The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research

Hispanic Carpenter Killed When Struck by Piece of Concrete That Fell From Rigging Device During Hoist in Highway Work Zone

Nebraska Case Report: 05NE028

Report Release Date: May 19, 2006

Summary

A 51-year-old Hispanic male carpenter was killed when struck by a 2000 pound piece of pre-cast concrete that broke loose and fell while being hoisted above him. The victim was part of a seven-person crew installing a 30 foot high interlocking concrete retaining wall system as part of a new bridge construction project. As the “cap” piece was being hoisted to the top of the wall, one of two bolts securing the sling to the “cap” pulled out of its threaded insert, causing the “cap” to swing to the opposite side, placing the entire weight on the remaining bolt/threaded insert which also failed. The piece of “cap” fell approximately 10-20 feet striking the victim.

The Nebraska Workforce Development, Department of Labor’s Investigator concluded that to help prevent future similar occurrences, employers should:

- Ensure rigging and other equipment being used is suitable for the intended load.
- Ensure loads are not being lifted near, over or in the vicinity of any employee(s).
- Train all employees in the recognition & avoidance of hazards.
- Establish a Safety Committee and an Effective Written Injury Prevention Program.

Program Objective

The goal of the Fatality Assessment and Control Evaluation (FACE) workplace investigation is to prevent future work-related deaths or injuries, by a study of the working environment, the worker, the task the worker was performing, the tools the worker was using, and the role of management in controlling how these factors interact.

This report is generated and distributed solely for the purpose of providing current, relevant education to employers, their employees and the community on methods to prevent occupational fatalities and injuries.

Introduction

On December 12, 2005, at approximately 9:30 a.m., a 51-year-old male carpenter died after being struck and crushed by a 2,000 pound piece of concrete that fell on him from above. The Nebraska Department of Labor was notified of the fatality on December 14, 2005, by the Nebraska Highway Safety Administrator. The Nebraska FACE Investigator met with the

investigating OSHA Compliance Officer (CSHO) on December 16, 2005, and company officials on February 17, 2006. No site visit was conducted.

The victim's employer is a steel fabrication/bridge building (SIC Code 1622) company. The company has been in business for over 100 years. At the time of the incident the company employed approximately 100 employees at various job sites. The company had a safety program written in English. The employer had no previous history of fatalities.

Back to Top

Investigation

Personnel:

Victim: The victim was a 51-year-old Hispanic male. He had been employed by this company since September 1999, as a carpenter. The victim's primary language was Spanish but he did act as the interpreter for the crew.

Job Superintendent: He had been employed by this company for several years. He was not a licensed engineer.

Crane Operator: He was a Hispanic male who had operated cranes for this company for over 10 years but had not received any formal training.

Equipment:

Crane: American model 5299

Man lift: Mark Lift model 62C 4×4

Back to Top

Analysis/Synopsis

The victim (worker #1) was part of a seven-person crew working on a new bridge project. On the day of the accident the crew was installing concrete "cap" on top of a 30 foot high interlocking concrete retaining wall below a new bridge. Worker #2 was operating the crane. Workers #3, a mechanic & #4, a rigger were on the ground connecting the pre-cast concrete "cap" to the crane's rigging. Workers #5 & #6 were on top of the concrete wall, waiting on the "cap" to be hoisted in place so they could shim it level. The victim and the job superintendent (worker #7) were in a man lift which was at ground level. Once the "cap" was in place, they would raise themselves up to the "cap" to grout and finish the installation process.

The concrete "caps" were manufactured according to contract specifications by the victim's company. They were approximately 10 feet in length, 2 feet high, and 16 inches thick, weighing approximately 2,000 pounds each. As each "cap" was poured, a commercially produced steel threaded insert was recessed its entire length plus approximately ½" into each end of the concrete form. A piece of rebar was then inserted through the loop at the bottom of the insert to firmly secure the insert inside of the "cap".

Under normal circumstances, to lift the "cap" a steel eye-bolt was threaded into the insert. A double-leg chain sling was attached to both ends, which was attached to a chain hooked onto the crane's hook. The "cap" was lifted into place and secured. The eyebolts were unscrewed and used again to lift more "cap".

Work had to be delayed several days due to a severe snowstorm in the area. After the crew returned to the work site they could not locate the eye bolts. After discussion, the Job Superintendent (worker #7) decided they could take two pieces of 3"x3" angle iron approximately 6" long and use a cutting torch to make a hole in each side (one for the bolt, one for the sling), attach them to the "cap" with square-headed straight-bolts of the same diameter as the eye bolts and continue to lift "cap" into place. This procedure, using square-headed straight-bolts instead of the regular eye-bolts had never been used before. After fabricating the angle iron pieces, the new straight bolts were installed and used to move four pieces of "cap" without incident.

Workers #2 & #4 screwed the bolts into the threaded insert and tightened them snug. Worker #2 raised the “cap” into the air and swung it toward the retaining wall, causing it to be swung over worker #4. It stopped above the victim and worker #7 in the man lift basket. As the “cap” was being raised (somewhere between 10 and 30 feet high) one of the bolts pulled out of the threaded insert. This caused the “cap” to swing towards the opposite side. The weight and pressure applied to the remaining bolt caused it to fail, and it pulled out of the threaded insert. The “cap” fell, striking the victim on his hard hat and body. The “cap” hit the man lift basket with sufficient force to cause it to jerk sideways with enough force into worker #7’s body, breaking several ribs.

Back to To

Cause of Death

According to the death certificate, the cause of death was: Blunt force trauma to the body.

Back to Top

Recommendations/Discussion

Recommendation #1: Ensure rigging and other equipment being used is suitable for the intended load.

Discussion: The “tried & approved” method for lifting the “cap” could not be used due to the loss of the eye bolts. A decision was made by the Job Superintendent to use fabricated pieces of angle iron and substitute bolts to secure the “cap” to the crane’s sling. For unknown reasons, one of the straight bolts pulled out of the threaded insert. This allowed the pre-cast “cap” to swing away to the opposite side, placing all of the weight on the remaining bolt, causing it to also fail and pull out of the threaded insert. This allowed the “cap” to fall, striking the victim, leading to his death.

Reference: **29 CFR Part 1926.251(a)(1), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.

Reference: **29 CFR Part 1926.251(b)(3), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** Job or shop hooks and links, or makeshift fasteners, formed from bolts, rods, etc., or other such attachments, shall not be used.

Reference: **29 CFR Part 1926.704(c), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** Lifting inserts which are embedded or otherwise attached to pre-cast concrete members, other than the tilt up members, shall be capable of supporting at least four times the maximum intended load applied or transmitted to them.

Recommendation #2: Ensure loads are not being lifted near, over or in the vicinity of any employee(s).

Discussion: Job sites and tasks must be arranged to ensure that all loads being hoisted in the vicinity of any employee(s) ensures an adequate safety zone in the event the hoisted load should fall. The “cap” was raised from the staging area, swung over worker #4 and hoisted above the victim and worker #7.

Reference: **29 CFR Part 1926.550(a)(19), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** All employees shall be kept clear of loads about to be lifted and of suspended loads.

Reference: **29 CFR Part 1926.651(e), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

Reference: **29 CFR Part 1926.704(e), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** No employee shall be permitted under pre-cast concrete members being lifted or tilted into position except those employees required for the erection of those members.

Recommendation #3: Train all employees in the recognition & avoidance of hazards.

Discussion: Employers and employees alike must be trained to recognize, avoid and prevent unsafe conditions that workers will be exposed to during their daily tasks. Previously trained employees that exhibit actions which could be unsafe should be retrained before returning to the job site.

Construction safety training for Hispanic employees is available free of charge through the Nebraska Workforce Development's 21-D OSHA Consultation Program. For further information you may contact them at 1-800-627-3611.

Reference: **29 CFR Part 1926.21(b)(2), Occupational Safety and Health Standards for the Construction Industry, February 1, 2004:** The employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.

Recommendation #4: Establish a Safety Committee and an Effective Written Injury Prevention Program.

Discussion: Although not required by Federal law, the State of Nebraska does require each company that carries Worker's compensation insurance on their employees to have an effective Written Injury Prevention Program and formal Safety Committee.

When Legislative Bill 757 was adopted in 1993 it mandated that employers develop an effective written injury prevention plan that addresses all work sites and all classes of workers. Programs required include, but are not limited to, Emergency Action Plan, Fire Prevention Plan, Confined Space Program, Lock-Out/Tagout, etc. Each program shall approach each category of workplace danger with the intention of totally preventing workplace injuries where feasible.

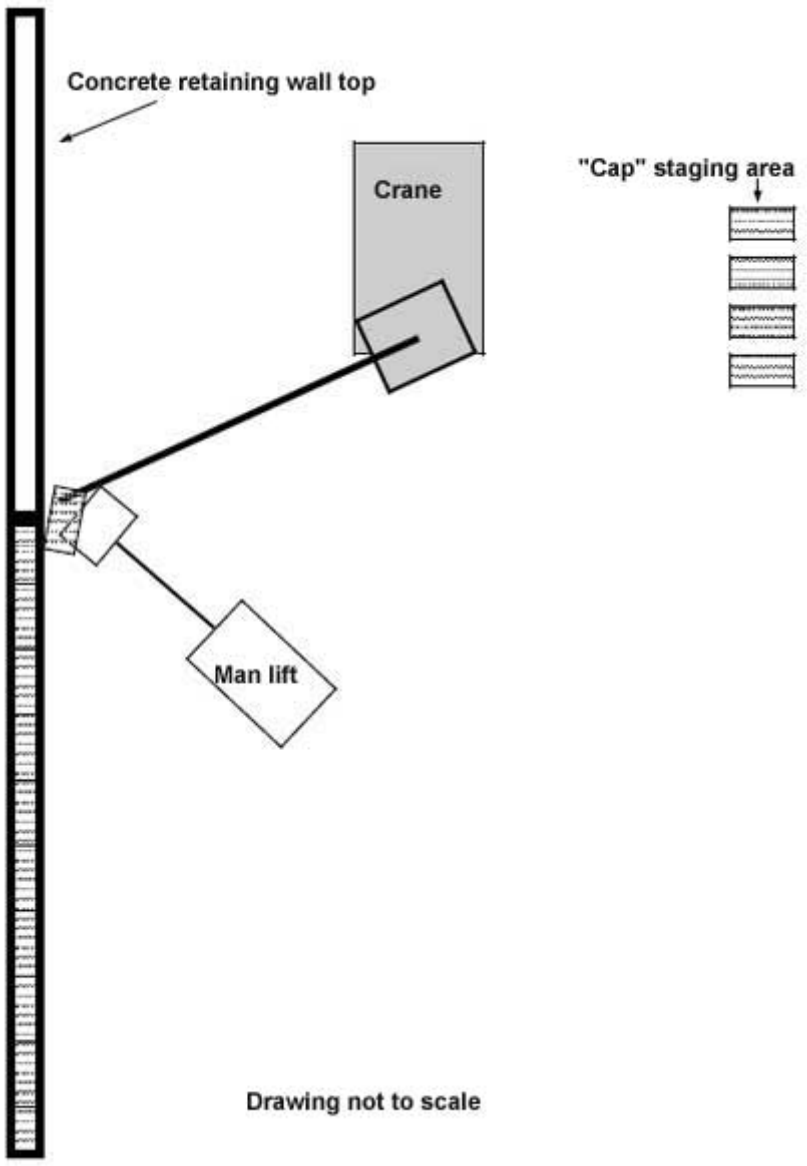
A Safety Committee shall consist of equal membership representing management
and employees. The purpose of the committee is to bring employees and employers together in a non-adversarial, cooperative effort to promote safety at each work site. They shall meet every three months at a minimum and maintain records of each meeting.

Assistance to develop these programs is available free of charge through the Nebraska Workforce Development's Department of Labor Voluntary On-Site Consultation Program in Lincoln.

Reference: **Nebraska Worker's compensation Reform (LB 757), title 230, chapter 6.**

Back to Top

Attachments



Attachment 1. Site diagram (Diagram not to scale)

Attachment 2. Top of the concrete interlocking retaining wall where the piece of “cap” that fell was to be placed.

Attachment 3. Man lift personnel basket with concrete “cap” across railing.

Attachment 4. Job-site manufactured lifting devices that were on top of concrete “cap” piece.

Attachment 5. Bolts that were screwed into threaded inserts on concrete “cap” that fell.

Attachment 6. New threaded insert with bolt involved in accident.

Attachment 7. New threaded insert with bolt attached to lifting device. Bolt & angle iron piece are from accident.

To contact Nebraska State FACE program personnel regarding State-based FACE reports, please use information listed on the Contact Sheet on the NIOSH FACE web site Please contact In-house FACE program personnel regarding In-house FACE reports and to gain assistance when State-FACE program personnel cannot be reached.

Nebraska Case Reports

Page last reviewed: November 18, 2015