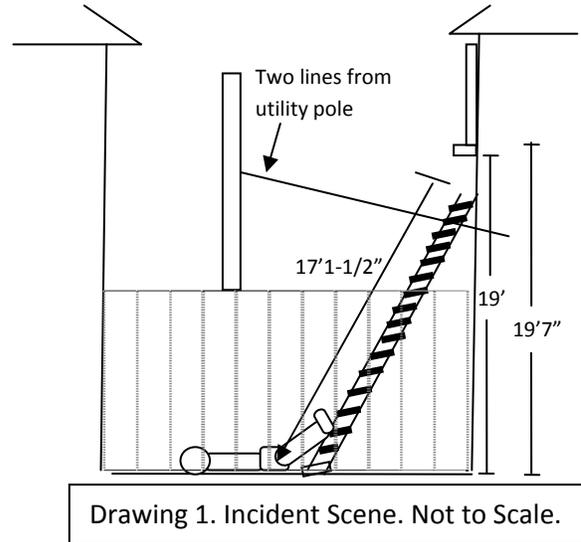


MIFACE Investigation Report #10MI137

Subject: Carpenter Died From Extension Ladder Fall

Summary

In the fall of 2010, a male carpenter in his 50's who worked for a home restoration company died when he fell an estimated 13 feet (exact height unknown) onto a concrete driveway from a 20-foot aluminum extension ladder. The decedent was performing window repairs at a residence. The decedent used a neighbor's 20-foot aluminum extension ladder rather than the company-issued 28-foot fiberglass ladder located on the work truck. Two lines from a nearby utility pole entered the home at this location. One of the two lines was a cable TV line and the second line was thought to be a phone line but this could not be confirmed. He placed the ladder against the outside of the home under the entering lines to reach a second story window located 19 feet 7 inches above the ground. The ladder was extended to its working height of 17 feet and positioned 4 feet 6 inches from the wall. The ladder was rated for a 200 pound individual; the decedent weighed 231 pounds. The lines were located between the decedent and the ladder. The decedent had an unwitnessed fall. The decedent lived directly next door to the jobsite and was scheduled to have computer work done at his home on the day of the incident. When the computer repair person arrived and did not find the deceased at home, he called his cell phone. The repairman heard the decedent's cell phone ringing. He followed the sound to the incident location and found the decedent on the driveway. He called for emergency response. The ladder was propped against the home and an unidentified line had been disconnected from the home (Drawing 1). The decedent was declared dead at the scene.



Known Contributing Factors:

- Ladder selection not appropriate.
- Ladder training not conducted.

RECOMMENDATIONS

- Employers should ensure employees using ladders receive training on safe use of the ladder.
- Construction employers should develop, implement and enforce an Accident Prevention Program as part of the firm's Safety and Health Management System.

- Employers should conduct a hazard assessment for the job site and assure safe work practices are developed to minimize the hazards found.
- To maximize the likelihood of use, employers should minimize the difficulty of accessing the proper equipment for a task. Installation of a drop-down style ladder rack for work vehicles may facilitate use of the proper ladder as well as minimize potential employee injury during loading and unloading the ladder.
- Employers should assess the work tools available to employees and consider whether additional options could be offered and used under appropriate work conditions.

INTRODUCTION

In the fall of 2010, a male carpenter in his 50s who worked for a home restoration company died when he fell from an unknown height from a 20-foot aluminum extension ladder to a concrete driveway. The MIFACE program was notified of this fatality by MIOSHA. In December 2010, the MIFACE investigator accompanied the MIOSHA compliance officer to the company headquarters, explained the MIFACE program, and asked the company owners for their voluntary participation. The owners decided to participate and the MIFACE investigator conducted separate interviews with the co-owners. During the writing of this report, the police and medical examiner reports, the death certificate, and the MIOSHA file were reviewed. Pictures used in this report are courtesy of the MIOSHA compliance officer.

The decedent's employer, a restoration remodeling company, had been in business for five years. The firm employed three to four individuals, depending upon the workload for the firm. The owners built to specification any required wood-based item for a remodeling project, such as molding, flooring, windows, and interior and exterior trim. The decedent had been working for the firm for four months, first as a subcontractor and then as a full-time employee. The firm had hired him as a subcontractor first, to see if he "fit in" with the firm's work philosophy, work ethic, and if he had the skill set to perform required tasks. After approximately one month as a subcontractor, the decedent was hired as a full-time employee. Employees and the firm owners worked four 10-hour days, Monday through Thursday, and four hours on Friday. The firm was non-union. The decedent had 25 years of experience working as a carpenter. He had not completed the required training to be a journeyman carpenter. The firm designated him as the lead carpenter.

The firm's insurance program instructed the firm that an Accident Prevention Program (Health and Safety Program) was required, so the firm bought a Health and Safety Program from an outside consultant in November 2009. The firm had not reviewed or implemented the Program or performed the required employee training. The Health and Safety Program had a Fixed and Portable Ladders section. The Section covered ladder ratings, types of portable ladders, selecting ladders, using ladders, placing ladders, metal ladders, transporting ladders, storing ladders, maintaining and repairing ladders, ladder hazard checklist, and ladder training. The Program was not at the jobsite.

The firm did not have a formal employee training program but had performed some on-the-job training. The decedent had been instructed regarding how to set a ladder safely on uneven

ground. The owners indicated they discussed general jobsite safety and safe equipment operation while at the job site while working alongside the decedent. The firm did not have documentation that the safety issues had been discussed. The owners indicated that they provided tools which were “in good repair and expected him to use them safely and with wisdom”; the decedent did so in the times that were witnessed. Both owners, who were interviewed separately, indicated the decedent was safety-oriented and worked safely.

During the estimate process, the owner indicated he considered issues such as accessibility (can work be performed with a ladder or is a ladder scaffold required and electrical issues (overhead lines). It is unknown if the issue of the lines entering the home on the south wall were considered and accounted for in the work practice review. When the bid was accepted and work began, the owner conducted a pre-job briefing with employees working on the project. The owner provided an overview of the job, methods to complete the work, and safety issues.

The MIOSHA Construction Safety and Health Division issued the following Serious citations to the decedent’s employer at the conclusion of its investigation.

SERIOUS:

GENERAL RULES, PART 1, RULE 114(1)

An accident prevention program was not developed, maintained, and coordinated with employees.

Accident prevention program not coordinated with employee. Employee performing window repair and restoration work from an extension ladder in driveway adjacent to South elevation of home.

FIXED AND PORTABLE LADDERS, PART 11, RULE 1112(1)

A training program was not provided for each employee who used a ladder. The program did not enable each employee to recognize hazards related to the ladder and did not train each employee in the procedures to be followed to minimize these hazards.

No training provided to employee performing window repair and restoration work from an extension ladder in driveway adjacent to South elevation of home.

INVESTIGATION

The scope of work for this home included repairing/replacing missing or damaged latches, new storm windows in the eating nook, glass repair in den, epoxy/re-caulking repair where needed on window sashes and ensuring casement windows would close properly.



Figure 1. Overview of incident scene

Another worker and the decedent started the renovation project the week prior to the incident. Both workers were taken off the project until the following Wednesday because of a delay in the arrival of window hardware. Beginning on Wednesday of the next week, the decedent and his coworker returned to the home to work on the interior storm windows and to install window hardware. The coworker stayed for approximately four hours and then left the jobsite.

The decedent worked alone on Thursday. On Friday, the incident day, the decedent arrived at the shop at approximately 7:00 a.m. to pick up an interior window and receive instruction for work to be performed. The firm owners instructed him to install some second story interior storm windows/latches and weather stripping. He picked up a second story casement window and left the shop. He was not instructed to perform any work outside the home.



Figure 2. Work performed inside of home

The homeowner indicated that the decedent was at her home just beginning the work when she left at approximately 9:30 a.m. It appeared to one of the firm's owners who arrived after the incident that the decedent was removing caulk from the second story windows that had been caulked shut. He also had been working on the second story window latches on the inside so the window would close. The decedent had not been removing the windows, as there were no paint chips on the window hinges. The decedent had placed a big screw on the inside of the window. One of the owners postulated that the decedent went outside to nail the window shut using a piece of shim and small nail to tack it shut.

To access the second story window, the decedent did not use the company-issued 28-foot fiberglass extension ladder stored in the ladder rack on the top of the company owned vehicle. Rather, he borrowed a Type III, 20-foot aluminum extension ladder from a neighbor to reach the second story window located 19 feet 7 inches above the ground. The owner stated that the decedent did not like to use the fiberglass ladder because it was too heavy and awkward to retrieve and place onto the ladder rack on the roof of the van. The decedent placed the aluminum ladder 4 feet 6 inches away from the house and fully extended it to its maximum working length of 17 feet. The maximum standing height of the ladder was 13 feet 1 inch. The maximum reach was 19 feet, assuming a 5-foot 6-inch person with a 12-inch vertical reach (the decedent was six



Figure 3. Incident Ladder label. Ladder at ladder owner's home.

feet tall). The ladder was rated for an individual weighing 200 pounds or less; the decedent weighed 231 pounds.

The decedent placed the ladder at an appropriate pitch (one foot away from the building for every 4 feet of ladder extension). It is unknown if the concrete driveway onto which the ladder was placed provided a solid, even base for the ladder feet.

Behind the home was a utility pole, which had two wires coming from it. One of the wires was a cable TV wire. The second wire was thought to be a phone line. The decedent placed the ladder on the south side of the home such that when he ascended the ladder, the wires were placed between his body and the ladder. Other homeowners saw the decedent set up the ladder approximately one hour prior to when he was found. The fall incident was unwitnessed.

The decedent lived directly next door to the jobsite and was scheduled to have computer work done at his home on the day of the incident. When the computer repair person arrived and did not find the decedent at home, he called the decedent's cell phone. The repairman heard the cell phone ringing and followed the sound to the incident scene. He found the decedent on the driveway and called for emergency response.

The decedent fell backward from the ladder and was found lying on his back with his right foot on the second ladder rung (Drawing 1). In his hand he was holding either nails or screws (one police officer described he was holding nails and one police officer described he was holding screws). A hammer and a pry-bar were lying on the driveway near the decedent's head. The ladder was still propped against the home. The cable line had been detached from the home. The decedent was declared dead at the scene.



Figure 4. Ladder involved in incident at ladder owner's home

After the incident, an insurance company hired an engineering firm who examined the ladder and determined that it was in good working condition; safety feet intact, latches and rungs not cracked, etc. Figure 4 shows the incident ladder propped against the home of the ladder owner.

CAUSE OF DEATH

The cause of death as listed on the death certificate was multiple blunt force injuries. Toxicological tests of his blood were negative for alcohol and illegal drugs. The toxicological tests were positive for an antidepressant and an extended-release pain medication, both with a level in the therapeutic range. It is unknown if the decedent had experienced any listed side effects, such as dizziness, and if the use of the medication was a factor in this incident.

RECOMMENDATIONS/DISCUSSION

- Employers should ensure employees using ladders receive training on safe use of the ladder.

The fiberglass ladder provided by the decedent's employer was available on the ladder rack on the top of the truck. The ladder the decedent selected was not an appropriate ladder for the task. The ladder was not long enough to permit the decedent to safely work at the window. The decedent was six feet tall, and to reach the window, he would have to stand on a higher rung than allowed by the manufacturer to reach the window. An additional issue with the ladder selection was that the decedent exceeded the weight limit for the ladder. The excess weight may have caused the aluminum ladder to flex excessively as the decedent climbed. The flex may have caused him to lose his balance or may have caused the ladder feet to slip causing ladder movement and thus causing him to lose his balance. Additionally, it was unknown how the decedent was carrying the pry-bar and hammer as he ascended. If he was carrying them in his hand, it would have been very difficult to maintain a three point contact with the ladder because one of his hands was holding the nails/screws.

Employers are required by the MIOSHA Construction Industry Safety Standard, Part 11-Fixed and Portable Ladders to instruct employees so the employee can recognize hazards related to the ladder and in the procedures to be followed to minimize these hazards. Included within the training requirements are: the maximum intended load-carrying capacities of ladders that are used and proper construction, use, and placement of, and care in handling ladders. Safe ladder use includes facing the ladder and having at least one hand to grasp the ladder when ascending or descending.

- Construction employers should develop, implement and enforce an Accident Prevention Program as part of the firm's Safety and Health Management System.

The employer had purchased an Accident Prevention Program but they had not implemented the program and it was not at the jobsite as required by MIOSHA Construction Safety Standard, Part 1, General Rules. An Accident Prevention Program is one of the elements of demonstrating management commitment to safety and thus, as part of an effective health and safety management system, it is important that the firm's Accident Prevention Program is developed and effectively implemented. MIFACE encourages firms to take the time to develop, review, and implement a health and safety management system at their business to demonstrate their commitment to safety and their employees.

- Employers should conduct a hazard assessment for the job site and assure safe work practices are developed to minimize the hazards found.

There were two wires attached to the south elevation of the home. Any work performed from the outside at this south wall would have to be performed in the presence of these wires. It is unknown if the decedent, as he was climbing or while preparing to work, caught the wires with the tools or his hand/arms, which may have caused him to lose his balance. The firm owners

indicated that they did not expect or instruct the decedent to perform any work outside of the home on the day of the incident – they stated they were surprised that he did so. Although the work was scheduled to be indoors, the decedent determined that some work outside of the home was necessary. The hazards of working outside near the two wires and the work practices to minimize the potential hazards caused by the wires were not discussed during the job briefing. MIFACE recommends that a hazard assessment be conducted for each job site to ensure safe work practices are developed to minimize any identified hazards.

- To maximize the likelihood of use, employers should minimize the difficulty of accessing the proper equipment for a task. Installation of a drop-down style ladder rack for work vehicles may facilitate use of the proper ladder as well as minimize potential employee injury during loading and unloading the ladder.

Drop-down style ladder racks minimize the need to climb onto the van, stretch or reach for the ladder. This style of ladder racks raise and lower the ladder to the side of the vehicle, permitting the operator to stand on the ground and minimizes the lift the employee must make to reload the ladder. Additionally, ladder securement issues are minimized as the employee can see the areas of securement. Making it easier to obtain the ladder will increase the likelihood that the correct ladder will be used. Among many examples of a roof-mounted ladder rack that permits a user to stand on the ground to unload the ladder is the WEATHER GUARD® EZ-Glide System ladder rack.

- Employers should assess the work tools available to employees and consider whether additional options could be offered and used under appropriate work conditions.

The firm provided a ladder of appropriate length for the task, but the 28-foot fiberglass extension ladder was heavy, and it was difficult for the decedent to load/unload from the ladder rack on the roof of the vehicle. To reach the ladder, the decedent had to stand on the van's bumper. The owners indicated that the ladder did not slide off easily, and that the decedent had mentioned that he did not like the weight. Employers should consider providing a variety of ladders to be selected and used based on the task.

RESOURCES

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

- MIOSHA Construction Safety and Health Division, General Rules, Part 1
- MIOSHA Construction Safety and Health Division, Fixed and Portable Ladders, Part 11
- WEATHER GUARD® Ladder Racks
http://www.weatherguard.com/van_storage_equipment/view_products.php?subcat_id=31
http://www.weatherguard.com/truck_tool_boxes/view_products.php?subcat_id=16
- National Library of Medicine, PubMedHealth.
<http://www.ncbi.nlm.nih.gov/pubmedhealth/>

Key Words: Ladder, Fall, Construction

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