Carpenter Dies in Fall Through Wall Opening in Factory Renovation Site

MASSACHUSETTS FACE 97-MA-050-01

SUMMARY

On October 10, 1997, a 33 year old male carpenter was fatally injured when he fell through the open side of the third floor of a structure being renovated from a factory into an office building. The victim was working with two co-workers to place a 300 pound wooden box beam onto the roof eight and one-half feet above the floor using a manual hoist. The hoist mechanism let go allowing the beam to fall striking the victim and pushing him out the opening. He fell approximately 22 1/2 feet to the ground below sustaining severe head injuries. Security personnel called for emergency medical assistance. The ambulance transported the victim to a nearby hospital, where he never regained consciousness and died two days later of his injuries. The MA FACE Director concluded that to prevent similar occurrences in the future, employers should:

- **ensure that alternate fall protection is used when guardrails are removed to gain access for construction tasks.**
- **ensure that all lifting equipment is in good working order and follow all recommended maintenance procedures.**
- **develop, implement, and enforce a comprehensive safety program that includes, but is not limited to, worker training in fall hazard recognition and the hazards of equipment used on the job.**
- **assure that safety planning is coordinated among contractors on multi-employer sties.**

INTRODUCTION

On November 3, 1997, the MA FACE Program was notified through a newspaper clipping service that on October 12, 1997, a 33 year old male carpenter died as a result of injuries incurred in a 22½ foot fall at a construction site. An investigation was immediately initiated. The MA FACE Program Director traveled to the jobsite where the victim's foreman and the general contractor were interviewed on November 6, 1997. The hoisting equipment was not available for inspection at the time. The police report, death certificate, corporate information, OSHA information, photographs and interviews were obtained during the course of the investigation.

The employer was a structural wood building contractor and was in business approximately 12 years at the time of the incident. Company-wide, 140 persons were employed, 9 of whom were working at the construction site at the time of the incident. Of these, 4 were working on the same task as the victim. The company had designated the foreman in charge of safety on the site and had written safety procedures, although it did not have regularly scheduled safety meetings.

The victim was employed by the company for six months at the time of his death. However, the foreman described him as an experienced carpenter.

INVESTIGATION

On October 10, 1997, crews from at least three different subcontractors were working on renovating a foundry into an office building. The foundry had been gutted and consisted of three floors with new siding and roofing. The current phase of the project was to install windows throughout. There were seven openings, approximately 20 feet wide by 8½ feet high, where curved greenhouse style windows would be installed on the top floor. In these openings the roof was recessed from the edge of the building approximately 5 feet.

The victim and three co-workers were assigned to install an overhead beam that would support one edge of a greenhouse window. A manual lifting machine, known in the trade as a "roustabout", was used to lift the beam into place atop concrete columns. The roustabout was located on the third floor and would lift the beam from the floor to the roof. The equipment had been purchased new by the contractor in 1986 and was customarily used for this work. The crew was familiar with this equipment having used it on previous jobs as well as for installing six similar beams on this job.

The box beam was made of four 2 x 6's covered by plywood. It was 20 feet long by 16¼ inches wide by 5¼ inches deep. It weighed approximately 300 pounds. The beam had been assembled by the crew on the previous day.

The task of fixing the beam into place consisted of wrapping a wire rope around the beam in the center. The beam was then lifted several feet off the floor by cranking the lifting equipment by hand. One end of the beam would then be pulled down manually causing the other end to rise. The higher end would be pushed onto the support, in this case, the roof. Then the beam would be cranked up further until the other end would also rest on the opposite support.

On the day of the incident the crew had started work on the third floor at 7 am when they began the preparation for hoisting the beam. The prep work consisted of cutting necessary angles on the edges of the beam and/or roof in order to fit the beam on the roof. The crew was working within eight feet of the edge of the window opening, which extended from floor to roof. The opening had been guarded by rails, but these had been removed sometime prior to the incident. Another contractor was boxing in a column in the middle of the opening where the guardrails would have obstructed the work. In order to perform this and other edge work, the guardrails were removed. Some of the work on the column was performed using an aerial lift from the ground. The two crews had followed the same procedure during the installation of the previous six greenhouse window supports. No other fall protection was provided.

After wrapping the wire rope around the beam, one crew member cranked the hoist to lift the beam. As the machine was cranked, a grinding noise was heard. The operator paused to check the equipment, but saw no damage. The victim stood at one end of the beam and tipped that end so that the other end could be rested on the roof. One crew member had left the area to go up on the roof to maneuver the beam into place. As the co-worker continued

to crank up the beam in order to bring the other end up to the roof, something failed inside the hoist and the beam fell. The victim, who was holding the beam in place, was pushed by the beam out of the opening and fell to the ground below.

The fire department emergency medical services and ambulance were called and arrived immediately, along with police assistance. The victim was secured and taken to the local hospital emergency room. He did not regain consciousness and died two days after the incident as a result of his injuries.

The "roustabout" is a manually driven hoisting device. It consists of three sections sliding inside one another: a base, a center mast and a top mast. On top of the mast is a tee section. The hoist is driven by gears and pulleys and wire rope. This particular piece of equipment stood 59″ high when contracted and up 15 feet high when the masts were fully extended. The maximum load limit of the equipment was 2000 lbs. There were two separate cranking mechanisms on the equipment, one on each side of the machine. One, called the mast hoist, was used to crank up the masts; the other, called a load hoist, was used to lift the load with pulleys on a cross section at the top of the mast. The manufacturer's manual recommends that the mast hoist not be used to lift loads over 500 lbs.

At the time of the incident, the load was being lifted using the mast hoist. The cover plate from this side was missing and the internal parts were rusted and worn. The mast hoist operated by turning a pinion gear which was held in the housing by a bearing. This bearing apparently became loose from the housing causing a misalignment on the gear and the associated ratchet brake mechanism. Once these parts were misaligned, nothing was securing the mast and it collapsed, causing the load to fall.

CAUSE OF DEATH

The medical examiner listed the cause of death as massive trauma.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that alternate fall protection is used when guardrails are removed to gain access for construction tasks.

Discussion: Guardrails had been installed in all window openings to prevent falls through these openings. Occasionally guardrails, or other safety devices, must be removed to gain access to the area for construction. When guardrails are removed, other fall protection, either personal fall arrest systems or a safety net system, should be provided and used. Both of these forms of fall protection are outlined in OSHA standard 1926.502. Had fall protection been provided and used by the victim, this incident may have been prevented.

Recommendation #2: Employers should ensure that all lifting equipment is in good working order and follow all recommended maintenance procedures.

Discussion: No equipment is designed to last forever. All hoisting equipment should be examined daily for defects and needed repairs. This pre-use check should include the lubrication of all rotating parts where necessary; the condition of chains, slings, and in this case, wire rope used to lift loads; the condition of stabilizing elements, including wheels and locks; and the general condition and structural integrity of the equipment. A checklist should be developed from the manufacturers' literature for this purpose. Operators and users of the equipment should be familiar with possible failure elements and encouraged to report all defects and deficiencies to the employer. The employer in turn should remove from service all equipment in need of repair until those repairs are made.

Discussion: Employers, with the participation of employees, should develop, implement, and enforce a comprehensive safety program. The program should begin with an analysis of hazards associated with building construction and the implementation of controls of those hazards. It should also include training for all employees in hazard recognition and use of controls.

As outlined in the OSHA regulations, fall protection should be a part of any safety program in the construction industry. Fall protection begins with an analysis of the fall hazards to which employees are exposed. In this case, training should have been provided employees in the recognition of fall hazards and the means to control them. A good safety training program enables employees to understand that alternate means of fall protection must be provided and used when guardrails are removed regardless of the duration of the task.

As outlined in the previous recommendation, equipment maintenance may also be considered part of a comprehensive safety program. Employees should be trained to recognize problems with equipment and understand the correct procedures to take when problems are encountered. They should be encouraged to report equipment defects and defective equipment should be tagged and removed from service until it is repaired.

Recommendation #4: Employers should assure that safety planning is coordinated among contractors on multi-employer sties.

Discussion: Health and safety planning is critical on multi-employer sites. Each contractor should understand their responsibility for providing such items as guardrails, fall protection equipment and training. Activities should be coordinated on a day-to-day basis so that when guardrails must be removed so that one contractor may access a location, work may be re-organized so that other contractors' employees are not working at the edge at that time. Whether or not alternate fall protection is provided, too many people working in one place could still create a fall hazard.

Responsibility for replacing guardrails that have been removed and for coordinating daily activities among contractors should be clearly defined in a site safety plan. All employees should understand the plan and know what to do when problems arise.

REFERENCES

Code of Federal Regulations, 29 CFR 1926.500 – 504, Subpart M, Fall Protection

U. S. Department of Labor, OSHA Construction Resource Manual, 1926 Subpart C, General Safety and Health Provisions

To contact Massachusetts State FACE program personnel regarding State-based FACE reports, please use information listed on the Contact Sheet on the NIOSH FACE web site Please contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.

Back to Massachusetts FACE reports (http://wwwn.cdc.gov/NIOSH-FACE/Default.cshtml?Category=0000&Category2=ALL&State=MA&Submit=Submit)

Back to NIOSH FACE Web

Page last reviewed: November 18, 2015