is Type A if:

The soil is fissured.

The soil is subject to vibration.

The soil has been previously disturbed.

Other factors…

- Water
- Layered soil classes
- Etc.

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Soil Classification

"Type B" means: Cohesive soils with an unconfined compressive strength greater than 0.5 tsf but less than 1.5 tsf.

Angular gravel (similar to crushed rock)

Silt

Silt loam

Sandy loam

Silty clay loam and

sandy clay loam

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Soil Classification

"Type B"

Previously disturbed soils, except those classed as Type C soil .

Soil that meets the compressive strength requirements for Type A but is fissured, or subject to vibration.

Dry rock that is not stable.

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Soil Classification

"Type C" means: Cohesive soils with an unconfined compressive strength of 0.5 tsf or less.

Gravel

Sand

Loamy sand

Submerged soil,

where water is freely seeping.

Submerged rock that

is not stable.

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Soil Classification

Requirements:

1. **Shall be classified by a competent person.**
2. **<u>Based on at least one visual and at least one manual analysis.</u>**
3. **Layered system, classified in accordance with its weakest layer.**
4. **Reclassified as necessary to reflect the changed circumstances.**

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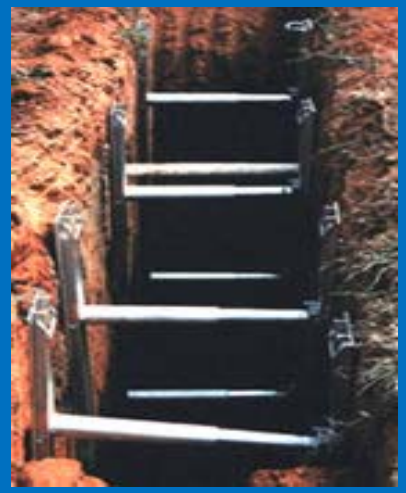
Cave in Protection

Adequate protection shall be provided by:

S loping

S horing

S hielding



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Sloping

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Soil or Rock Type	Maximum Allowable Slopes (Horizontal:Vertical) For Excavations Less Than 20 Feet Deep
Stable Rock	Vertical (90 Deg.)
Type A	3/4:1 (53 Deg.)
Type B	1:1 (45 Deg.)
Type C	1 1/2:1 (34 Deg.)

Notes

(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

(2) A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).

(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

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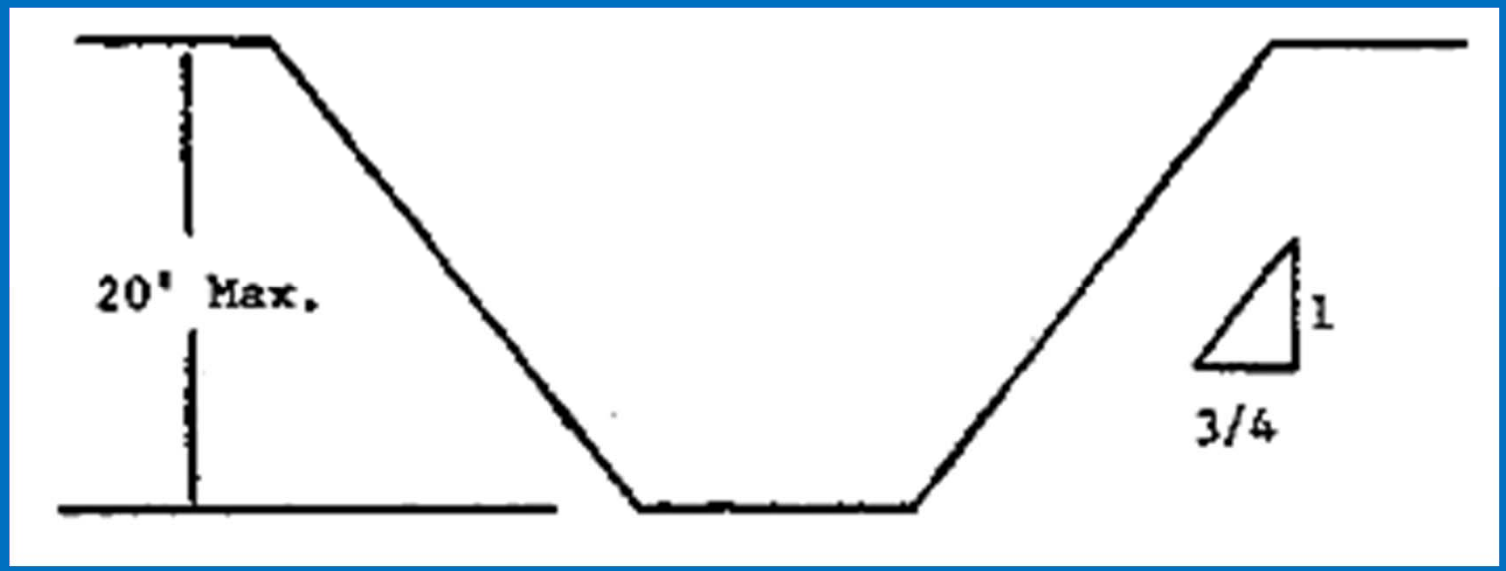
Excavations in Type A Soil

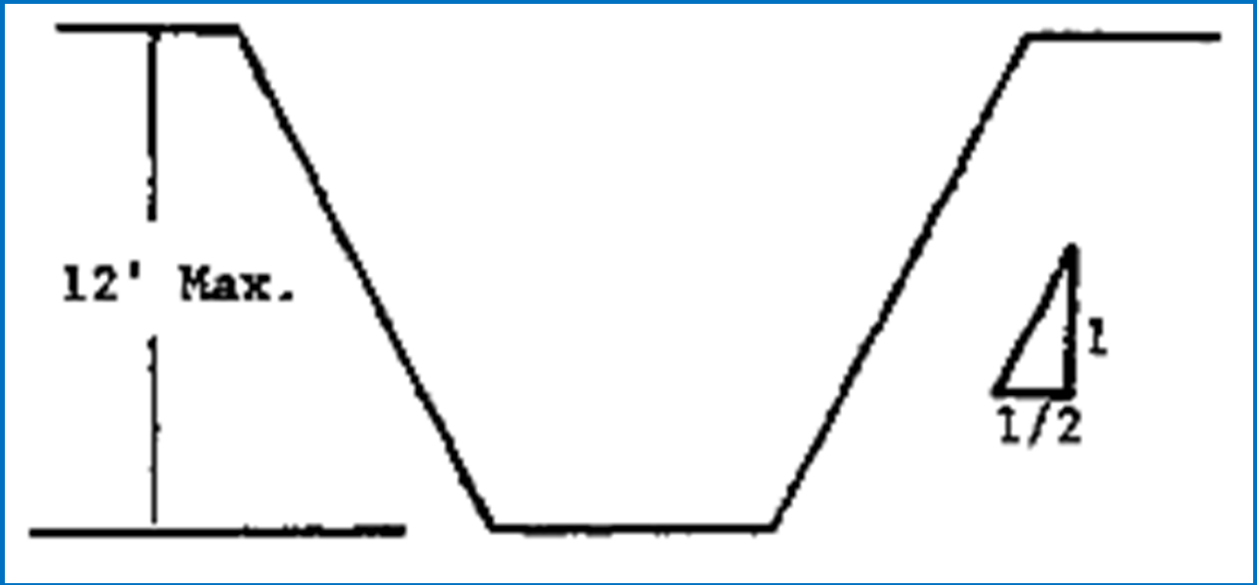
Simple slope – general: 20 feet or less in depth shall have a maximum allowable slope of ¾:1

Maximum Allowable Slopes



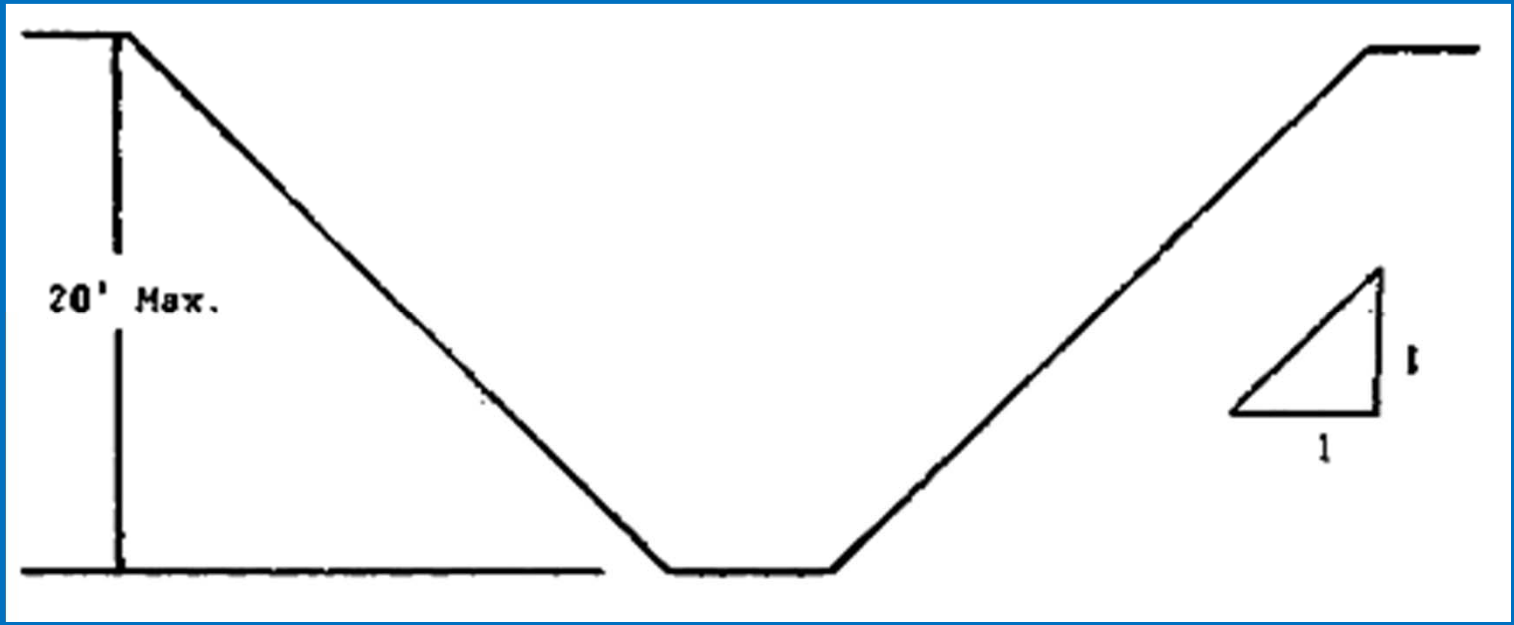
Excavations in Type A Soil

Exception: 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.



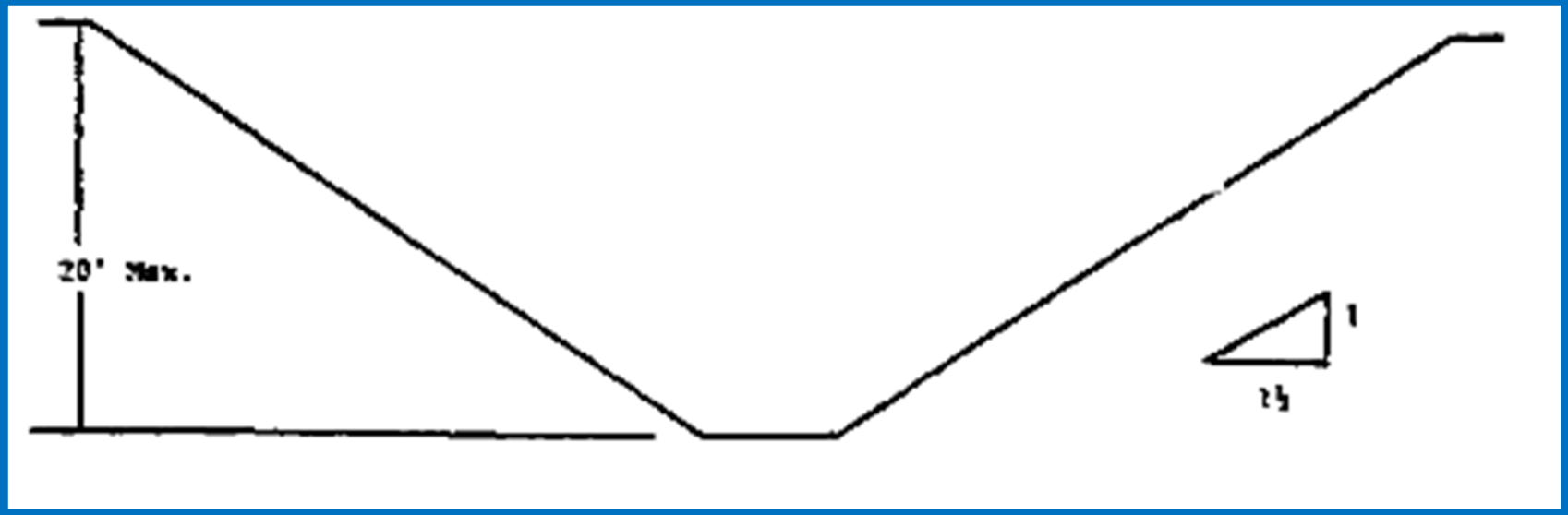
Excavations in Type B Soil

Simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



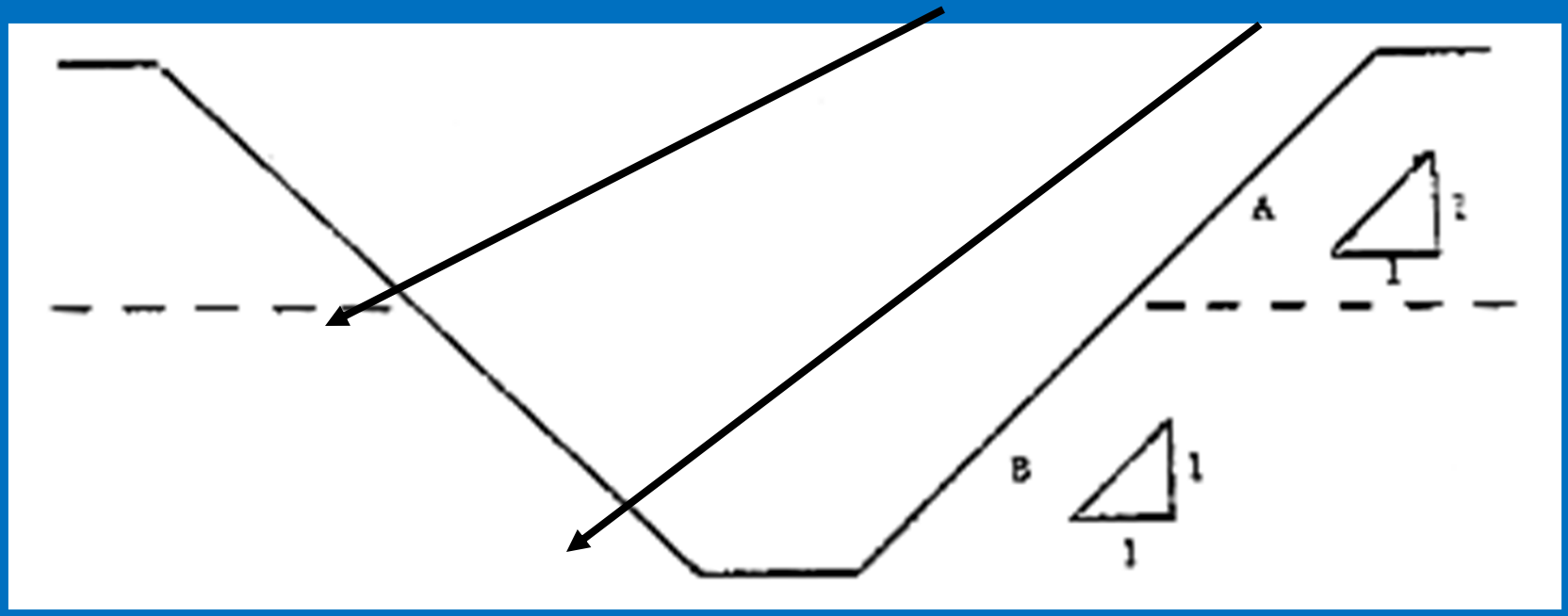
Excavations in Type C Soil

Simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1.



Excavations in Layered Soils

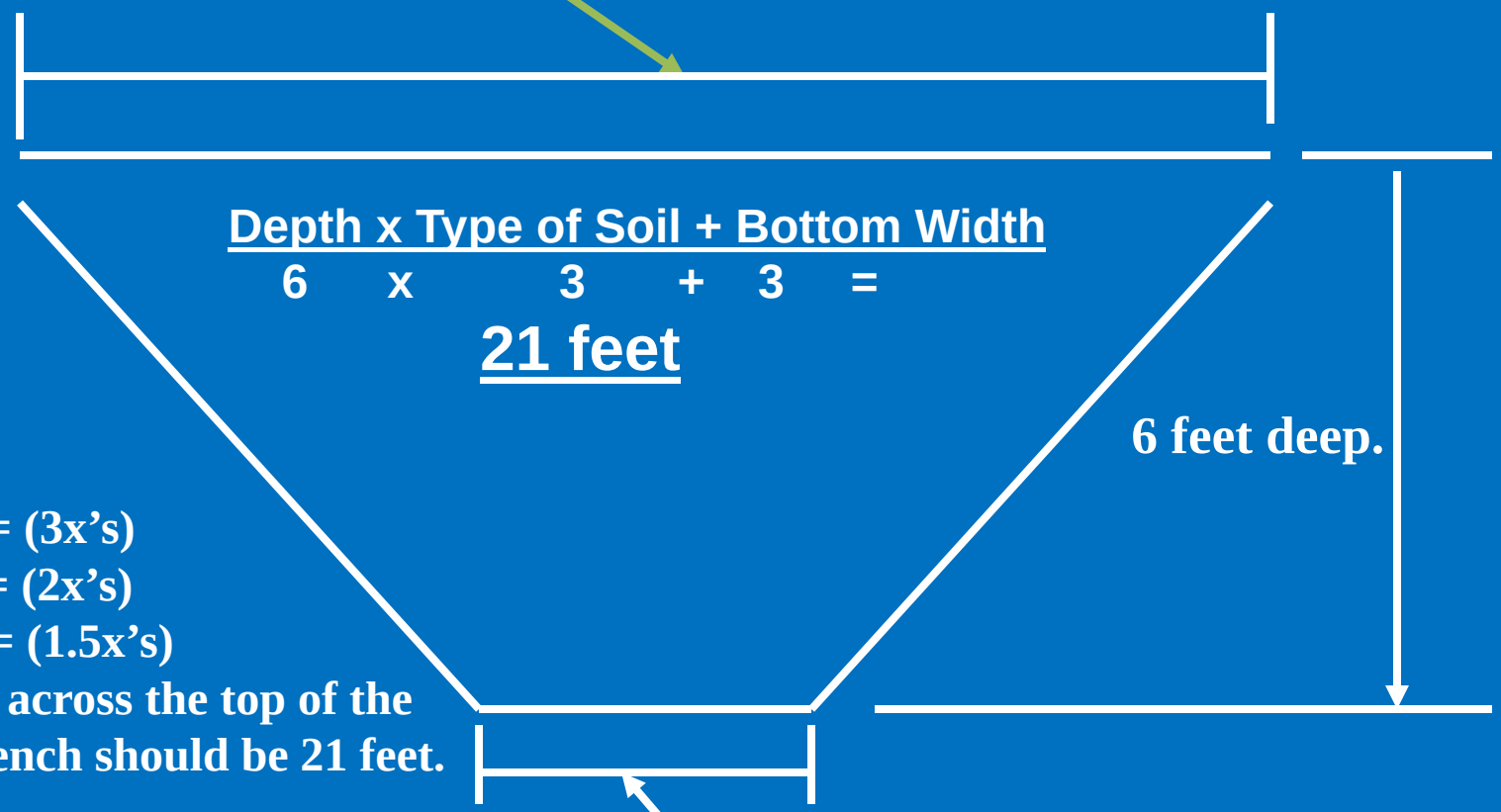
Excavations 20 feet or less in depth made in layered soils: A OVER B.



Note: Classified and layered in accordance to weakest layer since more stable soil does not lie under less stable soil

A Quick and Easy Method to Determine the Maximum Slope Allowed For a Trench

Needs to be 21 feet across.



Depth x Type of Soil + Bottom Width

6 x 3 + 3 =

21 feet

6 feet deep.

Class C soil = (3x's)
Class B soil = (2x's)
Class A Soil = (1.5x's)
The distance across the top of the Class "C" trench should be 21 feet.

3 feet wide at the bottom.

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Aluminum Hydraulic Shoring

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Aluminum Hydraulic Shoring

This type of protection may be used to prevent cave-ins in trenches 20 feet or less in depth.

Once the soil has been classified then the proper type of shoring system may be selected.

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Shield Systems

Do not subject the trench box to loads exceeding those which the system was designed to withstand.

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30

Trenching Hazard Considerations

Surface Encumbrances

- Remove or support if creating a hazard to employees
  - Sidewalks
  - Roads
  - Utility poles
  - Curbs
  - Mailboxes
  - Etc.

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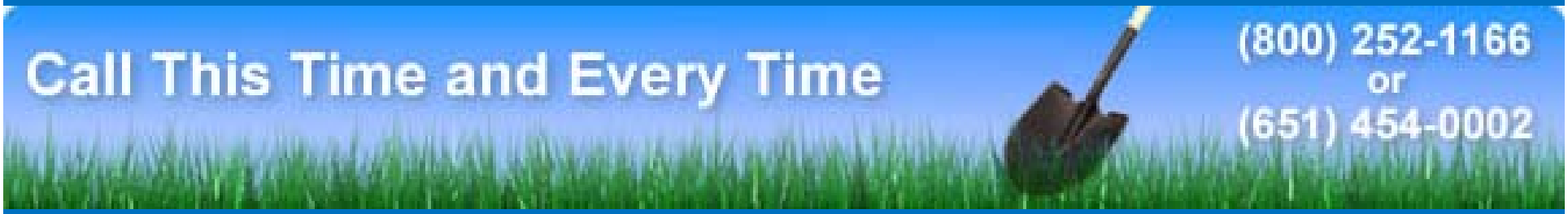

Gopher State One Call

Protect yourselves and your property against underground utility damage. Find out where the underground utilities might be buried before you begin excavation. Anyone working in Minnesota <u>must call</u> before excavating.

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- Gas-Oil-Steam
- Communication CATV
- Water
- Reclaimed Water, Irrigation
- Sewer
- Temporary Survey Markings
- Proposed Excavation

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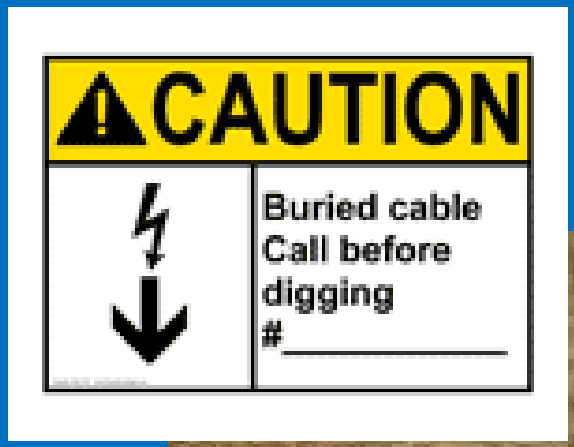

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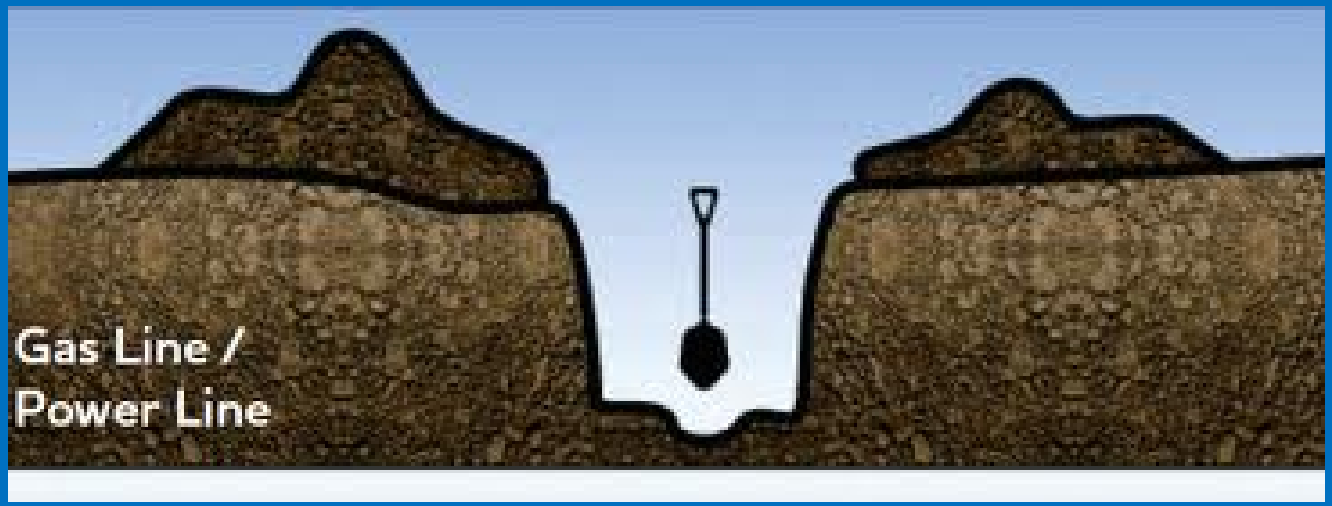

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Spoil Pile

At least 2 feet back from the edge of the trench.

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Access and Egress

Have a safe means for a way out of a trench, every 25 feet (7.62 m) of lateral travel.

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Exposure to Falling Loads

- Do not permit employees to work underneath loads handled by lifting or digging equipment.
- Overhead hazards require the need for hardhats.
- Additional MN Rule addressing high visibility garments.

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Exposure to Vehicular Traffic

- Warning vests or other suitable garments with reflectorized or high-visibility material shall be provided

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Hazards Associated With Water Accumulation

Do not allow employees to work in trenches where there is accumulated water.

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Remember Trench Inspections

Must be made by a competent person when:

- **Hazardous conditions exist.**
- **Prior to the start of work.**
- **After every rainstorm.**
- **As needed/conditions change.**

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1926.21 Training

The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.

“Nothing can be more deceptive than the harmless appearance of a deep trench!”

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