

July 21, 2005

Nebraska FACE Investigation NE 2004-40

SUBJECT:

Hispanic Laborer Run Over and Killed by Backing Dump Truck in Roadway Construction Zone

SUMMARY:

The victim, a 42-year-old Hispanic male concrete finisher, was killed when backed over by a dump truck in a roadway work zone. The victim's employer was contracted to remove old asphalt and concrete from a closed portion of a four-lane highway. The victim and several other employees met in front of the dump truck with a supervisor to discuss their specific job assignments. After receiving their instructions, the victim walked alongside the backing dump truck for a few feet, then moved into the path directly behind it. As the victim was walking away from the truck it struck him, knocking him over and rolling over him. The driver felt a "thump" and immediately stopped the truck. Another employee yelled for the supervisor to call 911. Emergency personnel responded and the victim was declared dead at the scene.

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

- establish a system to ensure the area behind and adjacent to vehicles and equipment is clear to safely operate.
- ensure that all employees are wearing appropriate personal protective equipment (PPE).
- ensure that equipment warning devices are adequate.
- establish & maintain a Safety Committee & an Effective Written Injury Prevention Plan.

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 21, 2004, at approximately 4:45 p.m., a 42-year-old Hispanic concrete laborer died after he was struck and backed over by a dump truck in a roadway construction zone. The Nebraska Department of Labor received notice of the fatality the next day through local news media coverage. The Nebraska FACE investigator met with the investigating OSHA Compliance Officer (COSHA), company officials and law enforcement investigators on December 29, 2004. Due to late notification and the removal of the incident equipment, a site visit was not conducted.

The victim's employer is a road construction company, doing both asphalt and concrete interstate and roadway work since 1946. The company averages 350 employees at multiple job sites during the normal construction season. It is company policy that they shut down operations the week before Christmas through New Years, but several employees were kept working to finish up some smaller jobs. There were 8 employees at the site when the incident occurred.

Since the company was founded in 1946 it has experienced one other fatality, approximately 25 years ago.

INVESTIGATION:

Personnel:

Victim: The victim was a 42-year-old male. He had been employed by this company for 11 years, most recently as a concrete finisher. He often translated safety-related training for other employees. He was wearing an orange hooded sweatshirt, with dark blue coveralls. At the time of the incident, he was wearing a ski mask that was rolled up over his ears, with another stocking hat over the ski mask, with the sweatshirt hood over both. Witnesses stated that the hood was "drawn up" to keep the wind out.

Truck Operator: He has been driving large trucks for over 30 years and been employed by the company for 7 years. He has both a valid state and Commercial Driver's License (CDL).

Worker 1: (Foreman) He has been employed by the incident company for 44 years.

Worker 2: (Assistant project manager) He has been employed by the incident company for 3 years.

Worker 3: (Laborer) (Hispanic) He has been employed for the incident company for 3 years.

Worker 4: (Laborer) (Hispanic) He has been employed for the incident company for 3 years.

Worker 5: (Laborer) (Hispanic) He has been employed for the incident company for 5 years.

Worker 6: (Laborer) (Hispanic) He has been employed for the incident company for 5 years.

Company training: The company has a company-specific written safety program that covers all of the OSHA required programs, including general requirements for the wear of Personal Protective Equipment (PPE). Each employee is given a copy upon initial employment. Weekly "tail gate talks" are conducted covering a variety of applicable subjects. Safety training literature is also given out along with pay checks and the employees are required to sign before receiving

their check. All training sessions are documented. Written and oral training is translated by company personnel when necessary. The company does employ a full-time Safety professional.

In accordance with Nebraska law the company established a Safety Committee that was active until recently. All required program elements are in place. This program needs to be reactivated and all meetings, etc. be documented.

Equipment: The truck involved in the incident was a 1993 Ford dump truck. It is equipped with reverse lights and an audible reverse alarm. All safety equipment was checked the morning of the incident by the operator and was working. After the incident, State Department of Transportation law enforcement personnel again checked all safety functions and found them to be operable.

ANALYSIS/SYNOPSIS:

The job site was a four-lane rural highway running basically north and south. The lanes are separated by a wide grassy median. The company had been working this particular stretch of highway for three weeks. It was approximately 20 degrees Fahrenheit with a 15-20 mph north wind. The two northbound lanes had been completely closed off from normal traffic during all phases of construction, which included the removal of old asphalt and concrete. Only construction vehicles and employees were allowed access to this stretch of roadway. Most of the crew had been on site for approximately 4 hours. The victim and another employee had been working since early that morning at another job site several miles from the incident site. They both arrived at the incident site at 4:15 p.m., approximately 30 minutes prior to the accident to assist in removal of small piles of asphalt and concrete debris alongside the roadway.

At approximately 4:45 p.m. the victim and all of the workers all met in front of the dump truck to get their instructions from Worker #1, the job foreman. The dump truck was idling in PARK, facing south. They were told that there were two piles of debris north of their location, behind the dump truck. They were told to leave the first pile and start up with the second, larger pile by shoveling and manually placing the concrete materials in a skid steer bucket, which would load it into the dump truck. After that they were quitting for the day.

Worker #5 got into the passenger side of the dump truck to warm up, while the victim made a comment to the truck operator that he was cold also, and started to walk north along the driver's side of the truck. Worker #4 went to a nearby front end loader that was already full of concrete debris, and drove it towards the dump truck. As he approached, the victim stopped to allow Worker #4 to dump his load, then continued to walk north as the front end loader backed away and went north towards the next pile. Worker #5 (in truck cab) stated he saw the truck operator look in both mirrors, then start to back up at idle speed, looking out the driver's side mirror. The victim continued to walk alongside the backing truck for several feet. According to Worker #4, he saw the victim walking alongside the backing truck with his hands in his pockets for approximately 35 feet, then move directly behind the truck, still facing away from it. He said that the truck continued to back slowly for approximately 65 more feet until it struck the victim. The victim attempted to turn towards the truck but it knocked him down under the rear axle. The truck had backed approximately 100 feet when the operator felt a "thump" and immediately stopped the vehicle. Worker #1 was in his vehicle approximately 100 feet from the dump truck. He saw the dump truck stop approximately 25 feet short of the pile, then noticed something underneath the rear axle. He immediately called Worker #2 who was 500 foot north of the dump truck in his vehicle to get there immediately. Worker #1 called 911 and local medical and law enforcement personnel responded. The victim was declared dead at the scene.

CAUSE OF DEATH:

According to the death certificate, the cause of death was: *Extreme head injuries due to truck-pedestrian accident.*

RECOMMENDATIONS/DISCUSSION:

- **Recommendation #1: Establish a system to ensure the area behind and adjacent to vehicles and equipment is clear to safely operate.**

Discussion: No employer shall use any motor vehicle equipment having an obstructed view to the rear unless the vehicle has a reverse signal alarm audible above the surrounding noise level, or the vehicle is backed up only when an observer signals that it is safe to do so.

Ref: 29 CFR 1926.601(4)(i-ii)

¹Workers in highway work zones are exposed to risk of injury from the movement of construction vehicles and equipment within the work zones, as well as from passing motor vehicle traffic. Data from the Census of Fatal Occupational Injuries (CFOI) indicate that of the 841 work-related fatalities in the U.S. highway construction industry between 1992 and 1998, 465 (55%) were vehicle or equipment-related incidents that occurred in a work zone. ²The primary injury source for fatalities of workers on foot struck by a construction vehicle within the work zone were trucks (61%).

Separate workers on foot from equipment as much as possible by:

1. Scheduling work tasks to keep workers on foot out of areas where heavy equipment is in use.
2. Channelizing dump trucks leaving the work space and keeping workers on foot out of that channel. Use flexible, colored poles (as used for snow plow markers) or temporary pavement marking inside the work space to mark pedestrian-free areas or flow-of-traffic lines. These delineators should be installed so that the public will not notice or respond to them, but the workers will recognize them as guideposts.
3. Train subcontractors, crews, operators, and truck drivers to understand any symbols, markers, and colors used to separate workers on foot from equipment within the work space.
4. Design the work space to eliminate or decrease backing and blind spots; when feasible pull trucks in and let the operation catch up to them.
5. Train workers on foot and equipment operators in appropriate communication methods (e.g., using hand signals and maintaining visual contact) to be used when workers on foot are required to be in the same area as equipment.
6. Train equipment operators never to move equipment without making positive visual contact with any workers on foot near the equipment.

Whenever practical, equipment, worker's private vehicles, materials, and debris should be stored in such a manner so it will not impede a vehicle operator's line-of-sight while operating construction equipment.

- **Recommendation #2: Ensure that all employees are wearing appropriate personal protective equipment (PPE).**

Discussion: The employer is responsible for requiring the wearing of appropriate personal protective equipment in all operations where there is an exposure to hazardous conditions.

Ref: 29 CFR 1926.28(a)

Written company policy states that workers will wear high visibility/reflective clothing when working with or in the vicinity of highway traffic, but does not require it to be worn in a work zone that has been completely closed off to the general public. The job foreman does carry additional PPE (reflective vests, hardhats, etc.) in his vehicle if they are required.

²All workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel meeting the requirements of ISEA “American National Standard for High-Visibility Safety Apparel (section 1A.11), or equivalent revisions, and labeled as ANSI 107-1999 standard performance for Class 1, 2, or 3 risk exposure.

³A competent person designated by the employer to be responsible for the worker safety plan within the activity area of the job site should make the selection of the appropriate class of garment and ensure its usage.

All workers, especially those on foot, need to wear high-visibility safety apparel, i.e. vests, arm bands, hard hat covers, etc. The site supervisor must ensure each employee on the job site, prior to commencing work, is in compliance with both OSHA and company policy.

⁴This clothing should be inspected regularly to ensure that color has not faded and that retro-reflective properties have not been lost. So that workers do not blend into the background, consider seasonal variations in landscape and foliage when choosing colors for worker apparel. Consider using fluorescent garments with retro-reflective material when working under poor lighting conditions. Also consider increasing visibility by using high-visibility arm bands and hats, and vests with strobes.

- **Recommendation #3: Ensure that equipment warning devices are adequate.**

⁵Discussion: All vehicles in use shall be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices.

Ref: 29 CFR 1926.601(14)

The operator conducted the pre-operational checklist prior to moving the truck from its parking location to the job site. All lights and audible signals were working. Witnesses stated that they heard the back up alarms working on the dump truck prior to the incident, and when Carrier Enforcement inspected it shortly after the incident, all were operating properly.

It can not be determined why the victim did not move away from the approaching dump truck. One possible scenario is that the victim may not have heard the backing truck due to a combination of multiple layers of head gear, nearby running equipment, and a strong north wind that was blowing directly in his face. It is also possible that he may have become complacent to the warning devices in use, being exposed to the same warning signals/tones every day.

There are other options available for construction equipment, vehicles and employees. Some of these are:

1. Hard hat mounted mirrors. These are similar to those worn by bicyclists. They allow the worker to have some rear vision to possibly see approaching hazards.
2. Changing the audible tone on equipment. This can be done using either mechanical or electrical warning devices. Workers that are exposed to the same warning tones every day may tend to become complacent when these audible signals are used. Changes every so often may help to alleviate this.
3. Parabolic mirrors. The use of parabolic mirrors on construction equipment and vehicles, similar to those used on school buses, allows the operator to view what is directly behind their vehicle. These mirrors normally produce a “fish-eye” type view, which must be taken into consideration when judging distances between a vehicle and the obstacle.
4. Ultrasonic backup sensing system. These devices attach to the left and right rear of trucks, and wired to either the left or right back up light, allowing it to only function when the vehicle is in reverse. The device emits an audio warning and sends a wireless signal to a video display to indicate in feet and in tenths of feet how close the vehicle is getting to the obstacle. The audio alerts and the red-flashing video display warning begin at about 6 feet and continue as the distance decreases to the obstacle. The audio warning becomes continuous when the video display indicates the distance to be one foot and/or less from the obstacle.
5. Reverse camera systems. These are normally mounted near a rear license plate and have a wide angle lens (up to 120 degrees cone of vision), and a visibility range of 165 feet. These are similar to ones used on larger recreational vehicles.

- **Recommendation #4: Establish & maintain a Safety Committee & 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 a Safety Committee and an Effective Written Injury Prevention Program. The company had previously established and ran such a program, but has not conducted formal Safety Committee meetings in several months. The Safety Committee needs to be re-activated and this incident discussed amongst the employees and management.

⁶Nebraska's Workplace Safety Consultation Program was brought about by Legislative Bill 757 (LB 757) in 1993. It mandated that employers:

1. Form a Safety Committee that consists 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

worksite. They shall meet every three months at a minimum and maintain records of each meeting.

2. The Safety Committee shall 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.

Ref: Nebraska Workers' Compensation Reform (LB 757), Title 230, chapter 6.

Assistance to develop these programs is available free of charge through the Nebraska Workforce Development's Department of Labor On-Site Consultation Program in Lincoln. A copy of their brochure was sent to the employer.

ATTACHMENTS:

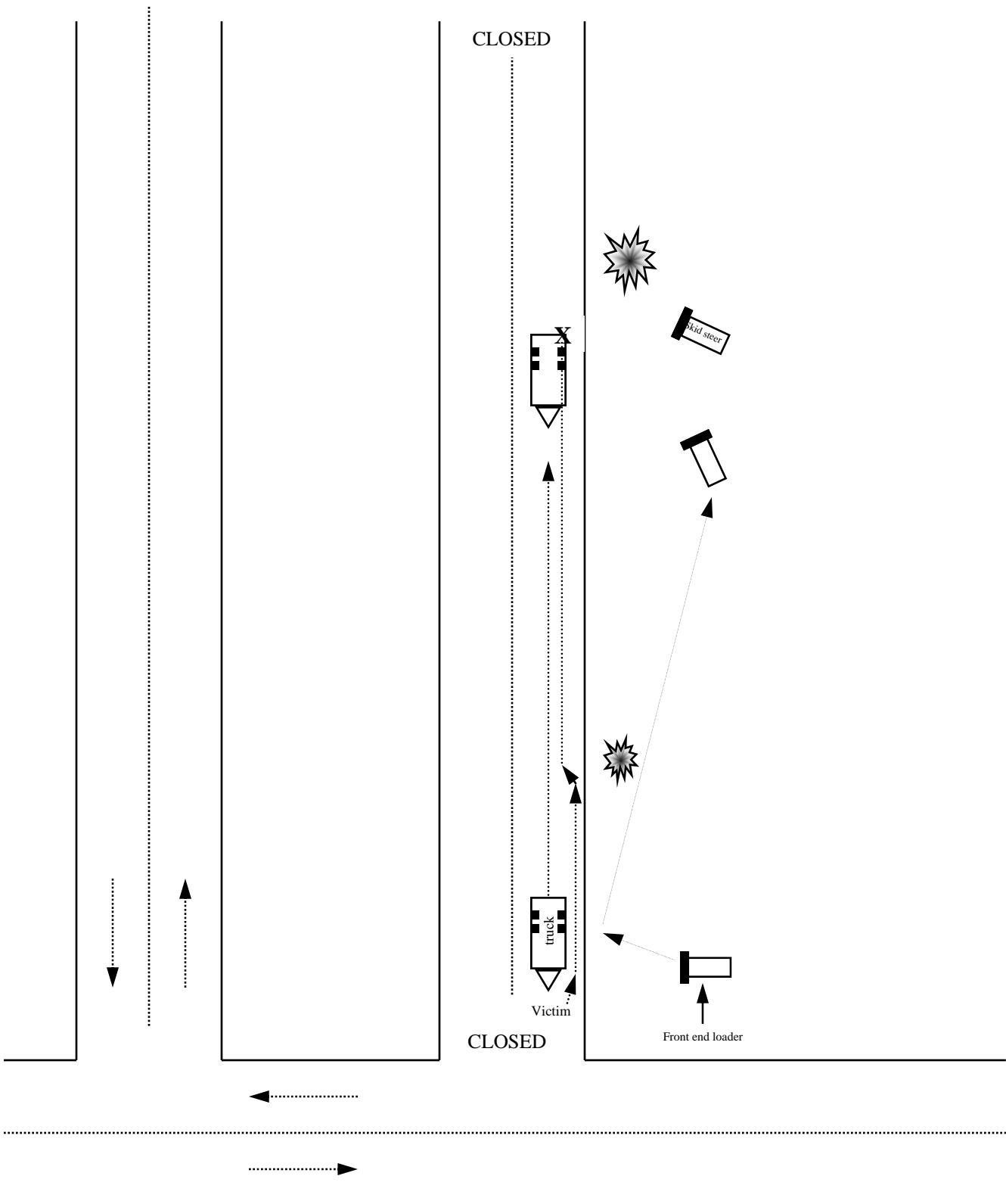
Attachment 1. Site diagram (not to scale).

REFERENCES:

1. ¹National Institute For Occupational Safety & Health, *Building Safety Highway Work Zones – Measures to Prevent Worker Injuries from Vehicles and Equipment*, April 2001, pg. ix.
2. ²National Institute For Occupational Safety & Health, *Building Safety Highway Work Zones – Measures to Prevent Worker Injuries from Vehicles and Equipment*, April 2001, pg. 5.
3. ³National Institute For Occupational Safety & Health, *Building Safety Highway Work Zones – Measures to Prevent Worker Injuries from Vehicles and Equipment*, April 2001, pg. 22.
4. ⁴U.S. Department of Transportation Federal Highway Administration, *Uniform Traffic Control Devices (MUTCD)*, Section 6D.03, Worker Safety Considerations, November 20, 2003 edition.
5. ⁵National Institute For Occupational Safety & Health, *Building Safety Highway Work Zones – Measures to Prevent Worker Injuries from Vehicles and Equipment*, April 2001, pgs. 12-13.
6. ⁶29 CFR 1926, Occupational Safety and Health Standards for The Construction Industry, 2003 Edition.
7. ⁷Nebraska Workers' Compensation Reform (LB 757), Title 230, chapter 6.

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Attachment #1—Site Diagram (Not to scale)