



Massachusetts FACE • Occupational Fatality Report

Massachusetts Department of Public Health
Occupational Health Surveillance Program
Fatality Assessment and Control Evaluation Project



Municipal Laborer Dies after being Struck by a Motor Vehicle while Closing a Water Gate Valve – Massachusetts

Investigation: # 09-MA-031-01

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SUMMARY

On August 31, 2009 a 35-year-old male municipal laborer (victim) was fatally injured while responding to a water main break. The victim and a co-worker were assigned to close a water main gate valve located in a roadway approximately 900 feet away from the water main break. They positioned their work pickup truck beyond the valve facing the same direction as the flow of traffic. While the victim was using a gate valve wrench to close the valve, the co-worker was reducing water pressure in the system by releasing water at an adjacent fire hydrant. The co-worker heard a crash and turned to see that the victim had been struck by a minivan that also struck the rear of the work pickup truck. The co-worker went to the victim and then placed a call for Emergency Medical Services (EMS) and a call to other co-workers. Within minutes EMS and the local police arrived at the incident location and the victim was transported to a local hospital where he was pronounced dead. The Massachusetts FACE Program concluded that to prevent similar occurrences in the future, municipalities should:

- **Ensure that when performing work in roadways that work zones are set up, at a minimum, in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*, Part 6, developed by the U.S. Department of Transportation Federal Highway Administration;**
- **Ensure that employees' exposure to moving traffic is minimized when working in and around roadways by developing temporary traffic control plans that include proper positioning of work vehicles;**
- **Provide work zone safety training for all employees who will be required to complete tasks while in proximity to roadways;**
- **Ensure that each department develops, implements, and enforces a comprehensive health and safety program that includes training on hazard recognition and avoidance of unsafe conditions; and**
- **Provide work environments that, at a minimum, meet all relevant Occupational Safety and Health Administration (OSHA) regulations and industry accepted standards of practice.**

INTRODUCTION

On August 31, 2009, the Massachusetts FACE Program was notified by a local police department through the 24-hour Occupational Fatality Hotline that on the same day a 35-year-old male city employee had died from injuries sustained when struck by a motor vehicle. An investigation was initiated. On September 23, 2009, the Massachusetts FACE Program Director and a representative from the Massachusetts Division of Occupational Safety traveled to the city's police department and water department and met with representatives from each department to discuss the incident and visit the incident location. The police report and death certificate were reviewed during the course of the investigation. Photographs were taken of the incident location.

The city where the incident occurred has been incorporated for more than 300 years and has a population of over 42,000 residents. The victim had been working for the city's water department for ten years. Prior to working at the water department, the victim was employed with the city's public works department and parks department. At the water department, the victim held the job title maintenance worker and his primary work location was at the water treatment facility. The normal work shift for water department employees is 8:00 a.m. to 4:00 p.m. The city provides employees overtime when they are called in for emergency events, such as water main breaks. There is a list of employees who have signed up to work emergency events. The victim had placed his name on this list and had worked several overtime shifts since placing his name on the list.

It was reported that the city's water department has very little employee turnover. When new employees are hired they are provided with an excavation safety course and on-the-job training. Water department employees are given a yearly clothing allowance to purchase department required clothing. When employees are performing roadway work, they are required to wear green American National Standards Institute (ANSI) Class II vests, boots, and hard hats. In addition, each work truck is outfitted with yellow rotating beacons and orange traffic cones.

The city has over 200 miles of water main piping and it is estimated that there are more than 1,400 water gate valves. The city's water mains are located underneath the roadways with water gate valves located within the roadways as well. The water and police departments have an agreement where the police will provide traffic details and help set up work zones when the water department will be performing large tasks within roadways, such as repairing a water main. It was reported that prior to the incident, there was no agreement between the departments when smaller tasks, such as opening or closing water valves, were being performed and that the water department did not routinely notify the police department about these tasks. Neither water department nor police department employees were provided with work zone training. Water department employees were being required to take 12 furlough days at the time of the incident. The victim was part of a collective bargaining unit.

INVESTIGATION

The morning of the incident, a water main located under a major roadway in the city broke at around 5:30 a.m. The victim, who was on the city's overtime list for such events, was called into work after the break occurred. At the water main break location a police detail was provided and a work zone was set up. The victim and a co-worker were at the water main break location and then were assigned to close a water gate valve to control the flow of water. They left the work zone area and traveled approximately 900 feet to the east, where the water gate valve was located (Figure #1).

The roadway where the incident occurred is a state highway comprised of asphalt with two travel lanes, one eastbound travel lane and one westbound travel lane. Each travel lane is approximately 12 feet wide and separated by a painted single solid yellow line. There are also painted white fog lines that designate the northern edge of the westbound lane and the southern edge of the eastbound lane. The section of roadway around the incident location is straight and level, and lined with residences. The westbound travel lane, where the water gate valve is located, has granite curbing at the northern edge, a strip of grass and then an asphalt sidewalk (Figure #1). The water gate valve is located approximately seven and one-half feet out from the granite curbing, in the westbound travel lane, and approximately five feet below the asphalt surface. At the time of the incident, approximately 8:00 a.m., the roadway was dry and the temperature was approximately 60 degrees Fahrenheit.

The gate valve is encased in a steel valve box and has a steel pipe that runs from the valve box up to the street level. This steel pipe provides access to the gate valve. At the street level there is a lid that covers the steel pipe. To open and close the water gate valve, a valve wrench is used. The valve wrench used during this incident has a pipe base that is approximately nine feet long with a perpendicular section of pipe at one end that is used as a handle. The other end of the wrench has a key that fits onto the gate valve (Figure #2). Using the handle the valve wrench is turned to open or close the water gate valve.

When the victim and the co-worker arrived at the incident site, they positioned the ½ ton work pickup truck approximately four feet beyond the gate valve lid, facing west in the westbound lane. This is the same direction as the traffic flow in that lane. The truck's hazard lights were on as well as the yellow beacon located on the roof of the truck's cab. There were no other traffic control devices being used at the incident location at the time of the incident. Both the victim and the co-worker were wearing ANSI Class II green vests at the time of the incident.

After positioning the truck, the victim entered the roadway and walked over to the gate valve's lid and the co-worker walked over to the fire hydrant, located approximately 15 feet from the gate valve's lid, to release some water pressure within the system. The victim removed the gate valve's lid and placed the end of the valve wrench with the key down into the steel pipe, positioning the wrench's key onto the gate valve. The victim, facing oncoming traffic, started to close the gate valve. The co-worker turned to the victim and asked him if the gate valve was

turning easily or if he needed help. The victim responded that the gate valve was turning easily and he did not need help. The co-worker then turned back towards the fire hydrant. Reportedly, the victim continued to close the gate valve by gripping the wrench handle and walking in a circular motion.

While walking in a circular motion to close the gate valve, the victim might have had his back to oncoming traffic as a minivan traveling west in the westbound travel lane approached. The minivan struck the victim, pushing him into the work pickup truck and pushing the pickup truck forward. The minivan then bounced backwards and then forwards, stopping partially on top of the victim. Reportedly, the minivan driver did not apply the minivan's breaks prior to the crash. The co-worker heard the noise of the crash and turned to see the victim trapped underneath the minivan (Figure #3). The co-worker went to the victim then placed a call to Emergency Medical Services (EMS) and to other co-workers. Within minutes EMS and the local police arrived at the incident location and the victim was freed and transported to a local hospital where he was pronounced dead. Since the incident, the municipality has instituted additional work zone safety measures, including providing comprehensive work zone training for city employees and a cooperative agreement between the water department and police department which calls for police officers to control traffic when water department employees are accessing water valves located in roadways.

CAUSE OF DEATH

The medical examiner listed the cause of death as blunt trauma with head, skull, brain, torso and extremity injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Municipalities should ensure that when performing work in roadways that work zones are set up, at a minimum, in accordance with the *Manual on Uniform Traffic Control Devices (MUTCD)*, Part 6, developed by the U.S. Department of Transportation Federal Highway Administration.

Discussion: The U.S. Department of Transportation's (DOT) *Manual on Uniform Traffic Control Devices (MUTCD)* sets forth the basic principles that govern the design and usage of traffic control signs and devices.¹ Part 6 of the MUTCD provides specific work zone designs to be used during roadway construction, maintenance, and utility operations. To help ensure employee safety while performing these and other roadway operations, employers should follow the MUTCD minimum standards and guidelines in Part 6.

When performing work in a roadway that will occupy a location for a few minutes up to one hour, employers should follow the short-duration roadway work application outlined in the MUTCD, Part 6G, Types of Temporary Traffic Control Zone Activities. Because most short-

duration roadway work is usually maintenance and utility based operations, the MUTCD recommends traffic control devices that have greater mobility. The MUTCD specifically states that worker safety during short-duration roadway work should not be compromised by using fewer traffic control devices.¹

The MUTCD acknowledges that during short-duration work it can sometimes take longer to set up the work zone properly. Therefore, the MUTCD suggests that appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lighting may be used in place of signs. In addition, the MUTCD suggests that these vehicles may be augmented with signs or arrow panels.¹

Recommendation #2: Municipalities should ensure that employees' exposure to moving traffic is minimized when working in and around roadways by developing temporary traffic control plans that include proper positioning of work vehicles.

Discussion: 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.² A TCP will not only help ensure worker safety, it will also help ensure motorist and pedestrian safety as well, TCPs should be based on the MUTCD as discussed in Recommendation #1. An individual TCP should be developed for each major highway and street project.

For routine tasks, such as opening and closing water gate valves in roadways and using work vehicles to help alert passing motorists that workers are in the roadway, a general TCP should be developed and modified when appropriate. A general TCP for routine short duration work involving work vehicles should include, but not be limited to:

- Assessing the work site upon arrival to determine the best location for work vehicles and mobile equipment and the appropriate number and locations of traffic control devices, such as warning signs and lights;
- Positioning work vehicles to provide a physical barrier between employees on foot and approaching traffic;
- Placing the vehicle in park and setting the brake;
- Turning the vehicle's wheels so if the vehicle is struck it will not enter the work zone or strike the workers on foot;
- Facing and watching out for approaching traffic;
- Wearing high-visibility safety apparel at all times; and
- Spending as little time as possible in and around the roadway.

At the time of the incident, the pickup truck was located beyond the victim facing west in the westbound travel lane. The truck's location did not provide the victim protection from the approaching motorists traveling in this westbound lane. In this case, the pickup truck could have been located between the victim and the approaching traffic by parking it before the gate valve lid with the truck's wheels turned to the left. Having the truck in this location with the wheels turned to the left would provide protection to the workers on foot in the event that the truck was struck from behind by an approaching motorist. If struck from behind, the truck would move towards the left, away from the workers in the roadway and sidewalk, and in front of the vehicle that struck it, blocking that vehicle from continuing forward towards the workers.

Recommendation #3: Municipalities should provide work zone safety training for all employees who will be required to complete tasks while in proximity to roadways.

Discussion: Work zone safety training for municipal workers 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 municipal 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.

It should be ensured that municipal police officers are not overlooked and are provided work zone safety training. The Massachusetts State Police train their troopers in work zone safety during their time at the academy. This existing training course, based on the MUTCD, could be used as an outline to develop training for local city and town officers. Training municipal officers in work zone/traffic detail safety, including proper setup of temporary traffic control devices, would provide officers knowledge to better protect not only themselves, but also pedestrians and motorists in the communities in which they serve. These trainings should be updated annually and documented. The documentation should include who provided the training and their qualifications, the content of the training, workers who were trained, and the assessments of workers' comprehension of the training.

Recommendation #4: Municipalities should ensure that each department develops, implements, and enforces a comprehensive health and safety program that includes training on hazard recognition and avoidance of unsafe conditions.

Discussion: In this case, the water department did not have a comprehensive health and safety program, but did send employees to excavation safety training. A comprehensive written safety program that addresses common hazards municipal employees face, such as electrical, confined space and work zone hazards should be developed. The health and safety program should also address hazard recognition and the avoidance of unsafe conditions. To develop the hazard

recognition and avoidance of unsafe conditions section of the health and safety plan, the employer should evaluate the tasks employees will perform for all potential hazards.³ Controls for all identified hazards should then be developed and implemented into tasks performed by employees.

Employers should provide employees training on all sections of the health and safety program. The training should include specific instructions that employees should not risk physical harm to accomplish tasks. The training program content and the names and dates of employees completing the training should be documented and retained by the employer. Employers should ensure that the trainer who provides training is qualified through education and/or experience to conduct training.

In addition, OSHA has developed a Web page that addresses how to implement health and safety programs (www.osha.gov/dsg/topics/safetyhealth/evaluation.html). This Web page includes a link to the OSHA draft proposed safety and health program rule, mentioned above, as well as other useful links. There is also a Roadway Safety Awareness Program available at www.workzonesafety.org/training/courses_programs/rsa_program. This program *Roadway Safety +*, which is available in English, Spanish, and Portuguese, provides an overview of common hazards in highway and road construction and prevention measures.

Recommendation #5: Municipalities should provide work environments that, at a minimum, meet all relevant Occupational Safety and Health Administration (OSHA) regulations and industry accepted standards of practice.

Discussion: The federal Occupational Safety and Health Act requires private sector employers to provide workplaces that are free from recognized hazards likely to cause death or serious physical harm to employees. While private sector employees are covered by federal OSHA, public sector employees in Massachusetts are not. The Massachusetts Division of Occupational Safety (DOS), in accordance with Chapter 149 Section 6, is charged with inspecting public sector workplaces in Massachusetts and determining what procedures and practices are required to protect workers.⁴ As a matter of policy, DOS references OSHA Standards as well as other consensus standards, such as ANSI, in determining whether proper procedures are being followed to protect workers. In this case, adhering to the OSHA standard 29 CFR 1926.202, *Barricades*, which refers to the MUTCD for design and usage of traffic control signs and devices and work zone designs, may have prevented this incident.^{1,5}

REFERENCES

1. U.S. DOT 2009. *Manual on Uniform Traffic Control Devices (MUTCD)*, 2009 Edition, U.S. Department of Transportation Federal Highway Administration. <http://mutcd.fhwa.dot.gov/>. Date accessed: 2/1/2010.

2. NIOSH 2001. *Building Safer Highway Work Zones: Measures to Prevent Worker Injuries from Vehicles and Equipment*, Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2001-128.
3. U.S. DOL 2002. *Job Hazard Analysis*. Occupational Safety and Health Administration, OSHA Publication No. OSHA-3071, 2002 (revised).
4. General Laws of Massachusetts, Title XXI, Labor and Industries, Chapter 149: Section 6. Safety devices and means to prevent accidents and diseases generally; fees for structural painting.
5. Code of Federal Regulations [2002]. 29 CFR 1926.202. *Barricades*. Washington DC: U.S. Government Printing Office, Office of the Federal Register.

Figure 1 – Incident location.

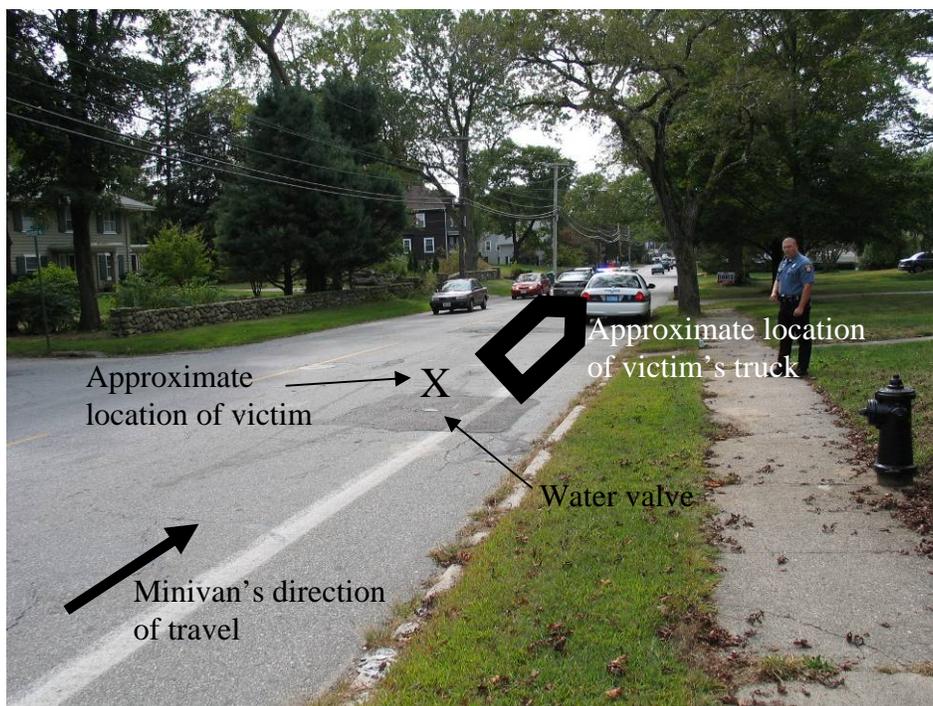


Figure 2 – Similar valve wrench to the one being used.



Figure 3 – Scene after the incident.



Photograph accessed from The Sun Chronicle Web site.

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FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The Massachusetts Department of Public Health, in cooperation with the National Institute for Occupational Safety and Health (NIOSH), conducts investigations on the causes of work-related fatalities. The goal of this program, known as Massachusetts Fatality Assessment and Control Evaluation (Massachusetts FACE) is to prevent future fatal workplace injuries. Massachusetts FACE aims to achieve this goal by identifying and studying the risk factors that contribute to workplace fatalities, by recommending intervention strategies, and by disseminating prevention information to employers and employees.

Massachusetts FACE also collaborates with engineering and work environment faculty at the University of Massachusetts at Lowell to identify technological solutions to the hazards associated with workplace fatalities.

NIOSH funded state-based FACE Programs currently include: California, Iowa, Kentucky, Massachusetts, Michigan, New Jersey, New York, Oregon, and Washington.

Additional information regarding this report is available from:

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We would appreciate your feedback on these reports so we may continue to improve the MA FACE project and our investigation reports. A feedback form can be found at:

http://www.mass.gov/Eeohhs2/docs/dph/occupational_health/report_evaluation.doc

The completed form may be returned by fax to (617) 624-5676, by mail to FACE, 250 Washington Street, 6th Floor, Boston, MA 02108, or by email to ma.face@state.ma.us.