

Fatality Assessment & Control Evaluation

Prevention through comprehensive research and investigation

INVESTIGATION/RESEARCH

In Michigan, from 2001-2005, 8 workers have been killed when a trench wall collapsed and buried the worker. Five of these workers were working on making sewer pipe taps. These include:

- 18-year-old male carpenter working on a sewer lead when a 9 ft trench wall collapsed.
- 22-year-old male construction worker replacing a sewer lead to a residence when an 8 ft trench wall collapsed.
- 37-year-old male plumber replacing a residential underground sewer pipe when a 9 ft trench wall collapsed.

TRENCH CAVE-INS KILL

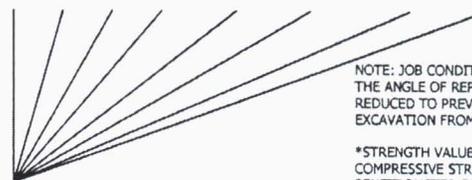


IN ORDER TO PREVENT SIMILAR INCIDENTS IN THE FUTURE

- **Designate** a qualified person (QP).
- **Locate** underground utilities.
- **Identify** soil type.
- **Determine** angle of repose (benching, sloping) or supporting system (shoring) designed by the QP.
- **Require** appropriate angle of repose or supporting system for excavations when one side over 5' in depth. See Table 1.
- **May Use** portable trench box or sliding trench shields in place of shoring or sloping. Benching permitted when toe of trench box is not more than 2' above trench bottom. **Extend** trench box at least 18" above top of trench if trench is to be sloped above the box.
- **Place** spoils at least 2' away from excavation edge.
- **Use** ladder or other means of egress at least every 25' along an excavation which is 4' or greater in depth.
- **Ensure** ladder extends at least 3' above trench edge.

TABLE 1
MAXIMUM ALLOWABLE ANGLE OF REPOSE FOR THE SIDE OF AN EXCAVATION IN EXCESS OF 5' DEPTH

SOLID ROCK FORMATION (90°)
FRACTURED ROCK FORMATION 1/4":1 (75°)
STIFF CLAY WITH MINIMUM OF 1.5 T.S.F.* 1/2":1 (63°)
FIRM CLAY A MINIMUM OF 1.5 T.S.F.* 2/3":1 (56°)
GRANULAR SOIL (DRY) DRY SAND OR CLAY FILL: DRY SAND AND CLAY (LOAM) MIXTURES: MEDIUM CLAY WITH MINIMUM OF 1.0 T.S.F.* 1:1 (45°)
GRANULAR SOIL (WET CLAY OR SILT SEAMS), RUBBLE OR TRASH FILL FIRM OR MEDIUM CLAYS WITH RUNNING SAND SEAMS 1 1/2":1 (34°)
SATURATED GRANULAR SOIL SOFT CLAYS WITH LESS THAN 1.0 T.S.F.* 2:1 (26°)
RUNNING SOIL (SAND OR CLAY) 3:1 (18°)



NOTE: JOB CONDITIONS MAY REQUIRE THE ANGLE OF REPOSE SHOWN IN THIS TO BE REDUCED TO PREVENT THE SIDE OF THE EXCAVATION FROM FAILURE.

*STRENGTH VALUES ARE GIVEN IN UNCONFINED COMPRESSIVE STRENGTH AS MEASURED BY A PENETROMETER OR LABORATORY TEST.

MIOSHA Part 9, Page 3

DID YOU KNOW?

- Every trench is an unnatural condition and will collapse. It is just a matter of time!
- A trench is an excavation having a depth greater than its width measured at the trench bottom.
- Clay soils are the most deadly when trench walls collapse.
- One cubic yard of soil can weigh over 3000 lbs.
- Trenches less than 5' in depth need sloping or shoring if hazardous earth movement expected.
- Lack of slope/support of excavation over 5' deep and placement of spoils and obstructions within 2' of excavations are the most frequently cited violations by MIOSHA.
- If different textured soils are encountered you must cut side to soil-required angle of repose.
- MIOSHA CET has an excavation and trenching awareness training class.

MIFACE: www.oem.msu.edu

FACEWeb: www.cdc.gov/niosh/face/

MIOSHA Excavation, Trenching and Shoring Construction Standard, Part 9. Click on

Construction. www.michigan.gov/mioshastandards/

MIOSHA Consultation, Education and Training Division: Click on MIOSHA, then CET.

www.michigan.gov/cis

OSHA Construction eTool: Trenching &

Excavation: www.osha.gov/SLTC/etools/construction/

Hazard Alert #9 7/26/06

**TO REPORT A NEW WORKPLACE
FATALITY TO MIOSHA**

1.800.858.0397

**MICHIGAN FATALITY ASSESSMENT &
CONTROL EVALUATION**

INFORMATION: 1.517.353.1846

E-MAIL: debra.chester@ht.msu.edu