

Bridge Inspection Safety Discussion



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Falls

- Since 1999, falls are the #2 leading cause of workplace fatalities in the U.S.
 - Transportation-related accidents #1
 - Workplace violence-related homicides #3
- In 2010, 635 workers died due to falls
- In a fall from a height of 11 feet or more, you have a 50-50 chance of survival

Working over water

- Ambassador Bridge worker
 - Fall protection?
 - Life jacket?
 - MIOSHA investigation continuing
- MIOSHA has issued two 'Working over Water' violations to MDOT



Working Over Water

- MIOSHA, Construction Standards, Part 6, Personal Protective Equipment:
- R 408.40636. Working over or near water:
- Where a possibility of drowning exists, an employee working over or adjacent to water shall wear a life jacket or buoyant work vest. The life jacket or buoyant vest shall bear a label, "U.S. Coast Guard approved." The jacket shall be of a type to roll the wearer face up, if unconscious.

Working Over Water (related rules)

- MIOSHA, Construction Standards, Part 45, Fall Protection:
- 1926.501 Duty to have fall protection.
- (1) "Unprotected sides and edges." Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.



What to Think About When Working Over Water

- Are there any potential fall hazards? Is there a chance for falling from a height of 6 feet or more to the surface below?
- Is there a guardrail in place or are workers wearing fall arrest equipment 100% of the time?



What to Think About When Working Over Water

- If the worker falls with their fall arrest equipment (body harness and lanyard), what is the plan for rescuing that worker? Self rescue, other co-workers, specialized equipment (Reachall)?
- Is there a rescue plan for a worker who falls into the water?
 - Ring buoy?
 - Boat nearby?
 - Rescue services nearby? (Ready and available to help and have been contacted beforehand?)
- Are rescue workers wearing life vests?

Types of Vest (PFD)

Type I. Big water. Rolls worker heads up. Bulky.



Type II. Inland waters. Not as bulky as Type I. Rolls worker heads up.



Type III. Does NOT roll worker heads up. Ok if in a boat.



Type V. Auto-inflate with Type II performance. Rolls worker heads up.



Slopes

- Contractor had an issue on a project for workers walking along a steep slope (60 degrees).



See dirt path next to 'rip rap.'

Slopes

- No specific rule for slopes, but here's one to think about...
- MIOSHA Part 9 Excavation and Trenching:
 - An earth ramp may be used in place of a ladder if it meets all of the following requirements:
 - (a) The ramp material shall be stable.
 - (c) The degree of angle of the ramp shall not be more than 45 degrees.
- Why 45 degrees?
 - Think of the angle of repose for “clean” fill

Histoplasmosis

- An infectious disease caused by inhaling the spores of a fungus called *Histoplasma capsulatum*.
- Fungus lives in the environment, usually in association with large amounts of bird or bat droppings.
- Histoplasmosis is not contagious, so it cannot be transmitted from an infected person or animal to someone else.



Histoplasmosis

- Histoplasmosis primarily affects a person's lungs, and its symptoms vary greatly between individuals.
- The vast majority of infected people have no apparent ill effects, or they experience symptoms so mild they do not seek medical attention and may not even realize that their illness was histoplasmosis.
- If symptoms do occur, they will usually start within 3 to 17 days after exposure.
- Histoplasmosis can appear as a mild, flu-like respiratory illness and has a combination of symptoms, including a general ill feeling, fever, chest pain, dry or nonproductive cough, headache, loss of appetite, shortness of breath, joint and muscle pain, chills, and hoarseness.

Suggested Work Practices:

- Wet the material with a water spray to reduce the amount of dust.
- Safe removal of accumulations of bird or bat manure before demolition may be necessary.
- Wearing a NIOSH-approved respirator. NIOSH advises that any particulate filter is effective for use. However for bridge work and inspection, there is a chance these respirators may be exposed to automotive related materials (oil, etc.) therefore an oil-proof P class filter with 99.97% efficiency (P-100) is recommended.
- Disposable protective clothing (such as a Tyvek suit) and disposable gloves should be worn whenever regular work clothing and shoes might be contaminated with dust containing *H. capsulatum* spores.

Why is this an Electrical Issue?



MIOSHA Citation

- Let's "paint" the scenario:
 - Metal culvert
 - Minimal water inside culvert
 - Pump inside to remove water
 - Electrical service to pump via generator
 - Workers inside culvert to conduct inspections
 - No Ground Fault Circuit Interrupter (GFCI) at generator or in line to pump

What does a GFCI do?

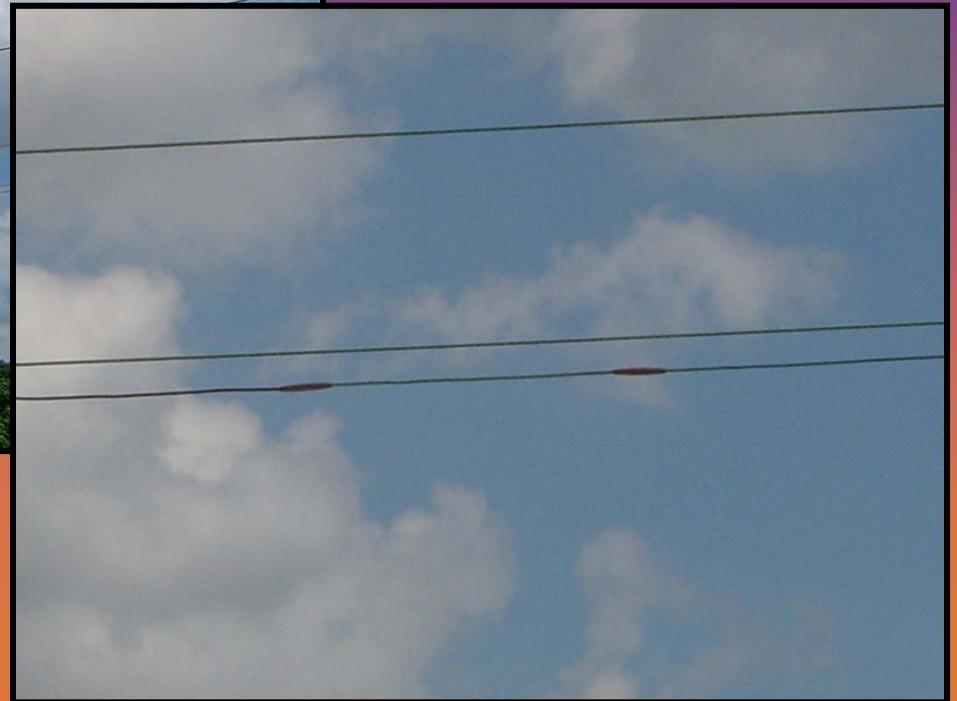
- A GFCI constantly monitors the electrical current passing through a circuit.
- If the amount of current passing into the circuit is different from the current being returned to the circuit, it indicates a ground fault and the GFCI shuts off electrical current to the circuit.
- A ground fault is when an electrical current is attempting to return to the ground through a source other than the wiring/circuit.
- GFCIs trip between 4 to 5 milliamps (mA)
 - A person can feel 1mA
 - 50mA - ventricular interference
 - 100 to 300mA – ventricular fibrillation

GFCIs

- **R 408.41721. Ground fault circuit interrupters.** All 120-volt, single phase 15 and 20 ampere receptacle outlets used for construction operations, which are not a part of the permanent wiring of the building or structure and which are in use by an employee, shall have approved ground fault circuit interrupters for personnel protection.



Overhead Power Line Issues



Powerlines - Electrical Hazards



- **MIOSHA R 408.40115. (4)**

...employees...shall not be allowed by the employer to work or be closer to energized electrical line, gear, or equipment exposed to contact than the minimum clearance prescribed in table 1....

Electrical Clearances (unless de-energized)

Table 1

<i>Voltage</i>	<i>Clearance</i>
up to 50kv	10ft.
over 50kv	10ft + .4 inches/kv

Note: for insulated lines of less than 300 volts, 3ft clearance minimum - is allowed. MIOSHA R 408.41212

MMUTCD

- 2011 Michigan Manual on Uniform Traffic Control Devices (MMUTCD)
 - 2009 Federal Edition
- Part 6, Temporary Traffic Control
 - http://mdotwas1.mdot.state.mi.us/public/tands/Details_Web/mmutcdpart6_2011.pdf

Worker Safety Considerations

- Chapter 6D, Pedestrian and Worker Safety
- Section 6D.03, Worker Safety Considerations
- A. Training—all workers should be trained on how to work next to motor vehicle traffic in a way that minimizes their vulnerability.

Worker Behavior

The video for this slide can be viewed at www.michiganLTAP.org under the “Additional Materials” section



- What do you think about the worker's position – in the live lane of traffic?
- (Think maybe the arrow board is pointing drivers to him?)

Worker Behavior – Standing on Barrier Walls



Behavior-Based Work Zones....

- Remember, the work zone is for the safety of both the worker and the motorist
- A work zone separates the motorist from the worker
- Think of how the work zone affects the behavior of both
- Once a work zone is in place, observe the behavior on both sides
- If it is not working right, take the time to fix it

Worker Safety Considerations – Hi Vis Clothing

Standard:

04 All workers, including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107–2004 publication entitled “American National Standard for High-Visibility Safety Apparel and Headwear” (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment.

Hi Vis Clothing - Background

- Federal Highway Administration, Worker Visibility, Final Rule, Issued November 24, 2006
- **“All workers within the ROW of a Federal-aid highway, who are exposed either to traffic (vehicles using the highway for purposes of travel) or to construction equipment within the work area, shall wear high-visibility safety apparel.”**
- Compliance date: Nov. 24, 2008

Hi Vis Clothing - Background

- Final Rule put into 2009 Federal Edition MUTCD (and 2011 Michigan Edition)
- Expands requirement to ALL public roads for workers to wear Hi Vis clothing
- **Compliance date Dec. 31, 2011**

FHWA Final Rule Definitions

- **High Visibility Apparel:** “...clothing during daytime and nighttime usage, and that meets the (ANSI 107) performance Class 2 or 3...”
- **Workers:** “...people whose duties place them within the ROW of a Federal-aid highway...”

(Note: To meet ANSI 107, the apparel must be labeled as meeting it. See example below.)



“All Workers” Means...

- Construction and maintenance forces
- Survey crews
- Utility crews
- Adopt-A-Highway volunteers
- News media
- Responders to incidents within the ROW
 - Firefighters, EMTs, tow truck drivers, Courtesy Patrol workers, etc.
- Law enforcement when:
 - Directing traffic
 - Investigating crashes
 - Handling lane closures
 - Obstructed roadways
 - Disasters

This does not include routine traffic stops!

Class 2

- Recommended when:
 - Working in close proximity to traffic
 - Speeds above 25 mph
 - When workers are not watching traffic
 - Greater visibility in poor weather
 - Road workers, utility crews, etc.



Class 3

- Recommended when:
 - No or limited separation from traffic (e.g., no work zone)
 - High vehicle speeds
 - Reduced sight distances
 - Workers with high task loads
 - Nighttime work
 - Hi Vis pants (Class E) + Class 2 vest = Class 3



Note: There is NO requirement by MDOT when to wear Class 3.

...but they must also be in good shape...



..the Good, the Bad, and the Ugly...



Worker Safety Considerations - Lighting

Standard:

09A Where nighttime work is performed the work location shall be lighted per MIOHSA General Rule R408.40133.

MIOSHA - Lighting

- **Part 1. General Rules**
- **R 408.40133. Illumination.**
- **Rule 133.** (1) A minimum illumination intensity of 10 footcandles shall be provided on a job site where construction work is being performed.
- (2) A minimum illumination intensity of 5 footcandles shall be provided to areas on a job site where work is not being immediately performed but where workers may pass through.
- (Foot candle: Equal to one lumen per square foot. Originally defined with reference to a standardized candle burning at one foot from a given surface.)

Nighttime Lighting



See the excavator and truck?



Find the 2 workers...



Can You See the Worker?

He's just to the right of the 3 small lights.



Now – can you see the worker?

“Gamma”
adjusted
on digital
photo



Things to think about...

- Ease of use for the workers?
- Integral to the truck?
- Impact on motoring public?
 - Glare/angle of lights
 - Too many flashing amber lights?
- Lighting should help the workers see and be seen
- Is there a light meter available to check?



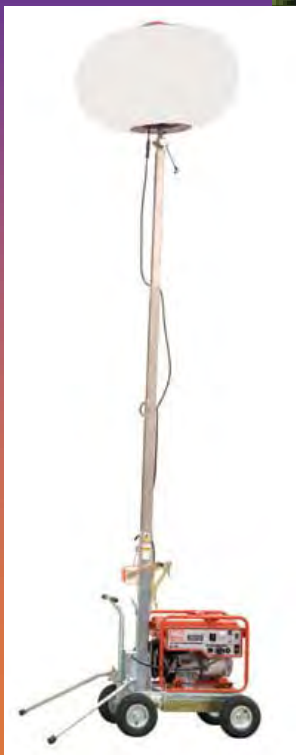
Inexpensive Lighting for Smaller Operations



Light Towers



Balloon Lighting



Questions?

