Window Washer is Pulled Off a Roof and Falls 53 Feet when the Rolling Roof Outrigger to which His Lifeline was Attached Rolls Off the Roof - Massachusetts

Investigation: # 05-MA-038-01
Release Date: October 11, 2007

SUMMARY

On June 8, 2005, a 46-year-old male window washer (the victim) was fatally injured when he was pulled off of a roof and fell approximately 53 feet to the ground below during window washing operations. The victim was located on the flat roof of a four story building controlling a rolling roof outrigger. The victim was wearing a full-body safety harness with a retractable lanyard that was anchored to the rolling roof outrigger. The victim's co-worker was suspended approximately five feet down the side of the building from the rolling roof outrigger. As the victim was trying to reposition the rolling roof outrigger, it rolled to the edge the roof and then rolled off of the roof dragging the victim over the roof edge. The victim, co-worker and the rolling outrigger all fell to the ground below. The rolling roof outrigger landed on top of the co-worker. Calls were placed to the local police and fire departments. Within minutes, police and fire department personnel arrived at the site to attend to the victim and his co-worker. The victim and co-worker were transported to a local hospital where the victim was pronounced dead and the co-worker sustained massive injuries but survived. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, employers should:

- **Consider eliminating the use of rolling roof outriggers on lower rise buildings with flat roofs and unguarded roof edges;**
- **Ensure that rolling roof outriggers are properly tied back at all times during use to prevent outriggers from falling off the roof;**
- **Ensure that anchor points for personal fall protection equipment are completely independent from descent equipment;**
- **Ensure a competent person* inspects and evaluates all anchor points and rigging before each descent;**
- **Obtain owner's manuals for all equipment to ensure that equipment is being used as it was designed to be used;**

* See definition of competent person on page 6.

- **Ensure that employees who are hired as window washers are provided training on the proper use of approved descent control devices and appropriate support systems prior to assigning employees any window washing tasks;**

- **Devise a communication system when the workforce is multilingual to ensure employees can understand general safety and procedural commands.**

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 June 8, 2005, the Massachusetts FACE Program was alerted by the local media that, on the same day, two window washers were injured, one fatally, when they fell from a building in an industrial park. An investigation was initiated. On August 15, 2005, the Massachusetts FACE Program Director and a Safety and Occupational Health Specialist from the National Institute for Occupational Safety and Health (NIOSH) traveled to the incident location and to the company's main office and talked with multiple company representatives. Company representatives could only discus general health and safety practices of the window washing group. The next day the Massachusetts FACE Program Director and the NIOSH Safety and Occupational Health Specialist traveled to the Occupational Health and Safety Administration (OSHA) area office and the office of the victim's union to continue the investigation. The police report, death certificate, corporate information, the OSHA fatality/catastrophe report, and union information were reviewed during the course of the investigation.

The employer, a facilities service company, had been in business for approximately 55 years at the time of the incident. Nationwide the company employed 20,000 workers. In Massachusetts, the company employed approximately 4,000 workers, including 200 window washers. The victim had worked for the company for four about months and was born in Portugal. The co-worker had worked for the company for ten years. Both victims were members of the Service Employees International Union (SEIU) Local 615.

The company had a designated person in charge of employee safety and a written safety and health plan. In addition, the company reported that they provide daylong classroom training for all new hires, as well as an annual training, although the victim had not yet attended the new-hire training at the time of the incident. The company reported that translators are available when the training classes are held. The company did not have the operator's manual of the rolling roof outrigger involved in the incident.

INVESTIGATION

The company involved in the incident provides facilities services to other businesses. These facilities services include but are not limited to maintenance, engineering, janitorial, production support, and office services. In this incident, the company was contracted to clean the exterior windows of an office building. The building, located in an office park, is four-stories high with a flat, white rubber roof, twenty six rooftop anchor points, and an unguarded roof edge (Figure 1). The work crew assigned to this job consisted of two window washers, the victim and the co-worker, and a supervisor. Each worker spoke a different first language. The victim spoke Portuguese, the co-worker spoke Spanish and the supervisor spoke English.

On the morning of the incident, the workers arrived at the company warehouse, the typical meeting location, at 6:00 a.m. The supervisor drove the work crew, via a company van, to the building (Figure 2), which was located in an industrial park approximately 16 miles away from the warehouse. Once onsite, the victim and co-worker brought the equipment they needed to the roof of the building.

A portable rolling roof outrigger was the main piece of equipment being used at the time of the incident (Figures 3a and 3b). Rolling roof outriggers are designed to suspend a worker out over an edge of a building with a flat roof. The rolling roof outrigger involved in this incident had four wheels and was made of metal with a cantilevered beam. When positioned for use, the cantilevered beam would extend out over the building's roof edge. The end section of the cantilevered metal beam is the location where the control descent line for the suspended worker is attached. The cantilevered section allows the control descent line to clear the roof's edge. The suspended worker should also have a lifeline, attached to their body harness. This lifeline must be tied off to an independent roof top anchor point and not to the rolling roof outrigger or the anchor point that is used to tieback the outrigger. The manufacturer of the rolling roof requires that during use, the unit be attached to a permanent rooftop anchor point to prevent it from falling off the building's roof. The rolling roof outrigger involved in this incident also required the use of counterweights to help stabilize the unit.

The victim's main task was to tend to the rolling roof outrigger. This included ensuring the rolling roof outrigger was repositioned after each descent to access the next section of windows to be washed and ensuring that the rolling roof outrigger was properly tied back to an appropriate anchor point. At the time of the incident, the victim was wearing a company supplied body safety harness with a retractable lanyard. The victim's retractable lanyard was tied off to the rolling roof outrigger and not to an independent roof top anchor point.

During the descents the co-worker was using a company supplied descent control device and a seat board. The descent control device was attached to a descent line. The co-worker was also wearing a company supplied body safety harness attached to a lanyard that was attached to a lifeline. Instead of using two separate ropes for the descent control line and lifeline, a single nylon rope with a knot tied in the middle was used to comprise the co-worker's descent control

line and lifeline. This rope was attached to the rolling roof outrigger as the anchor point. Therefore, the co-worker's lifeline was also not tied off to an independent roof top anchor point.

The morning of the incident, the work crew had made multiple descents using the rolling roof outrigger with four 50 pound counterweights equaling 200 pounds. The manufacturer's required counterweight was more than three times the 200 pounds that was being used. At the time of the incident, approximately 8:00 a.m., the supervisor was not in view of the work crew. The suspended co-worker finished cleaning the sections of windows located at a 45 degree angled corner of the building. It appears that the victim, who was alone on the roof, unlocked the rolling roof outrigger's wheels, unattached the rolling roof outrigger from the rooftop anchor point and started to roll the outrigger so the co-worker could make his way around the building's 45 degree angle to the next side of the building.

The rolling roof outrigger, with the co-worker suspended from it, rolled to the roof's edge (Figure 4) and then off the roof. As the outrigger fell from the roof, the victim, whose retractable lanyard was attached to his full-body harness at one end and to the outrigger at the other end, was pulled off the roof. The co-worker, who was suspended from the outrigger and whose lifeline was also attached to the outrigger, fell along with the outrigger. The co-worker fell 48 feet from his suspended location to the ground below. The rolling roof outrigger fell 53 feet from the building's roof and landed on top of the co-worker (Figure 5). The victim, who was pulled from the roof, fell 53 feet down and ten feet out from the edge of the building's roof (Figure 5).

A call was placed to the local police department by witnesses. Within minutes, police and fire department personnel arrived at the site to attend to the victim and his co-worker. The victim and co-worker were then transported to a local hospital. The victim was pronounced dead at the hospital and the coworker survived the incident, but sustained massive injuries.

The victim's employer had had a fatal incident two years prior, in May 2003, in which two window washers died after falling approximately 90 feet to a cement courtyard below. These victims were using rope descent systems with seat boards to wash the windows of an eight-story building. Both of the victims' descent control lines and lifelines were comprised of one rope each. These two ropes were attached to a single anchor point, a horizontal wire rope static line. The victims fell approximately 90 feet to the ground below when the anchor point failed. Both incidents involved the same supervisor.

CAUSE OF DEATH

The medical examiner listed the causes of death for the victim as multiple traumatic injuries with atrial laceration.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should consider eliminating the use of rolling roof outriggers on lower rise buildings with flat roofs and unguarded roof edges.

Discussion: In this case, the building was four stories high and had an unguarded roof edge. The sides of the building were flat with no terraces, overhangs or other protrusions. Therefore, the use of the rolling roof outrigger, which is design to suspend a worker out over a roof's edge, was not essential. The descent control device could have been directly secured (direct rigging) to a roof top anchor point. When using the direct rigging method, the worker's lifeline must still be secured to an independent roof top anchor point. An anti-abrasion protection device, such as a strip of carpet, must be used at the location where the descent line and lifeline contacts the roof's edge.

In addition, current technology has enhanced the pole method of window washing by utilizing light weight telescoping poles. This has enabled workers to reach and wash windows in four and five story buildings without leaving the ground. Employers should explore the feasibility of implementing alternative window washing methods that would minimize the need for workers to be suspended over the sides of buildings, which would eliminate fall hazards.

Recommendation #2: Employers should ensure that rolling roof outriggers are properly tied back at all times to prevent outriggers from falling off the roof.

Discussion: While the co-worker was suspended from the rolling roof outrigger, the outrigger was disconnected from its anchor point. This allowed the outrigger to roll towards the edge and off the building's roof while the co-worker was suspended from it. Employers must make sure that rolling roof outriggers are always anchored while employees are suspended from them. Rolling roof outriggers should only be disconnected from anchor points when suspended workers are safely on the ground or a lower level and have been unattached from the descent control line.

Recommendation #3: Employers should ensure that anchor points for personal fall protection equipment are completely independent from descent equipment.

Discussion: The victim's body harness was attached to a lifeline that was attached to the rolling roof outrigger. The co-worker's descent control line and lifeline was a single nylon rope with a knot tied in the middle. This single rope was attached to the outrigger as the anchor point. When the outrigger was unattached to the tieback so it could be moved, the victim and co-worker were then attached to an unsecured anchor point, the outrigger.

During window washing tasks in which rolling roof outriggers and descent control devices are used, employers should ensure that workers are protected from falls by fall arrest systems that have anchor points completely independent of the rolling roof outriggers and descent control devices. The fall arrest system should be utilized in such a manner that failure of any component of rolling roof outriggers and descent control devices or their support systems (anchor points, ropes, body harness) 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. OSHA requires that anchor points are capable of holding a 5,000 pound load.

Recommendation #4: Employers should ensure a competent person* inspects and evaluates all anchor points and rigging before each descent.

Discussion: 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. In this case, if a competent person was located on the roof of the building with the victim at the time of the incident, the competent person might have recognized the improper counterweights, fall prevention anchor points, or descent control device setup and not allowed the window washing operations to begin or continue until they could be performed safely.

**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 #5: Employers should obtain owner's manuals for all equipment to ensure that equipment is being used as it was designed to be used.

Discussion: Following the recommended operating procedures in the owner's manual will ensure that the outrigger is being used as the manufacturer intended. In this case, the company did not have a copy of the owner's manual for the rolling roof outrigger being used at the time of the incident. This could have contributed to the rolling roof outrigger not being used as the manufacturer designed and intended it to be used. A least four of the manufacturer's recommended operating procedures were not being adhered to, including:

- the rolling roof outrigger was not tied back while an employee was suspended;
- counterweights were insufficient to balance the suspended co-worker;
- the rolling roof outrigger's wheels were not locked while an employee was suspended;
- the fall prevention anchor points used for both the victim and co-worker were located on the rolling roof outrigger.

Recommendation #6: Employers should ensure that employees who are hired as window washers are provided training on the proper use of approved descent

control devices and appropriate support systems prior to assigning employees any window washing tasks.

Discussion: The company reported that they annually provided training for all window washers. At the time of the incident, the victim, who had worked for the employer for approximately four months, had not yet been provided with the window washer training. As in this case, if newly hired employees are out in the field receiving "on-the-job" training, it must be ensured that the inexperienced employees are partnered with more experienced employees and are closely supervised at all times.

All training should conclude with a thorough assessment of employees' comprehension of the covered material for both English and non-English speaking employees. This assessment can determine if the employees understood and retained the information supplied in the training, such as how to safely perform tasks and the hazards associated with these 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.

Recommendation #7: Employers should devise a communication system when the workforce is multilingual to ensure employees can understand general safety and procedural commands.

Discussion: The company reported that they provide interpreters for non-English speaking employees during trainings. In addition to language barriers, employers must overcome literacy barriers. Overcoming these barriers at a worksite is crucial to providing a safe work environment for a multilingual workforce. When employees who do not speak the same languages are required to work together, it is imperative that a system is devised to communicate general safety and procedural commands that are understood by all parties. This might include hand signals and some kind of an audio device such as a whistle or horn.

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. There are certificate programs for window cleaners available in both English and Spanish (e.g., International Window Cleaner Certification Institute, www.iwcci.org/programs/levels.htm).

Recommendation #8: 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, above a flat roof, or above any other surface, indoors or outdoors.

The ANSI/IWCA I-14.1 standard includes a requirement that building owners 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 ensure that the equipment they are supplying to employees is designed, maintained and inspected according to industry standards and that the equipment is compatible with the available anchor points at each jobsite. In addition, window washing contractors should document all maintenance and training, as stated in Recommendation #6, and supply these documents to building owners.

REFERENCES

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

Code of Federal Regulations, 29 CFR 1926.502 Fall protection systems criteria and practices. 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 – Anchor points on roof of building

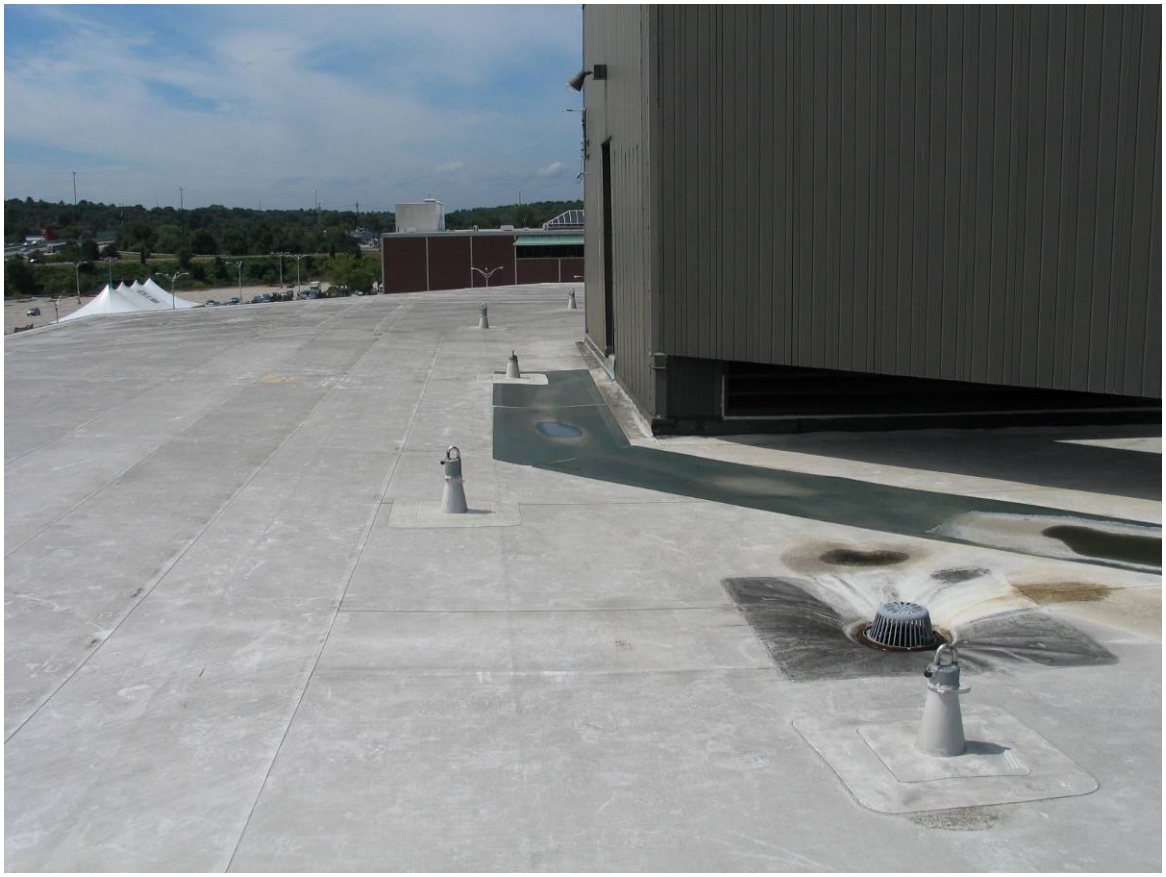

Figure 2 – Building where the incident occurred

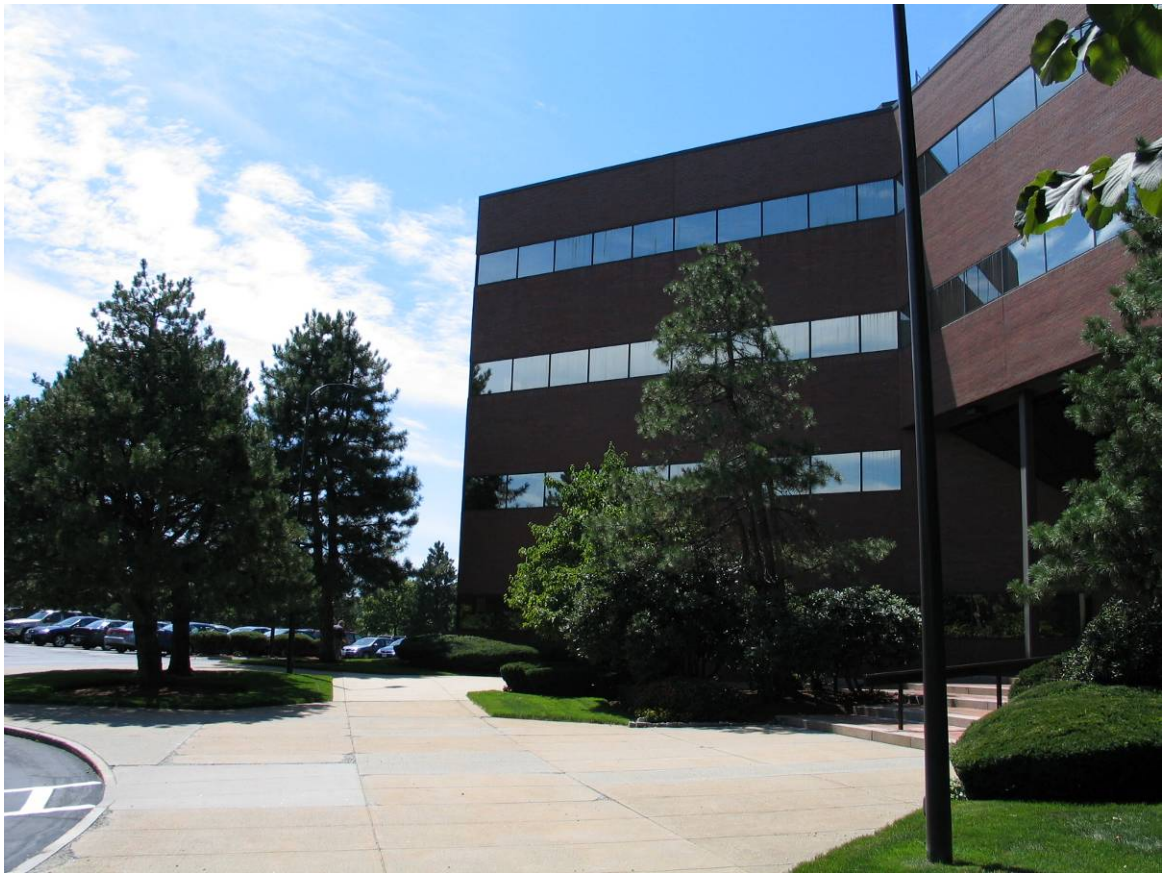

Figure 3a and 3b – Similar rolling roof outrigger system

3a.

3b.

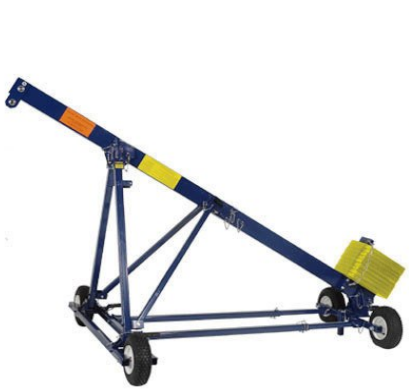

Figure 4 – Location at edge of roof where the rolling roof outrigger fell

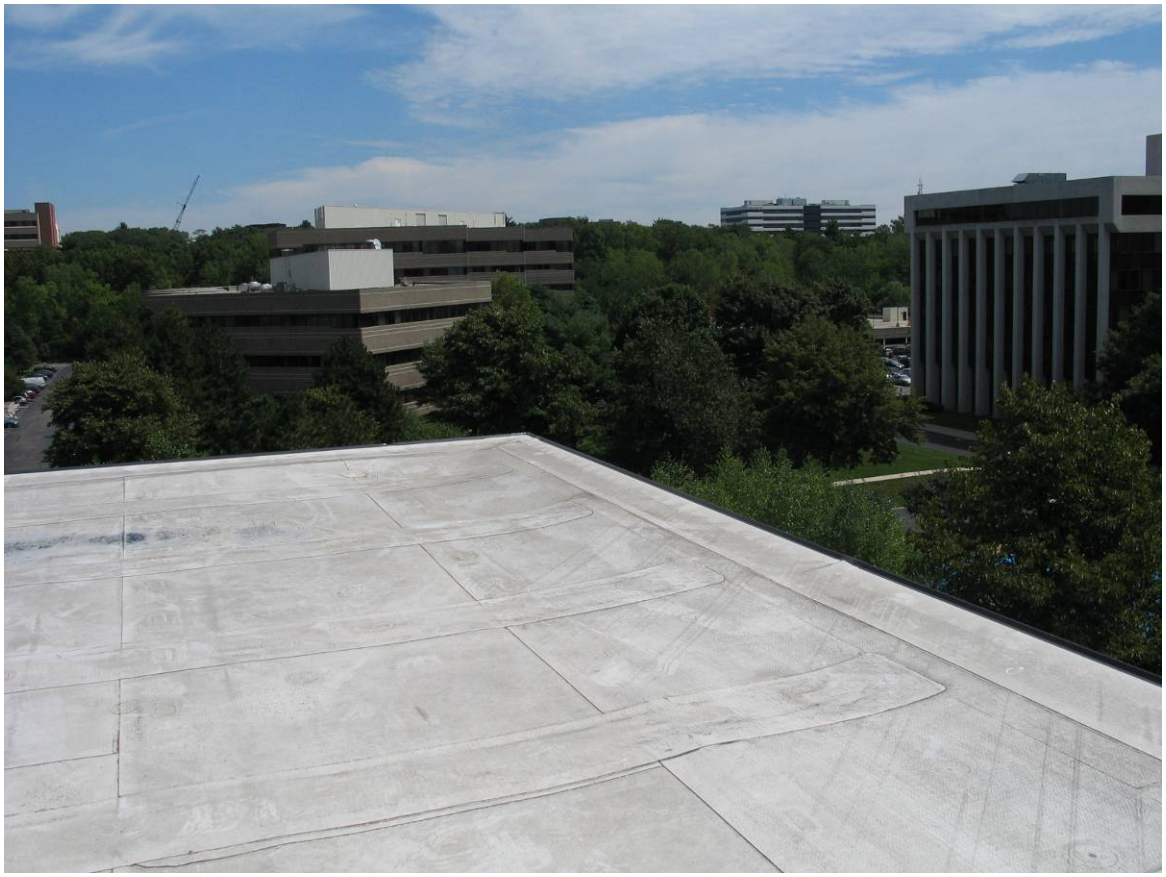

Figure 5 – General location where the victim, co-worker and rolling roof outrigger landed