



Excavation & Trenching Safety

Presentation by
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WARNING


This presentation was prepared in support of the Department of Buildings *Excavation and Trench Safety Guidelines* Flyer. It illustrates what, in the author's opinion, are the most important issues related to excavation and trenching safety.

This presentation, as well as the *guidelines* flyer, are for informational purposes only. All such work must comply with the requirements in the NYC Building Code and the relevant rules and regulations. You must also comply with all relevant federal and state laws.

The presentation provides links to these as well as to other relevant Internet publications.

DOB Flyer

The Department of Buildings has identified excavation and trenching as areas where code compliance needs improvement. The attached flyer is being handed out to remind contractors, workers and the general public of the basic safety rules for excavation and trenching.



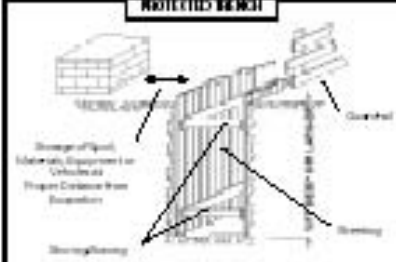
Michael R. Bloomingberg
Mayor
Peter J. Lawaender, F.A.S.
Commissioner

EXCAVATION AND TRENCH SAFETY GUIDELINES

January 2012


- ✓ Each side of an excavation or trench that is 5 feet or deeper must be protected by shoring, bracing and sheeting or be sloped – unless it is cut from rock.
- ✓ Each open side of an excavation or trench shall have a guardrail or a solid enclosure.
- ✓ Each excavation or trench shall have a way out, such as a ladder or ramp.
- ✓ Regularly check the walls of an excavation or trench for cracks, bulges and spalling and check the shoring for signs of distress -- especially after a rainstorm.
- ✓ Refer to §27-1032 of the NYC Building Code (www.nyc.gov/buildings) and OSHA's regulations (www.osha.gov) for details on the proper protection of an excavation or trench.

PROTECTED BENCH




SLOPED EXCAVATION

No Steeper Than 2:1




BENCHED EXCAVATION

Average Slope No Steeper Than 2:1



PROTECTED EXCAVATION



- 1. Do not work in an excavation or trench filled with running or standing water.
- 2. Do not work in an excavation or trench that is not properly protected.
- 3. Do not store spoil, materials or equipment along the edge of an excavation or trench.
- 4. Do not drive or park vehicles along the edge of an excavation or trench.

CALL 311 TO REPORT UNSAFE CONSTRUCTION ACTIVITY

OSHA

At about the same time, OSHA published its own card intended to remind the public of the safety rules for trenches.

OSHA Occupational Safety and Health Administration **Safety Tips**

Working safely in trenches

Do **NOT** enter an unprotected trench!

OSHA regulations **REQUIRE** the following to be present at **ALL** trenches:

Trenches 5 feet deep or greater **require** a protective system.

The walls of the trench **MUST** be one of the following:

- Sloped for stability; or
- Cut to create stepped benched grades; or
- Supported by a system made with posts, beams, shores or planking and hydraulic jacks; or
- Supported by a trench box to protect workers in a trench.

Excavated materials must be at least 2 feet back from the edge of trench.

An enter/exit ladder must be within 25 feet of workers.

For more complete information:
OSHA Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov OSHA 3110-10-10

Photo Courtesy OSHA

Contractors Shall Comply with both OSHA Regulations and the NYC Building Code

- **IT'S THE LAW**
- **IT MAY SAVE YOUR LIFE**
- **IT'S GOOD ENGINEERING AND BUSINESS PRACTICE**

Trench Walls will Collapse

Typically, trenches are only open for a short period of time (minutes or hours). The walls of any trench will eventually collapse; it is merely a matter of time. Short-term apparent stability is a temptation for a contractor to send workers into a dangerous trench in hopes of rapid progress and financial gain. Death or serious injury can result.

<http://www.cdc.gov/elcosh/docs/d0200/d000279/ilochap93.html>

Encyclopaedia of Occupational Health and Safety, fourth Edition Chapter 93 - Construction

Jack Mickle, Jack L. Mickle & Associates

Trenching/Excavation Accidents

Exposure Code	Description	Occurrences	%
012	Struck against stationary object	2	4%
013	Struck against moving object	1	2%
0220	Struck by flying object, unspecified	1	2%
	Caught in or compressed by equipment or objects, n.e.c.	4	8%
	Caught in or crushed by equipment or objects, n.e.c.	2	4%
004	Caught in or crushed in collapsing materials, unspecified	1	2%
041	Excavation or trenching cave-in	19	38%
042	Other cave-in	1	2%
0049	Caught in or crushed by collapsing materials, n.e.c.	4	8%
113	Fall from ladder	2	4%
0239	Struck by swinging or slipping object, n.e.c.	1	2%
313	Contact with overhead power lines	3	6%
319	Contact with electric current	3	6%
1120	Fall from floor, dock, or ground level, unspecified	1	2%
1124	Fall from ground level to lower level	3	6%
384	Depletion of oxygen in other enclosed, restricted, or confined space	1	2%

Cave-in is the most common accident in Excavation & Trenching

38%

J. Irizarry et al .
Analysis of
Safety Issues
in Trenching
Operations

Accidents vs. Trench Depth

37 % of all trenching accidents occur at depths less than 5 feet

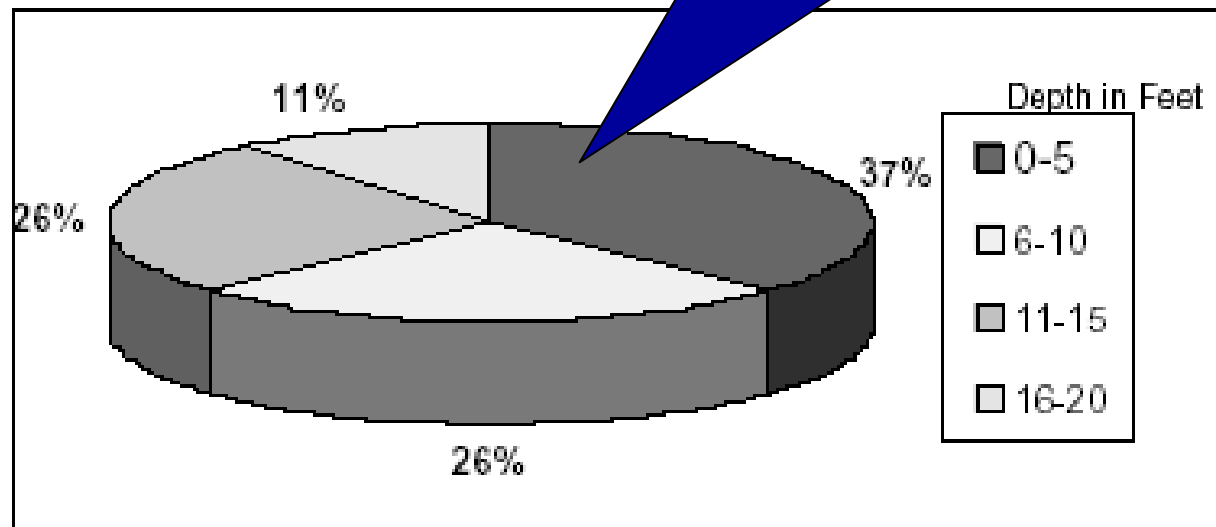


Figure 4 Total accident occurrence by trench depth - From OSHA's Integrated Management

J Irizarry et al . Analysis of Safety Issues in Trenching Operations

Most Fatalities Occur in Small Construction Projects

	Project Value	Percent	Cumulative
	\$50,000.00		
1	Under 50,000	28.51	28.51
2	50,000 - 250,000	18.81	47.38
3	250,000 - 500,000	10.35	57.73
4	500,000 - 1,000,000	8.94	66.67

28 %

\$1,000,000.00

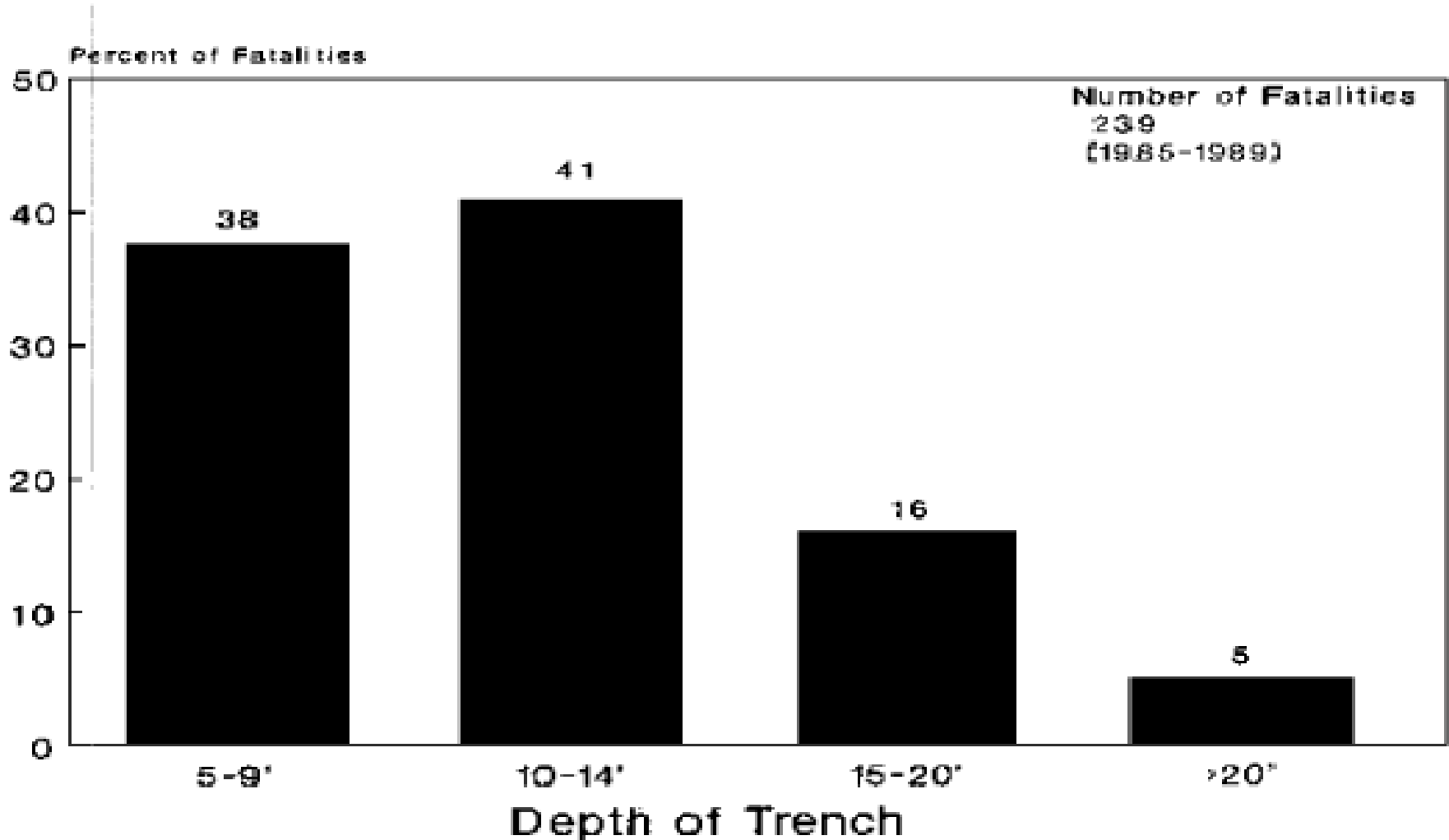
66.6%

Most Fatalities Occur:

- In trenches 5 feet to 14 feet deep
- In collapses that developed extremely fast.

-
- Additional [secondary] collapses are very common
 - Co-workers attempting to rescue someone can also become victims

**FIGURE 3.4.5
ANALYSIS OF TRENCHING FATALITIES**



Plan Before You Start Excavating

- Inspect the site. Collect information.
List the risks.
- Mitigate or eliminate potential problems
- Establish minimum rate of inspection
- Have written site safety plan, including emergency procedures

Understand Protection Requirements

- Determine project requirements and conditions
- Understand basic soil identification
- Understand available protection choices
 - Benching
 - Shoring
 - Terms
 - Selection
 - Installation and Removal
- Understand effects of water

EXCAVATION AND TRENCH SAFETY GUIDELINES

- ✓ Each side of an excavation or trench 5 feet or deeper must be protected by shoring/bracing and sheeting or trench shields -- unless it is cut from rock.
 - ✓ Each open side of an excavation or trench shall have a guardrail or a safety fence.
 - ✓ Each excavation or trench shall be kept clear of equipment, materials, and debris. Ladders or ramps shall be used for access and egress.
 - ✓ Regularly check the walls of an excavation or trench for cracks, bulges, or other signs of distress, and check the shoring and bracing -- especially after a rain.
 - ✓ Refer to §27-1032 of the Building Code (www.NYC.gov/buildings) and OSHA's regulations (www.osha.gov) for details on the proper protection of an excavation or trench.
-
- x Do not work in an excavation or trench filled with running or standing water.
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CONSTRUCTION ACTIVITY**

Soil Identification - General

See NYC [Building Code](#) Subchapter 11 -
Foundations Article 4.

- Rock
- Gravel
- Sand
- Silt
- Clay
- Fill

NYC Building Code and Soil

- Classification Intended for Excavation Protection and Sheet Piling
 - Hard
 - Likely to crack or crumble
 - Soft sandy filled in loose soil
- In most cases the top layer where excavation takes place is fill. It's worked and placed by man and has undetermined properties.

OSHA Soil Classification System

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure

- Stable Rock
- Type A Soils
- Type B Soils
- Type C Soils
- Layered

<http://www.osha.gov/Publications/Homebuilders/Homebuilders.html#subp>

Visual Determination-Soil Class

Soil class by OSHA is dependent on the condition of the soil in the vicinity of the excavation. Check for:

- ◆ Cracked ground at top or wall of excavation.
- ◆ Fill [earth that was added or disturbed]
- ◆ Excavation soil that is exposed to vibrations from traffic or construction equipment.
- ◆ Poor drainage around excavation or water seepage

Manual Tests

See the NYC Building Code -Table 11-1, Unified Soil Classification & Field Identification Procedures

See OSHA

- ◆ Plasticity
- ◆ Dry Strength
- ◆ Thumb penetration

<http://www.osha.gov/Publications/Homebuilders/Homebuilders.html#subp>

Safety Guidelines

Each side of an excavation or trench which is 5 feet or deeper must be protected by sheeting/bracing shoring or sloped unless it is cut from rock



Michael R. Bloomberg
Mayor
Patricia J. Lancaster, FAIA
Commissioner

EXCAVATION AND TRENCH SAFETY GUIDELINES

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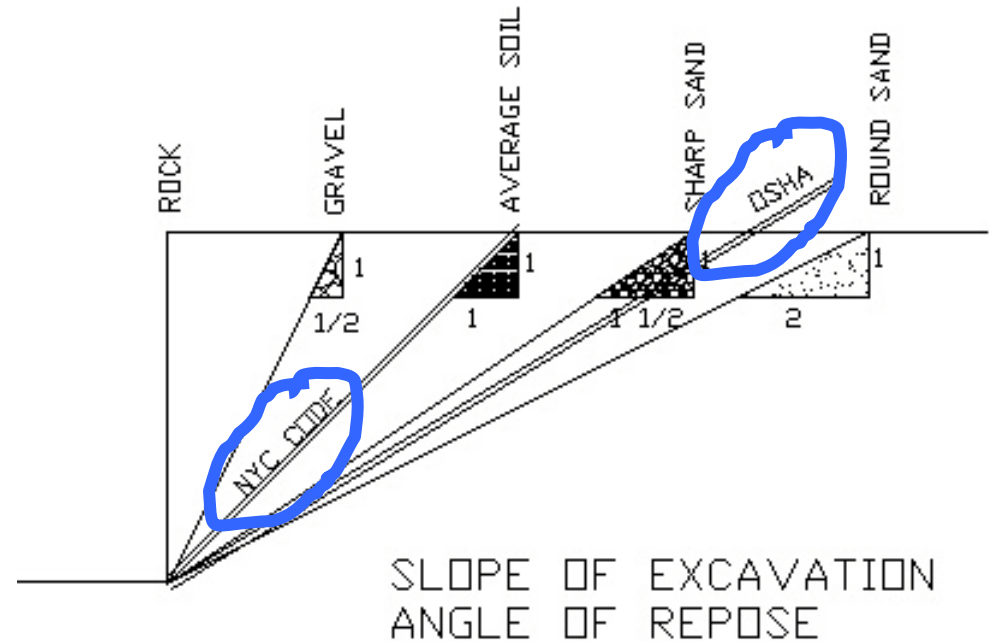
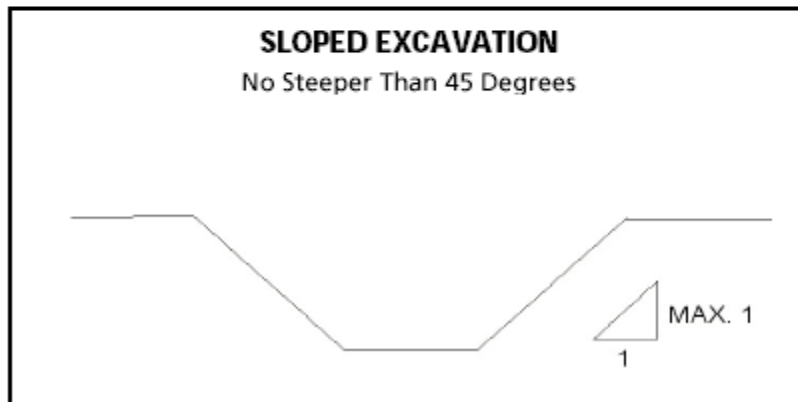
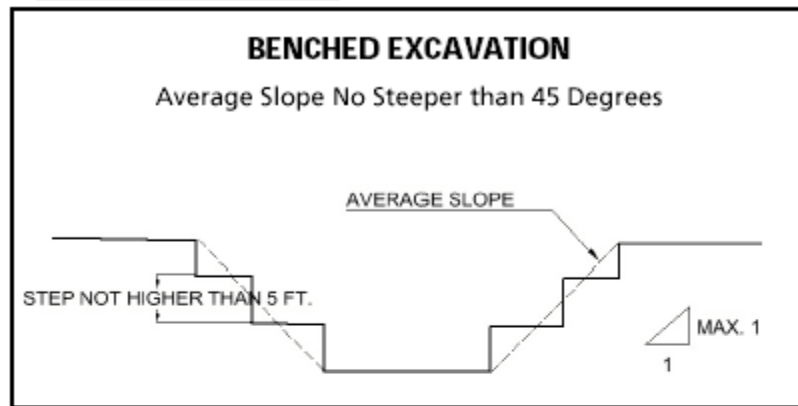
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Sloping & Benching -Required Configuration



Shoring Systems Selection

- ◆ Soil type must be known
- ◆ Depth and width of the excavation must be known
- ◆ One must be familiar with the NYC Building Code Tables

Building Code Terms for Shoring

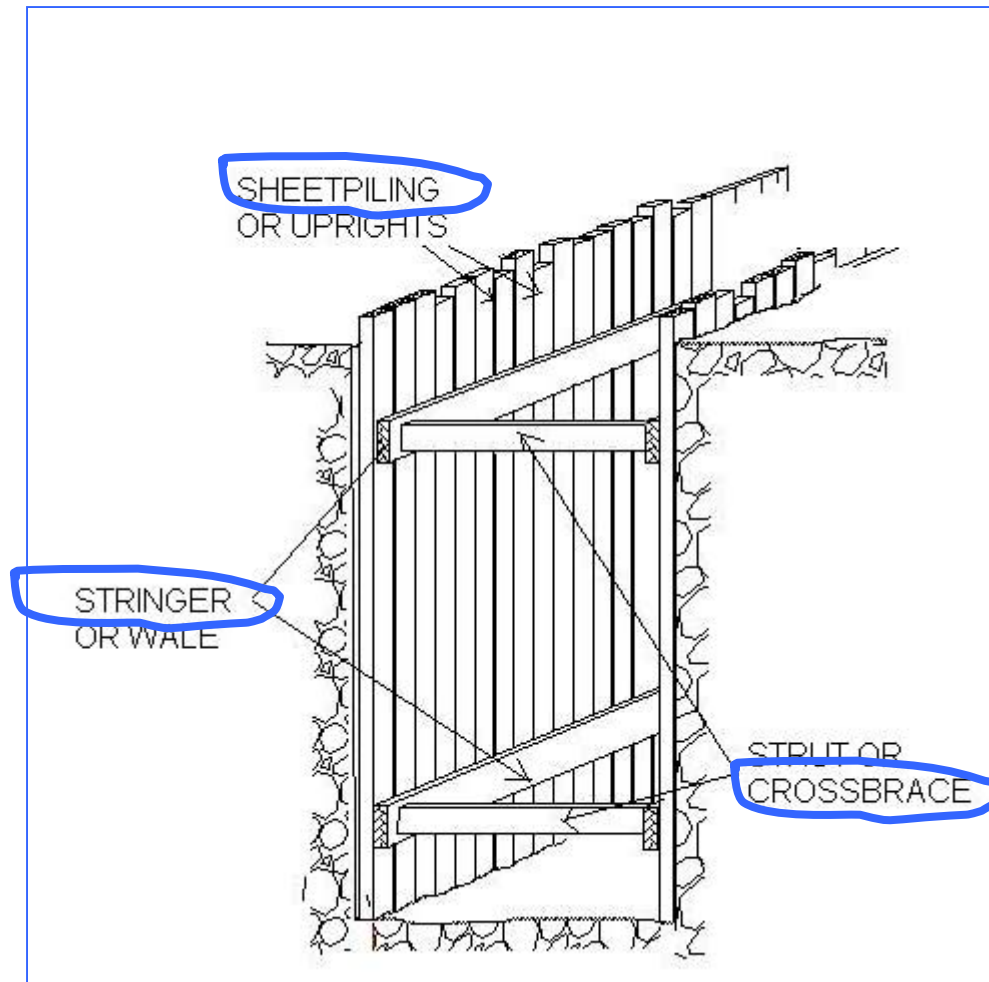


TABLE 19-1 MINIMUM SIZES OF TIMBER BRACING AND TIMBER SHEET PILING FOR TRENCHES FOUR FEET WIDE OR LESS ^a

Depth of trench, (ft.)	Sheet Piling		Stringers		Cross Bracing	
	Size (in.)	Horizontal spacing (ft.)	Size (in.)	Vertical spacing (ft.)	Size (in.)	Horizontal spacing (ft.)
Hard and solid soil						
5-10.....	2 x 6	6	2 x 6	6	2 x 6	6
10-15.....	2 x 6	4	2 x 6	6	2 x 6	4
More than 15	2 x 6	tight	4 x 8	4	4 x 8	6
Soil likely to crack or crumble						
5-10.....	2 x 6	3	2 x 6	5	2 x 6	5
10-15.....	2 x 6	2	2 x 6	4	2 x 6	4
More than 15	2 x 6	tight	4 x 10	4	4 x 10	6
Soft, sandy filled-in loose soil						
5-10.....	2 x 6	tight	4 x 6	6	4 x 6	6
10-15.....	2 x 6	tight	4 x 6	5	4 x 6	6
More than 15	2 x 6	tight	4 x 12	4	4 x 12	6
Where hydrostatic pressure exists						
To 10.....	2 x 6	tight	6 x 8	4	6 x 8	6
More than 10	3 x 6	tight	6 x 10	4	6 x 10	6

Note:

^a Steel sheet piling and bracing of equivalent strength may be substituted for wood sheet piling and timber bracing.

OSHA Terminology

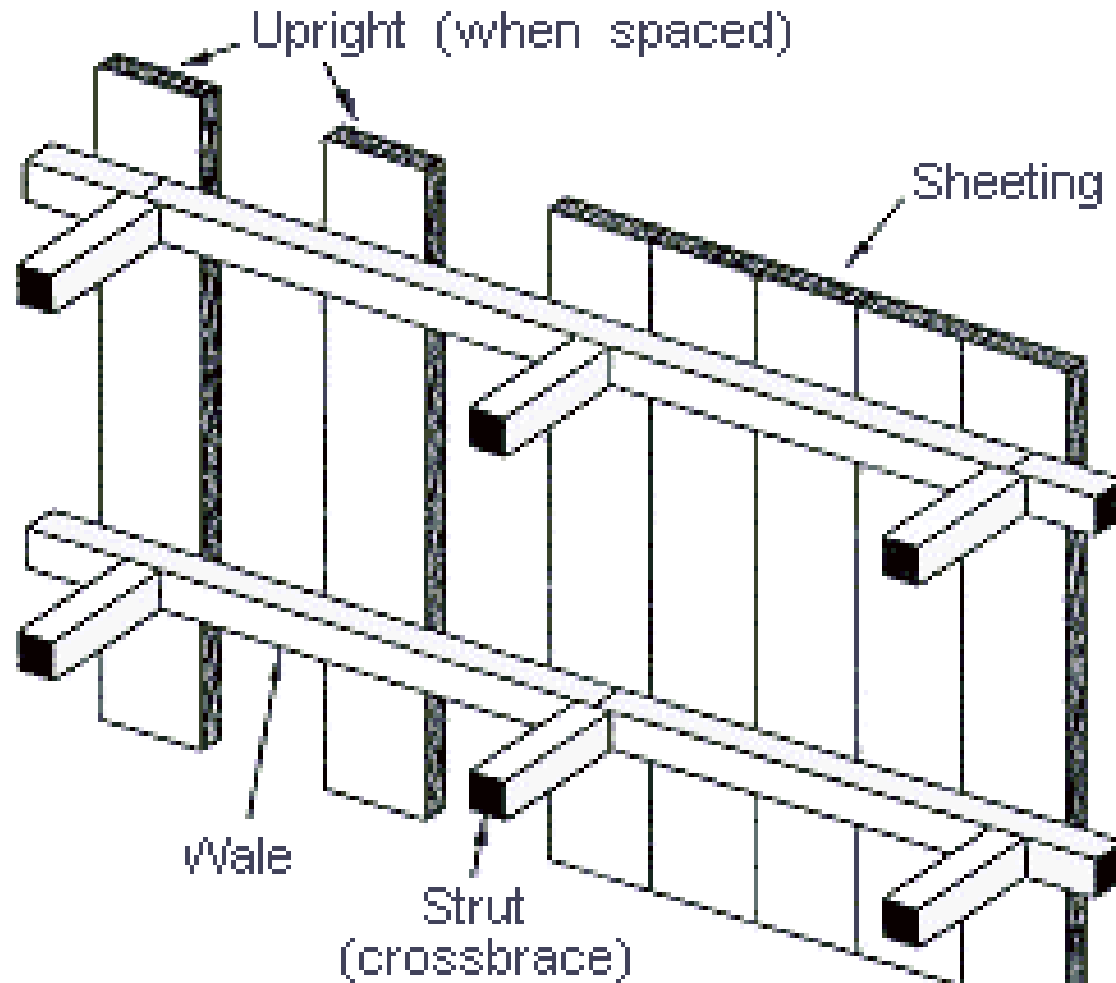
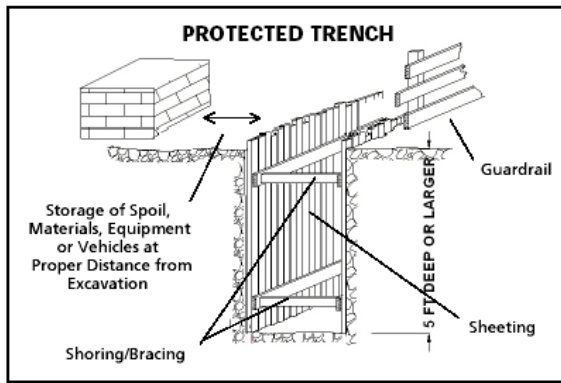


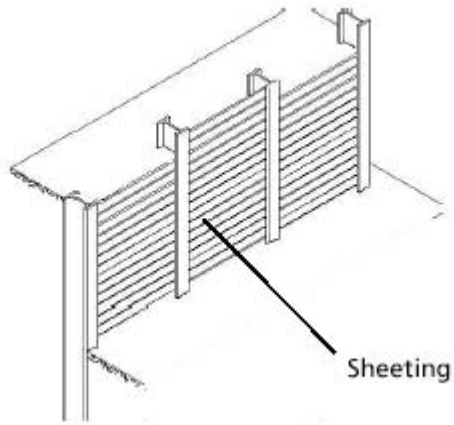
Photo Courtesy of OSHA



In this case, traffic exerts higher loads on walls of excavation - tables cannot be used.



PROTECTED EXCAVATION



Deeper excavations require engineered protective systems



Violation Issued: Improper shoring and improper benching.



The condition shown in the previous slide led to sidewalk collapse.



**EXCAVATION AND TRENCH
SAFETY GUIDELINES**



- ✓ Each side of an excavation or trench that is 5 feet or deeper must be protected by shoring/bracing and sheeting or be sloped - unless it is cut from rock.
- ✓ Each open side of an excavation shall have a guardrail or a solid
- ✓ Each excavation or trench shall have an access point, such as a ladder or ramp
- ✓ Regularly check the walls of an excavation or trench for cracks, bulging, or other signs of failure and check the shoring for stability -- especially after a rain
- ✓ Refer to §27-1032 of the Building Code (www.NYC.gov/buildings) for the proper protection of an excavation or trench.
- x Do not work in an excavation or trench filled with running or standing water.
- x Do not work in an excavation or trench that is not properly protected.
- x Do not store spoil, materials or equipment along the edge of an excavation or trench.
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Do not work in an excavation or trench filled with running or standing water.

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Accumulating or Standing Water Must Do's

- *Use of special support or shield systems approved by a registered professional engineer.*
- *Water removal equipment, i.e. well pointing, used and monitored by a competent person.*
- *Safety harnesses and lifelines used in conformance with 29 CFR 1926.104.*
- *Surface water diverted away from the trench. Employees removed from the trench during rainstorms.*
- *Trenches carefully inspected by a competent person after each rain and before employees are permitted to re-enter the trench.*

Despite significant shoring -water removal might still damage the adjoining building.



EXCAVATION AND TRENCH SAFETY GUIDELINES

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 - ✓ Each excavation or trench shall have an access out, such as a ladder or ramp.
 - ✓ Regularly check the walls of an excavation or trench for cracks, bulges and spalling and check the shoring for signs of distress -- especially after a rainstorm.
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**CALL 311 TO REPORT UNSAFE
CONSTRUCTION ACTIVITY**

Regularly check the walls of an excavation or trench for cracks, bulges and spalling. Check the shoring for signs of distress -- especially after a rain storm.

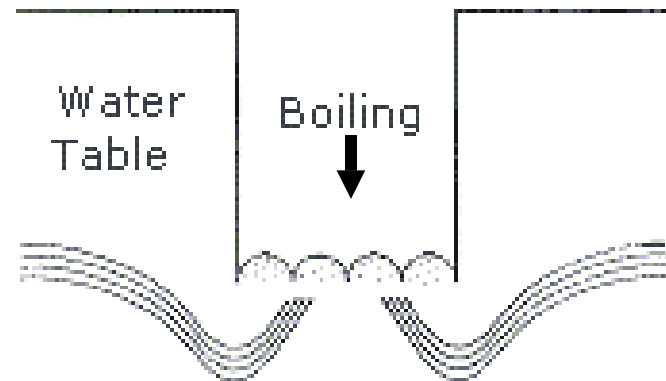
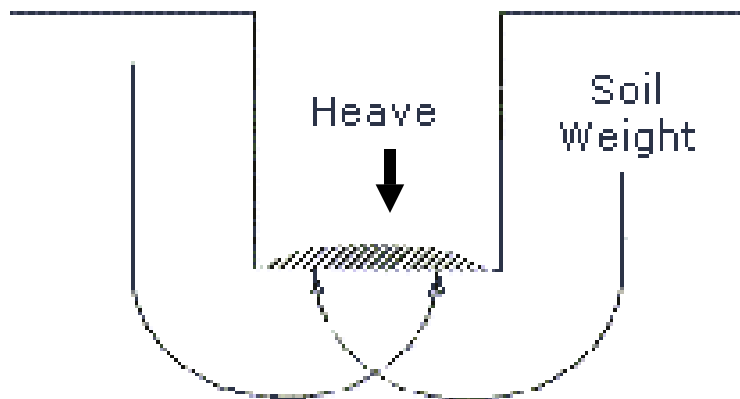
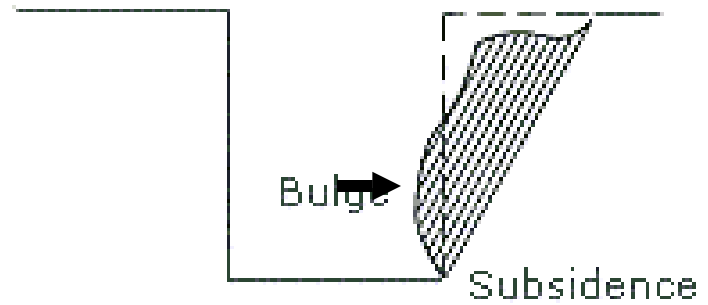
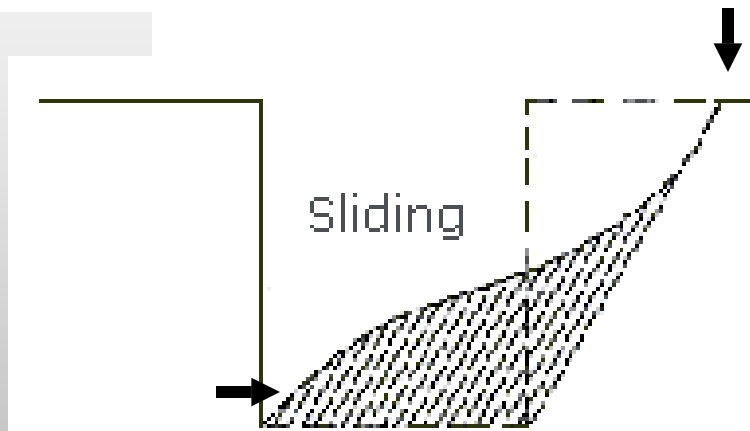
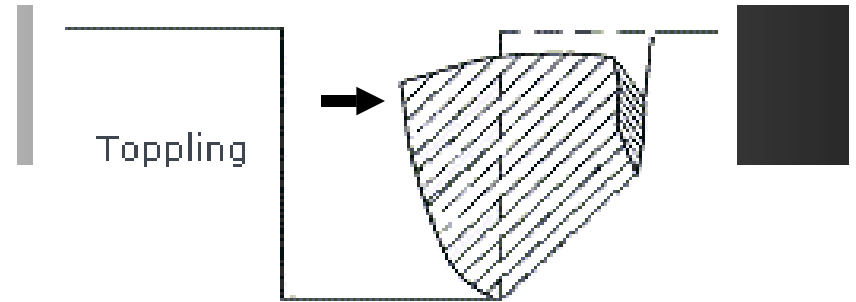
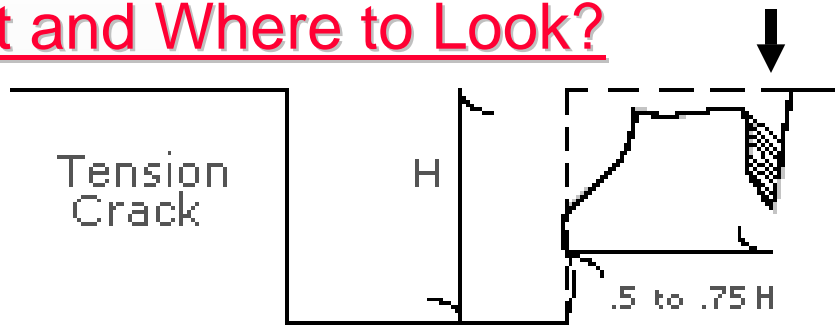
Daily Inspections Should Include:

- Area at the top of the trench
- Trench walls
- Excavated area at trench bottom
- Excavation protection system

Site Conditions Can Change Rapidly

- **Weather conditions. Inspect several times each day in case of :**
 - * Heavy rains and flooding
 - * Hot or Cold Temperatures
 - * Heavy Snow or Snow Melting
- **Vibration**
- **Dewatering**

What and Where to Look?



Tension cracks at a collapse



EXCAVATION AND TRENCH SAFETY GUIDELINES

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Do not store spoil, materials or equipment along the edge of an excavation or trench.

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CONSTRUCTION ACTIVITY**



Temporary Spoil Pile

2 ft. min.



Excavator left for the weekend too close to the trench edge. The improperly benched excavation might collapse.

Underground Installations - OSHA

(b)(1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(b)(2) Utility companies or owners shall be contacted .. to locate utility installations.

(b)(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(b)(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

Stability of Adjacent Structures

Excavation below the base of an existing foundation is not permitted as the foundation or the excavation wall might collapse.

Shoring is required when:

- A controlled inspection is required.
- A licensed engineer needs to specify procedure and protection.

Lack of such measures is one of the major causes of recent building distress and collapse.

Unprotected excavation next to existing building led to bearing wall collapse.





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EXCAVATION AND TRENCH SAFETY GUIDELINES

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Trench Ingress and Egress

Access to and exit from the trench require the :

- Trenches 4 ft or more in depth should be provided with a fixed means of egress.
- Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25 ft laterally to the nearest means of egress.
- Ladders must be secured and extend a minimum of 36 in (0.9 m) above the landing.
- Metal ladders should be used with caution, particularly when electric utilities are present.

Special Attention

- ◆ Removal of excavation support systems must be planned and usually proceed from the bottom up. Placing as well as removal of shoring or protecting systems shall be executed without inducing collapse.
- ◆ Must backfill together or immediately after removal of support system.
- ◆ Must follow specifications. All shoring members or any other protecting system shall be assembled together as per specs.
- ◆ Various elements of the support systems must be securely connected together and shall not be subjected to loads beyond their capacity such as those resulting from large vehicles or equipment.

Special Attention

- Installation of the support system is closely coordinated with the excavation of the trench. [1541.1(d)(1)]
- Workers are protected from cave-ins, structural collapse, or accidentally being hit during installation and removal of the support system. [1541.1(e)(1)(E)]
- Removal of shoring or other protective systems starts at the bottom of the excavation. Members are released slowly so structural failures will be noticed. [1541.1(e)(1)(E)]
- Backfilling progresses with the removal of support systems from excavations. [1541.1(e)(1)(F)]

Trench Rescue

Often, one death or severe injury in a trench is compounded by a poorly thought-out rescue attempt. The victim and rescuers may become trapped and overcome by deadly gases, fumes or lack of oxygen; drowned; or mutilated by machines or rescue ropes.

With failed rescue attempts, most of the dead are would-be rescuers. Emergency teams trained in trench rescue should be contacted immediately in the event of a cave-in.

<http://www.cdc.gov/elcosh/docs/d0200/d000279/ilochap93.html>

Encyclopaedia of Occupational Health and Safety, Fourth Edition
Chapter 93 - Construction

Jack Mickle, *Jack L. Mickle & Associates*

Basic Rules of Trench Rescue

- Immediately get help from units trained in trench/confined space rescue
- Call 911
- Do not enter trench
- Get people out of the trench

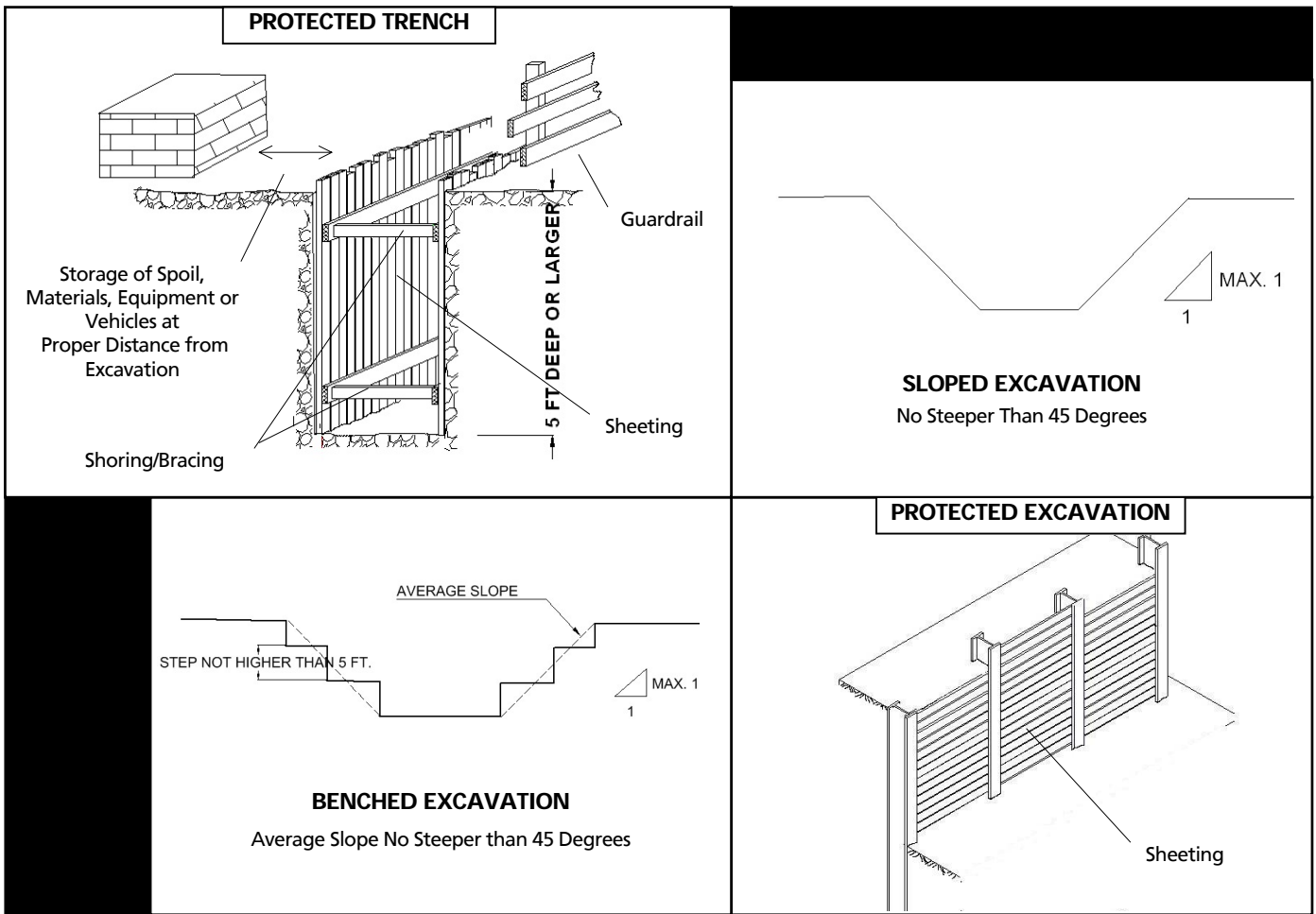
Bibliography

- New York City Building Code
[http://10.217.254.107/NXT/gateway.dll?f=templates&fn=default.htm\\$vid=BldgCd2:viewBC](http://10.217.254.107/NXT/gateway.dll?f=templates&fn=default.htm$vid=BldgCd2:viewBC)
- CDC -Occupational Fatalities During Trenching and Excavation Work –United States, 1992-2001
www.cdc.gov/mmwr/preview/mmwrhtml/mm5315a2.htm
- CIRPC-University of Tennessee, Knoxville –An Analysis Of Fatal Events In The Construction Industry –2001 prepared for Office of Statistics –OSHA
<http://www.cdc.gov/elcosh/docs/d0300/d000333/d000333.pdf>
- CIRPC-University of Tennessee, Knoxville –An Analysis Of Fatal Events In The Construction Industry –2000
<http://www.cdc.gov/elcosh/docs/d0600/d000644/d000644.PDF>
- CIRPC-University of Tennessee, Knoxville –An Analysis Of Fatal Events In The Construction Industry –1999 prepared for Office of statistics –OSHA
<http://www.riskworld.com/Nreports/2001/Construction/C010802.htm>
- Charles Culver et al. Analysis of Construction Fatalities - The OSHA Data Base 1985-1989
http://www.osha.gov/Publications/Construction_Fatalities/Confat.pdf
- OSHA Technical Manual SECTION V: CHAPTER 2 EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING
http://www.osha.gov/dts/osta/otm/otm_v/otm_v_2.html#1
- Larry C. Brown et al , Ohio State University Trenching And Excavation Safety Principles
<http://ohioline.osy.edu/aex-fact/0391.html>
- J Irizarry et al . Analysis Of Safety Issues In Trenching Operations, Purdue University
<https://engineering.purdue.edu/CSA/publications/trenching01>
- Trenches and Excavations Checklist - Taken from the "Tailgate Meetings that Work : A Guide to Effective Construction Safety Training" series
<http://www.cdc.gov/elcosh/docs/d0200/d000246/d000246.html>

EXCAVATION AND TRENCH SAFETY GUIDELINES

January 2005

- ✓ Each side of an excavation or trench that is 5 feet or deeper must be protected by shoring/bracing and sheeting or be sloped – unless it is cut from rock.
- ✓ Each open side of an excavation or trench shall have a guardrail or a solid enclosure.
- ✓ Each excavation or trench shall have a way out, such as a ladder or ramp.
- ✓ Regularly check the walls of an excavation or trench for cracks, bulges and spalling and check the shoring for signs of distress -- especially after a rainstorm.
- ✓ Refer to §27-1032 of the NYC Building Code (www.NYC.gov/buildings) and OSHA's regulations (www.osha.gov) for details on the proper protection of an excavation or trench.



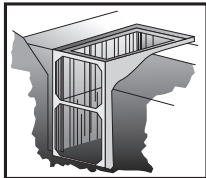
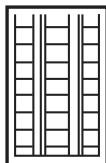
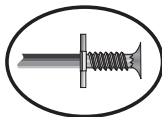
- × Do not work in an excavation or trench filled with running or standing water.
- × Do not work in an excavation or trench that is not properly protected.
- × Do not store spoil, materials or equipment along the edge of an excavation or trench.
- × Do not drive or park vehicles along the edge of an excavation or trench.

CALL 311 TO REPORT UNSAFE CONSTRUCTION ACTIVITY

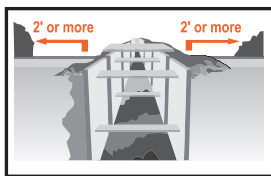
Working Safely in Trenches

Two workers are killed every month in trench collapses. Each worker in a trench shall be protected from a cave-in by an adequate protective system. Some of the protective systems for trenches are:

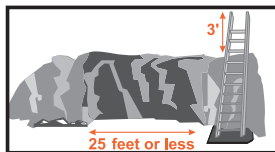
- Sloped for stability; or
- Cut to create stepped benched grades (Type A or B soil only); or
- Supported by a system made with materials such as posts, beams, shores or planking and hydraulic jacks; or
- Shielded by a trench box to protect workers in a trench.



Excavated or other materials and equipment must be at least 2 feet back from the edge of a trench; and



A safe way to exit must be provided within 25 feet of workers in a trench.



A competent person must inspect trenches daily and when conditions change. An unprotected trench is an early grave. Do not enter an unprotected trench.

For more information:



U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

TTY (887) 889-5627