

REPORT#: 18MI072

REPORT DATE: 6/24/20

INCIDENT HIGHLIGHTS



DATE:

Spring, 2018



TIME:

12:04 p.m.



VICTIM:

Field Manager in his 40s



INDUSTRY/NAICS CODE:

Construction/23



EMPLOYER:

Horizontal Directional
Drilling Locating Equipment



SAFETY & TRAINING:

General Safety



SCENE:

Active traffic lane



LOCATION:

Michigan



EVENT TYPE:

Struck By

Field Manager Struck by Vehicle in Active Roadway While Taking Depth Measurement

SUMMARY

In Spring 2018, a male field manager for underground-equipment-locating operations in his 40s died when he was struck by a vehicle while taking a drilling depth measurement in an active north-south roadway with a speed limit of 50 mph. A directional boring machine was set up on the west side of the roadway. The plan was to bore under the roadway, west to east, pull new water pipe and then make the connection. The decedent took instrumentation into the northbound travel lane to check bore depth and bent over facing west to read the results. A vehicle travelling in the open northbound lane at approximately 55 mph neared the work zone.... [READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Lack of hazard recognition
 - Temporary traffic control not appropriate for roadway speed limit, traffic volume, and work being performed
 - Worker in active roadway without a dedicated spotter or flagger
- [LEARN MORE>](#) (p.13)

RECOMMENDATIONS

MIFACE investigators concluded that, to help prevent similar occurrences, employers should:

- Ensure that work zones and traffic control plans are properly set up.
- Provide job safety analysis (JSA) training to enable workers to recognize jobsite hazards.

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Fatality Assessment & Control Evaluation

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Michigan Fatality Assessment and Control Evaluation (FACE) Program

MIFACE (Michigan Fatality Assessment and Control Evaluation), Michigan State University (MSU) Occupational & Environmental Medicine, 909 Fee Road, 117 West Fee Hall, East Lansing, Michigan 48824-1315; <http://www.oem.msu.edu>.

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SUMMARY

In Spring 2018, a male field manager for underground-equipment-locating operations in his 40s died when he was struck by a vehicle while taking a drilling depth measurement in an active north-south roadway with a speed limit of 50 mph. The north-south roadway had two traffic lanes with a middle (center) lane. At a nearby intersection, the southbound roadway widened to two lanes and the northbound two-lane wide roadway narrowed to one lane. The posted speed limit was 50 mph. There had been a water tap break on the west side of the roadway. The Department of Public Works (DPW) foreman instructed two workers to place temporary traffic control signs (“Work Zone Ahead” and “Work Zone Begins”) on each side of the roadway. Channelizing devices were placed on the east and west fog lines of the roadway in the work zone; both the northbound and southbound travel lanes were open to active traffic. A DPW subcontractor dug an excavation on the west side of the roadway and then dug a second excavation on the east side of the roadway. A directional boring machine was set up on the west side. The plan was to bore under the roadway, west to east, pull the new water pipe through and then make the connection. While the boring took place, the location and depth of the bore were monitored. The decedent and a coworker, who worked for a company that developed, manufactured and marketed instruments for underground locating were at the site to demonstrate their new locating equipment. The decedent and his coworker placed sensors on both sides of the road to assist with locating the boring head. Throughout the boring operation, the decedent had walked back and forth across the open traffic lanes, assessing the depth and location of the bore head, demonstrating the new underground locating equipment. Checking the bore depth one last time, the decedent took an older piece of equipment into the northbound travel lane. He placed the equipment on the roadway and bent over facing west to read the results. A vehicle travelling in the open northbound lane at approximately 55 mph neared the work zone. A worker ran toward the vehicle yelling and waving his hands and hard hat. The vehicle struck the decedent, propelling him in the air. He landed on the asphalt. Emergency response arrived and transported the decedent to a nearby hospital. He died several days later from the injuries sustained at the time of the crash. The decedent was wearing a Class 2 high-visibility vest at the time of the incident.

INTRODUCTION

In Spring 2018, a male field manager for underground-equipment-locating operations in his 40s died when he was struck by a vehicle while taking a drilling depth measurement in an active north-south roadway with a speed limit of 50 mph. MIFACE learned of this incident upon receiving notification from MIOSHA. MIFACE personnel contacted the human resources director at the firm who agreed to be interviewed. MIFACE reviewed the death certificate, police and medical examiner reports, the MIOSHA file during the writing of this report, and the documents provided by the human resources director. Pictures used in the report are courtesy of the responding police department, Google maps, and the MIOSHA file, which also included a media photograph. MIFACE has removed identifying information from the photographs.

EMPLOYERS

The contractors that were on-site at the time of the incident included:

- Township DPW, a Michigan township Department of Public Works was the primary contractor and was responsible for setting up the temporary traffic control devices for the construction work zone.
- Firm B was the underground boring contractor subcontracted by the township DPW. Firm B did this type of work quite regularly. Firm B had previously purchased their existing underground locating equipment from Firm C. Firm B was permitting Firm C to conduct side-by-side testing of underground locating equipment.

- Firm C employed the decedent and his coworker. The two workers were conducting a field test/demonstrating a new underground locating equipment prototype. The prototype was being tested side-by-side with Firm B's existing equipment which was not compatible with the prototype.

Firm C's main headquarters was in another state. Firm C designed and manufactured electronic locating equipment for horizontal directional drilling, as well as providing hands-on customer support services in the field. Total employment was 180 individuals, 75% of whom worked at the headquarter location, and 25% worked domestically or internationally. The firm had territory field managers who managed the field techs providing customer support services for Firm C equipment used on construction sites. Each territory manager was responsible for 4-5 states.

WRITTEN SAFETY PROGRAMS and TRAINING

There was one supervisor and two workers from Township DPW at the worksite. The township DPW workers had received work zone training conducted by the DPW supervisor in early 2018 utilizing an online training program developed by a nearby university. Routinely, when the DPW is responsible for setting up the work zone, a drawing and/or copy of the appropriate temporary traffic control is given to the workers; on the date of the incident, no drawing or copy was made. The township DPW provided all required personal protective equipment, although one employee at the site was not wearing the appropriate high visibility clothing; he was wearing a fluorescent green tee-shirt.

The health and safety training for the underground boring contractor is unknown.

Firm C had a written health and safety policy and a health and safety committee. The company utilized its state-based health and safety program template for their safety program; the health and safety program primarily addressed the office/manufacturing segment of the business, not the construction segment (providing customer support on construction sites).

The firm relied on the field techs/managers to keep themselves safe in the field. Employees working in the field coordinated and received their training from a third party. The firm did not confirm the training was performed or if it pertained to the work operation. Firm C did not have knowledge of or documentation regarding the type or content of the decedent's training.

Firm C did not have knowledge of MIOSHA Construction Safety and Health regulations/requirements, nor the requirements of the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) or Michigan's Maintenance Work Zone Traffic Control Guidelines (MWZTCD). Employees in the field did not receive training on Michigan or federal Manuals of Uniform Traffic Control Devices. Employees were not provided training regarding the hazards associated with working at construction sites and the application of the MMUTCD/MWZTCD at construction areas.

The health and safety committee did not have a designated chair for its monthly meetings. The committee included individuals from various departments, but at the time of the incident, did not include any members representing individuals working in the field. Any employee could bring a safety concern to any committee member and the concern was discussed.

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WORKER INFORMATION

The decedent had been a full-time employee for 20 years. He had been in Field Service for 19 years. Prior to his promotion to Manager of Territory Reps three months earlier, he had been one of six regional territory reps. He routinely worked in roadways and spent a significant amount of time in construction activities. The content of the training he may have received is unknown. He was wearing a Type 2 high-visibility vest at the time of the incident.

INCIDENT SCENE



Photo 1. Drone view, south of intersection looking north

The north-south roadway had two through-travel traffic lanes, and as traffic approached the intersection, a middle (center) lane to make a left turn at the intersection and a right turn lane. (See Photos 1 and 2). The incident occurred approximately 1000 feet north of the intersection.

The road was dry and had a posted speed limit of 50 mph. There was no reduction of speed in the work zone.

Photo 2 shows the excavation and directional boring equipment, vehicles, channelizing devices and the location of the bore and the decedent at the time he was struck by the oncoming vehicle.

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- Near the receiving bore hole were the backhoe and Township DPW’s tool truck, a converted fire engine.
- Firm B’s stake truck with an attached flatbed semi-trailer, parked primarily on the paved shoulder. The amber lights on top of the stake truck were not activated. The truck’s four-way flashers were not activated.
- Firm C’s black pickup was parked primarily on the grass south of Firm B’s truck/trailer unit. The four-way flashers on the pickup were not activated.

A rubber-tired excavator was used to make two excavations, one on each side of the roadway, so the bore head of the head of the directional boring machine could enter and exit (exit hole is identified on Photo 2 as the receiving hole).

To test the prototype underground locating system, Firm C personnel placed sensors at the receiving hole and attached sensors to the bore head; the two sensing units were in communication with each other. The decedent walked back and forth across the active roadway to monitor the bore progress and success of the prototype as well as test the bore depth with traditional underground locating equipment. Traditional underground locating equipment utilizes a hand-held detector requiring an individual to manually locate underground equipment.

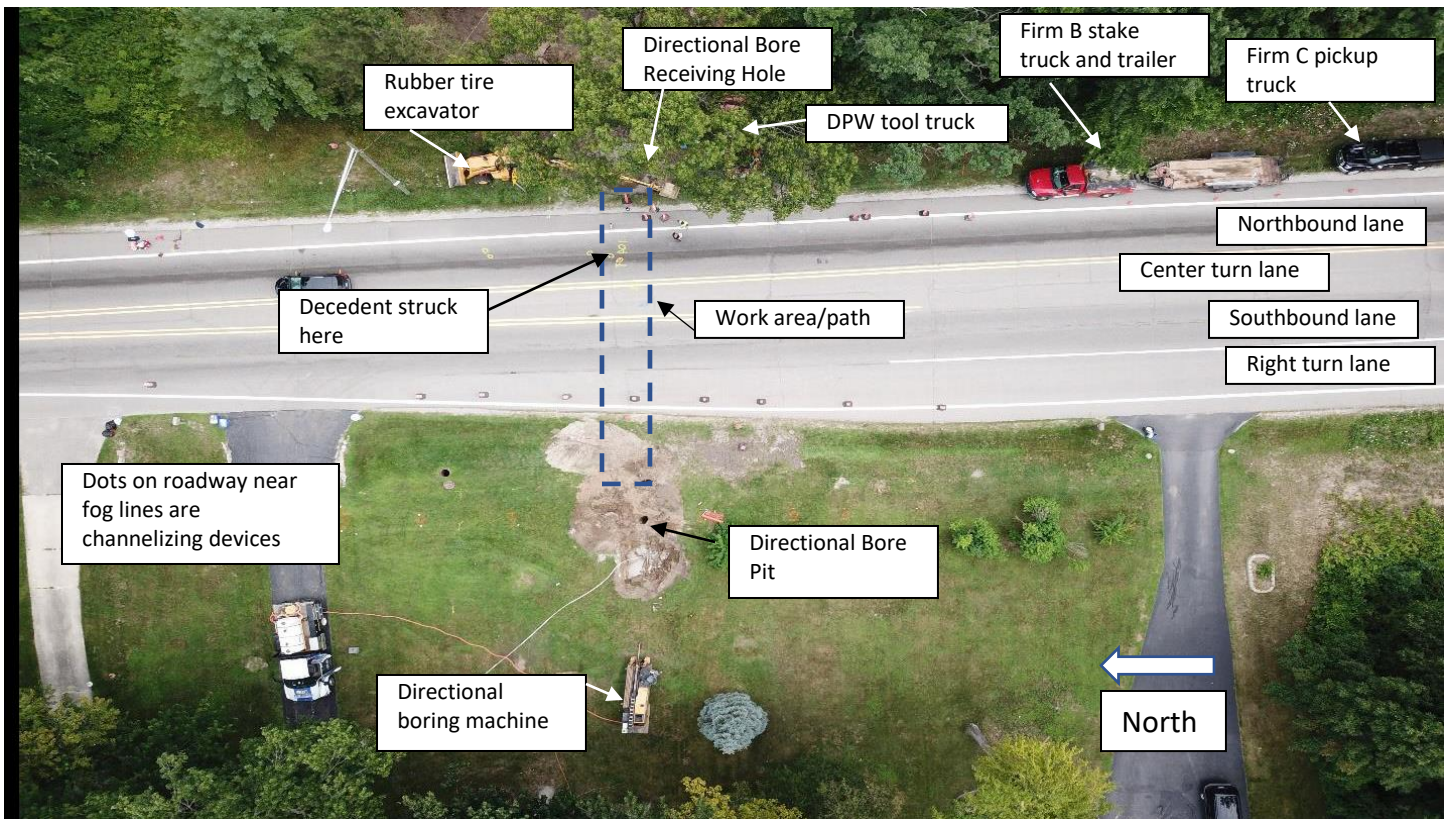


Photo 2. Responding police drone picture, overhead view of incident site.

Firm A personnel had placed the temporary traffic control work zone signage and channelizing devices (traffic cones). The channelizing devices were of different sizes and placed on both the east and west sides of the roadway (Photos 1 and 3). On the east side of the roadway, traffic cones were placed near the rear of the semi-trailer and angled out from the edge of the pavement toward the fog line. Once the cones met the fog line, they were positioned three to four feet west of the fog line in a straight line northbound past the excavation area indicating the shoulder of the roadway was closed. On the west side of the roadway, traffic cones were similarly placed three-to four feet east of the fog line.

One "Road Work Ahead" sign and one "Work Zone Begins" sign was placed on the east side of the northbound roadway south of the intersection (Photo 4) and one set of signs was placed on the west side of the roadway, north of the incident site for southbound traffic. No "Work Zone Ends" signs were erected. There were no signs within the work area.

South of the intersection was a big box store with a traffic light at the entrance/exit to the store.

WEATHER

The weather at the time of the incident: fair skies, 79°F, with south winds at 10 mph and visibility at 9 miles. [[Weather Underground](#)].

Company Remediation

After the incident, the firm took the following steps to minimize the likelihood of a similar incident:

- The Safety Committee and Leadership brought the entire US field team to headquarters to talk about the incident and risks they've experienced on job sites and tested several changes in their process for realism and practicality.
- The Safety Committee completed the OSHA Safety Investigation process and determined what preventative solutions would ensure none of its employees were ever at risk again.
- Updated the Job Safety Analysis (JSA) for the activities its employees performed on construction sites which included updating PPE requirements, adding visibility to employee vehicles and creating a checklist (Checklist A) and safety plan for Territory Managers to go through upon arrival at all job sites.
- Reviewed Checklist A and received support from US Territory Managers. Field staff used a paper copy until the automated checklist was combined with their standard trip reporting format to ensure the checklist was as easy to use and documentation as possible.
- Reviewed the new JSA and checklist material with their international Territory Manager personnel to determine how to protect their employees on job sites around the world.
- Instituted a policy to have Territory Managers include safety training and review in each of their bi-annual meetings.
- Added two individuals from the Territory Manager team to be part of the safety committee efforts and ensure the company was representing field site needs.
- Investigated the types of safety training available which would clarify traffic control standards for both Federal and state requirements.
- Developed protocols when testing or providing demonstrations of equipment when in a high-risk active roadway or other hazardous condition.
- Implemented a new standard stating that employees should never be in an active roadway without a flagger or spotter.
- Outfitted each company truck with grill-mounted strobe lights or a portable top-mounted strobe and collapsible cones for visibility during road work.

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- Conducted safety training on Federal road standards to ensure personnel understood spotter/flagger requirements to ensure site conditions were appropriate, including safety protocols, federal traffic control when spotting an unsafe condition, and addressing environmental and weather risks/hazards and worker fatigue.
- Documenting field representative training (many had completed OSHA 4-hour courses and attended customer training but had not documented their training).
- Most importantly, field representatives were instructed to simply inform the customer and leave the site if they felt unsafe. **They were also instructed to never stand or work in an open roadway unless there was a flagger and to only work in a protected area of the construction.** If the customer asked to go outside of the protected area, employees were instructed to refuse.

INVESTIGATION

On the day before the fatal incident, the township DPW received a report of a water tap break under the roadway. Due to its location under the roadway, fixing the break required special equipment (a directional boring machine). The DPW typically subcontracted private firms to conduct directional boring. After evaluating the work site, the township DPW determined that the construction zone didn't require rerouting of traffic, so no lane closures or flaggers were utilized.

On the day of the incident, Township DPW workers arrived at the site and met with a Firm B representative. Township DPW's foreman was responsible for setting up and ensuring the work zone signage. The foreman assigned two Township DPW workers to set the "Road Work Ahead" sign and "Work Zone Begins" sign on the northbound and southbound roadways and the channeling devices to alert drivers of the work being performed (Photos 2,3 and 4). No flagger was used; Township DPW determined that there was no requirement for a flagger or a lane closure due to the center turn lane option for northbound drivers to avoid the areas of work (with the construction cones in place there was enough clearance for cars to travel through the construction zone because of the center lane). At the scene of the incident the center lane was approximately 8 feet wide.

After the signs were in place and the channelizing devices were installed on each side of the roadway, Township DPW's foreman dug the first excavation on the west side outside of the shoulder on the southbound roadway using a rubber-tired tractor with a backhoe attachment. The machine was then moved to the east side of the northbound roadway where he dug the second excavation outside of the shoulder.

With the exception of one DPW worker, all workers, including the decedent were wearing high visibility safety apparel that met the Performance Class 2 or 3 requirements of the ANSI/ISEA 1007-2004 standard performance for Class 2 or 3 risk exposure as required by Part 6 of the MMUTCD, Section 6D.03 – Worker Safety Considerations. The majority of the work was to be performed outside the shoulders and underneath the traveled way; however, work vehicles were parked on the shoulder. Equipment and employees/workers were crossing the roadway throughout the day.

With the excavations completed, Firm B employees set their directional boring machine up on the west side. The work plan was to bore under the roadway west to east, pull the new water pipe through, and then perform the connection.

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The decedent and another individual from headquarters were supposed to be on another jobsite demonstrating the prototype underground locating equipment for horizontal directional drilling but the job did not happen. The decedent contacted Firm B, an existing customer, who agreed to field test the equipment side-by-side an existing product line. The prototype allowed for target steering of the horizontal directional drilling head without the use of an overhead locator; an overhead locator required an individual holding a piece of equipment to locate the drilling head. An advantage of the prototype was that sensors were used at the location of the drilling rig as well as at the end of the path of the drill head, keeping people out of the roadway.



Photo 3. Road Work Ahead and Work Zone begins signs placed on northbound roadway, south of intersection

The decedent and his coworker arrived at this site at approximately 10:00 a.m., after all signage and channelizing devices were in place.

They placed the sensors on each side of the roadway with set depths along the drill path to allow the drill head to drill from west to east, from one sensor to the other. The decedent's coworker was operating the remote for the drill head. The bore length was approximately 120 feet.

During the boring operation the decedent walked back and forth across the roadway at least six times. The boring head was approximately 7-8 feet from the sensor on the east side of the roadway. The prototype had worked well, but Firm B wanted to make sure that the drill head was at the proper depth. Firm B asked for a depth measurement at the current location of the drill head to verify depth as it was critical to hit that depth at the placement of the last sensor.

Firm B had a hand-held depth reading locator, but it was not compatible with the prototype. The decedent had a hand-held unit compatible to take a reading and Firm B asked him to do so to verify the prototype's depth reading. Workers were sitting in the tool truck (converted fire truck) eating lunch. Another worker was sitting in the backhoe. A Township DPW worker was sitting in the stake truck.

The decedent and a Township DPW employee, who was approximately 25-30 feet south of the decedent, waited for the traffic to clear while standing on the shoulder of the northbound road. Once traffic cleared, the decedent walked into the street about six feet from the fog line of the road, outside of the cone area. The decedent was facing west and bent over

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taking the reading with his hand-held locator to confirm the current location of the tip of the bore when the incident occurred. Per the decedent’s employer, it took approximately 20 seconds to take a reading.

An SUV had been stopped at the traffic light controlling traffic for the big box store. The SUV was the first vehicle stopped at the light. When the light changed, the SUV driver accelerated and was traveling northbound at approximately 55 mph when the vehicle approached the work zone. The SUV did not slow down as it entered the work zone. Township DPW’s worker was standing either in the northbound lane of travel or near the east shoulder waving his arms attempting to slow down the vehicle because he knew the decedent was in the roadway and it appeared to him that the vehicle was speeding. As the SUV was approaching or passing his location, he yelled and screamed and threw his hard hat at the vehicle; the hard hat did not strike the vehicle. The driver looked toward Township DPW’s employee and swerved to avoid striking him, and then struck the decedent who had just stood up when he heard the yelling.

Responding police determined the SUV was traveling 57 mph when she applied the brakes near the stake truck and was traveling between 36-41 mph when she struck the decedent.

The impact launched the decedent into the air, and he landed approximately 70 feet from the impact site. Emergency response was called by several workers at the site. The driver of the SUV stopped immediately and stayed on scene. Two nurses were in a car behind the SUV and stopped to render assistance until emergency response arrived. The decedent was transported to the hospital and then transported again to a level 3 trauma center where he died several days later.

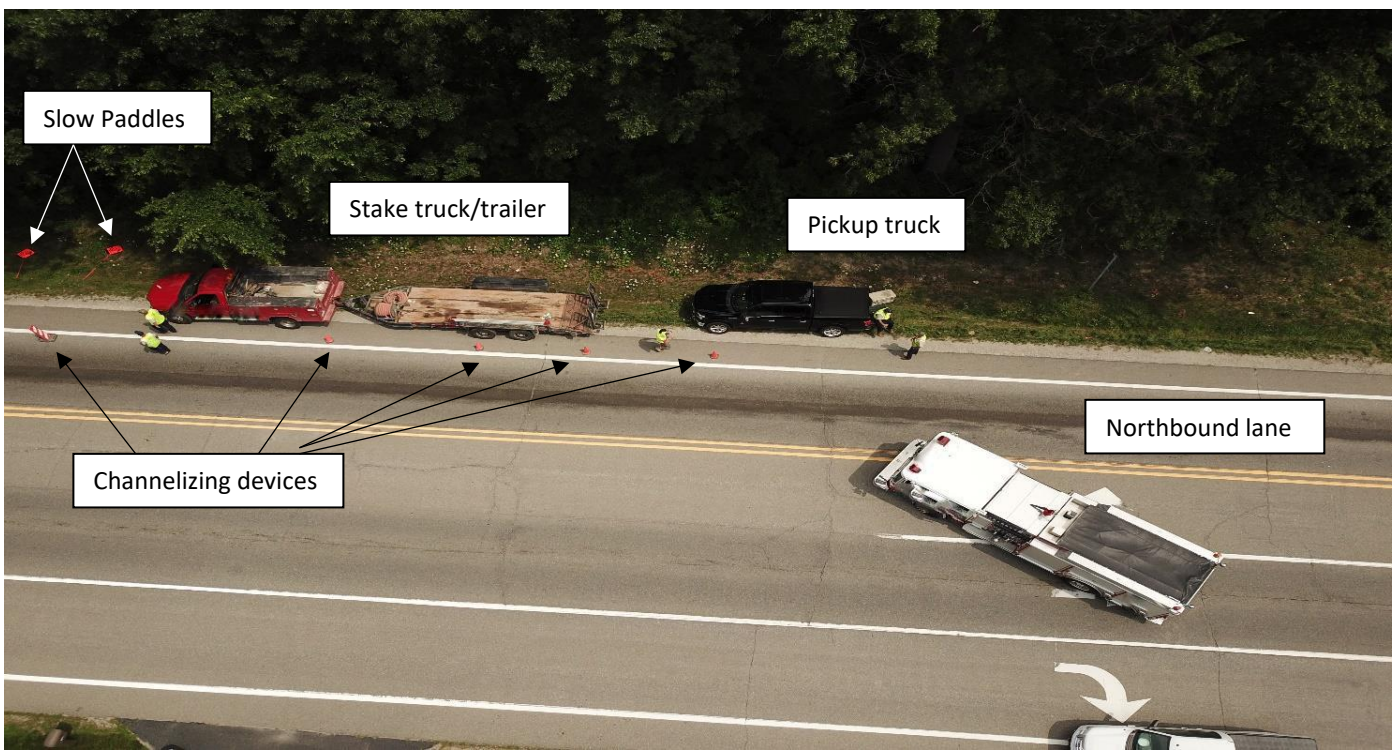


Photo 4. Location of construction equipment and channelizing devices

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The SUV driver indicated to responding police she noticed a red truck on the right side of the road, then saw a man waving his arms over his head, walking from the ditch area towards the road, in front of the red truck. She said she swerved left and braked hard, never seeing the other worker at the time but felt the impact, and after exiting, realized she struck the construction worker. Near the area of impact, the skid marks were visible and led to the final resting spot of the SUV, which was partially in the northbound lane of travel straddling the yellow line.

The driver noted that she didn't notice any lights but stated she saw a sign that said "slow" before the red truck (No slow sign was noted by responding police and no individuals interviewed by the police or MIOSHA indicated that they were holding a Slow paddle at the time of the incident). The passenger in the front seat of the SUV indicated that he saw the construction worker (decedent) in front of the vehicle, who appeared to be looking away from them and then right before the impact looked back towards them.

After the decedent had been struck by the SUV and emergency response was called, a Township DPW and Firm B employee "grabbed the "spin" signs" (Slow signs) and re-routed traffic so traffic could not enter the northbound roadway.

A Michigan Department of Transportation (MDOT) transportation technician arrived while the responding police department was on scene. The technician informed the police that Township DPW did not obtain a permit from MDOT to work within the road right-of-way on a State Highway and this construction zone was not properly "signed" in accordance with Michigan laws as a construction zone. The technician stated that at a minimum they should have obtained a "Shoulder Closure" permit however with the speed limit in this area, roadway design and with work being done on both sides of the road, the proper permit should have been "Temporary Lane Closure" with flaggers at each end of the "Work Area".

Per the police report: "Based on my investigation, I conclude that as the driver of the SUV was approaching the area where the work was being completed, her attention was directed towards the shoulder /ditch area with the construction worker waving his arms trying to gain the driver's attention which he believed was speeding. The driver observed this construction worker and took evasive actions by braking and swerving left. With this result, the driver's attention was not directed down the roadway but towards the shoulder area. After the driver passed the construction work, she struck a pedestrian which was part of the construction crew on scene, that was in the north bound lane of travel and as a result the pedestrian succumbed to his injuries."

The responding police contacted the MSP Traffic Crash Reporting Unit and provided them with the circumstances of the crash. The officer was informed that if the construction zone was not permitted and did not qualify as a "work zone" per statute, then the crash would be treated as a vehicle vs pedestrian crash and not to complete the required "work zone" fields on the State of Michigan Crash Report.

MIOSHA Citations

MIOSHA Construction Safety and Health Division issued the following Serious citations at the conclusion of its investigation.

SERIOUS: Rule 408.40114(1): CS Part 1 General Rules

An employer shall develop, maintain, and coordinate with employees an accident prevention program, a copy of which shall be available at the worksite.

Workers/employees were walking/working in the traveled way.

The employer does not have an accident prevention program in place as it relates to construction related work activities pertaining to their sales operation including but not limited to water line repair/replacement. Such a document would at a minimum:

Instance A. Pertain to the construction hazards the employees are exposed to, including but not limited to being exposed to the hazard of vehicular traffic in the work zone.

Instance B. Ensure that employees are properly trained by the employer or that the employer has reviewed employee training by other entities and made a determination that the scope of training received meets corporate requirements and those of the State of Michigan.

Instance C. Ensure the subject matter and employee training (workers and supervision) received is properly recorded and monitored for effectiveness, for the type of work being performed and area it is performed in.

Instance D. Evaluation of the site conditions, to recognize traffic control hazards/hazards created by other workers on site, whose actions could/would affect the safety of employees.

Instance E. Instruction to comply with the Maintenance Work Zone Traffic Control Guidelines, which is referred to as a Temporary Traffic Control Plan.

SERIOUS: Rule 408.42223(1): CS Part 22, Signals, Signs, Tags, and Barricades

Traffic control devices shall be installed and maintained as prescribed in Part 6 of the 2011 MMUTCD, which is adopted by reference in R 408.42209.

On *Incident Location*, employees are walking/working in the traveled way while exposed to vehicular traffic. The temporary traffic control devices used are not in compliance of Part 6 of the 2011 MMUTCD.

Instance A. The Vertical Panels, installed for the *Incident Location* shoulder closure (north and south directions) that are located in the traveled way (*Incident Location*) and are not properly oriented to direct traffic flow.

Reference: Part 6 of the Michigan Manual on Uniform Traffic Control Devices Section 6F.66 Vertical Panels (see Figure 6F-7) shall have retroreflective stripe material that is 8 to 12 inches in width and at least 244 inches in height. They shall have alternating diagonal orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction the traffic is to pass.

Instance B. Permit application was not made to the state transportation department, a county road commission, or a local authority, prior to commencement of work under/across *Incident Location*. Such a permit would ensure determining if the speed limit, through the work zone should be maintained, at the

current posted 50 miles per hour or, should be reduced. This determination would also require the appropriate Temporary Traffic Control Devices.

Reference: Part 6 of the Michigan Manual on Uniform Traffic Control Devices Section 6C.01 – Temporary Traffic Control Devices – The setting of speed limits within work zones shall be in accordance with section 257.627(9) of the Michigan Vehicle Code. A person operating a vehicle on a highway, when entering and passing through a work zone described in section 79d(a) where a normal lane or part of the lane of traffic has been closed due to highway construction, Maintenance or surveying activities, shall not exceed a speed of 45 miles per hour unless a different speed limit is determined for that work zone by the state transportation department, a county road commission, or a local authority shall post speed limit signs in each work zone described in Section 79d(a) that indicate the speed limit in that work zone and shall identify that work zone with any other traffic control devices necessary to conform to the Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

MIOSHA Construction Safety and Health Division issued a Notice of Potential Hazard to the employer at the conclusion of its investigation

NOTICE OF POTENTIAL HAZARD

The following information is provided to the employer to correct an identified hazard. A MIOSHA rule violation exists, but employee exposure has not been determined or evidence is not sufficient to document a violation at this time.

1. The employer should, prior to sending employees to work sites outside of the state of *name of state deleted*, review the local, state, and/or federal Occupational Safety and Health Administration rules/regulations. (This includes U.S possessions/territories such as but not limited to Guam, U.S. Virgin Islands...) Said review should familiarize employees with the applicable safety and health requirements necessary to protect the workers and to detect any differences between those and the employers' requirements. Should there be a difference the most stringent safety/health requirements should be followed.
2. Work should not be permitted within the traveled way without the use of traffic regulators and proper advanced signage or other appropriate traffic controls per the applicable documents (Example: In Michigan – Part 6 being the Michigan Manual on Uniform Traffic Control Devices).
3. Supervisors should also receive the same training required for employees, so they can ensure compliance with the company requirements.

CAUSE OF DEATH

The death certificate listed the cause of death as craniocerebral injuries due to or as a consequence of blunt impact to the head. Results of post-mortem toxicology were not provided by the medical examiner.

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. The following hazards were identified as key contributing factors in this incident:

- *Lack of hazard recognition*
- *Temporary traffic control not appropriate for roadway speed limit, traffic volume, and work being performed*
- *Worker in active roadway without a dedicated spotter or flagger*

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers and employees should ensure that work zones and traffic control plans are properly set up.

Discussion: All employers working in/around active roadways should ensure workers understand the Michigan Manual of Uniform Traffic Control Devices (MMUTCD) requirements to ensure work zones are properly evaluated and set up when working near roadways and familiarize employees with the requirements of the Michigan Motor Vehicle Code, Act 300 or 1949 and as it pertains to the selection and placement of traffic control devices. Employees who are required to complete tasks in and around roadways face multiple hazards, one of which is being struck by oncoming motor vehicles. To ensure worker safety, employers should develop temporary traffic control plans (TCP) that outline the temporary traffic control devices to be used and how they should be set up during roadway work. A TCP will not only help ensure worker safety, it will also help ensure motorist and pedestrian safety. TCPs should be based on the MMUTCD. The MMUTCD should be used on all state roads, as required per the Michigan Vehicle Code, Act 300 of 1949, section 257.[609](#) “Traffic control devices; placement and maintenance; restrictions; county road commission, permission, costs”. Section 609 states:

(1) The state transportation department shall place or require to be placed, and maintain or require to be maintained, upon all state highways traffic control devices as it considers necessary to indicate and carry out the provisions of this chapter or to regulate, warn, or guide traffic. A traffic control device placed and maintained under this subsection shall conform to the most current Michigan manual on uniform traffic control devices.

(2) A local authority shall not place or maintain a traffic control device upon a trunk line highway under the jurisdiction of the state transportation department, except by the latter's permission, or upon a county road without the permission of the county road commission having jurisdiction over that road. (emphasis added) With the approval of the state transportation department, the board of county road commissioners of a county, at its option, may install and maintain traffic control devices conforming to the Michigan manual on uniform traffic control devices if the cost would be less than that estimated by the state transportation department and bill the state transportation department for its share of the cost of installation.

The department of public works did not obtain a permit from the State for the work involving the roadway on which the decedent was hit by the vehicle. The Michigan DOT did not approve the work nor specify the appropriate MMUTCD or Maintenance Work Zone Traffic Control Devices required for the scope of work. Temporary traffic control plans should be prepared by persons knowledgeable (for example, trained and/or certified) about the fundamental principles of temporary traffic control and work activities to be performed. The design, selection, and placement of TCP devices for a TCP should be based on engineering judgment. There was no signage indicating that the shoulder was closed.

The township Department of Public Works should have specified to the DOT when seeking the permit that workers would be spending time in active roadway lanes to monitor the bore under the roadway. Based on prior experience working with this boring company, the DPW should have assumed that workers would be present in active travel lanes monitoring the depth of the drill head under the roadway.

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According to the police report, an MDOT technician suggested using a Shoulder Closed, No Speed Reduction temporary traffic control plan (either MD-11a or MD 11-b) from Michigan’s Maintenance Work Zone Traffic Control Guidelines (MWZTCG); MIFACE could not find an equivalent temporary traffic control plan in the MMUTCD.

MIFACE recommends, due to the posted speed limit of 50 mph in the area and the assumed traffic volume (due to the many businesses located just south of the intersection) that the minimum MMUTCD traffic control device plan be TA-10: Lane Closure on Two Lane Road Using Traffic Regulators (see Figure A). Ensuring that traffic is stopped in both directions as the worker walks from one side of the road to the other side ensures the worker will not be struck by a vehicle. All traffic should be stopped when workers are crossing/working in the roadway. Traffic regulators are one method to ensure this.

Recommendation #2: Employers should provide job hazard analysis training to employees that includes a jobsite survey and hazard assessment to identify all potential hazards including those associated with working near an active roadway.

Discussion: Prior to the start of a project, employers should conduct a worksite inspection, note any potential hazards to employees and take steps to plan and implement appropriate controls to minimize the risks posed by the project. The use of a hazard assessment checklist or other standardized form can help remind those conducting the survey of potential hazards to look for, even if they are rare or unusual for the typical work performed by the contractors. All employees should receive training to perform a job hazard analysis to identify and mitigate hazards at their work sites.

Integral to safety in a work zone is being seen by both other workers and the motoring public. Appropriate personal protective equipment should be selected and worn based on the speed of the work zone and time of day.

High visibility garments are composed of two elements: background high-quality fluorescent fabric in colors including fluorescent yellow/green, fluorescent orange-red and fluorescent red and retroreflective tape. The retroreflective tape is added so the wearer can be distinguished from a traffic control device such as a drum or sign.

Figure 6H-10. Lane Closure on a Two-Lane Road Using Traffic Regulators (TA-10)

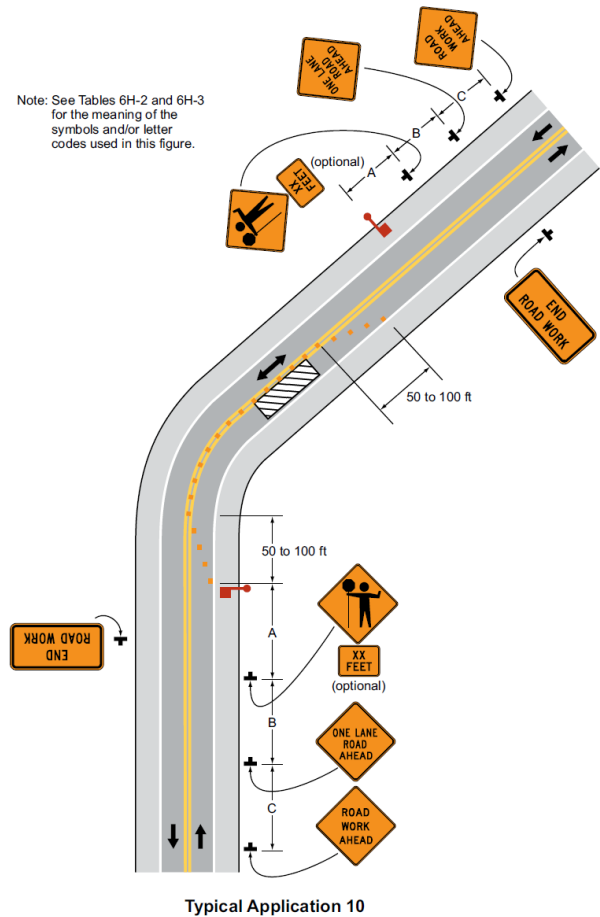


Figure A. *Michigan Manual of Uniform Traffic Devices, Figure 6H-10: Lane Closure on a Two-Lane Road Using Traffic Regulators.*

selecting high visibility clothing, be sure to look at the label. It will include information about class, standards compliance, and care instructions

When working near/on roadways, there are two classes of garments that are usually Class 2 garments should be selected for work in inclement weather, areas with complex backgrounds, when worker's attention may be diverted from approaching traffic, and/or the worker is in closer proximity to traffic. Vehicles and equipment travel at speeds greater than 25 mph. Typical Factors or Characteristics for Workers Wearing Performance Class 2

- *Daytime activities.*
- *Working off the roadway.*
- *Physical barrier between worker and traffic.*
- *Lower speed roadways.*

For workers exposed to high speed traffic and/or conditions where visibility of workers may be reduced, a Class 3 a high visibility garment should be selected. For conditions where equipment operators perform tasks near pedestrian workers. Worker must be conspicuous through a full range of body motions at a minimum of 1,280 feet and identifiable as a person

Recommendation #3: Institute a hazard awareness program to educate employees about the potential and specific hazards noted during the jobsite survey and how to minimize exposure to these hazards.

Discussion: The firm, upon review of the fatality identified weaknesses in their safety program for workers in the field and instituted many control measures to minimize the likelihood of a reoccurrence of a similar incident, such as workers also being trained to walk away from a job if they feel unsafe (stop work authority, in a way, even if they don't have actually authority to stop ALL work, just the parts their firm is engaged in.

The work zone was already set up when the decedent and his coworker arrived at the scene, but the decedent and his coworker had not received training regarding work zone set up. The Michigan MUTCD is based upon the Federal manual, which the decedent's employer subsequently utilized to train their field staff. Although the decedent's employer was not responsible for work zone set up, if training had been provided, the decedent may have identified the deficiencies of the work zone traffic control devices and advocated for appropriate traffic control devices to be placed.

Regular training for employees in hazard awareness and identification encourages employees to remain vigilant regarding worksite hazards to themselves and their coworkers. Work zone safety training should include, but not be limited to, how to work near motor vehicle traffic in a way that will minimize exposure to these moving vehicles, as well as the proper techniques for warning device usage, placement, and retrieval. Training workers in roadway work zone safety, including work zone set up and design and appropriate personal protective equipment, would provide these workers the knowledge to better protect themselves so they can safely complete tasks.

Additionally, specific discussions before the start of a project, such as toolbox talks, regarding any hazards identified for the particular worksite and their pertinent controls, ensures that employees are aware of these hazards and equipped to control and mitigate them. The wearing of high-visibility vests each and every time while on the work site should be

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emphasized during the toolbox and hazard review of the site; being visible increases the likelihood of being seen by equipment operators and the general motoring public.

ADDITIONAL RESOURCES

- MIFACE Investigation Report [#16MI104](#): Concrete Finisher Electrocuted When Bull Float Contacted an Energized Power Line
- Massachusetts Case Report [#09-MA-031](#): Municipal Laborer Dies after being Struck by a Motor Vehicle while Closing a Water Gate Valve – Massachusetts
- American Road and Transportation Builders Association. *High Visibility Clothing For Heavy & Highway Construction* <http://elcosh.org/document/4149/d001454/high-visibility-clothing-for-heavy-%26-highway-construction.html>
- High Visibility Apparel in Work Zones: Characteristics of High-Visibility Safety Apparel. https://www.workzonesafety.org/training-resources/fhwa_wz_grant/atssa_high_visibility_pocket_guide/

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REFERENCES

- Michigan Department of Transportation <https://www.michigan.gov/mdot/>
 - [Michigan Vehicle Code](#)
 - [Michigan Manual of Uniform Traffic Control Devices \(MMUTCD\)](#)
 - [Michigan Maintenance Work Zone Traffic Control Guidelines \(MMWZTC\)](#)

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