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FACE

Fatality Assessment and Control Evaluation Program

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State Department of Transportation Worker (Laborer) Dies After Being Struck by Motor Vehicle

SUMMARY

On October 25, 2000, a 34-year-old State Department of Transportation worker (the victim) died after he was struck by a motor vehicle while working in a highway construction zone. The victim and coworkers had been preparing the work area, located just beyond a gently curved section of two-lane asphalt-surfaced state highway, for a trench excavation the following day. After installing temporary traffic control signs and marking the pavement for excavation, the crew was preparing to leave the area. The victim was sweeping spillage near the crew's work vehicle, parked on the shoulder near the roadway's northbound lane, when a northbound motorist veered off the roadway and struck the driver's side rear corner of the work vehicle. The motorist continued traveling north, scraping the entire side of the work vehicle and striking the victim, before coming to a stop in a roadside ditch. At the time of the collision, none of the crew members were looking toward the victim, however, they all heard the sound, turned toward the victim, and immediately went to his aid. Emergency personnel were notified via 911 and responded within 5 minutes. However, the victim died within minutes of the collision.

Photo. *Incident Scene*

NIOSH investigators concluded that, to help prevent similar occurrences, departments of transportation should

- ***consider the use of supplemental traffic control devices in addition to the minimum specified by the Manual of Uniform Traffic Control Devices (MUTCD) during highway construction work***

Fatality Assessment and Control Evaluation (FACE) Project

The National Institute for Occupational Safety and Health (NIOSH), Division of Safety Research (DSR), performs Fatality Assessment and Control Evaluation (FACE) investigations when notified by participating states (North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia); by the Wage and Hour Division, Department of Labor; or when a request for technical assistance is received from NIOSH-funded state-level FACE programs in Alaska, California, Iowa, Kentucky, Massachusetts, Minnesota, Missouri, Nebraska, New Jersey, Ohio, Oklahoma, Texas, Washington, West Virginia, and Wisconsin. The goal of these evaluations is to prevent fatal work injuries in the future by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. The FACE program does not seek to determine fault or place blame on companies or individual workers. For further information visit the FACE website at **www.cdc.gov/niosh/face/faceweb.html** or call toll free 1-800-35-NIOSH.

- ***consider installing rumble strips along the roadway pavement edges to warn motorists when their vehicle is approaching the shoulder***

INTRODUCTION

On October 25, 2000, a State Department of Transportation worker (the victim) was struck and killed by a motorist while working in a highway construction area. On October 27, 2000, the state Occupational Safety and Health Administration (OSHA) notified the Division of Safety Research (DSR) of the occurrence. On November 7 and 8, a DSR safety engineer met with the OSHA compliance officer assigned to investigate the case, traveled to the incident site, interviewed the State Department of Transportation (DOT) safety engineer and the DOT safety trainer, obtained photographs of the incident scene, and reviewed the investigative files.

The victim, a general laborer, had 11 years experience and had participated in all DOT training sessions. The DOT had been in existence since 1920, and employed between 14,500 and 15,000 employees; the exact number varies depending on temporary and summer employment. The department had 14 highway divisions. There were about 650 employees within the victim's division. The department had a comprehensive written safety policy and written workplace safety manual which contained safe operating procedures for all job tasks. The employer had full-time safety and training officers as well as safety consultants for each division. Training was provided both formally and on the job through daily tailgate meetings and work observation. On-the-job training was conducted by crew foremen.

At the time of the incident, the victim was wearing employer-supplied personal protective equipment, which included an orange hat and orange mesh safety vest.

The employer had experienced 72 fatalities since 1978.

INVESTIGATION

The incident occurred on a two-lane state highway which ran north and south through a small village. The roadway consisted of two travel lanes totaling 24 feet in width with an additional 3- to 4-foot, asphalt-paved bike path on each side. A grassy, sand shoulder, approximately 10 feet wide, was on each side of the pavement. The northbound approach was curved until about 300 feet before the incident site. The pavement edge was level with the shoulder just after the northbound exit from the curve. From there, the height of the pavement edge above the shoulder increased to 3½ inches between 100 and 92 feet before the incident site. The height then decreased to 1¾ inches, 60 feet before the incident site. The roadway, including the curve before the incident site, appeared to be level with little or no crown.

On October 25, 2000, the crew, consisting of one transportation supervisor, three permanent transportation workers, and one temporary transportation worker, gathered at the DOT maintenance yard shortly before 8:00 a.m. The supervisor briefed them on the tasks for the day, which included setting up and marking a work area where pipes were to be installed across the road the next day. The briefing also included a discussion of the equipment that would be needed and the driving

assignments. The crew loaded the tools needed for the day's work. At about 8:20 a.m, they left the yard aboard a crew-cab flatbed truck pulling a trailer loaded with four 20-foot joints of 24-inch-diameter aluminum pipe, and a four-wheel drive crew cab pickup truck (approximately 6000 pounds curb weight) towing an air compressor. Once at the work site, the crew parked the flatbed truck with trailer beside an access road that intersected the state road. The pickup truck and air compressor was parked beside the state road and the air compressor was disconnected. They then retrieved traffic control signs from the flat-bed truck, transferred them and themselves to the pickup truck, and proceeded to set up traffic controls as shown in the figure. After all traffic control signs had been positioned, the crew returned to the work site and parked the pickup truck on the northbound side of the road, just off the bike path.

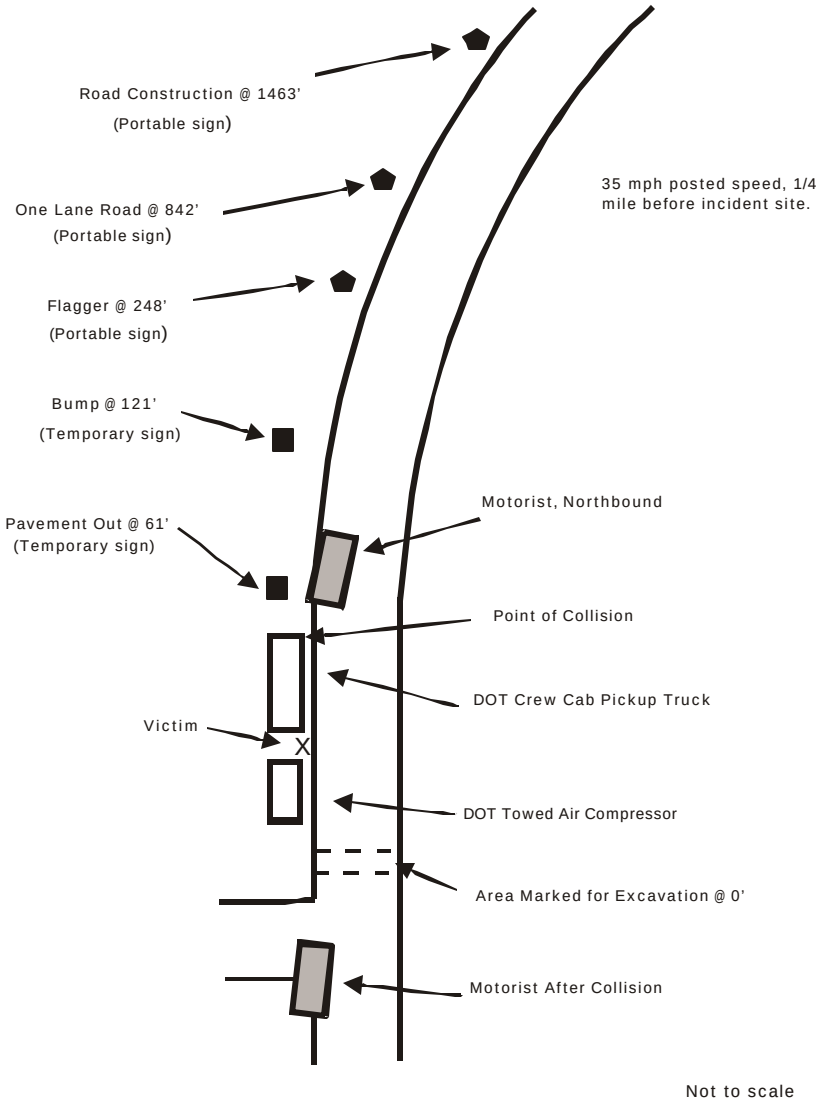

Figure. *Layout of Incident Scene*

The supervisor marked the locations of the cuts for the trench on the pavement with spray paint, while two crew members flagged northbound and southbound traffic. Cones were set out, closing the northbound lane to traffic, and the supervisor, assisted by two crew members, cut the asphalt road surface using a jackhammer. After the surface was cut across the northbound traffic lane, the supervisor had the flaggers stop traffic in both lanes while the southbound lane was cut. While cutting the surface, the crew members swept and shoveled the cuttings off the road and placed them in a pile on the northbound shoulder, just behind the air compressor. The cutting operation was completed between 10:00 and 10:15 a.m., and the cones were removed. At that time, the supervisor directed the crew to erect temporary signs, "pavement out" and "bump," along the north- and southbound road shoulders. The "pavement out" sign was to be turned away from traffic to remain unreadable and was to be turned around the next day prior to beginning excavation for the trench. Crew members were then directed to begin hand digging along the shoulders to explore for public utilities so the locations would be known for the next day's trenching work. One crew member began digging post holes to erect the temporary signs, two others had brought the signs from the flatbed truck and carried them to their intended locations, and one crew member had begun to dig exploration holes in search of underground utilities.

The incident occurred between 10:20 a.m. and 10:25 a.m. as the supervisor and two crew members were located on the side of the southbound lane exploring for utilities and one crew member was located on the access road. Because the crew members and supervisor were not looking directly at the victim his exact location is not known, but when last seen he had been standing in front of the pickup truck, sweeping spillage. A motorist, driving a sport utility vehicle (about 4000 pounds curb weight), was exiting the curve in the northbound lane and drifted toward the outside of the curve. The motorist traversed the bike path and his vehicle's passenger-side wheels dropped off of the pavement and onto the grassy sand shoulder. The motorist continued traveling with his wheels off the pavement and sideswiped the rear corner of the DOT pickup truck, shoving it approximately 20 feet north. The motorist vehicle then struck the victim and continued north with its right side airborne for about 50 feet. It traveled an additional 65 feet with ground contact before coming to rest in the northbound roadside ditch. The victim was thrown north approximately 20 feet after the collision. All the crew members heard the sounds of the collision and turned toward the victim. The supervisor and two crew members went to the victim and one crew member went to the motorist's vehicle. A crew member notified 911 at 10:31 a.m. and emergency personnel were on the scene by 10:35 a.m. The victim was transported to a local clinic where he was pronounced dead, having expired within minutes of the collision.

CAUSE OF DEATH

The official cause of death was determined to be multiple blunt force injuries of head and trunk as a result of motor-vehicle collision with pedestrian.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Departments of transportation should consider the use of supplemental traffic control devices in addition to the minimum specified by the Manual of Uniform Traffic Control Devices (MUCTD) during highway construction work

Discussion: The work area was marked according to the recommendations of the MUTCD for the design and usage of traffic control devices. In this situation, traffic control devices consisted of temporary signs and a flag person. At the time of the incident, a flag person was not required because the roadway was no longer closed to normal traffic. However, workers were still engaged in work tasks along the shoulder of the roadway and temporary warning signs remained in place. A flagger positioned on either approach to the work area on the road shoulder may have been able to warn the victim of the approaching motorist or may have been able to attract the motorist's attention, causing him to slow. Additional protection may also be obtained through the use of portable rumble strips positioned across the roadway, 250 feet in advance of the work zone. The 75-pound strips are designed to be deployed from the back of a pickup truck. Their use has been evaluated by the Kentucky Transportation Center through a grant from the Federal Highway Administration (FHWA)[1]. The evaluation concluded that they are best suited for low-speed roads and are effective in making drivers more aware of approaching work zones.

Recommendation #2: Departments of transportation should consider installing rumble strips along the roadway pavement edges to warn motorists when their vehicle is approaching the shoulder.

Discussion: The use of rumble strips along the edge of roadway pavements is becoming increasingly common. Strategically located, these strips provide an audible warning to a motorist when the vehicle's passenger-side wheels approach the pavement edge. This allows time and space for the motorist to correct the vehicle's direction of travel before it encounters any pavement-edge drop offs that may pull the vehicle to the road side. When used in conjunction with a bike path, cyclist safety should also be considered. The rumble strips could have been positioned between the roadway and the bike path and a minimum clear path of 4 feet allowed for bicycle operation[2]. It could not be determined to what extent the drop-off may have contributed to the incident; however, an audible warning before the pavement edge may have motivated the motorist to correct his line of travel away from the victim's location before the vehicle's wheels had dropped to the shoulder.

REFERENCES

1. University of Kentucky [1996]. Kentucky Transportation Center Research Report KTC-96-30: Evaluation of SHRP work zone safety devices. Lexington, KY: College of Engineering, University of Kentucky.

2. DOT [2000]. Accommodating bicycle and pedestrian travel: A recommended approach, U.S. Department of Transportation, Federal Highway Administration, March 2000.

INVESTIGATOR INFORMATION

This investigation was conducted by Paul H. Moore, Safety Engineer, NIOSH Division of Safety Research, Surveillance and Field Investigation Branch, Fatality Assessment and Control Evaluation Team.