MIFACE Investigation Report #10MI144

Subject: Hispanic Roofer Dies After Falling Through an Improperly Secured Roof Hatch Cover

Summary

In the winter of 2010, a Hispanic male roofer in his 30s died when he fell 48 feet through a 5-foot by 5-foot roof hatch that was improperly covered. Eight of the roof hatches were covered with 60-inch by 60-inch 22-guage sheet metal and one roof hatch was covered with corrugated sheet metal. The employee was assisting the foreman by moving insulation to the slightly tapered roof drainage areas. The roof hatch's curb and cover had been installed by another contractor. The sequence of events leading to the fall was unwitnessed. At some point, the decedent fell onto the sheet metal cover. The cover gave way and both the cover and the decedent fell 48 feet to the concrete floor below. Emergency response was called and the decedent was declared dead at the scene. No fasteners were found on the sheet cover, ground or on the roof after the incident occurred. The hatch cover had no tears or other abrasions as a result of the decedent's fall. Three other employers (general contractor, primary mechanical contractor, and subcontractor of the primary mechanical contractor) were working onsite when the fatality occurred. MIOSHA cited all four employers of the multi-employer worksite at the conclusion of its investigation.

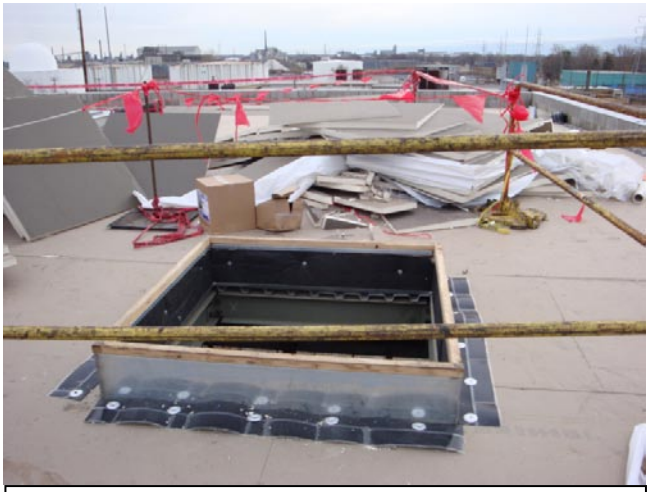


Figure 1. Roof hatch involved in incident. Note nearby pile of insulation sheets.

Key contributing factors identified in this investigation were:

- Improper materials used and securement of the cover for access hatch
- Company's Environmental Health and Safety program requirements were not followed
- Construction companies interaction with each other

RECOMMENDATIONS

- Construction employers should develop and ensure implementation of their MIOSHA-required accident prevention program at the jobsite including, but not limited to, daily hazard assessments to identify and mitigate hazards, such as unsecured roof covers, to ensure employee safety.

- Employers should ensure that employees on walking/working surfaces are protected from falling through holes more than 6 feet above lower levels by personal fall arrest systems, covers, or guardrail systems erected around such holes. Covers should be labeled and meet the requirements specified in the MIOSHA Fall Protection Standard.
- Construction employers should conduct a daily hazard assessment to identify and mitigate hazards, such as roof openings, to ensure employee safety.
- As part of their MIOSHA-required accident prevention program at the jobsite, construction employers should include a functional health and safety committee.
- Employers should require that all job site hazards are communicated on an ongoing basis to all workers required to be in the area.
- Employers on multi-employer sites should utilize contract language that clearly defines the safety responsibilities of each contractor prior to the initiation of work.

BACKGROUND

In the Winter of 2010, a Hispanic male roofer in his 30s died when he fell 48 feet through a 5-foot by 5-foot roof hatch that was improperly covered. MIFACE was notified of this incident through the MIOSHA 24-hour hotline. MIFACE met with the company's safety director at the home office of the employer. During the writing of this report, the police report and pictures, death certificate, and MIOSHA file were reviewed. The pictures used in this report are courtesy of the responding police department and the MIOSHA compliance officer.

The decedent's employer was a commercial roofing company, which had been in business for more than 60 years. The decedent was a roofer/laborer and had been employed for nine years according to the decedent's employer. The company employed 125 roofers (approximately), but additional roofers were also hired on a seasonal basis. The decedent worked full time. His workday began at approximately 7:00 a.m. and concluded at approximately 3:30 p.m. He had 12-15 years of experience as a roofer and was a member of a roofer's union. The decedent's country of origin was Mexico, but he attended high school in California. His primary language was Spanish and the company described his vocabulary as "speaking English well, but not fluently". The Safety Director indicated that the decedent could ask questions in English. The Safety Director indicated approximately one-third of the roofing employees were native Spanish speakers.

Environmental Health and Safety (EH&S) Manual

The roofing company had a written Environmental Health and Safety (EH&S) manual meeting the MIOSHA-required accident prevention program requirement. All written safety and health programs were in English; no Spanish translation was available. Topic areas included:

- Safety Notice to All Employees
- Safety Responsibilities
- Employee Safety and Health Training
- Hazard Communication
- Disciplinary Action
- Substance Abuse

- Housekeeping
- Motor Vehicle and Fleet Safety
- PPE
- Fall Protection
- Electrical Safety &Lockout/Tagout
- Occupational Medicine
- Bloodborne Pathogens
- Fire Prevention and Protection
- Respiratory Protection
- Hearing Conservation
- Material Handling and Back Injury Prevention
- Steel Erection
- Basic Company Safety Rules
- Equal Employment Opportunity
- Claims Investigation and Reporting
- First Aid Procedures and Emergency Rescue Plan
- Responsibilities
- Training

The EH&S program contained the following sections which directly applied to the fatal incident:

- The safety director, in conjunction with supervisors, will conduct a walk-through survey of each work area to identify sources of work hazards. Each survey will be documented using the Job Site Hazard Analysis (JSHA) and Safe Work Plan (SWP), which identifies the work area surveyed, the person conducting the survey, findings of potential hazards and date of the survey. A copy of the project's individual JHSA will be signed by the Safety Director, superintendent, foreman and all employees working on the site. A copy will be available on site at all times and in the Safety Office. Additionally, a one page Fall Protection and Safety Work Plan will be on the roof at all times."
- Fall Protection: Each job site will have a completed, reviewed and signed JSHA and Fall Protection & Safe Work Plan in place *before beginning any job or phase of a job (italics added).*
- Arrival on site and job set up: All employees will wear required ANSI approved safety glasses, reflective safety vest, hard hat and leather work boots at all times. Identify and communicate all areas of bad or questionable deck.
- Preparation for work: hold toolbox talk with crew, communicate material and equipment and material staging, follow all safety rules, ensure all crew members have necessary personal protective equipment, inspect all materials and equipment by competent person before use.
- Weekly safety meeting (toolbox talks) for all job sites.

Many, but not all employees are hired out of the union hall – some are hired by the decedent's employer and then join the union. Most employees who were hired through the union hall have completed the Management and Union Serving Together (MUST) learning modules. MUST training modules were available in both English and Spanish. The roofing contractor required employees to complete the MUST modules. The decedent did not complete the MUST training; the Safety Director indicated the decedent remained an apprentice, when the employee could have been a journeyman, due to the MUST training deficiency.

Before new employees could work on a worksite, the company required them to attend a new hire orientation and complete the National Roofing Contractors Association (NRCA) Fall Protection module. Additional safety training is provided to all employees. Some of the training topics, but was not limited to, "It's About Time", Hazard Communication, and a review of a company-provided safety guidelines packet regarding proper clothing, ladders, kettles and fall protection.

The decedent had completed the NRCA Fall Protection module, and had attended the new hire orientation. He was trained by the company's prior Safety Director, who spoke only English.

The Safety Director interviewed by MIFACE stated he was fluent in English, Spanish and German, and could also speak Russian. He was certified to conduct OSHA 10-hour and 30-hour Construction outreach training. The Safety Director's training practice was to provide worker training in English and then in Spanish. All training was classroom and hands-on when necessary. For example, workers were instructed in both English and Spanish regarding fall protection, and then a hands-on opportunity was provided to correctly don the fall protection equipment.

During the winter months, employees received the 10-hour OSHA Construction class and supervisors received the 30-hour OSHA Construction class. When the decedent's employer evaluated employee learning through written tests, the tests were written in English only. Employees must pass a written test with a score of at least 70% correct. Periodic retraining was provided to employees to recognize the hazards pertaining to a fall. The decedent did not have a passing score as determined by the employer. The employer's resulting action is unknown.

The Safety Director indicated that the Roofers union provided additional safety documents in Spanish.

Citations

MIOSHA Construction Safety and Health Division issued the following citations 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—
>
> The Accident Prevention Program was not coordinated. Employees engaged in roofing activities.
>
> Instance A) Inspection of the construction site and elimination of hazards.
> Instance B) Recognition and avoidance of hazards.

Willful Serious:

- **Fall Protection, Part 45, Rule 4502, REF OSHA 1926.502(I)(2)**

  All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.---

  Covers were not capable of supporting without failure, at least twice the weight of employees, equipment and materials that may be imposed on the cover at any one time. Employees engaged in roofing activities. Distance to lower level approximately 48 feet. There were eight 60-inch by 60-inch covers cited by the MIOSHA compliance officer.

- **Fall Protection, Part 45, Rule 4502, REF OSHA 1926.502(I)(3)**

  All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.

  Employees engaged in roofing activities did not have covers secured to prevent accidental displacement by wind, equipment, or employees. Employees engaged in roofing activities. Distance to lower level approximately 48 feet. There were nine 60-inch by 60-inch covers cited by the MIOSHA compliance officer.

INVESTIGATION

Site Overview

The city's Water and Sewerage Department was replacing an existing pump station and constructing a retention basin to eliminate untreated overflow into a nearby river. The construction project began in the fall of 2007. The multi-employer worksite consisted of the general contractor (Firm 1), the decedent's employer (Firm 2), a primary mechanical contractor (Firm 3) and a subcontracted heating, ventilation and air conditioning (HVAC) mechanical contractor (Firm 4).

On this multi-employer worksite, MIOSHA determined that Firm 1 was both an Exposing employer (employer whose own employees are exposed to the hazard) and a Controlling employer (employer who has general supervisory authority over the worksite), Firm 2 was an Exposing employer, Firm 3 was a Controlling employer and Firm 4 was the Creating (employer that caused condition that violates a MIOSHA standard) employer.

The 62-foot by 89-foot flat roof had nine roof hatches which were cut to provide access for future ventilation units. Each roof hatch had a roof curb, a piece of flashing formed to fit around the hatch hole and designed to channel water away from the seam formed between the roof and the ventilation unit. Firm 4 installed the curbs and covers under Firm 1's direction. Firm 4 did

not utilize the traditional type of covers (plywood and corrugated metal); instead, they utilized 22-guage sheet metal on eight covers and corrugated metal on only one cover. The covers were not secured with fasteners.

Roofing Company (Decedent's Employer) Work History at Site

The Safety Director indicated that the roofing company's foreman spoke "functional Spanish" and had worked 8 of his 13 years with the firm as a foreman. The foreman had been trained on the firm's EH&S manual, but had not received training on the site-specific safety plan developed in 2009. The roofing company's Superintendent had been employed at the firm for six years. The Superintendent had worked on and off in the roofing trade for approximately 28 years. The Superintendent visited the worksite periodically during 2009 and 2010.

The roofing company's foreman and Superintendent were on the roof prior to the start of this particular roofing activity, laying the insulation. Roof covers were in place at the respective times that they were on the roof; it is unclear as to whether the covers were properly secured during their visits. A week prior to the incident, the roofing company's Superintendent visited the site with a representative of Firm 1 and discussed the covers, but did not inform the roofing company's foreman (as required by the EH&S plan) of the discussion with Firm 1's representative. Safety meetings were not held prior to commencing this roofing activity.

In 2009, when roofing work on the structure commenced, the roofing company conducted a pre-task analysis and developed a site specific safety plan. A pre-task analysis was not submitted for the work currently being performed.

The roofing company's standard work procedure required the project manager, safety director, on-site foreman or superintendent to check for any areas of the deck that could be identified as "bad or questionable".

Fall protection had been in place during the roofing company's previous work tasks.

Work Activity the Day Prior to Incident Day

The foreman did not identify an area of the deck as "bad or questionable" the day prior to the incident. One of the decedent's coworkers assisted the crane operator to rig the material (flags, insulation, roofing accessories) lifted to the roof. The foreman acted as the safety monitor and signal man for the crane lift (level of training unknown). Due to high winds, no roofing work was performed except to set up the flag perimeter. The flag perimeter did not comply to the roofing company's 2009 Pre-Task Analysis and Safe Work Plan - did not fasten the 48-inch tall safety posts directly to the metal decking with two 3/8-inch steel cables ran through steel eye bolts at 21-inches and 43-inches with caution tape every 6 feet installed at the jobsite. Additionally, the crane operator lifted and placed 10 bundles of insulation on the roof.

Day of Incident

The decedent was a member of a 10-person work crew who arrived between 7:00 a.m. and 7:30 a.m. and were installing insulation and related insulation products. The sequence of events leading to the fall was unwitnessed.

Figure 2. The word HOLE written in orange paint on top of the sheet metal cover involved in the incident.

The incident occurred in the southeast corner of the roof. The roof cover involved in the incident was 22-guage sheet metal, which was not secured. The sheet metal had the word HOLE written upon it in orange paint.

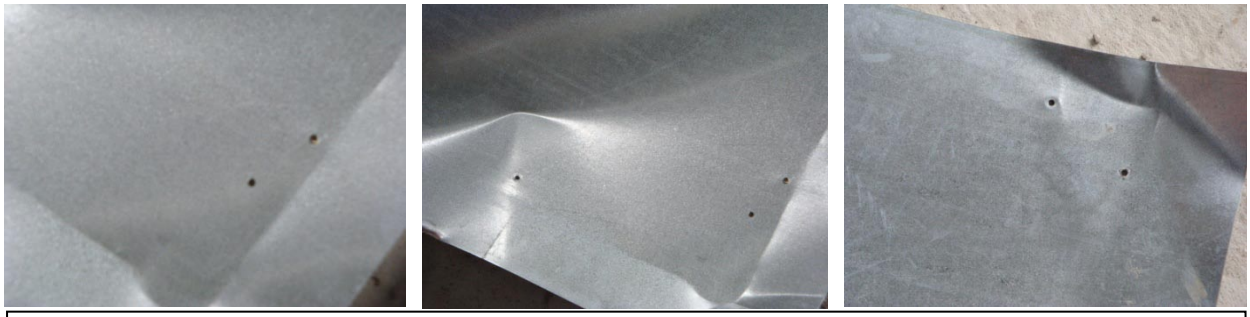
Located near the incident roof hatch was a pile of insulation sheets. At approximately 9:30 a.m., the decedent was assisting the foreman in moving the insulation sheets to the appropriate area of the roof for engineered roof drainage.

The foreman indicated that the decedent had lifted a sheet of insulation. The foreman heard a noise, turned around, and witnessed the decedent fall on the metal cover. The foreman attempted to grab the decedent without success. The cover gave way and both the cover and the decedent fell 48 feet to the concrete floor below.

Figure 3. Sheet metal cover after it fell 48 feet to the ground.

Emergency response was called. Another coworker went to the road entrance to help guide the emergency responders, who arrived approximately 10 minutes after the call was made, to the scene. This coworker helped to clear a path for the emergency responders to render aid to the decedent. The decedent was declared dead at the scene.

During the conduct of their post-incident investigations, MIOSHA and investigating police did not find any fasteners on the sheet cover involved in the incident, or on the ground and roof. The hatch cover had no tears or other abrasions as a result of the decedent's fall.



Figures 4-6. Absence of fasteners on sheet metal cover.

After incident, several of the decedent's coworkers moved guard rails to secure the open hatch. They also placed scraps of old deck to the tops of the remaining roof covers after the incident. Additional pieces of metal installed over the sheet metal – metal was staggered since they weren't long enough to span curb, and then screwed in place with a screw gun.

The roofing company indicated that Firm 1 did not inform them of the lack of structural integrity of the covers. Due to nature of subcontractor agreement, the roofing foreman did not attempt to remove the covers to verify their integrity. The roofing company identified the following factors contributing to this incident: employee inattention, and improper anchorage, and material used to cover roof openings. Prevention recommendations developed by the firm were: slow down when moving in tight quarters, and verify stability and integrity of the hole covers.

Three other employers (general contractor (Firm 1), primary mechanical contractor (Firm 3), and subcontractor of the primary mechanical contractor (Firm 4)) were working onsite when the fatality occurred. MIOSHA cited these employers of the multi-employer worksite at the conclusion of its investigation. Attachment 1 contains the MIOSHA citations issued to the firms at the conclusion of the MIOSHA investigation.

CAUSE OF DEATH

The cause of death as listed on the death certificate was multiple injuries. Toxicology was negative for alcohol, illegal, and prescription drugs.

RECOMMENDATIONS/DISCUSSION

- Construction employers should develop and ensure implementation of their MIOSHA-required accident prevention program at the jobsite including, but not limited to, daily hazard assessments to identify and mitigate hazards, such as unsecured roof covers, to ensure employee safety.

The firm's written EH&S program met MIOSHA program requirements for an accident prevention program, but it was not implemented, coordinated and communicated with employees on the worksite. The key responsibilities of the Safety Director, Superintendent and Foreman

were not fulfilled, thus, the unsecured, inappropriately covered access hatch was not identified as a potential hazard and preventative measures taken.

- Safety Director:"Provides all levels of management the technical advice and services to properly administer Roofing Company's Safety & Risk Program.
- Superintendent: "Ensures his own familiarity with all safety programs, procedures and standards related to his area of responsibility.
- Foreman: Ensures that no unsafe conditions exist on his job site. Reports any unsafe conditions beyond his control to the Superintendent or Safety Director.

Although developed, the implementation and integration of some key requirements of the EH&S program to ensure their workers were protected from hazards was inadequate. Some key requirements not implemented included:

- For each Company roofing job, a completed, reviewed and signed Job Site Hazard Analysis (JSHA) and Fall Protection & Safe Work Plan (SWP) must be in place before beginning any job or phase of a job. These must be created in accordance with 29 CFR 1926.502 and 29 CFR Subpart M. For more information on these hazard assessments, please see Policy on Personal Protective Equipment for its section on Hazard Assessment. The JHSA and SWP are designed to enable supervisors and employees to recognize fall hazards on this job and to establish the procedures that are to be followed in order to prevent fall to lower levels or through holes in walking and working surfaces…. *The JSHA and SWP were not developed for this phase of the job and a copy of the SWP was not located on the roof in violation of the EH&S plan.*
- Safety talks were not held with employees prior to work at the jobsite.
- The foreman did not conduct a jobsite hazard survey to determine if there were unsafe conditions, such as unsecured access hatch covers, existing on the jobsite.

- Employers should ensure that employees on walking/working surfaces are protected from falling through holes more than 6 feet above lower levels by personal fall arrest systems, covers, or guardrail systems erected around such holes. Covers should be labeled and meet the requirements specified in the MIOSHA Fall Protection Standard.

Ensuring the use of personal fall arrest systems, standard guardrails or covers secured against displacement and labeled as required by MIOSHA Construction Safety Standard, Part 45, Fall Protection would have prevented this tragedy.

- Construction employers should conduct a daily hazard assessment to identify and mitigate hazards, such as roof openings, to ensure employee safety.

The MIOSHA file included worker interviews, where it identified that workers were unaware that the cover involved in the incident was not secured. A hazard assessment performed by the decedent's employer would have identified the inappropriately secured cover, and appropriate

remedial action could have been initiated. Because the hazard was not identified and communicated to the decedent, he may have thought that because the access hatch was covered, he would be "safe". In addition to not being tied off, being unaware of the hazard contributed to his death.

One method to ensure job site hazards are identified is for a company to make it mandatory for foremen to get to a job early, along with their second person, walk the work area and when the rest of the crew arrives, have a morning huddle. Although some overtime pay might be necessary, this commitment to safety demonstrates to employees that safety is an integral component of the company's work culture.

- As part of their MIOSHA-required accident prevention program at the jobsite, construction employers should include a functional health and safety committee.

Within their program, the roofing company had identified the formation of a Joint Health and Safety Committee comprised four worker-elected representatives, superintendents, President and Safety Director. Employees elected must have successfully completed all 18 MUST modules and the OSHA 10 hour to serve. Minutes were to be posted. The Health and Safety Committee was in name only; it had not been functional. No minutes were posted.

A Health and Safety Committee, comprised of both management and hourly employees provides many benefits, such as: a) a forum for management and employees to regularly discuss health and safety issues in the workplace; b) a process for open communication on health and safety issues; c)enhances the ability of employees and management to resolve safety and health concerns reasonably and cooperatively, d) employees can help manage their own health and safety and assist the employer in providing a safer, healthier workplace. Conducted appropriately it reinforces management's commitment to a safe and healthy work environment and provides employees with a platform to voice their concerns regarding consistent enforcement of company health and safety policies.

- Employers should require that all job site hazards are communicated on an ongoing basis to all workers required to be in the area.

The hazardous situation that existed in this incident, the unsecured roof cover, was not communicated to the other employees on the job. Because situations change on construction or demolition sites, a communication system should be established to inform others on the job site of hazards. This should be carried out on an ongoing basis so everyone concerned is continually informed of changes and the hazards the changes present. Specifically, an employer should inspect the area to determine what hazards exist or may arise during the work to be performed before permitting employees to work in that area, and then give specific and appropriate instructions to prevent exposure to unsafe conditions.

- Employers on multi-employer sites should utilize contract language that clearly defines the safety responsibilities of each contractor prior to the initiation of work.

A contract should be written that contains clear and concise language as to which party is responsible for a given safety and health issue. Any differences should be negotiated and resolved before work begins. Once the provisions for these responsibilities have been established, the respective parties should ensure that all provisions regarding safety and health are upheld. When a safety hazard, such as an unsecured cover is identified, prompt attention to correct the hazard should be initiated. Prime contractors should also utilize contract language that requires subcontractors to implement a site-specific safety and health program prior to the initiation of work. The contract language should require all subcontractors (and their subcontractors) to identify how they intend to implement a site-specific safety and health program prior to the initiation of work. Subcontractors' safety programs should be consistent and compatible with the prime contractor's safety program. Once the provisions for these responsibilities have been established, the respective parties should ensure that the provisions of the contract regarding safety and health are upheld.

Contracts should include language that states that at the time the openings are made in the roof, the firm making the roof opening should be required to install covers which are secured in place and clearly labeled, so that other work crews on the roof will not be exposed to the potential fall hazard.

REFERENCES

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 Standard, Part 1, General Rules
- MIOSHA Construction Safety Standard, Part 45, Fall Protection
- *Construction Worker Dies from 69-foot Fall Through Roof Opening.* Michigan FACE Inspection Report #08MI015. http://www.cdc.gov/niosh/face/stateface/mi/08MI015.html
- *Roofer's Family Member Helping at Work Site Dies After Falling Through Skylight.* Oregon FACE Inspection Report #03MI001. http://www.cdc.gov/niosh/face/stateface/or/03or001.html
- *Ironworker Dies Following a 25-foot Fall through a Roof Opening.* NIOSH FACE Investigation Report 8913. http://www.cdc.gov/niosh/face/In-house/full8913.html

Key Words: Fall, Roof Opening, Unsecured Roof Cover, Hispanic, Construction

November 14, 2012

ATTACHMENT 1

General Contractor (Firm 1)

Part 1, General Rules, Rule 114(1) Serious: Accident Prevention Plan was not coordinated with employees

Part 45, Fall Protection, Rule 45(52) Serious: No documentation of weight capabilities for covers

Mechanical Contractor (Firm 3)

Part 1, General Rules Rule 114(1) Serious: Accident Prevention Plan was not coordinated with employees

Subcontractor of primary mechanical contractor (Firm 4):

Part 45, Fall Protection, Rule 1926.502: Willful Serious: No documentation of weight capabilities for covers

Part 1, General Rules, Rule 114(1): Serious: Accident Prevention Plan was not coordinated with employees