Personal Protective Equipment in Construction

29 CFR 1926.95-106

1926.95(a)

Protective equipment shall be provided, used, and maintained in a sanitary and reliable condition for hazards.

1926.95(d)(1)

- PPE used to comply with this part, shall be **provided by the employer** at no cost to employees.
- Exceptions?

Payment of PPE

- Except as noted, protective equipment used to comply with this part, shall be provided by the employer at **no cost** to employees.
- Exceptions:
  - Safety-toe protective footwear,
  - Prescription safety glasses, and
  - Long sleeve shirts

...were excepted from the employer payment requirement, considered to be very personal in nature and often worn off the jobsite.

1926.95(d)(2)-(5)

Frank Smith: "I'm never going to buy safety equipment - no matter how light or comfortable it may be - that's the contractor's responsibility."

General Safety and Health Provisions

The employer is responsible for **requiring** wear of appropriate personal protective equipment in all operations where there is exposure to hazardous conditions.

1926.28(a)

Criteria for PPE

Design:
All personal protective equipment shall be of safe design and construction for work to be performed.

1926.95(c)

Training

Employer shall instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.

1926.21(b)

1926.102(a)(2)

- The employer shall ensure that each affected employee uses **eye protection** that provides **side protection** when there is a hazard from flying objects.
- Detachable side protectors (e.g. clip-on or slide-on side shields) meeting the pertinent requirements of this section are acceptable.

1926.100(a)

Employees working in areas where there is a possible danger of **head injury** from impact, or from falling or flying objects, or from electrical shock and burns, shall be protected by **protective helmets**.

Head Protection

- Hard Hats
  - Change or clean liner every year
  - New every 5 years
  - Marked with ANSI Z89
  - 4 saved with this.
  - 2 dead when hard hat fell off mobile scaffold

Hard Hats

- April 4, 2010
- “Chain broke and whipped back.”
- “Scared the heck out of me.”
- “That was a BUNCH of weight hittin’ me.”
- “Hard hat saved me.”

January 2015

<u>Matt Jabiro</u>:

- Log with brush came down.
- Brush hit the hat, log hit my pretty head.

October 2014

Issue?

April 2015

STIHL
8 hours ago ·

We learned recently of a 21 year-old STIHL user who was severely injured after she was pinned to the ground by the tree she was working on. Her father performed CPR for almost an hour until paramedics were able to get into the woods. Thankfully, after several days in the hospital, she is doing fine and is expected to fully recover – thanks in part to her decision to wear the proper protective apparel. Her forestry helmet (partially glued back together only for visual purposes) helped to distribute and absorb some of the impact and limit potential head trauma. We share this story because we care about you. Please, always wear the proper protective gear when you are operating outdoor power equipment as recommended in your instruction manual.

Further

Emily Beiler:

- This is Emily, the 21 year old with the smashed helmet.
- Although most of it is right, the part about my dad administering CPR for an hour is erroneous.
- It did take over an hour for EMTs to get me out of the woods and I was unconscious for most of it but my dad only performed CPR for about a minute until I began to breathe again.
- I'm sure it felt like an hour to him.

- This helmet no doubt saved my life or at least prevented permanent injury.
- I did have a fractured skull and a brain bleed but no bruising or cuts on my head.
- Even my doctors called it a miracle.

Service Life

- The V-Gard helmet was designed with high quality, wear-resistant materials but it WILL NOT last forever.
- The protective properties of the helmet WILL be degraded by exposure to many common work environments, such as temperature extremes, chemical exposure, sunlight and normal daily wear and tear.

MSA recommends the following replacement schedule:

Suspension—replace after NO MORE THAN 12 months;

Entire Helmet—replace after NO MORE THAN 5 years.

Stickers

MSA: It is permissible to use pressure-sensitive, non-metallic stickers or tape with self-adhesive backing as long as they are placed no closer than ½" from the helmet's edge.

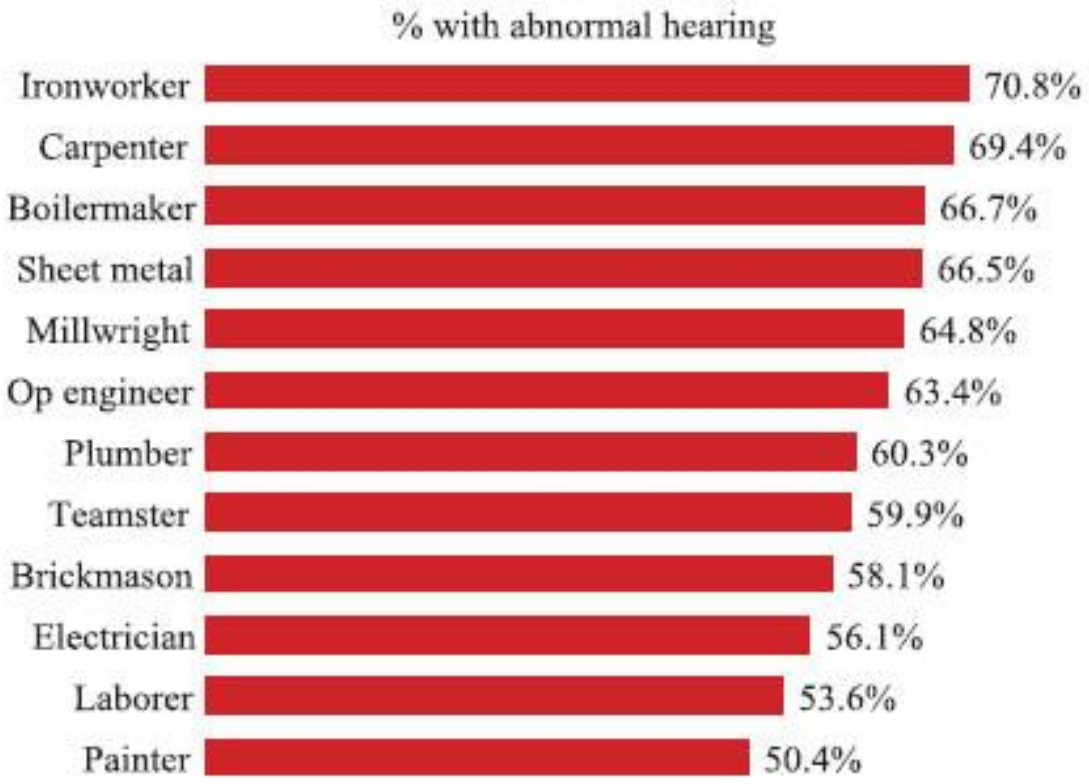
Hearing Protection

- Wherever it is not feasible to reduce the noise levels or duration of exposure to those specified in Table D-2, Permissible Noise Exposures, in 1926.52, **ear protection devices** shall be provided and used.
- A **hearing conservation program** becomes a requirement at exposures **>90 dBA**.

1926.101(a)

Hearing

42b. Noise-induced hearing loss, by selected trade, U.S. Department of Energy construction workers, 1997-2007



Ear Protection

Reusable ear plugs:

- regular and careful washing
- fitted by a trained person
- must be good fit
- dust may irritate

Ear defenders:

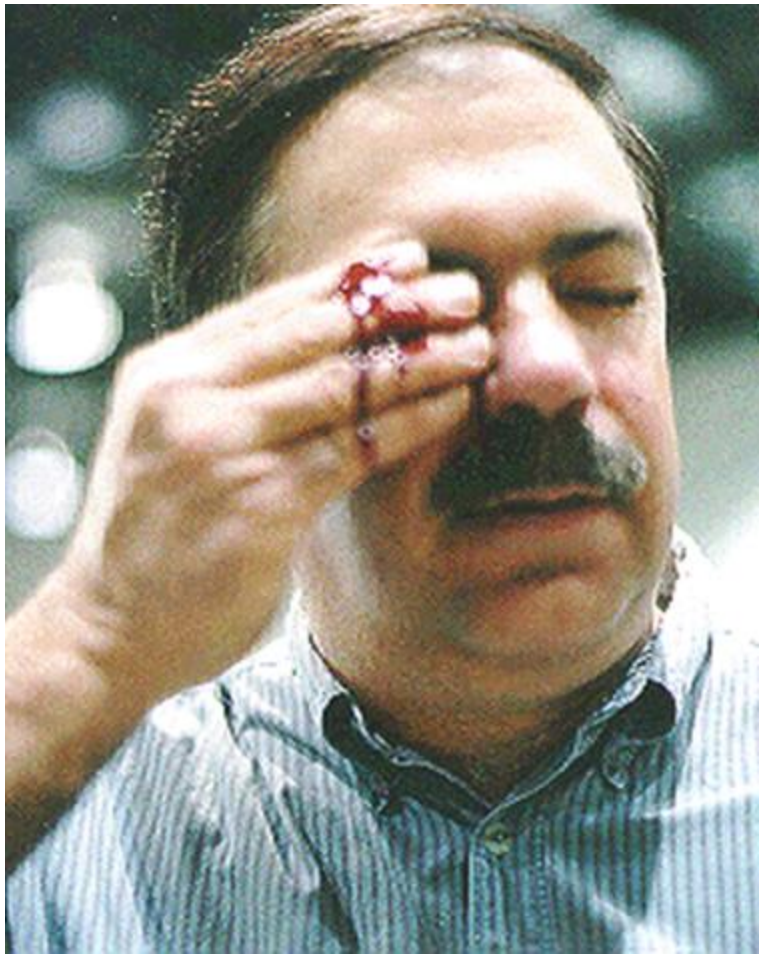
- well designed
- well made
- must be good fit

1926.102(a)(1)

The employer shall ensure that each affected employee uses appropriate **eye or face protection** when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Eye Protection

- May 3, 2012
- Employee was using a 5" Makita Grinder to cut a slab of marble.
- The cutting blade broke and the broken pieces seriously injured Employee's left eye and face.
- Employee #1 had used **no safety guard**.
- Employee #1 was **not provided personal protection equipment** such as goggles or face shield.



Eye and Face Protection

Employees whose vision requires the use of **corrective lenses** in spectacles, when required by this regulation to wear **eye protection**, shall be protected by goggles or spectacles.

1926.102(a)(3)

Eye and Face Protection

- Spectacles whose protective lenses **provide** optical correction

- Goggles that can be **worn over** corrective spectacles without disturbing the adjustment of the spectacles

- Goggles that **incorporate** corrective lenses mounted behind the protective lenses

1926.102(a)(3)

Exploding Angle Grinder Disc

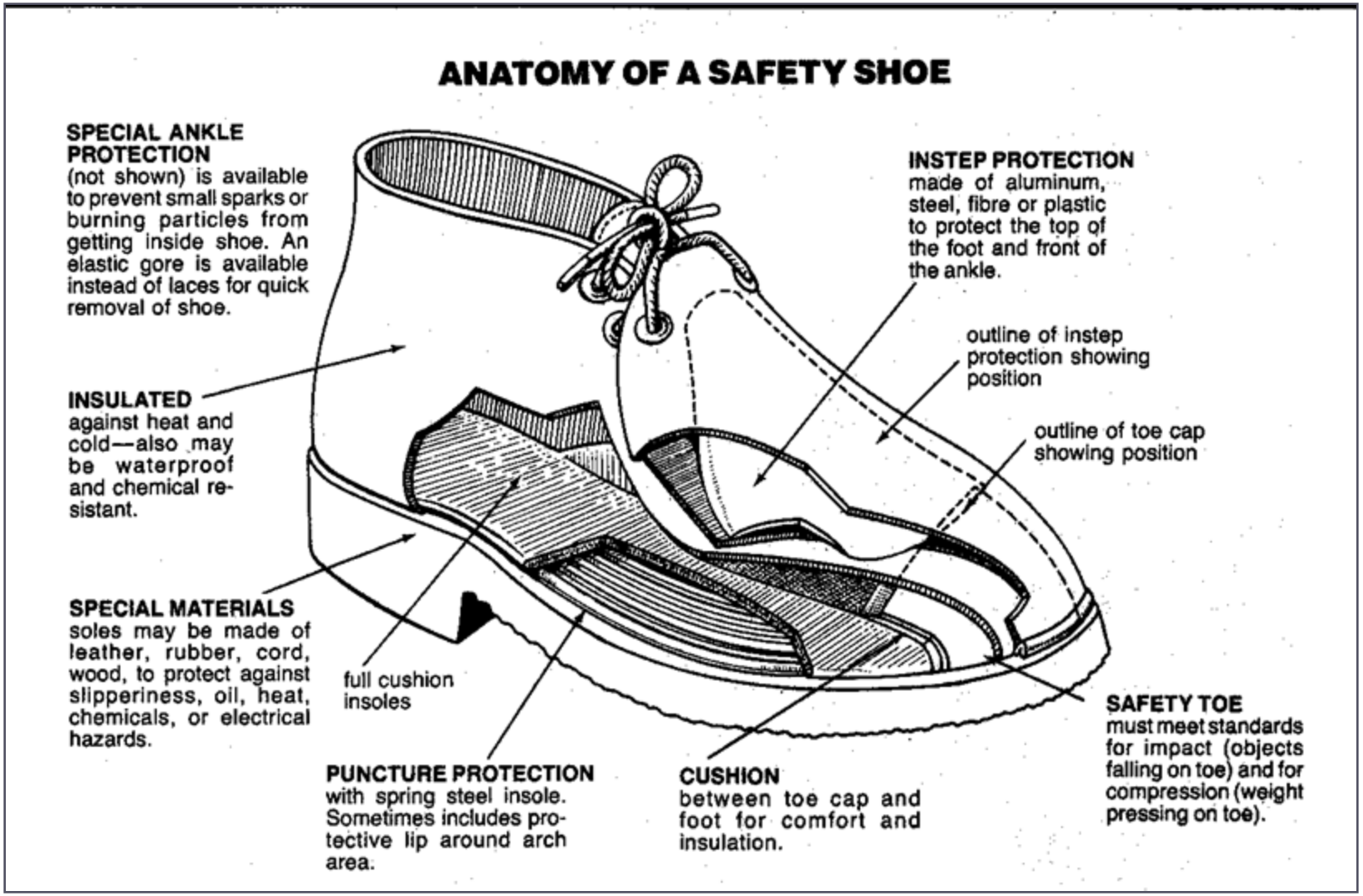
“These cutoff discs are no joke. They are designed to be used in a specific way (straight through cutting using the disc edge) but they are frequently used incorrectly (such as grinding using the face of the disc) which can lead to this sort of failure, with high speed shrapnel spraying in every direction.”

“Trying to use a cutting disc like a grinding wheel results in a ‘rapid unplanned disassembly’.”

1926.96

Safety-toe footwear for employees shall meet the requirements and specifications in American National Standard for Men's Safety-Toe Footwear, Z41.1-1967

Foot Protection



Foot Protection

- February 15, 2012
- Lowering 5’ by 10’ trench plates to cover the excavation.
- Workers hooked a steel sling through a hole in center of the trench plate, which was suspended from the excavator, to hoist it.
- Employee was steadying the plate with his right foot as it was lowered.
- When the plate was just a few inches from the ground, it caught on something and jumped towards the employee, falling a few inches onto the left foot of the employee.
- The employee suffered a **serious injury**, consisting of an **amputation** of his left big toe at the first joint and a **laceration** and **fracture** of the second toe.

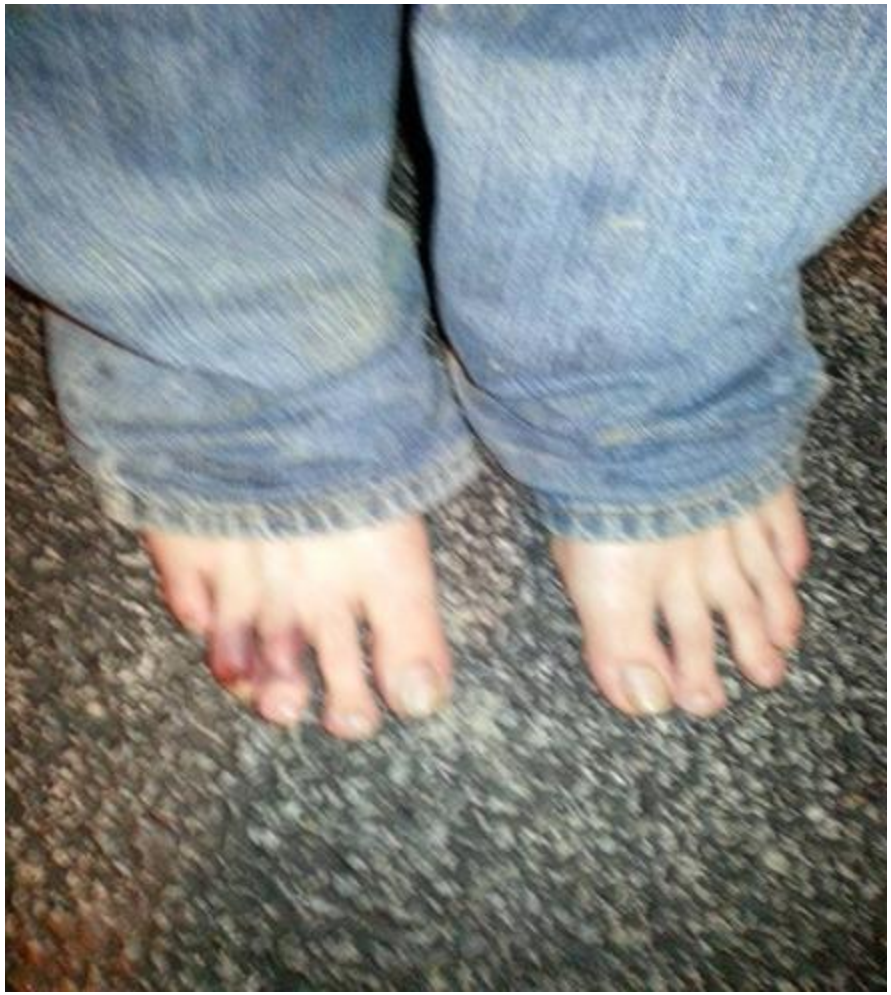
ANSI

Arbor press test to find total failure point:

- They used an **arbor press** to squish boots to their **total failure point**. The steel-toe boot was able to take **6000lbs** of pressure before total failure; the regular boot was only able to take about **1200lbs**, which was hard to measure as it failed so quickly.
- At the official test height of **3ft** with **75lbs** there was **0.5”** of clay compression with the steel-toe boot, which is **exactly to spec**.
- The regular boot **failed horribly**, with the clay being completely splattered.

June 2014

- Broken toes.
- Leather work boots.
- No safety toe.
- Crane dropped load as it was being lifted.



May 2015

Dropped log on foot.

(Photo by Alan Cooper)

October 2015

6000-pound steel beam dropped on foot.

Ice

Gloves

Traumatic Injuries

- cuts
- punctures
- sprains or crushing from equipment

Contact Injuries

- toxic chemicals
- biological substances
- electrical sources
- extreme temperatures

Repetitive Motion

- same hand movement over extended time periods

Jewelry 2014

- Ring can strip the skin off a finger or pull it off.

- Loose clothing can get caught in rotating machinery.

Skin Protection

Potentially harmful substances:

- pitch, tar, bitumen
- cement, brick and stone dust
- tile and plaster dust
- paint, varnish, lacquer adhesives
- wood dust, fibreglass, resins
- solvents, fuels, oils
- spirits, thinners, acids, alkalis
- ionising radiations and others

One VPP Construction Site

- 10 hand injuries
- Workers hands not visible

January 2015

- One company.
- Two employees suffered box knife cuts.
- One was stripping cable.
- Another was cutting open a box toward himself.

Gloves

Cutting zip ties with box knife.

Arc Flash

- July 16, 2012
- An electrical contractor was replacing a power breaker cover after checking for proper wiring and power to the cell side.
- As he proceeded to put the panel cover back on, an **electric arc flash** occurred.
- The employee suffered **severe first and second degree burns** to his left arm, left hand, and right hand.

Class 2 will protect for 480 volts.

Body Protection

Hazards:

Chemical or metal splash, spray from pressure leaks or spray guns, impact or penetration, contaminated dust, excessive wear or entanglement of clothing.

- Protection against hazardous substances: overalls, aprons and coveralls.
- Clothing for cold, heat & bad weather.
- Clothing to protect against machinery, e.g. chainsaws.
- High visibility clothing (e.g. jackets, vests).
- Harnesses
- Back supports

Roofing

- October 4, 2011
- Employee was pulling on the handle of a long metal mop cart carrying a bucket containing 400 degrees F, hot roofing material.
- Employee tripped and fell forward.
- His right hand landed in previously placed hot roofing material.
- Wear **long sleeve** shirts.

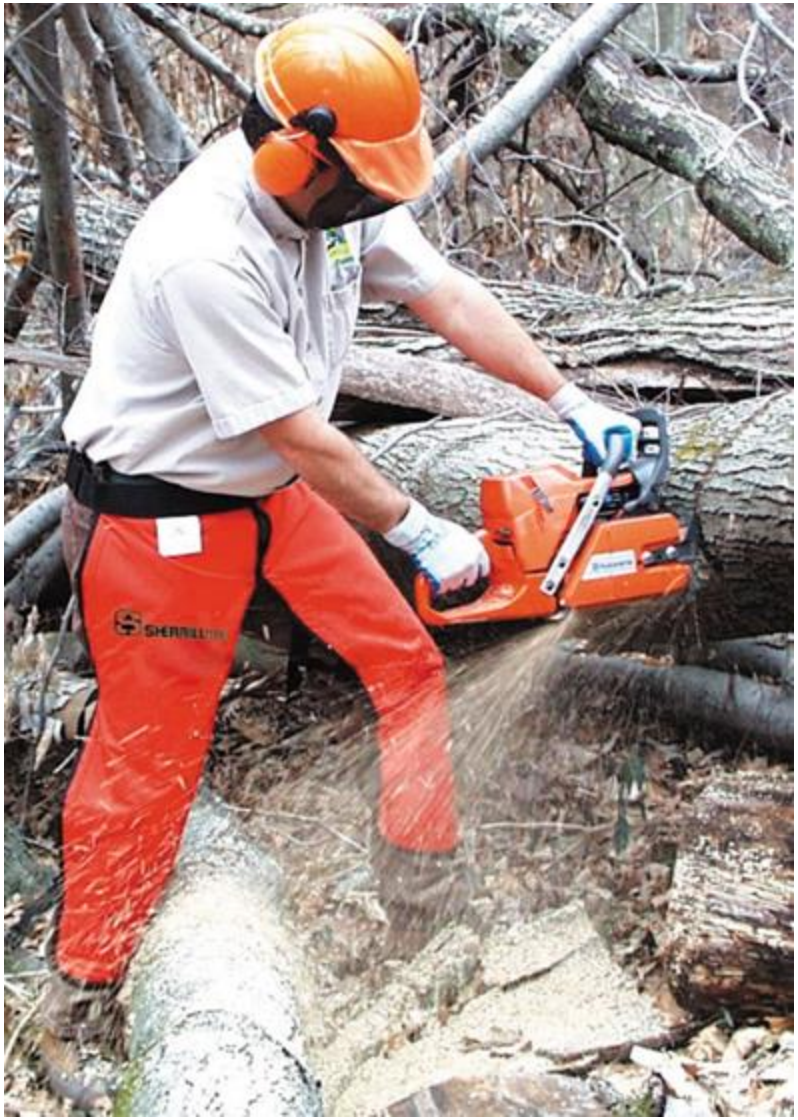
Welding

- November 24, 2009
- Employee was repairing a holding tank.
- While repairing the tank, he was using an arc welder and his shirt caught on fire.
- Employee was hospitalized for burns to his torso.

Body Protection

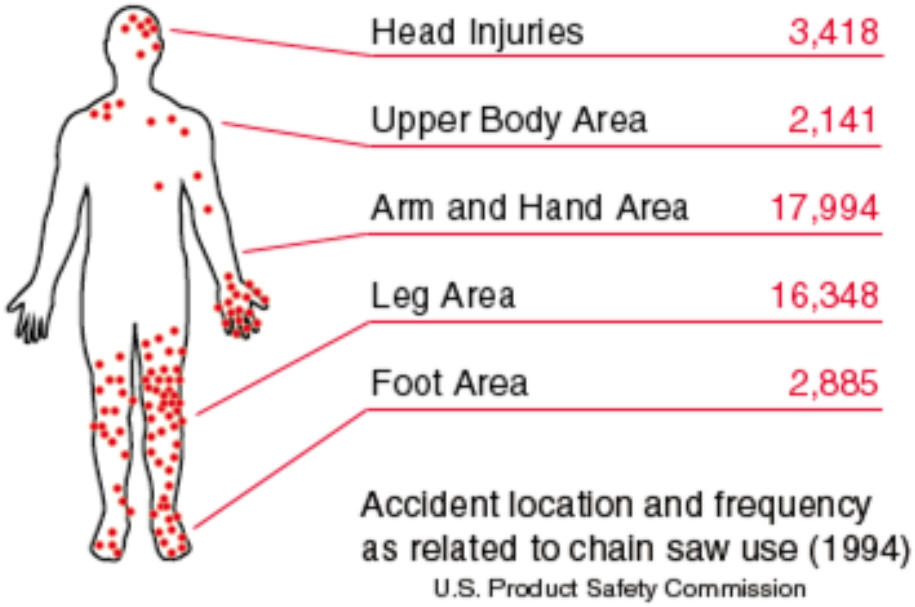
- Power washing birdcrap.
- Issues?

Chainsaws



Why Wear Chaps?

- Nicholas Abuhl
- One arming a chainsaw
- August 2015

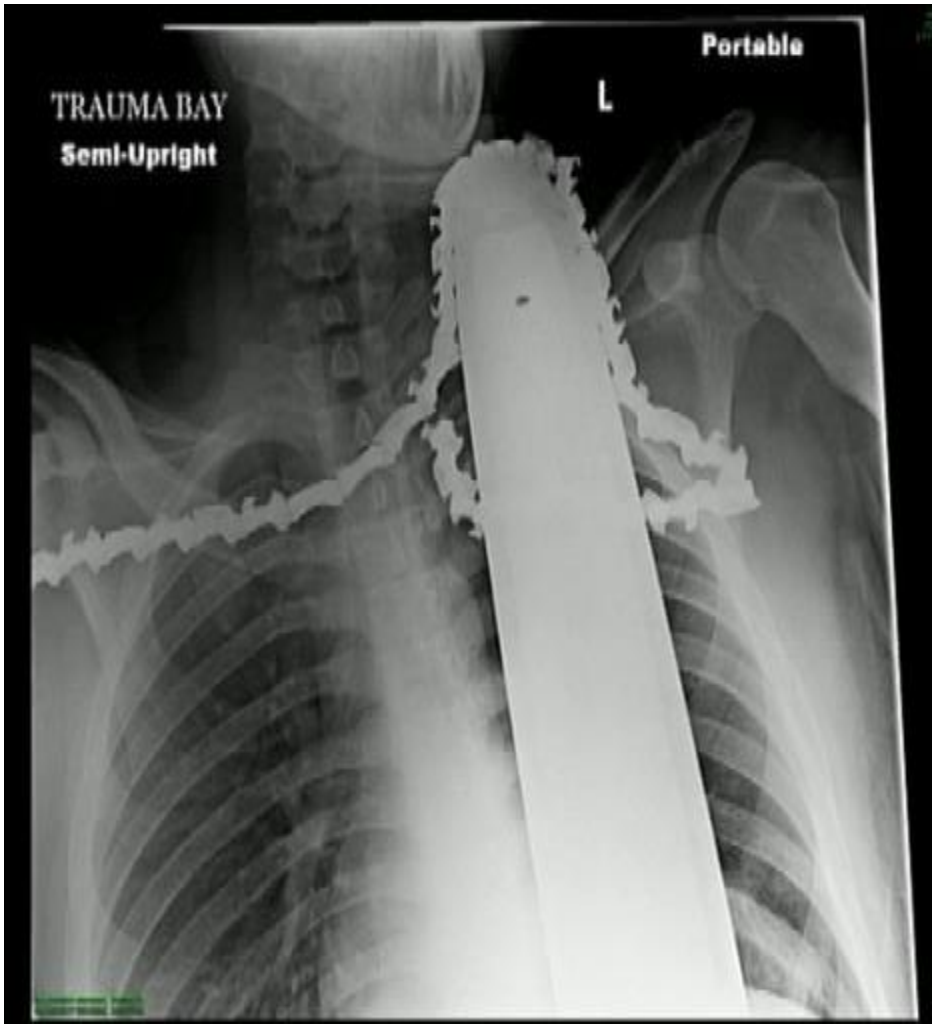


Why Wear Chaps?

- Patrick Muir
- August 2015
- One arm chainsaw

April 2014

- A tree trimmer is recovering after he was rushed to a Pittsburgh hospital with a chainsaw blade embedded in his neck.
- James Valentine was in a tree in Ross Township on Monday afternoon when he was struck in the neck by the saw.
- Another worker helped him down, and his co-workers left the saw in place to try to limit the bleeding.

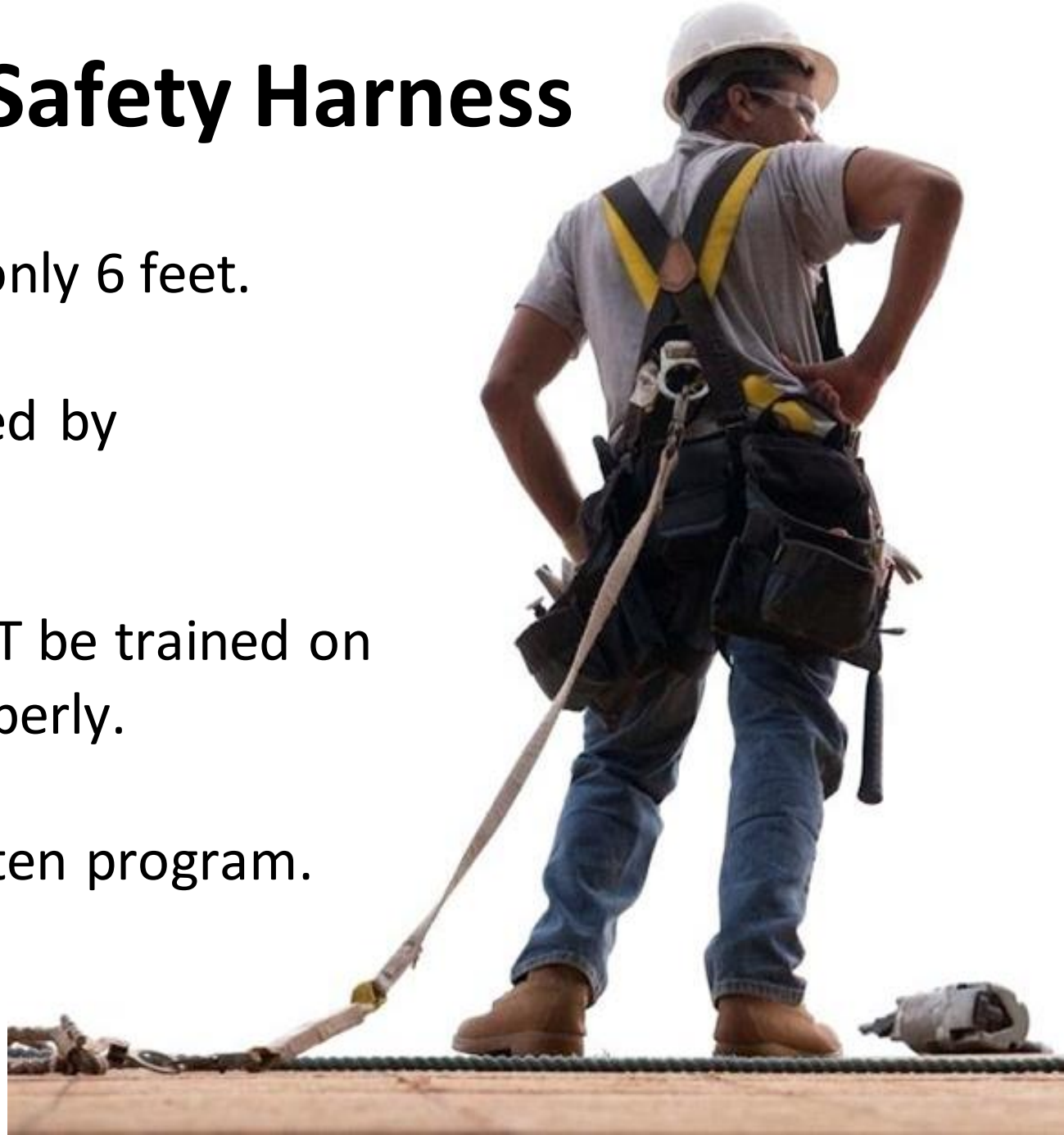


February 2015

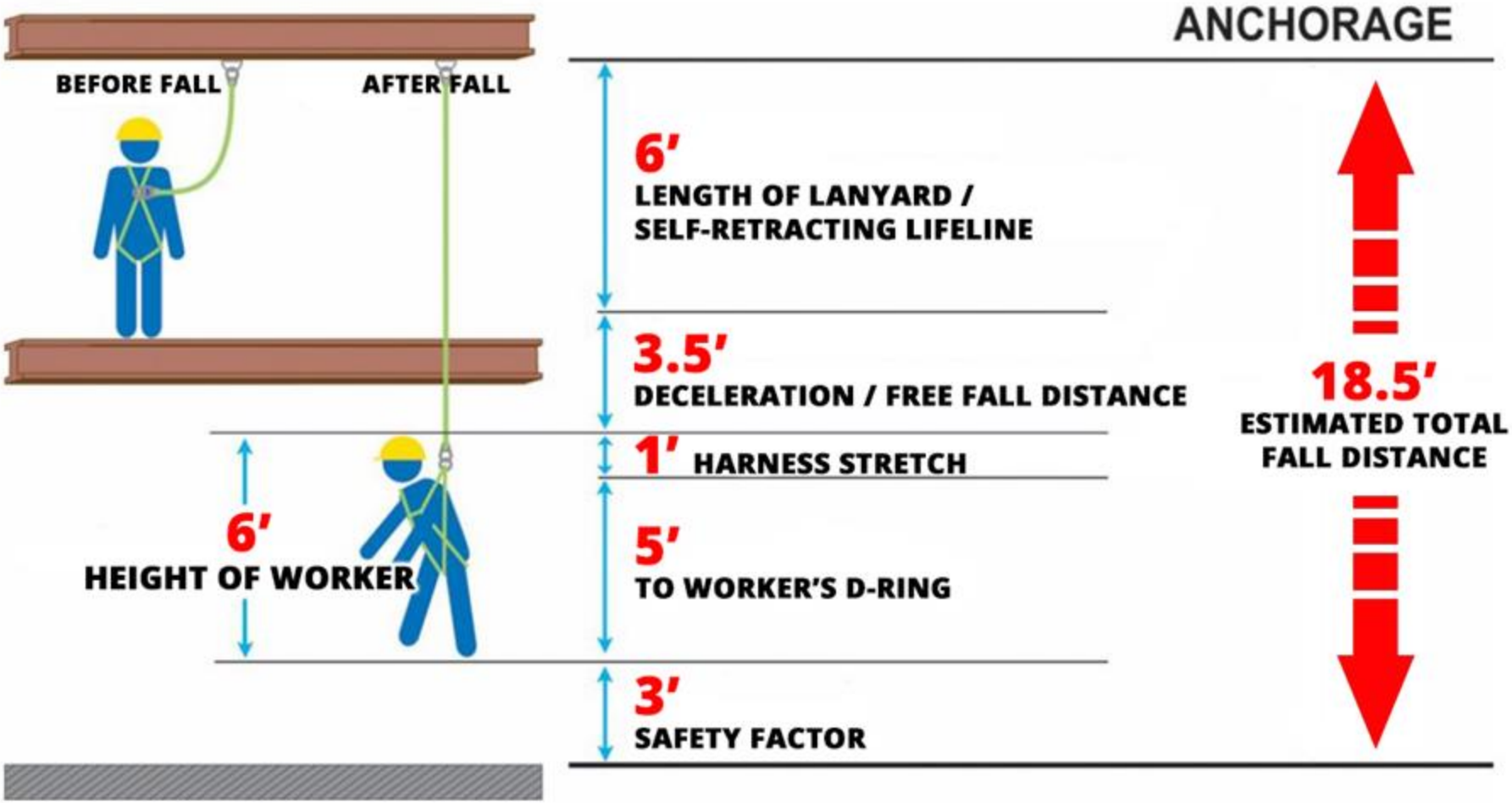
- Chainsaw

Safety Harness

- Limits a fall to only 6 feet.
- Must be supplied by employer.
- Employee MUST be trained on how to use properly.
- Requires a written program.



Safety Harness



Safety Harness

Safety Harness Inspection

Inspection

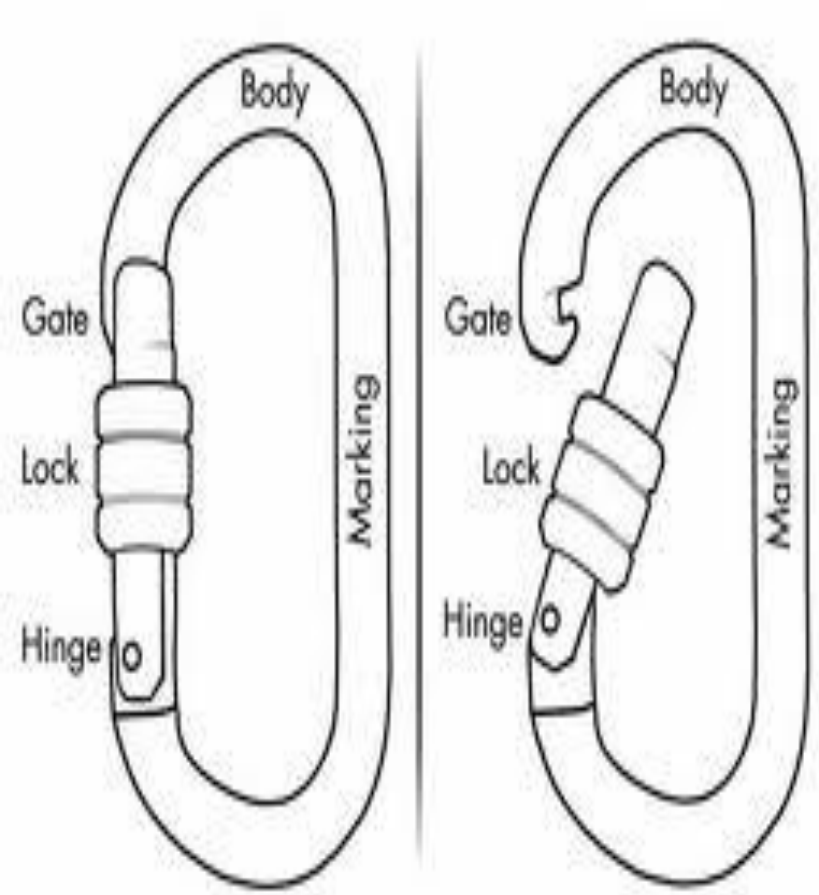
- December 2014

Lanyards

Abrasion damage

Damaged protector

Wear to webbing loop

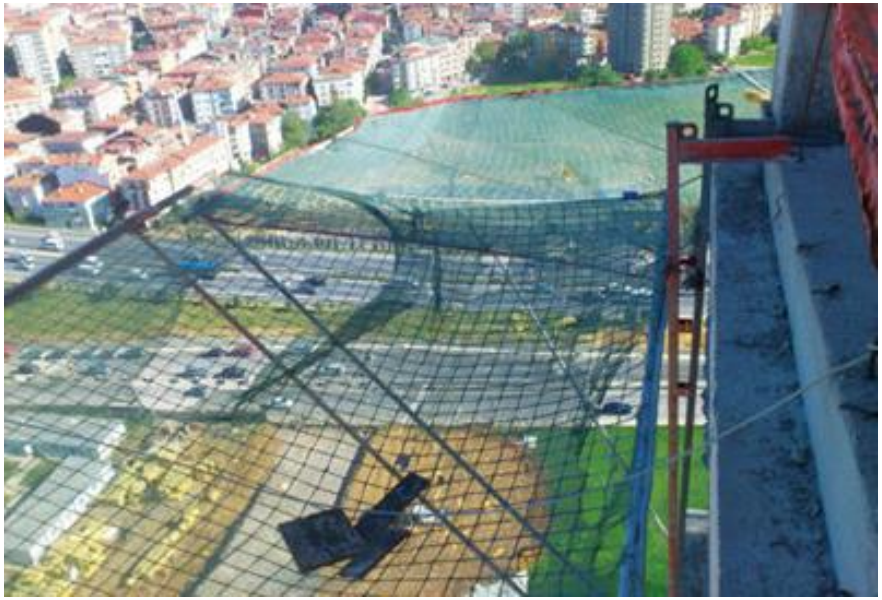


Safety Nets

Safety nets shall be provided when workplaces are more than 25 feet above the ground, or water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

1926.105(a)

Safety Nets



- Nets shall extend 8 feet beyond the edge of the work surface where employees are exposed and shall be installed as close under the work surface.
- It is intended that only one level of nets be required for bridge construction.

1926.105(c)

Safety Nets

- The mesh size of nets shall not exceed 6 inches by 6 inches.
- All nets shall meet accepted performance standards of 17,5000 foot-pounds minimum impact resistance as determined and certified by the manufacturers and shall bear a label of proof test.

1926.105(d)

1926.106(a)

Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved **life jacket** or **buoyant work vests**.

1926.106(c)

Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations.

1926.106(d)

At least one **lifesaving skiff** shall be immediately available at locations where employees are working over or adjacent to water.

Flaggers

- The MUTCD requires the paddle to be at least 5 ft. in height preferably higher.
- The one on the left is also to low, but is the wrong shape. Again according to the MUTCD the Stop side must be octagonal in shape..

Road Construction

Class 2 vests during the day and 45 and under.

Class 3 if 50 mph and higher and night.

The paddle used during night work is too low.

Road Construction

November 2014

Emerging PPE: Smart Helmets

- The Daqri Smart Helmet combines the physical head and eye protection of a hard hat and visor with augmented reality.
- The helmet includes sensors and 360-degree navigational cameras capable of recording and interacting with the outside world.
- Despite all the extra equipment inside, the Smart Helmet is not bulky or any heavier than a regular hard hat.

Emerging PPE: Smart Helmets

- Workers can overlay their view of the job site with schematics, or pull up directions to carry out a task - including animation to show them exactly how it should be done.
- Thermal imaging provides a kind of “X-ray vision” which can help workers “see” inside equipment to determine if it is functioning properly based on heat readings.
- The helmet has been tested by more than 100 companies, but comes with a $15,000 price tag - keeping it out of reach of most job sites - for now.

Emerging PPE: Lightweight Fabrics

- PPE manufacturers are looking to companies developing lighter weight fabrics to improve their products.
- Lightweight fabrics can make PPE less heavy and bulky, more flexible and breathable, while still providing protection.
- Many of the fabrics being developed are also fire resistant which is useful for firefighters, but also for hazards such as arc flash.

Emerging PPE: Designed for Women

- Women are still extremely underrepresented in construction jobs, and are often given the same PPE to wear as men instead of gear designed for a woman to wear.
- Improperly-fitting PPE leads to increased risk of injury or death.
- Women can also seem less competent on the job when trying to do it in gloves or other gear that does not fit them.

Questions?