Massachusetts Piledriver Dies When Struck By Pile in Trench

Investigation: #98-MA-021-01

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SUMMARY

On March 11, 1998, a 47 year old male construction worker was fatally injured when he was struck by an wooden pile weighing approximately 1500 pounds. The 50 foot long pile was suspended within the leads of a piledriving crane while the victim was setting the bottom of the pile. He was working in a 15 foot deep trench at the time of the incident. According to co-workers, the hammer was lowered by the crane operator and struck the pile before it was set causing it to swing into the victim. The victim was pushed into the wall of the trench box and killed. Emergency medical assistance was immediately summoned while co-workers attempted to assist him. The victim was pronounced dead at the scene and transported to the medical examiner's office.

To prevent future similar occurrences, the MA FACE Director concluded that employers should:

- **employ only competent crane operators experienced in the type of equipment to be operated, in this case, a piledriver.**

- **develop and maintain a health and safety program which includes but is not limited to regular consultation with employees on safety issues**

Also, the state and/or other certifying agencies should:

- **consider issuing a special license for the operation of cranes as piledrivers**

INTRODUCTION

On March 11, 1998, the MA FACE Program was informed through its Occupational Fatality Hotline by a Massachusetts medical examiner that a 47 year old male piledriver had died that morning of injuries received in a machine-related incident on a public works mega-project. An investigation was immediately initiated. On the same day the FACE Director traveled to the incident site to review where the incident occurred and conduct interviews. On the following day, OSHA organized an inspection of the crane involved in the incident by the manufacturer's representative and a certified crane inspector. The FACE Director attended the

day-long crane inspection. Multiple photographs, witness interviews, the death certificate, police report and OSHA information were obtained during the course of the investigation.

The employer was a unionized pile driving company. The company had been in business for thirteen years and employed fifteen people on a regular basis, with seven of those people at the incident site. The company had a designated safety officer and written safety rules and procedures in place for the tasks being performed by the victim and the crane operator at the time of the incident.

Six of the employees on the site, including the victim, were union piledrivers (carpenters) and had received training through a union apprenticeship. The piledrivers are members of the United Brotherhood of Carpenters and Joiners. The operator of the piledriver (crane) was also an employee of the company, and had recently joined the local operating engineers union. He had not gone through the apprentice training program of that local. The operator was licensed by the state to operate the crane.

INVESTIGATION

On Friday, March 6, a piledriving crew arrived on the site of a utility relocation project to set up their operation. Their job was to drive wood piles that would support a large combined sewer overflow flow pipe that was to be installed. The project was part of a multi-year public works mega-project to depress a highway underground through the city. The relocation of utilities had been going on for several years throughout the city. The site was located under a major road leading into the downtown. During non-work hours the site was covered with metal plates and traffic traveled over the trench. While the men were working traffic was slowed into one lane. This particular company and crew had just completed a similar project less than a mile away. No problems were encountered during setup.

On the following Wednesday, March 11, work continued as usual. Six piledrivers (carpenters), including one working foreman, and a crane operator were on site. Their task that day was to continue to drive piles and then cut the piles to a given height.

A piledriver (machine) is a modified crane in which two separate lines are used. One line is used to hoist the pile into position. A second line is used to hold the hammer in place. The hammer has two parts. One is a sleeve which holds the pile in place. The other is the striking surface which hammers the pile into the ground. When the pile is set, the hammer is lowered onto the pile and the sleeve will contain about a foot of the pile. The hammer then strikes the pile repeatedly until the pile reaches resistance as specified in the contract. The hammer on this vehicle was air-powered.

The locations for the piles are marked on the ground by stakes and spray paint. A pile is set by being lifted by the crane inside a cage, called the leads, then the leads and the pile are moved into position as near to the marked positions as possible. The pile is lowered a certain amount until it is just above the ground. A piledriver (carpenter) called a spotter then works at the base of the pile to move it into its exact position for driving. When the pile is set and the

hammer, which weighs approximately 5 tons, is lowered onto the pile, the pile presses into the ground from several inches to several feet. This stabilizes the bottom for hammering the pile further into the ground. Under certain circumstances, piles are driven up to 100 feet underground.

Another piledriver (carpenter) called the monkey is located at the top of the pile. His task is to hold the pile at the top so that the hammer is lowered onto the pile correctly. He climbs up the leads in order to be in position for this task.

At the time of the incident, a spotter (the victim) was setting a pile in a trench approximately 15 foot deep. The trench walls were held in place by metal trench shields. The pile was to be set approximately 18 inches from the wall of the trench shield. The wooden pile was over 50 feet in length with a diameter of approximately 12 inches and weighed approximately 1500 pounds. The crane had lowered the pile to within a foot of the ground. The victim manually pulled the pile into position over the mark on the ground. Observing this, another spotter outside the trench then signaled or told the operator to lower the pile into place by calling for "line 1", which indicates the hoist line. Instead of lowering "line 1", the operator lowered "line 2" which lowered the hammer. The hammer then came down onto the top of the unstable pile knocking the bottom into the victim. He was pushed against the wall of the trench and struck in the head by the pile.

Two co-workers rushed into the trench to assist him while another called for emergency help on a cellular phone on the site. Emergency medical services responded immediately and attempted to resuscitate the victim. He was, however, pronounced dead on the scene.

The investigation revealed that the operator had little or no experience with piledriving although he was a licensed and experienced crane operator. No separate license is required to operate cranes that have been modified and set up for piledriving. Because of the large project in progress, cranes and operators had been brought in from other areas. The operator had been employed by this piledriving company for about a week at the time of the incident. He had operated the same crane on a similar job during that week. Co-workers mentioned that the operator was having problems with operating the piledriver. He had had some problems with the hammer slipping and had requested that adjustments be made to the brake for that line. The adjustments were made and the brakes were checked and found to be operating properly. One crane inspector noticed that a rag had been tied around one of the controls, possibly to assist the operator in feeling which control operated which line.

The crane involved in the incident was a crawler mounted lattice boom 65-ton capacity Manitowoc Model # 2900WC. The leads were approximately 80 feet high. The inspection of the crane revealed no deficiencies. All parts of the crane were operating properly at the time of the incident.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt trauma to head.

RECOMMENDATIONS

Recommendation #1: Employers should employ only competent crane operators experienced in the type of equipment to be operated, in this case, a piledriver.

Discussion: The piles to be driven on this worksite were in close quarters with no room for error. Due to production requirements and the lack of available experienced piledriver operators, the employer chose to employ a less experienced operator. The work area where the incident occurred was located beneath a major road leading into the city. Therefore while work was in progress half of the roadway was closed causing traffic problems. This situation created a certain pressure to complete the job as quickly as possible. It was not a good situation for an inexperienced operator.

The responsibility of the operator in these situations is unique considering the inherent safety hazards in piledriving and the number of people affected. Recognizing this unique situation, the ANSI B30.5-1968, Safety Code for Crawler, Locomotive and Truck Cranes, Section 5-3.1.3 d. states:

> "The operator shall be responsible for those operations under his direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured."

It therefore follows that the crane operator should be experienced in the particular work to be done and competent in making important safety decisions. Employers place a huge responsibility on the crane operator and therefore should employ only operators who have the experience to accept that responsibility.

Recommendation #2: Employers should develop and maintain a health and safety program which includes but is not limited to regular consultation with employees on safety issues.

Discussion: In the week before this incident, crew members had noticed that the crane operator was having difficulty operating the piledriver. If a health and safety program which included regular meetings with the crew, soliciting their health and safety concerns, had been in place, their concerns may have come up and the situation may have been corrected. An effective health and safety program is one that responds to situations as they arise and is based on actual site conditions.

Recommendation #3: The state and/or other certifying agencies should consider a special license for the operation of cranes as piledrivers.

Discussion: Heavy equipment operators in this area are usually trained through a union apprenticeship program lasting four years. After that training period, operators tend to specialize in the operation of specific equipment. Very few become expert in the operation of all types of equipment. Piledriving involves a different set of skills than operating a crane for materials

handling, particularly in the coordination of the two lines. Expertise in this area should be recognized by a special license or endorsement on the normal crane operator's license.

REFERENCES

Commonwealth of Massachusetts, Department of Public Safety, 520 CMR 6.00 Hoisting Machinery

Code of Federal Regulations, Labor 29 Parts 1926.28; 1926.550 Cranes and Derricks

American Society of Mechanical Engineers, ANSI/ASME B30.5-1994, Mobile and Locomotive Cranes. (ANSI B30.5-1968, Safety Code for Crawler, Locomotive and Truck Cranes is incorporated into the OSHA standard with exceptions as noted in the standard.)