

MIFACE INVESTIGATION #05MI095

SUBJECT: Municipal Tree Trimmer Dies When Falling Tree Limb Struck Him.

Summary:

On August 25, 2005, 51-year-old male municipal tree trimmer and his three coworkers were in the process of delimiting a dead silver maple tree that was approximately 31 inches in diameter at its base when an overhead limb broke and struck the decedent on his head and shoulder. The tree was on city property and deemed to be a hazard to residents. The decedent, who was the on-site supervisor, and his crew had delimited the smaller branches and were in the process of removing the three remaining major limbs. One limb grew over the pedestrian sidewalk toward a home, one limb grew almost straight up in the air, and one limb grew over the street. The crew decided to remove the limb that grew over the pedestrian sidewalk because it was near the home. The decedent was responsible for the friction rope used to lower the cut limb to the ground. The crew had successfully made three cuts to this limb; the cut limb fell away from the remaining limb, struck the tree trunk, and then was lowered via the friction rope to the stake truck below. The incident occurred on the fourth cut. The decedent was standing approximately 25 feet away from the tree in the street and under the tree limb that grew over the street. When the tree limb being cut struck the trunk, it may have caused the tree itself to vibrate, which may have caused the limb growing almost straight up to break at a weak spot. The fully barked, 8-inch diameter center limb broke at its center section due to a knothole that had rotted out. The knothole had a bird/squirrel nest covering it. The center limb section fell and struck the decedent (Figure 1). He was wearing all required protective equipment - hardhat, safety vest, and safety glasses. He died approximately two weeks after the incident.



Figure 1. Broken limb that struck decedent

RECOMMENDATIONS

- Employers should review tree-trimming activities and determine if existing rigging methods could be updated with existing technology.
- Employers should ensure that crew sizes are large enough to enable a site supervisor to effectively perform their safety-related activities.
- Employers should standardize tree trimming safe work practices, such as prohibiting an employee to work under the drip line of a tree and sounding dead tree limbs with an axe handle.

Key Words: Struck By, Tree Trimming, Rigging

INTRODUCTION

On August 25, 2005, a 51-year-old male tree trimmer was struck by a tree limb that broke away from the tree at a weak spot on the limb. He died approximately two weeks later from complications of the injuries sustained on August 25, 2005. On September 9, 2005, MIFACE investigators were informed by the Michigan Occupational Safety and Health Administration (MIOSHA) personnel who had received a report on their 24-hour-a-day hotline, that a work-related fatal injury had occurred and the decedent had died on September 9, 2005. On September 21, 2005, MIFACE interviewed the city's safety technician responsible for investigating the incident, and the supervisor and union representatives for the city department for whom the decedent worked. During the course of writing the report, the police report and pictures, medical examiner's report, city safety technician investigation report, and MIOSHA file and citations were reviewed. The city safety technician took the photograph used as Figure 1 at the time of his investigation. Figure 2 and Figure 3 are photographs taken by the city police at the time of their investigation. Photographs have been modified by MIFACE to remove identifiers.

The city department for whom the decedent worked was responsible for removing diseased and dead trees from city property and right of ways. The decedent had approximately 26 years of experience as a tree trimmer and had worked as a tree trimmer for other cities for eleven years. He worked for his current employer for 15 years. His job title was Tree Trimmer II and he was designated as an on-site supervisor. The workforce was unionized. He was an hourly, full time employee. The eight-hour workshift began at 7:00 a.m. and ended at 3:30 p.m.

The city had a written and implemented comprehensive safety and health program. No written procedures were in place for "delimiting and felling" a dead tree. The city utilized a trade group and a paid private consultant to help provide employee training. There was a joint management and labor health and safety committee that met monthly. The department within which the decedent worked held monthly safety meetings. There was a written disciplinary procedure in place for health and safety violations. The city required employees to wear a hard hat, safety glasses, safety vest and safety boots for this job task. The decedent was wearing all of the required items.

The employer had a safety training program, provided by both the employer and union. Most training was done on-the-job and in the classroom under direct supervision by the supervisor. Employees were also sent off-site for specific training programs offered by trade groups and equipment manufacturers. Training records were maintained. The employee was deemed competent by both testing and demonstration.

MIOSHA did not document any conditions that would lead to the issuance of any citations to the employer.

INVESTIGATION

The city assigned two crews to work together for the day. The crew members consisted of two workers (decedent and another worker) who had tree trimmer II classifications, one worker with a tree trimmer I classification, and one seasonal worker. At the incident site the crew was assigned to remove a dead tree from the edge of a residential street on a city right of way.

The tree to be removed was a dead silver maple. The location of the tree was between the pedestrian sidewalk and the road. The tree base was 31 inches in diameter. At 4.5 inches from the ground, the trunk was 24 inches in diameter. There were no leaves on the tree and the tree was fully barked. The tree had three main limbs, one extending south over the sidewalk toward a home, one (center) extending almost vertically, and one extending north over the street (Figure 2 and Figure 3).

The crew arrived at the site at approximately 8:30 a.m. The crew had removed at least two trees earlier in the morning. The decedent was “in charge” of the worksite and responsible for all site safety issues. Upon arrival at the incident site, the decedent conducted pre-job briefing with the crew. Traffic control was established, equipment was positioned, and the felling operation began.

To prepare the tree for felling, the Tree Trimmer II coworker used an aerial lift to remove all of the smaller limbs and branches from the three main limbs. It took the crew approximately two hours to “brush out” the tree. The coworker who brushed out the tree noted no tree defects and nothing unusual was observed to alert neither the decedent nor the crew to alter their approach to removing the remaining limbs and tree trunk.

The decedent had determined that the south limb, which was leaning over the sidewalk towards a house, should be removed first.

The decedent was not in the fall zone of the south limb; he was standing in the street about 25 feet away from the tree under the drip line of the north tree limb. According to the city safety technician, he chose this position so that he would be able to operate the friction rope and still be able to watch the crew’s work activities and note any other hazards or concerns

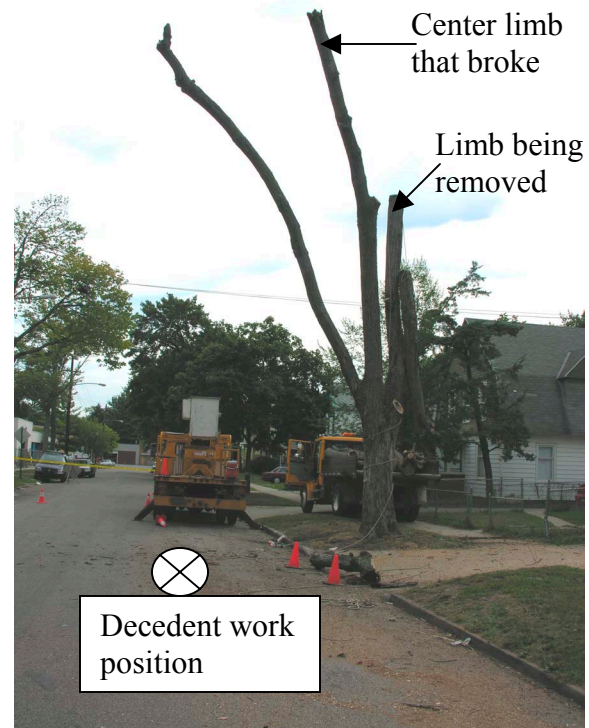


Figure 2. Overview of work site

(pedestrians, vehicles, etc).

The south limb was cut in 5-8 foot long sections using a butt cut to leave hinge wood to help control the cut section when it fell away. The decedent was controlling a single 5/8-inch diameter synthetic “friction rope,” which used as both a load line and a tag line. The friction rope was wrapped around the tree trunk and attached to the future cut section of the south limb by a clove hitch knot. The cut section fell away and the tree trunk was used to stop the momentum of the limb fall. The friction rope prevented the limb from swinging uncontrollably as it fell from the cut and as it was lowered to the stake truck (See Figure 3).

The crew had used this method to remove three sections of the limb and had not encountered any problems. The incident occurred after the fourth cut. After completing the fourth cut, the limb fell away, and swung down striking the side of the tree trunk.

It is hypothesized that each impact of the falling limb caused the tree itself to vibrate. On the fourth cut, the tree vibration may have caused the center tree limb to break away at a decayed spot in the center section approximately 25-30 feet above the decedent.

A witness observed the south limb strike the tree trunk. When he turned his head to watch the decedent lower the limb he observed the center section of the center limb break away from the tree and fall, striking the decedent on the right side of his head and shoulder. The section of limb that struck the decedent was eight inches in diameter and approximately five feet long. Its weight was estimated at 40-50 pounds by the safety technician and 150 pounds by the medical examiner.

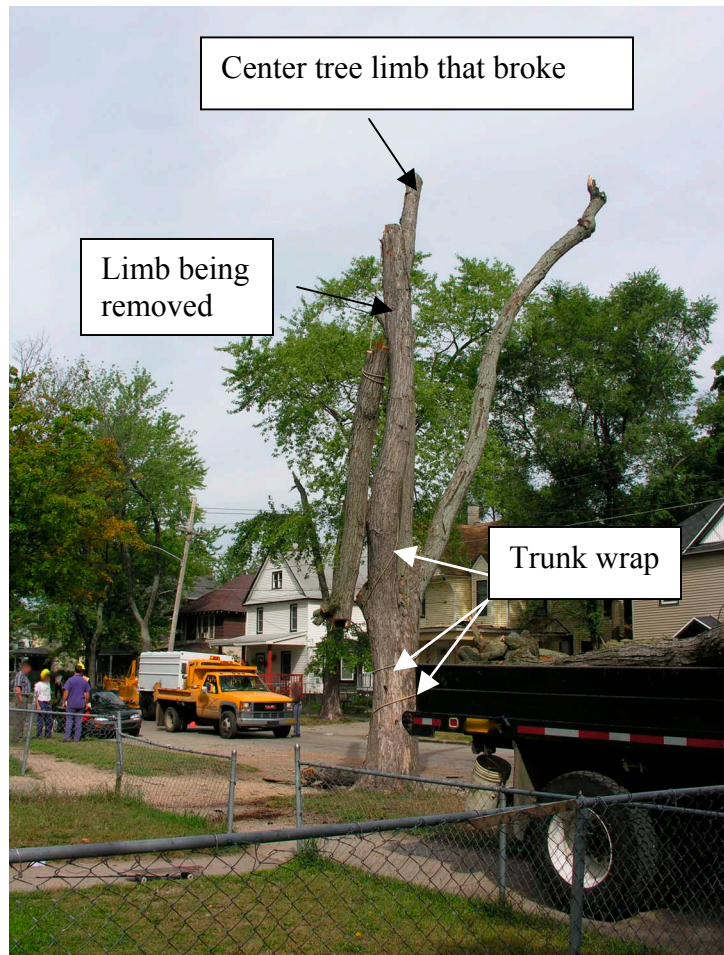


Figure 3. Overview of worksite: trunk wrap, suspended limb

The witness stated that he did not have time to warn the decedent and didn't believe that the decedent was aware of the limb falling from the tree. It was later determined that at

the limb's break point that there was a knothole that had rotted out and a bird/squirrel nest covered the knothole. This limb was fully barked, with the bark approximately ½ inch thick.

The falling limb knocked off the decedent's hardhat and he was propelled into the air by the force of the limb striking him. Upon landing, the decedent was unresponsive. The work crew turned him on his side to assist with breathing. The limb was moved to allow for emergency response access. Emergency response arrived and he was transferred by ambulance to a nearby hospital. He died approximately two weeks after the injury.

CAUSE OF DEATH

The death certificate indicated the cause of death as craniocerebral trauma. Toxicological tests were not performed.

RECOMMENDATIONS/DISCUSSION

- Employers should review tree-trimming activities and determine if existing rigging methods could be updated with existing technology.

The decedent and his crew were using the "trunk wrap" and clove hitch rigging techniques for the limb being cut to lower the limb to the ground. Starting at the edge of the limb, they cut 5-8 foot sections of limb and allowed the limb to fall away from the branch and strike the tree trunk to stop the momentum. The method selected created additional shock load on the ropes and the tree trunk because of the distance that the limb dropped before being caught by the rigging was not minimized. For every foot of fall, an object gains a unit of weight plus one (e.g., 500 pound limb falling four feet will hit the rigging at about 2,500 pounds).

Employers are encouraged to explore different rigging techniques for trees in their area and should adequately train employees on new rigging techniques selected.

- Employers should ensure that crew sizes are large enough to enable a site supervisor to effectively perform their safety-related activities.

The decedent was responsible for crew safety as well as maintaining site safety. As with any city activity, a crowd of spectators always gathers to observe the work activity. Maintaining site safety (both crew and public spectators) was not the only job the decedent had at the worksite; he was also an active worker. These dual job responsibilities placed him in a position where he may not have effectively performed both jobs, as evidenced by his position in the street. When work crews interact with the public, the individual responsible for maintaining site safety should have only those responsibilities, not also be an active work crewmember.

- Employers should standardize tree trimming safe work practices, such as prohibiting an employee to work under the drip line of a tree and sounding dead tree limbs with an axe handle.

Employers should standardize procedures, such as prohibiting an employee to work under the drip line of a tree and sounding limbs to identify weak spots, to provide protection from unexpected tree breaks.

The National Arborist Association (NAA) Pocket Guide, Safe Tree Felling, states “always give special consideration when you are planning to fell rotted, dead, split or otherwise hazardous trees because they may act or fall in an unexpected manner.” Although the decedent was out of the fall zone of the limb being cut, he was within the “drip line” or canopy of other tree limbs should they break. The tree was dead, and it is within the realm of possibility that unobserved tree hazards were present. The decedent chose his position in the street so he could observe the crew’s work and maintain site safety, but by choosing this position, he was in the fall path of other tree limbs.

In addition, any time a dead tree is being taken down, the limbs should be sounded with an ax handle, hammer, etc. to identify any hollow spots or sections prior to removal.

RESOURCES

MIOSHA Standards cited in this report can be directly accessed from the Michigan Department of Labor and Economic Growth, MIOSHA website www.michigan.gov/mioshastandards. The Standards may also be obtained for a fee by writing to the following address: Michigan Department of Labor and Economic Growth, MIOSHA, MIOSHA Standards Section, P.O. Box 30643, Lansing, Michigan, 48909-8143. MIOSHA Standard Section phone number is (517) 322-1845.

MIOSHA General Industry Safety Standard, Tree Trimming and Removal, Part 53.

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1/23/07

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