Two Window Washers Fall 90 Feet When Their Horizontal Static Line Failed - Massachusetts

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SUMMARY

On May 15, 2003, two male window washers (the victims), ages 20 and 47, were fatally injured when they fell approximately 90 feet. At the time of the incident, the victims were using rope descent systems with seat boards to wash windows of an eight-story building. Both victims' descent control devices and personal fall arrest systems were attached to a single horizontal wire rope static line that was improperly secured prior to the incident. The victims fell when the static line failed. The victims landed on the cement courtyard below. The courtyard was crowded with pedestrians and construction workers who witnessed the incident. Multiple 911 calls were placed by witnesses via cell phones. A doctor from a neighboring building noticed that people were in need of assistance and rushed out of her office to help the victims. Within minutes Emergency Medical Services (EMS) personnel arrived and transported the victims to a local hospital where both were pronounced dead. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **ensure that anchor points for personal fall protection equipment are completely independent from the descent control devices**
- **ensure a competent person inspects and evaluates all anchor points and rigging before descents**
- **provide training to employees in the proper use of approved descent control devices and appropriate support system and evaluate employees' knowledge of this training**

Commercial building owners should:

- **consult with certified professional engineers to retrofit older buildings with permanent anchor points or ensure that existing anchor points are capable of withstanding intended loads for window washing operations**

In addition, employers and commercial building owners should:

- **develop and enforce a plan of service that addresses the availability of a competent person, safety training, and standard operating procedures specifically for window washing operations.**

INTRODUCTION

On May 15, 2003, the Massachusetts FACE Program was alerted by the local media, that on the same day, two window washers were fatally injured when they simultaneously fell approximately 90 feet. An investigation was immediately initiated. On May 16, 2003, the Massachusetts FACE Program Director and an investigator traveled to the company office and interviewed multiple company representatives. Later that same day, the two FACE representatives visited the incident location. The police report, death certificate, corporate information, and the Occupational Safety and Health Administration (OSHA) fatality/catastrophe report were reviewed during the course of the investigation.

The employer, a facilities service company, had been in business for approximately 53 years at the time of the incident. Nationwide the company employed approximately 20,000 workers. In Massachusetts, the company employed approximately 4,000 workers, including approximately 200 window washers. One victim had worked for the company for less than one year and was born in the United States. The other victim had worked for the company for less than two years and was born in El Salvador. Both victims were members of a local union.

The company had a designated person in charge of employee safety and a written safety and health plan. In addition, the company provided daylong classroom training for all new hires and an annual training. The company reported that a translator was available during these training classes.

INVESTIGATION

The company provided facilities services to other businesses. These facilities services include but were not limited to maintenance, engineering, janitorial, production support, and office services. In this incident, the company was contracted to clean the exterior windows of a building. The building was eight-stories high and had a flat roof with a parapet. The work crew assigned to this building consisted of two window washers, the two victims.

At approximately 6:30 a.m. the work crew arrived at the work site (Figure 1). Once on site, the victims set up the horizontal wire rope static line, which would be used as their anchorage point for their descents. There was neither a competent person nor a supervisor onsite to ensure that the horizontal wire rope static line, descent control devices, and personal fall arrest systems were properly setup. The area below the windows to be cleaned was a cement and brick courtyard.

There were neither ground level barricades set up, as required by OSHA, nor an attendant present to keep pedestrians out from underneath the window washing operation.

On the day of the incident, each victim's equipment consisted of a body harness, lanyard, descent control device, and seat boards suspended from a rooftop anchor point (Figures 2 and 3). The rooftop anchor point was a single 5/16-inch 365-foot galvanized steel wire rope. The wire rope was stretched horizontally through a series of carabiner D-rings and then attached to two of the building's existing tiebacks. The existing tiebacks/anchor points were originally designed for a different type of window washing operation, a scaffold system, which was no longer used. The victims had fabricated turn back eyes at each end of the wire rope. The turn back eyes consisted of three 5/16-inch wire rope U-bolts at each end. The turn back eyes had been formed without the use of thimbles and the U-bolts were tightened without the use of a torque wrench (Figure 4). The two turn back eyes of the horizontal static line were attached to the two existing stationary tiebacks. Most of the hardware used by the company for the horizontal static line, descent control devices, and the personal fall arrest systems was purchased from local hardware stores. The U-bolts used by the victims were made out of cast iron and not forged steel as required by OSHA.

The horizontal static line setup created a "single" rooftop anchor point. Both victims' had been using one nylon rope each with a figure 8-knot tied in the middle of each rope to comprise "two ropes". Each rope had an "anchor loop" located at the figure 8-knot. A carabiner was attached to each anchor loop on each rope and then the carabiners were attached to the same single horizontal wire rope static line (Figure 5). One side of each nylon rope was attached to their descent control system and the other side of the each nylon rope was attached to their personal fall arrest system. During the decent each end of the two nylon ropes hung over the roof's edge. A carpet strip was placed in between the nylon ropes and roof's edge to minimize wear to the rope.

Prior to the incident, each victim had performed two descents each cleaning a total of four sections of windows. During these descents and at the time of the incident, each victim had been carrying two five-gallon buckets. One bucket contained washing solution and the other held equipment, such as a squeegee and a washing solution applicator.

At approximately 9:25 a.m., the victims had to reposition the horizontal wire rope static line, which entailed removing an end of the horizontal wire rope static line from one of the tiebacks. This was accomplished by disassembling one of the horizontal wire rope static line turn back eye and reassembling the turn back eye at another tieback. Evidence suggests that, at this point, the U-bolts of this turn back were not tightened to the correct torque. When the victims climbed over the edge of the building to make a third descent from the rooftop, the turn back that they had just reassembled prior to the descent came apart. The weight of the two victims hanging over the building's edge pulled the horizontal wire rope static line through all three U-bolts of the turn back and over the side of the building and pulled the wire rope through the carabiners, attached to the victim's nylon rope. The two victims fell approximately 90 feet to the cement

and brick courtyard below, crowded with passing pedestrian and construction workers from a construction site across the courtyard. No pedestrians were injured during the incident.

Pedestrians and construction workers who witnessed the incident placed multiple 911 phone calls using their cell phones. A doctor from a neighboring building noticed that the victims were in need of help and rushed out of her office to assist. Within minutes Emergency Medical Services (EMS) personnel arrived and transported the victims to a local hospital where they were both pronounced dead.

CAUSE OF DEATH

The medical examiner listed the causes of death for both victims as multiple traumatic injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should ensure that anchor points for personal fall protection equipment are completely independent from the descent control devices.

Discussion: In this case, each victim had been using one nylon rope with a figure 8-knot tied in the middle to comprise "two ropes". One side of each nylon rope was attached to their descent control system and the other side of the each nylon rope was attached to their personal fall arrest system. Each nylon rope was attached to the same single horizontal static line. Therefore, when one of the two horizontal static line anchor points failed, both victim's ropes were no longer attached to a secure anchor point causing each victims' decent control system and personal fall protection system (one rope for each victim) to fail, resulting in fall to the ground below.

During window washing tasks where descent control devices are used, employers should ensure that workers are protected from falls by a fall arrest system that has an anchor point completely independent of the descent control device. The fall arrest system should be utilized in such a manner that failure of any component of the descent control device or its support system (seat board, harness, support line, or anchorage) will not affect the ability of the fall arrest system to operate properly. In addition, the employer should ensure that tieback points being used are adequate for the intended load.

Recommendation #2: Employers should ensure a competent person inspects and evaluates all anchor points and rigging before each descent.

Discussion: In this case, the two victims were working with neither a supervisor nor a competent person* on site. This was a common occurrence within the window washing group for this company. To ensure that workers utilize adequate anchor points and required rigging, employers should ensure that a competent person evaluates and inspects all anchor points and rigging prior to the start of work. Had a competent person been on site the morning of the incident, this

person might have recognized the improper window washing operation setup and not allowed the victims to descend the building.

**Competent person:* a person through training or knowledge who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Recommendation #3: Employers should provide training to employees in the proper use of approved descent control devices and appropriate support system and evaluate employees' knowledge this training.

Discussion: In this case, it appears that the victims did not understand the hazards of setting up descent control devices and personal fall arrest systems using a single anchor point. The employees' lack of knowledge about proper setup of descent control devices and personal fall arrest systems occurred even though the company reported that they provided training for all window washers. The company also reported that they provided an interpreter for non-English speaking employees during training. At a minimum, these two victims were not able to fully comprehend the employer provided training. Either the training and/or the interpretation during the training were inadequate.

At the end of the training, employers should conduct for both English and non-English speaking employees a thorough assessment of comprehension of the covered material. This assessment will ensure that the employees know how to perform their job safely and ensure that they understand the hazards associated with required tasks. The employer should also document all provided training. Documentation should include the following: the name of the trainer and their qualifications, the content of the training, the names of trained workers, and the assessment of the workers' comprehension of the training.

Companies that employ workers who do not understand English should identify the languages spoken by their employees and ensure that the training they are providing to their employees is multi-lingual. To the extent feasible, the training should be developed at a literacy level corresponding with that of the company's workforce. Companies may need to consider providing special safety training for workers with low literacy to meet their safety responsibilities.

Recommendation #4: Commercial building owners should consult with certified professional engineers to retrofit older buildings with permanent anchor points or to ensure that existing anchor points are capable of with standing intended loads for window washing operations.

Discussion: In this case, a single anchor point was supporting the seat board window washing operation for two people. This single anchor point was a horizontal static line, attached to two

existing tie backs, which were originally designed for a different type of window washing operation, a scaffold system.

Commercial building owners that utilize exterior window washing services should ensure that existing anchor points are capable of withstanding intended loads and that separate anchor points are available for descent lines and personal fall arrest systems. If buildings do not have existing anchor points for window washing operations then the building owners should retrofit these building with permanent anchor points.

A certified professional engineer should be hired to inspect existing anchor points as well as new permanent anchor points retrofitted to older buildings. During the inspection of permanent anchor points, the engineer should evaluate, based on the type of window washing operation that will be used, the number of anchor points needed, the proper placement of the anchor points and the intended load of the anchor points. Permanent anchor point inspections should be performed annually.

Recommendation #5: Employers and commercial building owners should develop and enforce a plan of service that addresses the availability of a competent person, safety training, and standard operating procedures specifically for window washing operations.

Discussion: A plan of service should be developed by both the building owner and the window washing contractor and should include, but not be limited to, availability of a competent person, safety training, and standard operating procedures. The ANSI/IWCA I-14.1 standard defines window-cleaning operations as any window cleaning performed at least three stories above grade, flat roof, or any other surface, indoors or outdoors.

Included in the ANSI/IWCA I-14.1 standard is that building owners should have available documentation of annual inspections and maintenance records of any permanent window-cleaning equipment installed on the building's rooftop. This information should be furnished to window-cleaning contractors prior to the use of the equipment. Relevant information about the window washing equipment, including, but not limited to, the manufacturer's manuals, load ratings, intended use and limitations, and any additional instructions should be supplied to the window-cleaning contractors as well.

Window washing contractors should, as stated in Recommendation #3, document all training and maintenance and supply these documents to building owners. Depending on the type of window washing operation, contractors might need to provide their employees with portable equipment, such as a rope descent system with a seat board. Both contractors and building owners are required to inspect any portable equipment and should verify that the equipment is compatible with the available anchor points. In addition, window washing contractors should ensure that the equipment they are supplying to employees is designed, maintained and inspected according to industry standards.

REFERENCES

Code of Federal Regulations, 29 CFR 1910.132 General requirements. Government Printing Office.

Code of Federal Regulations, 29 CFR 1910.145 Specifications for accident prevention signs and tags. Government Printing Office.

American National Standard: Safety Requirements for Window Cleaning. New York, NY: American National Standards Institute, Inc. ANSI/ASME A39.1-1987.

American National Standard: Window Cleaning Safety. New York, NY: American National Standards Institute, Inc. ANSI/IWCA I-14.1-2001.

Figure 1 – Building where the incident occurred

Figure 2 – Similar rope descent system with a seat board

Figure 3 – Window washer using rope descent system with a seat board

Figure 4 – Wire rope turn back eye fabricated with a thimble and three U-bolts

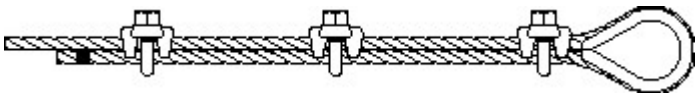

Figure 5 – Figure 8-knot with a carabiner attached to an “anchor loop”