

**Case 218. 36-year-old Hispanic construction laborer died when an excavation collapsed.**

A 36-year-old Hispanic male construction laborer was killed when an excavation collapsed. The decedent was a member of a three-person crew assigned to repair a residential leaking water main. The crew consisted of an equipment operator, a foreman and the laborer (decedent), with oversight by a municipal inspector. The soils along the west side consisted of an undetermined depth of roadbed and soil of an unknown composition. The soils directly to the north, south, and east consisted of unknown backfill material. All soils were saturated with water. The foreman used a probing rod, to determine soil type. When the work crew arrived, water was observed bubbling out of the 5-foot wide grassy area between the curb and sidewalk. The decedent and the equipment operator shut off the water for the affected main while the foreman began to remove the soil using a front-end loader with a backhoe attachment located at the south end of the excavation. The contract with the municipal department required a 30-foot square cut as a maximum opening size for the excavation. The excavation was approximately 6 feet long and 7 feet 2 inches deep. The width at the bottom was 6 feet 9 inches and the width at the top was 5 feet 6 inches. All four of the excavation walls were nearly vertical. Water saturated spoils were placed on the roadway, along the west side of the excavation and flowed to the west and over the opposite curb. A pump was used to remove water from the excavation. The roadway had been undercut approximately 15 inches to expose the leak location and to obtain adequate clearance to make a “cut out” repair. The decedent and equipment operator found the 8-inch water main leak. The excavation was repeatedly entered via a ladder located on the east wall of the excavation next to the sidewalk at the north end to clean around the pipe so repairs could be made. Water saturated soil was entering the excavation on the north side. The foreman placed loose straw and 1-inch by 6-inch boards against the north wall while the decedent hand-dug with a shovel around the water main. The decedent was standing on the water main due to the water level at the base of the excavation as he was cleaning. The foreman was in the excavation and the equipment operator was at the top of the east side of the excavation to watch the excavation walls. The roadway curb was located approximately vertical to the decedent’s position. The equipment operator and inspector watched as the roadway curb and street buckled creating an audible “pop” as the concrete dropped into the excavation. The equipment operator yelled a warning to the decedent and the foreman to watch out. The sides of the excavation, concrete roadway, and a portion of a concrete driveway apron collapsed into the bottom of the excavation. The decedent was struck by and trapped by the falling roadway and soil. Emergency response was called and while waiting for emergency response to arrive, the crew used the backhoe to lift pieces of the roadway from the decedent. Emergency response arrived, and ordered the decedent’s coworker out of the excavation. The decedent was declared dead at the scene after several hours of trying to extricate him from the excavation.

MIOSHA Construction Safety and Health Division issued the following Willful/Serious and Serious citations to the employer at the conclusion of its investigation:

**WILLFUL/SERIOUS: EXCAVATION, TRENCHING, AND SHORING, PART 9.**

- **RULE 933(2):**  
An excavation that an employee was required to enter did not have excavated and other material stored and retained not less than 2 feet from the excavation edge.

Water saturated soils in the roadway approximately 26 inches tall by 8 feet long by 5 feet wide were permitted to spread from the curb as close as 6 inches from the edge of the excavation while 3 employees entered the excavation to repair a leaking water main on the west side of the excavation.

- **RULE 933(1):**  
A tree, boulder, rock fragments, or other obstructions whose movement could cause injury to an employee were not removed or supported.

Three employees are working at the bottom of an approximately 7-foot 2-inch deep excavation with:

**INSTANCE A**

North side edge of the excavation has an approximately 4-inch thick by 5-foot 6-inch wide concrete driveway apron. A 4-sided section approximately 1 foot 2 inches by 6 foot 9 inches by 4 foot 3 inches by 5 foot 6 inches and 4-inch thick collapsed into the excavation.

**INSTANCE B**

East side of the excavation has approximately 4-inch thick by 5-foot by 5-foot concrete sidewalk directly on the edge of the excavation.

**INSTANCE C**

West side of the excavation has approximately a 7-inch thick concrete roadway with an integral 6-inch by 13-inch thick curb. An approximately 8-foot by 3-foot 4-inch by 7-inch thick section collapsed into the excavation where employees were in the excavation. One employee was struck on the shoulder and pinned while repairing water main break.

- **RULE 932(5):**  
An ongoing inspection of an excavation or trench was not made by a qualified person.

Methods of determining soil conditions/angle of repose and bracing design for soil types were not consistent with that of a qualified person. Straw and 1-inch by 6-inch lumber is being used in an attempt to support saturated soil in an excavation with standing water and sloughing sides entered by the employees to repair water main break.

- **RULE 933(2):**  
The side of an excavation more than 5 feet deep was not sloped as prescribed in Table 1., unless supported as prescribed in this part.

Employees engaged in water main break repair activities with sides of excavation not cut to proper angle of repose – no shoring/no trench box. Excavation: 6 feet long and 7 feet 2 inches deep, width at bottom is 6 feet 9 inches and width at top is 5 feet 6 inches. North side of excavation is near vertical. South side of excavation is near vertical. East side of excavation is near vertical. West side of excavation is near vertical.

#### INSTANCE A

Two employees entered the excavation when the water main was exposed to find break. They exited the excavation to have the front end loader expose more of the water main.

#### INSTANCE B

Three employees entered the excavation to perform water main repair activities until sides started to slough into the excavation

#### INSTANCE C

Two employees were in the excavation at the time of the incident. Employee was installing straw and 1-inch by 6-inch lumber and prepping the water main for repair with a shovel. A portion of the street approximately 8 feet 3 inches long by 3 feet 4 inches wide by 7 inches thick, fell into the excavation and pinned on employee down while surrounded by soil.

#### **SERIOUS: EXCAVATION, TRENCHING, AND SHORING, PART 9, RULE 942(2):**

A support system was not designed by a qualified employee. The design of the supporting system was not maintained at the jobsite. Changes from the design of the support system were not approved by a qualified employee.

There is no design for a support system consisting of 1-inch by 6-inch wide length of lumber and straw used for a 7-foot 2-inch deep excavation in water saturated soils used by employees during water main repair.