MIFACE INVESTIGATION #05MI051

Subject: Carpenter Dies After He Jumped/Lost Balance From An Unsecured Ladder That Fell Due To A Wind Gust.

Summary

On Wednesday, May 11, 2005, a 38-year-old male carpenter died after jumping or losing his balance from an unsecured ladder that was falling due to a gust of wind. The company's jobsite foreman instructed the victim and two coworkers to work on the siding on the west side of the house. The victim and one of the coworkers positioned their 30-foot fiberglass extension ladders on a second floor walk out deck. The 16- x 20-foot deck was constructed seven feet above grade and was unguarded on all sides. The victim and his coworker erected their ladders side-by-side and leaned them against the side of the house. Both the victim and his coworker were working approximately 15 feet high on their respective ladders. Both ladders had the ladder feet supported by a piece of plywood adhered to the deck to prevent the ladders from sliding away from the house. At approximately 8:30 a.m., the victim and his coworker were attaching wood nailers for a soffit screen when a gust of wind (~ 45 mph) from an approaching thunderstorm blew the top of the victim's ladder sideways (south) along the facia board. As the ladder was falling, the victim jumped to the deck approximately 15 feet below and landed at the unguarded deck edge. He then fell ten more feet into a concrete basement well (Figure 1). Coworkers called 911 and the victim was transported to a local hospital where he was pronounced dead.

Figure 1. Incident Scene

RECOMMENDATIONS

- Construction employers should conduct a daily hazard assessment to determine if working conditions have changed or will change. They should inform their employees of their findings and how the changing conditions may affect the work to be performed.
- Employers must ensure that those in a supervisory position are knowledgeable regarding appropriate safe work practices, so that they will be able to recognize if employees are effectively protected or exhibiting behavior that would indicate that further training or retraining was necessary.

Key Words: Construction, Fall, Ladder, Environmental Conditions

- Construction employers should consider using scaffolds or other work platforms to work from instead of ladders.
- If a ladder is determined to be the best tool, then supervision should ensure that the ladder is properly secured against displacement, even if the ladder has safety feet.
- Employers should cover ground openings, including basement well openings when work is being performed around the opening.

Additionally, MIFACE recommends that MIOSHA modify its Sample Construction Safety Program Safety Rules section to include language from Fixed and Portable Ladders, Part 11, Rule 1122(1) and Rule 1124(2).

INTRODUCTION

On Wednesday, May 11, 2005, a 38-year-old male carpenter died after jumping or losing his balance from an unsecured ladder that was falling due to a gust of wind. On May 16, 2005, the Michigan Occupational Safety and Health Administration (MIOSHA) personnel received the work-related fatality report on their 24-hour-a-day hotline. MIOSHA personnel notified MIFACE investigators of the fatality on the same day. On December 7, 2005, the MIFACE researcher interviewed the company owner. The owner provided the MIFACE researcher copies of the firm's Construction Safety Program and the company Work Policy. Pictures used for this report are courtesy of the responding police department. During the course of writing this report, MIFACE reviewed the company policies, death certificate, the medical examiner report, police report and pictures, and MIOSHA file and citations.

The company for whom the deceased worked was a general contractor that built high-end homes and other "light commercial" buildings. The company had been in business for 32 years and had year-round employment of 30 people. Seasonal workers were added as necessary. The deceased, a carpenter, was a full-time, hourly worker and had worked for the company for over three years. He was very familiar with the job task. The deceased performed both framing and concrete work. All company employees worked nine hours (7:30 a.m. to 5:00 p.m.) on Monday through Thursday, and 7:30 a.m. to 12:00 p.m. on Friday. The owner indicated that the firm held a minimum of two health and safety meetings per year. All employees were required to attend.

In the past, the company utilized construction associations and governmental agencies expertise to provide health and safety assistance. The firm did not have a health and safety committee. The company's worksite supervisor, who had completed several safety-oriented classes, had on-the-job experience and a non-related professional degree. He was responsible for the company safety policy. The worksite supervisor visited all jobsites on a daily basis to identify safety issues and work crew needs/problems/issues. At the time of this visit, the supervisor spoke to the jobsite foreman about any issues noted. The jobsite foreman was required to address any issues observed. The company safety program had a section on ladder safety. MIOSHA found no documentation for any type of ladder training.

The employer had a written health and safety program. There were specific procedures in place for the specific task being performed by the victim. The company program indicated that the ladder was to be secured to prevent its from sliding away from the wall. The company safety program also had a section on disciplinary actions taken if violations of company safety policy were observed.

MIOSHA issued five Serious and two Other-than-serious citations at the conclusion of their investigation.

The Serious citations were for violations of the following standards:

- Construction Safety, Fixed and Portable Ladders, Part 11 – two citations
    - Rule 1112(1) - employer did not provide a ladder training program for each employee who uses a ladder to recognize the hazards associated with using an extension ladder and the procedures to be followed to minimize these hazards.
    - Rule 1122(1)- employer did not ensure that the ladder was not placed in a passageway, doorway, driveway, or any location where it may be displaced, unless it is protected by barricades or guards or is secured to prevent displacement.
- Construction Safety, Fall Protection, Part 45 – two citations
    - Rule 4502, REF OSHA 1926.501(b)(1)-employer did not protect employees on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8m) or more above a lower level from falling by the use of guardrail systems, safety net systems, or personal fall arrest system.
    - Rule 4502, REF OSHA 1926.501(b)(4)(ii)-employer did not protect employees on a walking/working surface from tripping in or stepping into or through holes (including skylights) by covers.
- Construction Safety, General Rules, Part 1 – one citation
    - Rule 114(2)(c)-employer did not provide for the following:
        - Inspections of the construction site, tools, materials, and equipment to assure that unsafe conditions which could create a hazard are eliminated.
            - Item A: No fall protection used when working on walk-out deck 18 feet x 20 feet x 7 feet above existing grade. Employees exposed to serious injury from fall when working on deck.
            - Item B: Basement well 4 feet 8 inches deep on the south side of deck was not covered or guarded. Employees exposed to falling or stepping into hole when working and walking in area.

The Other-than-serious citations were issued for violations of the following standards:

- Construction Safety, General Rules, Part 1

- Rule 114(1)-employer did not maintain a copy of accident prevention program on the jobsite.

- MIOSHA Safety and Health Standard - Part 11, Recording and Reporting of Occupational Injuries and Illnesses
  - Rule 1129(4) employer did not record the fatality on Form 300 and 301 log within 7 days.

INVESTIGATION

There were four employees on site, three carpenters and one jobsite foreman who had 25 years experience. The company had been working at the site for two months. The three-story home was being built on a 33-foot wide lot, with the west side of the home facing a lake. At the second floor level, there was a 16-foot x 20-foot walkout deck, built 7 feet above grade. The deck had recently been constructed and no guardrails were installed. On the south side of the deck was a basement stairwell entrance. The basement well was 4 feet 8 inches deep by 4 feet wide by 6 feet long. The concrete well floor was approximately 10 feet from the top of deck (Figure 2). There were two entrances for employees to gain access to the interior of the home. One entrance was on the street side and the other entrance was the basement well on the west side.

Figure 2. West Side of house

The victim and a coworker working from another ladder had been working for about a week installing siding. On the day of the incident, the jobsite foreman instructed the deceased and his two coworkers to continue working on the siding on the west side of the house. The deceased and his coworker positioned their 30-foot fiberglass extension ladders side by side on the deck. The third coworker stayed on the ground as a saw man, supplying material to the victim and his coworker. The coworker positioned his ladder that was extended to approximately 16 feet on the north side of the deck (north of the deceased's ladder) against the siding just above the third floor windows. The victim positioned his ladder that was extended to approximately 20 feet against the wood facia board and drip edge soffit. Plywood "ladder boards" were nailed on the deck to prevent the ladders' safety feet from slipping away from the building. The ladders were not secured at the top. It is unknown if the deceased's ladder complied with the 4 to1 rule. The 4 to 1 rule recommends that the distance from the bottom of the ladder to the surface it leans against should be a quarter of the ladder's extended height.

The coworker and deceased were installing treated lumber for the nailer for the screen soffit inside the soffit. Both workers were working approximately 15 feet high on their ladders. The coworker and deceased had been working approximately one hour. There was a thunderstorm approaching with variable high winds. The deceased had his nailbag on and was handing nails to his coworker when a 45-mile-per-hour gust of wind blew the deceased's ladder sideways along the facia. The ladder began to fall and the deceased, as he was climbing down the ladder, either jumped from the ladder or lost his balance. The deceased fell between 10 to 15 feet knee-first to the edge of the deck, hit some equipment, and then fell 10 feet face-first into the concrete stairwell below the deck. The ladder landed on the deck.

Coworkers called 911 and when police arrived, the deceased was in the stairwell with a coworker supporting his head. According to the police report, the jobsite foreman performed rescue breathing prior to emergency response arrival. The deceased was removed from the stairwell by the emergency responders and transported to a local hospital. He was declared dead later that morning.

CAUSE OF DEATH

The cause of death on the death certificate was anoxic encephalopathy (oxygen was not delivered to the brain which resulted in brain dysfunction) due to or as a consequence of a cervical fracture due to a fall from a ladder. No autopsy was performed. The results of the toxicology tests were negative for alcohol and other screened drugs.

RECOMMENDATIONS/DISCUSSION

- Construction employers should conduct a daily hazard assessment to determine if working conditions have changed or will change. They should inform their employees of their findings and how the changing conditions may affect the work to be performed.

A daily hazard assessment of a worksite will provide management the tools they need to determine that the work that can be safely performed and also what work practices may need to be changed to perform the work safely.

According to the company's Construction Safety Program, the "safety person or other designated person will identify and evaluate all potential hazards for: a) injury severity potential and b) probability of an accident." It is unknown if appropriate training was given to employees pointing out the hazards and the necessary precautions. The employer did not record onsite employee training, so it is unknown if the job foreman did indeed point out the hazards to the employees.

As part of a hazard assessment, weather conditions should be evaluated and considered when determining how and when a job should be performed. Weather conditions are a factor in work place injuries and fatalities. If the employer had evaluated the weather conditions, the incoming storm would have alerted him to the possibility of high wind

speeds. At the onset of severe weather, such as thunderstorms with high winds, employers should consider withdrawing workers to an indoor work environment. As part of the employee training on the jobsite, the importance of lashing the ladder could have been emphasized and the fatality prevented, because the ladder would not have moved due to the wind gust.

- Employers must ensure that those in a supervisory position are knowledgeable regarding appropriate safe work practices, so that they will be able to recognize if employees are effectively protected or exhibiting behavior that would indicate that further training or retraining was necessary.

Those responsible for overseeing the work of others must be aware themselves of the correct procedures to be followed. They cannot assume that because something looks like it will work or has worked in the past, that it is appropriate for the job. Knowledgeable supervisory personnel and trained safety professionals should conduct scheduled and unscheduled safety inspections to ensure that workers are safe. The jobsite supervisor did not instruct the employees to lash their ladders.

- Construction employers should consider using scaffolds or other work platforms to work from instead of ladders.

Better work platforms for this construction activity would have been a scaffold or an aerial work platform. Many safety experts recommend that a ladder should be used primarily to climb to or from a work area, not as a work platform. Employers should endeavor to limit the use of a ladder as a work platform. The use of a ladder inherently limits the possible work area of a worker to an arm's length on either side of the ladder. Safe ladder use requires a worker to maintain a three-point connection (two hands/one foot or two feet/one hand) and his/her shoulders within the side rails. The employer should determine if there are safer alternatives to performing a job rather than using ladders.

When possible, instead of using ladders to work from, use scaffolds or an aerial work platform, such as a scissor lift. A larger work area, more stable work platform, and reduced physical stress could be gained through the use of scaffolding or other types of work platforms. This would enable a worker to walk small distances safely and reduce the need for re-positioning a ladder to access a new work area during operations. Because a worker can stand fully upright and use both hands for work procedures, an additional safety factor is obtained with this type of equipment. Also, a larger work surface is available for the safer storage or positioning of tools and materials.

Operators of an aerial work platform must receive training for the specific aerial work platform he/she operates and receive an aerial work platform permit. The aerial work platform permit should indicate the type of aerial work platforms as operator has been trained on and is qualified to operate. The permit may be carried on either the operator or be available at the worksite.

Employers are also required to train each employee who performs work on a scaffold. Employee training must be performed by a person qualified in scaffold safety and enable the employee to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize the hazards. MIOSHA defines a qualified person as a person who, by possession of a recognized degree, certificate or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his or her ability to solve or resolve problems related to the subject matter, the work, or the project. If the employee is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold, he/she must be trained by a competent person. MIOSHA defines competent person as a person who is experienced and capable of identifying an existing or potential hazard n surroundings, or under working conditions that are hazardous or dangerous to an employee and who has the authority and knowledge to take prompt corrective measures to eliminate the hazards.

- If a ladder is determined to be the best tool, then supervision should ensure that the ladder is properly secured against displacement, even if the ladder has safety feet.

Although both the deceased's and his coworker's ladders were blocked at the base, the jobsite foreman did not ensure the ladders lashed, per company policy, to prevent displacement. Blocking the ladder at its base did not provide adequate protection from displacement. Lashing a straight ladder as close to an upper support point as possible in addition to blocking will provide more protection against unexpected ladder movement. The employer stated to the MIFACE investigator that employees were instructed to lash the ladder when there was a possibility that the ladder could become displaced. The oncoming storm with the potential high winds raised the possibility that the ladder could become displaced. He stated that training had been given in the correct procedures when erecting and using an extension ladder.

- Employers should cover ground openings, including basement well openings when work is being performed around the opening.

The company was cited under General Rules for the open basement stairwell. The employer did not cover the basement well next to walk-out deck because the well was used as an employee entrance to the home. Although a cover may have been inconvenient, it would have provided protection from a further fall distance when the deceased fell from the deck edge. A MIFACE internet search of options to cover such an opening found transparent solid covers, rectangular grates, and fall arrest netting that could be purchased at a reasonable price to provide worker protection. If the basement well was covered, the deceased would not have fallen the additional distance and the fatality may have been prevented.

Additionally, MIFACE recommends that MIOSHA modify its Sample Construction Safety Program Safety Rules section to include language from Fixed and Portable Ladders, Part 11, Rule 1122(1) and Rule 1124(2).

The MIOSHA Sample Construction Safety Program can be found on the MIOSHA CET website: lists the following items concerning ladders in the Safety Rules Section (Rules 1-23 address other safety items):

24. Use the "four and one" rule when using a ladder. One foot of base for every four feet of height.
25. Portable ladders in use shall be equipped with safety feet unless ladder is tied, blocked or otherwise secured. Step ladders shall not be used as a straight ladder.
26. Ladders must extend three feet above landing on roof for proper use.
27. Defective ladders must be properly tagged and removed from service.
28. Keep ladder bases free of debris, hoses, wires, materials, etc.

If Part 11 is not consulted, item number 25 can be interpreted to say that if a ladder is equipped with safety feet it does not have to be tied, blocked or otherwise secured. Part 11, Rule 1122(1) requires that "A ladder shall not be placed in a passageway, doorway, driveway, or **any location where it may be displaced, unless it is protected** by barricades or guards **or is secured to prevent displacement** (Emphasis added). Part 11, Rule 1124(2) requires "a portable ladder in use shall be equipped with appropriate safety feet, unless the ladder is tied, blocked or otherwise secured to prevent it from being displaced. **Slip resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including flat metal or concrete surfaces that are constructed so that they cannot be prevented from becoming slippery**." (Emphasis added)

The company's Construction Safety Program was based on the MIOSHA Sample Construction Safety Program. Several work-related fatalities have occurred when a ladder that had safety feet either slid away from or parallel to the building it was leaning against causing the worker to fall. Because many companies base their construction safety programs on the language contained within the MIOSHA Sample Construction Program, MIFACE recommends that MIOSHA expand the language of the MIOSHA Sample Construction Safety Program, Rule 25 to include the requirement to secure all ladders (even those ladders with safety feet) to prevent displacement of the ladder and the limitations of the safety feet use on slippery surfaces.

REFERENCES

MIOSHA standards cited in this report may be found at and downloaded from the MIOSHA, Michigan Department of Labor and Economic Growth (DLEG) website at: www.michigan.gov/mioshastandards. MIOSHA standards are available for a fee by writing to: Michigan Department of Labor and Economic Growth, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan 48909-8143 or calling (517) 322-1845.

MIOSHA Consultation, Education and Training (CET) Division provides free health and safety consultation to assist Michigan employers in their efforts to provide a safe and healthful workplace. MIOSHA CET personnel can conduct an on-site consultation

without the attachment of fines or penalties but employers must agree prior to the start of the inspection to correct all serious violations found. The MIOSHA CET Self-Help Program assists employers in conducting their own evaluations of hazardous exposures in their workplaces. This free service provides limited technical industrial hygiene guidance, monitoring and measuring equipment, sample analyses and general information. For more information about these free services, contact MIOSHA CET Division at 1-517-322-1809 or via their website www.michigan.gov/miosha.

- MIOSHA Construction Safety, Part 11, Fixed and Portable Ladders
- MIOSHA Construction Safety, Part 45, Fall Protection
- MIOSHA Construction Safety, Part 1, General Rules
- NIOSH Worker Deaths by Falls: A Summary of Surveillance Findings and Investigative Case Reports.
  Internet Address: www.cdc.gov/niosh/00-116pd.html
- Center to Protect Workers Rights, Portable Ladder Safety Hazard Alert.
  Internet Address: www.buildsafe.org/hazalerts/hazladders.pdf
- Alaska FACE Report AK-93-045: Carpenter Dies After 12 Foot Fall From Ladder
  Internet Address:
  www.hss.state.ak.us/dph/chems/occupation_injury/reports/docs/93ak045.htm
- Washington State FACE Fatality Narrative, Case number 04WA05301: Laborer Falls from Ladder.
  Internet Address: www.lni.wa.gov/Safety/Research/FACE/files/LaborerFall.pdf
- Barrett Miller, Med, OHST. Safe Ladder Management. Internet Address: http://www.safety-engineer.com/ladder.htm
- Health and Safety Executive. Construction Information Sheet: Falls From Heights. Internet Address: www.tuc.org.uk/h_and_s/tuc-8704-f0.cfm

MIFACE
Investigation Report # 05 MI 051
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Please rate the report using a scale of:

Excellent	**Good**	**Fair**	**Poor**
1	2	3	4

What was your general impression of this MIFACE investigation report?

Excellent	**Good**	**Fair**	**Poor**
1	2	3	4

Was the report…	**Excellent**		**Good**	**Fair** **Poor**
Objective?	1	2	3	4
Clearly written?	1	2	3	4
Useful?	1	2	3	4

Were the recommendations …	**Excellent**		**Good**	**Fair** **Poor**
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How will you use this report? (Check all that apply)

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Thank You!

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