

Kentucky Injury Prevention and Research Center
Bona fide agent for Kentucky Department for Public Health
333 Waller Avenue, Suite 242 • Lexington, KY 40504 • 859-257-5839

INCIDENT HIGHLIGHTS



DATE:
September 29, 2022



TIME:
8:30 a.m.



VICTIM:
25-year-old non-Hispanic
general laborer



INDUSTRY/NAICS CODE:
Highway construction/
2373100



EMPLOYER:
Highway construction



SAFETY & TRAINING:
Formal safety program



SCENE:
State Highway



LOCATION:
Kentucky



EVENT TYPE:
Struck by



REPORT#: 22KY097

REPORT DATE: 05/01/2023

Highway Construction Flagger Dies After Being Struck by Vehicle

SUMMARY

On September 29, 2022, a 25-year-old general laborer (victim) was conducting traffic control for a highway construction project on a two-lane state highway. While doing so, a vehicle failed to stop and struck the victim. The victim succumbed to his injuries at the scene of the incident.

[READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Unsafe operation of a motor vehicle,
- Lack of hazard recognition,
- No physical barrier between moving vehicles and workers.

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RECOMMENDATIONS

Kentucky investigators concluded that, to help prevent similar occurrences, the following actions should be implemented:

- Employers should utilize automated flagger assistance devices (AFAD) for traffic control in work zones in lieu of flaggers.
- Stationary law enforcement vehicles with activated blue lights should be utilized in work zones when workers are present.
- Employers should utilize portable temporary rumble strips (PTRS) in temporary work zones.
- Motor vehicle operators should utilize safe driving practices when approaching and driving through work zones.

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KENTUCKY

State **FACE** Program

Fatality Assessment & Control Evaluation

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Fatality Assessment and Control Evaluation (FACE) Program

This case report was developed to draw the attention of employers and employees to a serious safety hazard and is based on preliminary data only. This publication does not represent final determinations regarding the nature of the incident, cause of the injury, or fault of employer, employee, or any party involved.

This case report was developed by the Kentucky Fatality Assessment and Control Evaluation (FACE) program. Kentucky FACE is a NIOSH-funded occupational fatality surveillance program with the goal of preventing fatal work injuries by studying the worker, the work environment, and the role of management, engineering, and behavioral changes in preventing future injuries. The FACE program is located in the Kentucky Injury Prevention and Research Center (KIPRC). KIPRC is a bona fide agent for the Kentucky Department for Public Health.

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INTRODUCTION

On September 29, 2022, a 25-year-old general laborer (victim) was conducting traffic control for a guardrail installation project on a two-lane state highway. While doing so, a vehicle failed to stop and struck and killed the victim. On November 18, 2022, the Kentucky Labor Cabinet informed the Kentucky Fatality Assessment and Control Evaluation (FACE) program of the incident. On March 18, 2023, the Kentucky FACE investigator conducted a site visit to gather photographs of the incident site.

EMPLOYERS

The employer is a family-owned and -operated highway construction contractor that specializes in the installation of guardrails, cable barriers, and road signs. The company was founded in 1962 and consists of 45 total employees, 10 of whom are office support staff and 35 laborers that make up seven crews. The company works exclusively on state and federal government contracted jobs across five states.

WRITTEN SAFETY PROGRAMS and TRAINING

According to the owner, the company utilizes the [Guidelines for Traffic Control in Short Duration/Mobile Work Zones¹](#) to train all employees. Upon completion, field training takes place that requires new employees to shadow tenured employees for up to six weeks to learn additional job-specific functions. The employer stated that a drug testing program is in place; however, he was unable to provide specifics on the exact details of the program.

WORKER INFORMATION

The victim was a 25-year-old non-Hispanic single male. The decedent was a high school graduate and had worked for the company since July of 2021. Prior to becoming an employee at the involved company, the victim worked as an auto maintenance technician and as a landscaping laborer.

INCIDENT SCENE

The incident occurred on the eastbound shoulder of a two-lane state highway (photo 1) with a posted speed limit of 55 miles per hour. East- and westbound travel lanes are divided by a standard double yellow line. The shoulder of the highway measures approximately 7 feet on either side of the highway. A grassy slope meets the edge of the shoulder and leads to a ditch and earth embankment on both east- and westbound lanes (photo 2). Work zone signage was present on the day the incident occurred in the below arrangement:

- Sign 1: ROAD WORK ½ MILE (photo 3)
- Sign 2: ROAD WORK 1500 FT (photo 4)
- Sign 3: ROAD WORK 1000 FT (photo 5)
- Sign 4: ROAD WORK 500 FT (photo 6)
- Sign 5: ONE LANE ROAD AHEAD (photo 7)
- Sign 6: BE PREPARED TO STOP (photo 8)
- Sign 7: FLAGGER AHEAD (photo 9)

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Photo 1. Overhead Google Earth image showing location where the incident occurred.

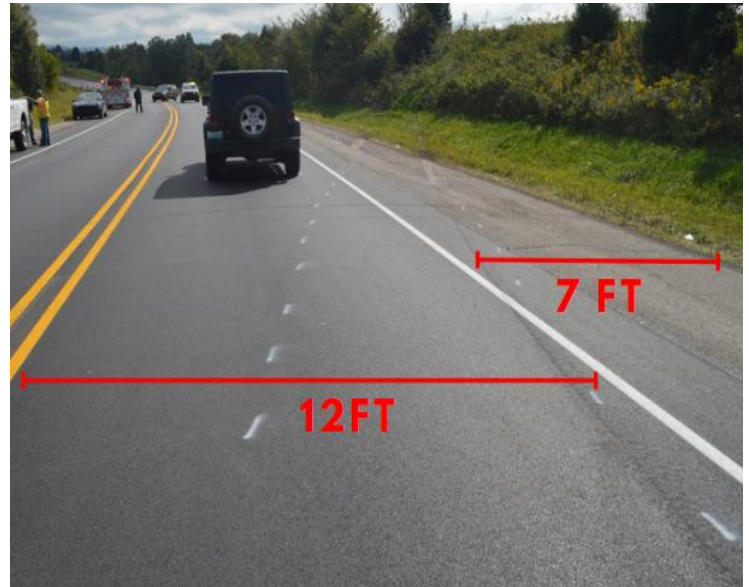


Photo 2. Photo showing eastbound lane of travel and relative approximate measurements.



Photo 3. Photo showing first work zone sign present as you approach the scene of the incident traveling east. Sign reads, "ROAD WORK 1/2 MILE."



Photo 4. Photo showing second work zone sign present as you approach the scene of the incident traveling east. Sign reads, "ROAD WORK 1500 FT."

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Photo 5. Photo showing third work zone sign present as you approach the scene of the incident traveling east. Sign reads, "ROAD WORK 1000 FT."



Photo 6. Photo showing fourth work zone sign present as you approach the scene of the incident traveling east. Sign reads, "ROAD WORK 500 FT."



Photo 7. Photo showing fifth work zone sign present as you approach the scene of the incident traveling east. Sign reads, "ONE LANE ROAD AHEAD."



Photo 8. Photo showing sixth work zone sign present as you approach the scene of the incident traveling east. Sign reads, "BE PREPARED TO STOP."

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Photo 9. Photo showing seventh work zone sign present as you approach the scene of the incident traveling east. Sign depicts flagger ahead.

WEATHER

The weather on the day of the incident was approximately 49 degrees Fahrenheit, 93% humidity, 8 mph average northeast wind speed. The weather is not believed to have been a factor in this incident.²

INVESTIGATION

On September 29, 2022, a 25-year-old general laborer (victim) arrived on site at 7:30 a.m. for day nine of what was projected to be a 10-day guardrail installation project on a two-lane state highway. The victim was a member of the seven-man crew tasked with completing the installation project. The crew consisted of two flaggers and five field installation technicians. Although the victim was qualified to perform installation technician duties, he was selected as one of two employees tasked with flagger responsibilities throughout the entirety of the 10-day project. According to the company, the position of flagger is one that is often rotated amongst the seven-man crew. After a safety briefing, the victim put on his American National Standards Institute (ANSI) Class 2 safety vest (photo 10) and positioned himself on the shoulder of the eastbound travel lane at 8:00 a.m. (photo 11).

The construction project was positioned on the shoulder of the westbound lane, requiring the westbound lane of travel to be closed. Vehicles traveling east and west were required to alternate the use of the eastbound travel lane. The victim was responsible for conducting traffic control for vehicles traveling east on the two-lane state highway, communicating with the westbound flagger to alternate traffic flow. Each flagger was equipped with a standard stop/slow paddle (photo 12), to communicate appropriate commands to oncoming drivers.

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At 8:30 a.m., after work had been active for approximately 30 minutes, a Chevrolet pickup truck traveling east approached the work zone but failed to stop, as instructed by the victim. Approximately 18 feet prior to the victim's location, the driver of the pickup truck made an evasive maneuver and steered to the right, attempting to avoid the flagman (victim) (photo 12). Simultaneously, the victim fled to his left toward the ditch to escape the approaching vehicle (photo 13). The vehicle traveled approximately 21 feet after leaving the eastbound lane of travel, across the shoulder of the highway and into the ditch, striking the victim approximately 3 feet off the paved shoulder (photo 14). According to the involved company, the impact resulted in the victim being thrown to the ground. The involved vehicle continued forward, driving over the victim and out of the ditch, steering the truck back onto the travel portion of the highway. Once back on the highway, the involved vehicle proceeded to make a U-turn and flee the scene of the incident, heading west. A motorist traveling west witnessed the events unfold and contacted emergency medical services, who arrived on scene approximately 15 minutes later at 8:45 am. The victim was transported to a local hospital, where he succumbed to his injuries.



Photo 10. Photo depicting an ANSI Class 2 safety vest. Photo retrieved from and property of criticaltool.com.



Photo 11. Photo depicting path of the involved vehicle (yellow arrows) and original position of victim (red location marker).

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Photo 12. Stock photo of STOP/SLOW wand utilized by flaggers. Photo retrieved from and property of trafficsafetyzone.com.

Photo 13. Photo depicting continued path of vehicle after leaving the east travel lanes (yellow arrows) and the escape route taken by the victim (green location marker and arrows).



Photo 14. Photo depicting location where victim was struck (red X) and the path of the vehicle prior to and after striking the victim (red lines).

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CAUSE OF DEATH

According to the death certificate, the cause of death was blunt force trauma.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Kentucky investigators identified the following unrecognized hazards as key contributing factors in this incident:

- Unsafe operation of a motor vehicle,
- Lack of hazard recognition,
- No physical barrier between moving vehicles and workers.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should utilize automated flagger assistance devices for traffic control in work zones in lieu of flaggers.

Discussion: The utilization of automated flagger assistance devices (AFADs) is an alternative method to control the flow of traffic in temporary work zones. AFADs (photo 15) can be operated via remote control from up to 200 ft away, eliminating the need for traditional flaggers to be present on the highway in potentially vulnerable locations. According to Ver-Mac, a provider of AFADs, a typical AFAD device is equipped with two 12-inch lamps, (one red and one yellow), a static “Stop Here on Red” sign, one gate with a flag, and a wireless remote controller.³ Ver-Mac states that in most work zones, the operator would be positioned to visually see each end of the work zone to determine when to open or close each gate depending on traffic flow. The system has a fail-safe that both gates cannot be open at the same time, to prevent head-on collisions. When the gate is in the down position, the red 12-inch lamp will activate; when the gate is in the up position, the 12-inch yellow lamp will activate.³ An [Evaluation of Automated Flagger Assistance Devices](#) study conducted by the University of Missouri–Columbia for the Missouri Department of Transportation concluded that the average vehicle approach speed to work zones was significantly lower when AFADs were utilized in comparison to flaggers. The study also concluded that the average full stop location of vehicles was significantly farther back when AFADs were utilized in comparison to flaggers. Additionally, the study surveyed the opinion of vehicle operators, and more than 78% of respondents preferred the utilization of AFADs over human flaggers.⁴ Employers should utilize automated flagger assistance devices (photo 16) for traffic control in work zones in lieu of flaggers to help keep employees safe.

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Photo 15. Photo of AFAD. Photo retrieved from and property of temporarytrafficsignals.com.



Photo 16. Photo of AFAD in use. Photo retrieved from and property of ver-mac.com.

Recommendation #2: Stationary law enforcement vehicles with activated blue lights in work zones should be utilized when workers are present.

Discussion: The day the incident occurred, law enforcement was not present on scene to assist with traffic control duties. Although law enforcement presence may be utilized in Kentucky work zones, it's currently not required. The victim's family, along with the owner of the involved company, believe the utilization of law enforcement would be an effective measure to alert inattentive motorists of hazards that lie ahead. Findings in a study conducted by the Maryland State Highway Administration (MSHA) on the [Use of Police Traffic Services in Work Zones](#) conclude that the presence of a marked police vehicle is the most effective speed control measure in work zones. Results of the study show police presence reduced average speed of travel by 6–22%, while excessive speeding events were reduced by 14–32%.⁵ MSHA state other advantages, including:

- Police enforcement increases motorists' compliance with work zone regulations and discourages aggressive or careless driving.
- Work zone officers can immediately respond to any incident/accident, quickly restoring traffic flow and enhancing the safe operation of the work zone.
- A police officer commands respect and authority. Thus, police presence facilitates the safe and efficient movement of traffic through the work zone.
- The presence of a marked police vehicle in the work zone area is an effective measure to capture the attention of passing motorists causing greater motorist alertness.⁵

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Reduction in speed alone affords drivers operating vehicles in work zones additional time to react to work zone hazards. As an added preventative measure, the Kentucky Transportation Cabinet should require the use of stationary law enforcement vehicles with activated blue lights in work zones when workers are present.

Recommendation #3: Employers should utilize portable temporary rumble strips in temporary work zones.

Discussion: According to a guide published by the American Traffic Safety Service Association (ATSSA), [Guidance for the Use of Temporary Rumble Strips in Work Zones](#), portable temporary rumble strips (PTRSs) (photo 17) are rumble strips placed on the highway as a countermeasure to alert drivers approaching work zones. The ATSSA reports that studies on the use of portable temporary rumble strips in work zones found that 46% of traffic slowed down, with nearly half of all vehicles slowing down by an average of 8 miles per hour.⁶ The Virginia Department of Transportation, who began utilizing portable temporary rumble strips for temporary work zones in 2019, states that PTRSs add an additional layer of protection for everyone in work zones, whether driving or working; the noise and vibration caused by driving over PTRS devices will result in workers and drivers paying extra attention.⁷

As a best practice and additional safeguard, employers should utilize portable temporary rumble strips, when possible, in work zones.



Photo 17. Photo of portable temporary rumble strips in use. Photo retrieved from Google Image search on 03-22-23.

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Recommendation #4: Motor vehicle operators should utilize safe driving practices when approaching and driving through work zones.

Discussion: The United States Federal Highway Administration classifies a work zone as an area of a trafficway with highway construction, maintenance, or utility-work activities. A work zone is typically marked by signs, channeling devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or flashing lights on a vehicle to the "End of Road Work" sign or the last traffic control device. A work zone may be for short or long durations and may include stationary or moving activities.

Inclusions:

- Long-term stationary highway construction such as building a new bridge, adding travel lanes to the roadway, and extending an existing trafficway;
- Mobile highway maintenance such as striping the roadway, median and roadside grass mowing/landscaping, and pothole repair;
- Short-term stationary utility work such as repairing electric, gas, or water lines within the trafficway.

Exclusions:

- Private construction, maintenance, or utility work outside the trafficway.⁸

The Centers for Disease Control and Prevention state that highway work zones are hazardous for both drivers and workers. Transportation-related fatalities accounted for 73% (919) of worker deaths that occurred at road construction sites from 2011 through 2020. In 63% (n=577) of these transportation events at road construction sites, the worker was struck by a vehicle; 371 of the 577 workers were struck by a forward-moving vehicle, 123 by a backing vehicle.⁹ [EHS Today](#) recommends the below tips while driving through work zones:

- Pay attention to the orange diamond-shaped warning signs or electronic message boards posted in advance of a road construction project.
- Stay alert. Dedicate your full attention to driving.
- Minimize distractions. Avoid changing radio stations, using a cell phone, etc., while driving in a work zone.
- Drive carefully and slowly through the construction site; always obey the posted speed limits in the work zone area.
- Pay close attention and heed directions on work zone warning signs. Signs and work zone flaggers save lives.
- Watch for stopped or slowing traffic. Do not tailgate.
- Expect the unexpected. Anticipate potential dangers.
- Watch how the traffic ahead is flowing.
- Keep an eye out for construction workers, their equipment, and vehicles, as well as the vehicles around you.
- Use extra caution when driving through a site at night.
- Watch for detours and lane diversions.¹⁰

Due to the dangers associated with operating a motor vehicle in work zones, motor vehicle operators should utilize safe driving practices when approaching and driving through work zones.

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REFERENCES

- [1] Guidelines for Traffic Control in Short Duration / Mobile Work Zones. https://www.kyt2.com/sites/default/files/08shortdurationmobile_final.pdf
- [2] Historical Weather. <https://www.wunderground.com/history>
- [3] VER-MAC Automated Flagger Assistance Devices. <https://ver-mac.com/en/news-and-events/file/white-paper-the-role-and-safety-impacts-of-automated-flagging-assistance-devices/122>
- [4] University of Missouri–Columbia AFAD Study. <https://spexternal.modot.mo.gov/sites/cm/CORDT/cmr17-010.pdf>
- [5] Maryland State Highway Administration. <https://www.roads.maryland.gov/oost/01police.pdf>
- [6] Temporary Rumble Strips in Work Zones. <https://www.atssa.com/Portals/0/WZGrant/GuidelinesUseTemporaryRumbleStripsWorkZones.pdf>
- [7] Virginia Department of Transportation. <https://www.virginiadot.org/newsroom/statewide/2019/vdot-enhances-work-zone-safety-with-new-portable-temporary-rumble-strips4-16-2019.asp>
- [8] Federal Highway Administration. <https://highways.dot.gov/public-roads/mayjune-1999/whats-work-zone>
- [9] Centers for Disease Control and Prevention Statistics. <https://www.cdc.gov/niosh/topics/highwayworkzones/default.html>
- [10] EHS Today Work Zone Driving Tips. <https://www.ehstoday.com/construction/article/21904358/work-zone-safety-tips>

INVESTIGATOR INFORMATION

This investigation was conducted by Beau Mosley, Fatality Investigator, Fatality Assessment and Control Evaluation, Kentucky Injury Prevention and Research Center, University of Kentucky, College of Public Health.

ACKNOWLEDGMENT

The Kentucky FACE Program would like to thank the involved company for its assistance with the completion of this report.



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PROGRAM FUNDING

The Kentucky Fatality Assessment & Control Evaluation program is funded by grant 5U6O0H008483-17 from the National Institute for Occupational Safety and Health.