

Investigating Fall Fatalities: Lessons Learned and Tools for Prevention

Moderator: Scott P. Breloff, Ph.D

Detailed as the Coordinator for the NIOSH Office of Construction Safety and Health
Biomedical Research Engineer

Panel:

Hispanic Worker Falls From Residential Roof in North Carolina

Jennifer E. Lincoln, NIOSH FACE Program, Surveillance and Field Investigations Branch,
Division of Safety Research

Gutter Installer Dies After Falling From Roof

Michael Turner , Kentucky Injury Prevention and Research Center; Kentucky FACE

Mast Climbing Work Platform Daily Inspection Walkthrough Tool

LT Bryan Wimer- NIOSH, Division of Safety Research



For Technical Difficulties, chat with Jessica Bunting, or
email jbunting@cpwr.com.

For Audio Difficulties, call in:

1-415-655-0003 Access code: **127 781 0590 #**

CAMPAIGN TO PREVENT FALLS IN CONSTRUCTION: SAFETY PAYS. FALLS COST.





Hispanic worker falls from residential roof – North Carolina

(Photo courtesy of NCDOL/OSH)

NIOSH FACE 2012-02

Jennifer E. Lincoln
National Institute for
Occupational Safety and
Health
Division of Safety Research





NIOSH FACE Program

- Methodology derived from research of William Haddon
- Reflects public health perspective
 - Etiology of injury is multifaceted
 - Injury is preventable
- Collects data about circumstances and contributors to fatal injuries through field investigations
- Collects descriptive data not generally available from injury surveillance databases
- NIOSH fatality investigation data supports effective prevention measures at the workplace level



Incident Scene



(Photo courtesy of NCDOL/OSH)



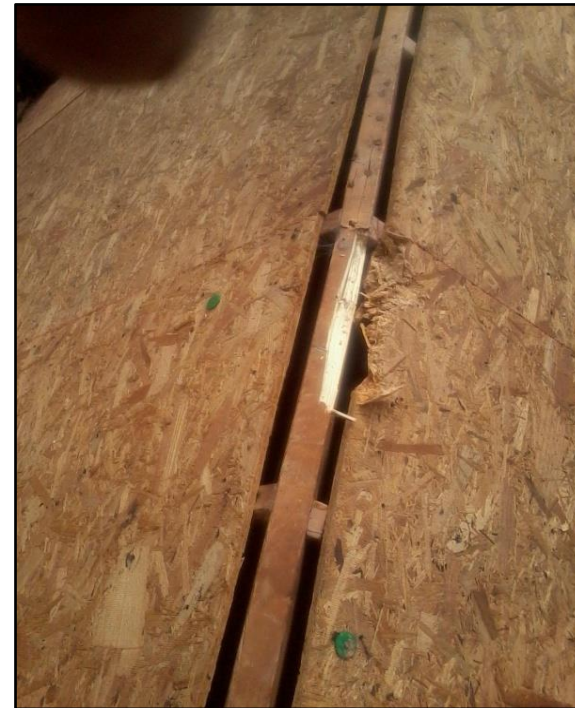
Incident Scene

(Photo courtesy of NCDOL/OSH)





Investigation



(Photos courtesy of NCDOL/OSH)



Contributing Factors

- *13-foot plus fall distance and concrete surface*
- *10/12 roof pitch*
- *25 foot working length of fall arrest system lifeline*
- *Fall arrest system lanyard connection point*
- *Fall arrest system anchorage method*
- *Worker level of experience / lack of training*



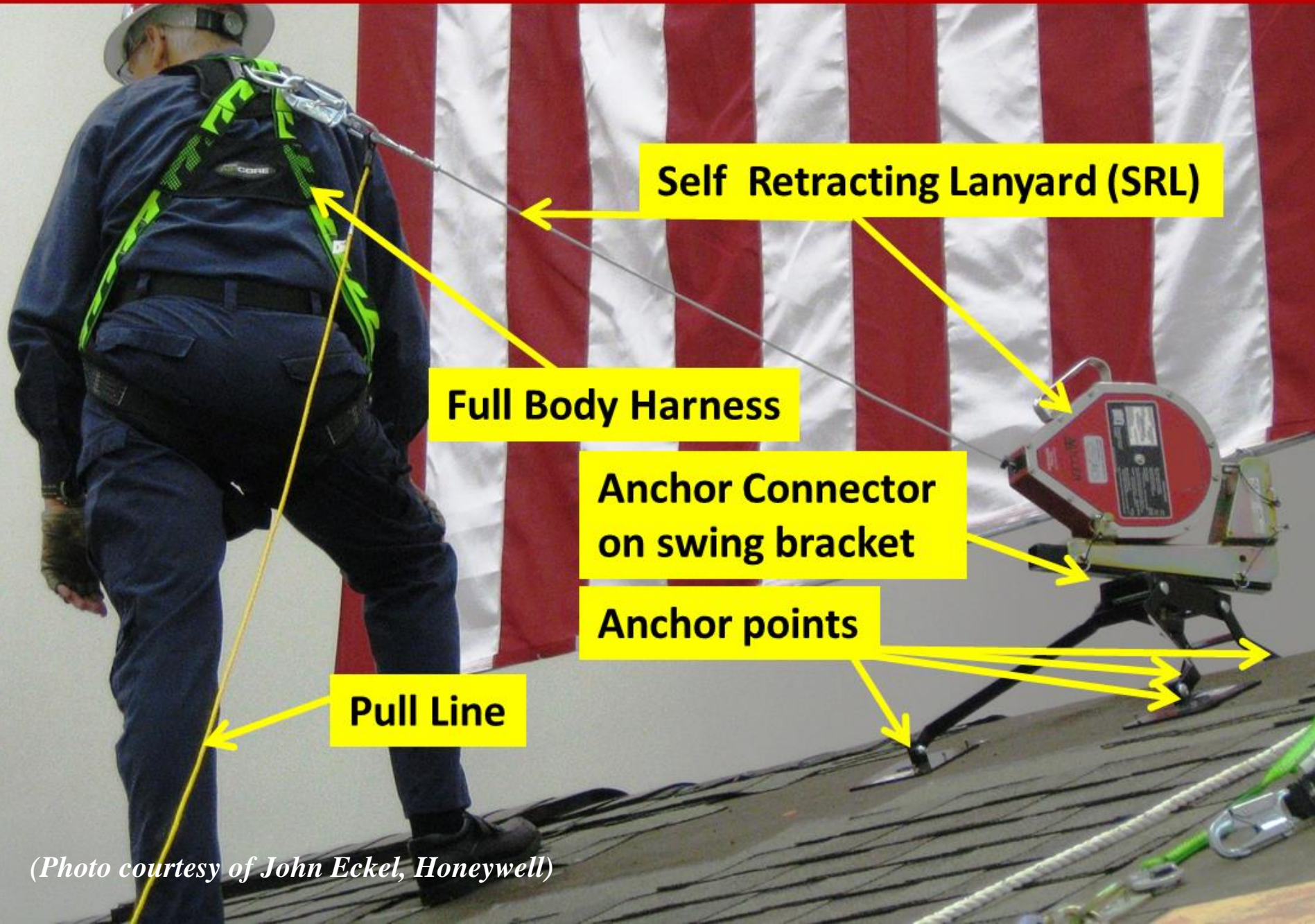
Recommendation #1: Employers should develop, implement, and enforce a comprehensive, safety program.





Recommendation #2: Employers should ensure that all employees working at heights are provided with fall prevention training that complies with applicable OSHA fall prevention standards, in a language and at a literacy level that they employees can comprehend. The program should include safe work practices, hazard awareness and identification, avoidance of fall hazards, and the correct assembly, installation and use of the personal fall arrest system.

Personal Fall Arrest System (PFAS) Components



Self Retracting Lanyard (SRL)

Full Body Harness

**Anchor Connector
on swing bracket**

Anchor points

Pull Line

(Photo courtesy of John Eckel, Honeywell)



Recommendation #3: Employers should ensure that all employees are provided with properly assembled and maintained fall protection systems when exposed to fall hazards.

Personal Fall Arrest System (PFAS) Components



Full Body Harness

Energy Absorbing Lanyard

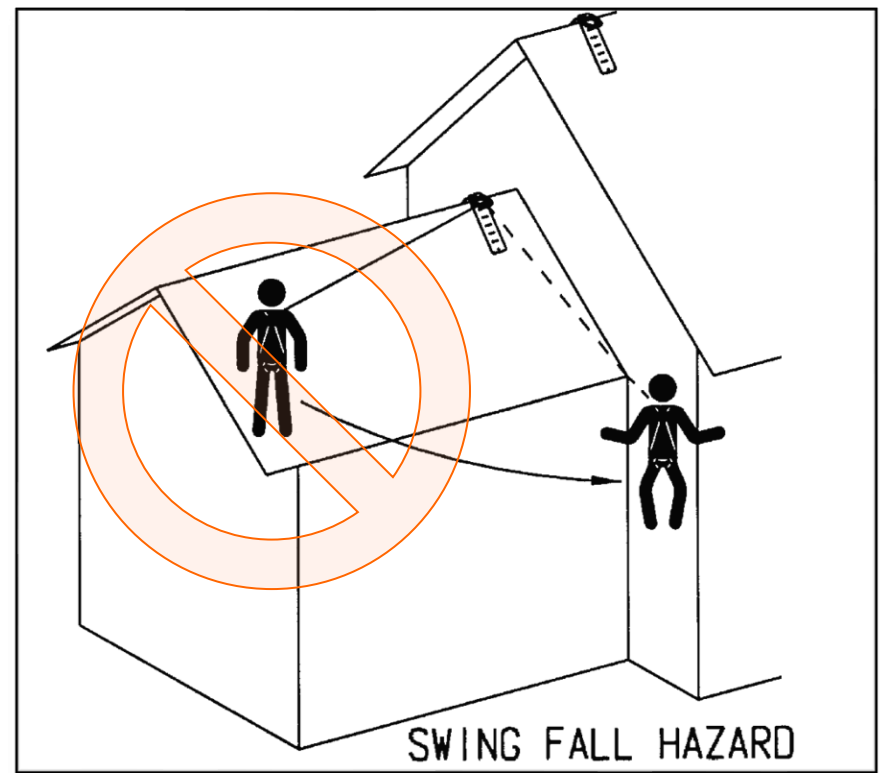
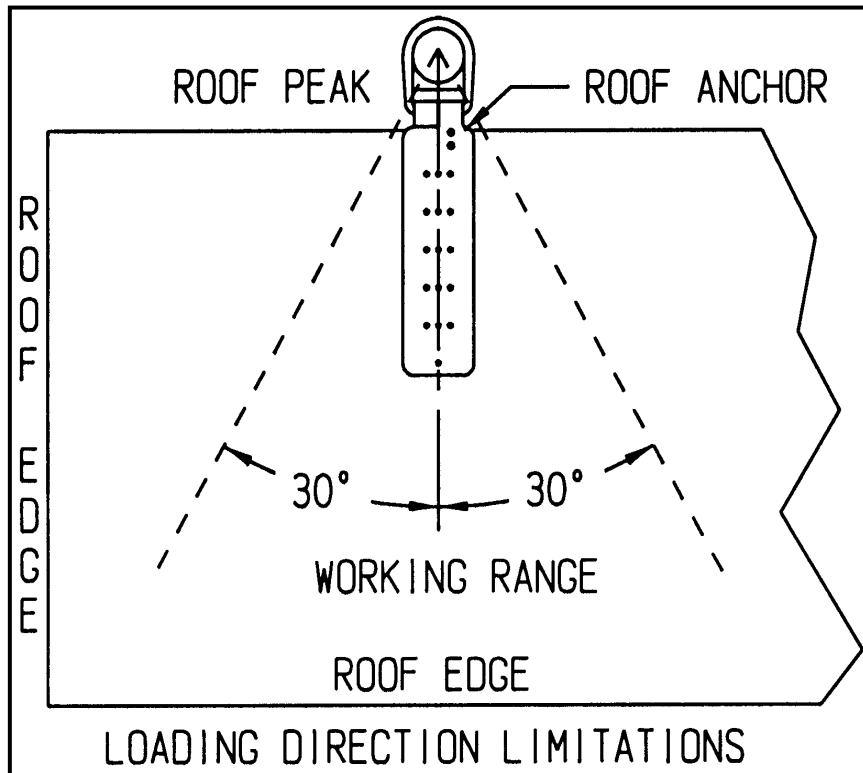
Life Line

Rope Grab

(Photo courtesy of John Eckel, Honeywell)



(Photo courtesy of NAHB)



(Diagrams courtesy of DBI-SALA/Capital Safety)



Recommendation #4: Employers should assign a competent person to inspect the worksite before work begins to identify fall hazards, determine the appropriate fall prevention systems for workers, and ensure the PFAS is installed properly.



Recommendation #5: General contractors should ensure through contract language that subcontractors have a comprehensive safety program.



NIOSH Division of Safety
Research
1095 Willowdale Road
Morgantown, WV 26505
<http://www.cdc.gov/niosh/face>
Twitter name: @NIOSHFACE

Jennifer E. Lincoln
axi5@cdc.gov
(304) 285-6185

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.



Centers for Disease Control
and Prevention
National Institute for Occupational
Safety and Health

19KY034 - Gutter Installer Dies after Falling from Roof

Michael Turner

Kentucky Fatality Assessment and Control
Evaluation (FACE) Program



Incident Facts

- **Report #:** 19KY034
- **Report Date:** November 13, 2019
- **Incident Date:** July 20, 2019
- **Victim:** 47-year-old male
- **Occupation:** Gutter & Siding Installer
- **Scene:** Two-story private residence
- **Event Type:** Fall from roof
- **Link to Report:** <http://www.mc.uky.edu/kiprc/face/reports/pdf/19KY034.pdf>

Incident Facts

- A 47-year-old male died when he fell from a roof while installing guards on the existing gutters located on the residence's roof.
- The victim was employed by a small gutter and siding installation company with two employees: the owner and the victim
- The victim had been employed with the company for four years.

On the day of the incident:

- At 9:00 AM, the victim arrived on the site of a two-story private residence to install guards on existing gutters.
- The 5,000 sq. ft. home was constructed in 1920 on a 0.61-acre lot. While most of the house was two stories, each wing of the house was one story, measuring 10 feet from the ground.
- The second story roof – from which the victim was working – measured an additional 8’3” above the first story roof.



Front view of the residence



Side view of the residence

On the day of the incident:

- The victim was working from the second story roof for approximately one hour when the owner arrived to check the worker's progress.
- The owner instructed the victim on what part of the house to complete. The owner then told the victim that he was leaving to purchase additional supplies.
- As the owner was leaving the property, he spoke with the victim's girlfriend who had provided the victim with a ride to work. She stated that she sometimes likes to stay for a little bit in order to keep her boyfriend company when he works alone.

The incident:

- The owner stated that as he was leaving, at 10:51 AM, he saw the victim sitting with his legs folded, leaning towards the gutter.
- Within 30 seconds of leaving, the owner was flagged down by the girlfriend, stating she had witnessed the victim fall from the second story, strike the first-floor roof.
- When they returned to check on him, the victim had fallen to the concrete driveway.





Area from which the victim fell

After the incident:

- Upon his return, the owner found the victim laying unconscious on the driveway.
- While awaiting first responders, the girlfriend informed the owner the victim ‘spaced out’ before falling and appeared to be suffering from a grand-mal seizure when he struck the first story roof.

*Note – A grand-mal seizure, also known as a tonic-clonic seizure, is caused by abnormal electrical activity throughout the brain. They can be caused by epilepsy, extremely low blood sugar, a high fever, or a stroke. They cause a loss of consciousness and violent muscle contractions.

After the incident:

- First responders arrived on the scene at 10:57 AM and transported the victim to a local hospital.
- Knowing his injuries were severe, EMS performed a 'hot load' – meaning they went straight to the helipad to transport the victim to a larger hospital.
- Injuries included multiple fractures to the spine and ribs, lacerations to the face, and a subdural hematoma.
- The victim was intubated to assist with breathing, but his condition deteriorated over the next several days, and he was declared brain dead.

After the incident:

- The victim died on July 27, 2019, seven days after the incident.
- The death certificate stated the victim died ‘due to blunt force injuries of the head due to a fall from a roof caused by reported seizure issues.’
- The medical examiner stated the victim had an ‘unspecified seizure disorder.’

The Investigation:

FACE Investigators found that:

- There was no training on or use of fall protection.
- No hazard analysis was performed.
- The victim was working at heights with a known medical condition.

Recommendations

FACE investigator concluded that, to help prevent similar occurrences:

- Employers should train employees on and enforce the use of fall protection when working at heights above 6 feet.
- Employers should implement a job hazard analysis process.
- Employers who learn of physical disabilities which pose a direct threat to an employee's safety should perform threat assessments to evaluate his/her ability to safely perform assigned job duties.

The Employer

- In 2016, the employer was cited and fined \$10,500 by Kentucky OSHA for several violations while performing roofing activities, which included:
 - Allowing six employees working from an unprotected height of 56 feet.
 - Allowing employees to work in an aerial lift while feet were not standing firmly on the floor of the basket.
 - Allowing employees to work from an aerial lift without a lanyard.
 - Not obtaining fall protection certifications for subcontractors.
- On the day of the incident (7/20/2019), the victim and the business owner were both working at a height of over 18 feet without fall protection.

Duty to have fall protection and training

- In Kentucky OSHA's investigation of the incident, the owner was cited for two serious willful violations of standards 1926.501(b)(13) – *Duty to have fall protection in residential construction* and 1926.503(a)(1) – *Training requirements*.
- A willful violation is characterized by intentional, knowing or voluntary (as opposed to accidental) conduct that demonstrates a careless disregard or plain indifference to the law. If an employer is aware that a hazardous condition exists and makes no reasonable effort to eliminate it he may be cited for a willful violation.

Duty to have fall protection and training

- "Residential construction." Each employee engaged in residential construction activities 6 feet (1.8 m) or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure.
- The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.
- See OSHA Standards [29 CFR 1926.501\(b\)\(13\)](#) and [29 CFR 1926.503\(a\)\(1\)](#)

Job Hazard Analysis

- On the day of the incident – their first day on site – the owner stated that they began working immediately, treating it like every other job they've done.
- The owner stated he didn't do a hazard analysis due to having done this type of job before.
- The owner acknowledged he was aware that working from heights was dangerous.

Job Hazard Analysis

- The requirement for hazard assessments was instituted in 1994.
- A job hazard analysis (JHA) is a technique employed by site supervisors, experienced employees, and safety personnel that focuses on job tasks as a way of identifying potential hazards that workers may encounter when performing each task.
- See [OSHA's document on JHAs](#)

Physical Disability

- The death certificate stated the victim had an ‘unspecified seizure disorder’; however, in an interview with FACE investigators, the victim’s girlfriend confirmed the victim suffered from epilepsy.
- According to the Mayo Clinic, “epilepsy is a central nervous system (neurological) disorder in which brain activity becomes abnormal, causing seizures or periods of unusual behavior, sensations, and sometimes loss of awareness.”
- The CDC states that approximately 3.4 million people in the United States suffer from epilepsy.

Physical Disability

- The U.S. Equal Employment Opportunity Commission (EEOC) has specific requirements pertaining to epilepsy in the workplace and the Americans with Disability Act (ADA).
- An employer may not ask an applicant if they have epilepsy, nor is an employee required to disclose that they have epilepsy.

Physical Disability

- If an employer learns that an employee has epilepsy, they may ask for medical information; however, they may only ask for information needed to make an assessment on the employee's *present* ability to perform their job safely.
- An employer may exclude an individual with epilepsy from a job for safety reasons when the individual poses a direct threat.
- A "direct threat" is a significant risk of substantial harm to the individual or others that cannot be eliminated or reduced through reasonable accommodation.

Physical Disability

- In making a direct threat assessment, the employer must also consider the duration of the risk; the nature and severity of the potential harm; the likelihood that the potential harm will occur; and the imminence of the potential harm.
- The employer must determine whether any reasonable accommodation – such as reassignment – is possible and would reduce the risk.

Physical Disability

- The owner of the company stated he was aware that the employee ‘had suffered from seizures in the past’ but continued to allow the employee to work at heights while unprotected.
- It is recommended that once an employer learns of an employee disability, the employer should perform a direct threat assessment to evaluate the employee’s ability to safely perform assigned job duties.

What Happened Next?

- On January 14, 2020, KY OSHA fined the owner \$145,000 for the two aforementioned serious willful violations and failure to report a work-related hospitalization within 72 hours.
- On March 18, 2020, the owner filed a formal contest of the charges, claiming the worker was a ‘contractor’.
- As of this presentation, litigation is ongoing.

87 Kentucky Construction Workers Died from Falls Between 2000 and 2018

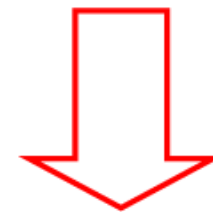
Counties with the most fatal construction falls

Jefferson - 18
Fayette - 11
Boyd/Campbell - 4



74%

of fatal construction falls
were from *30 feet or less*



28% of Fatal Construction Falls
happen between
8:00 am and 10:30 am



18%

of the workers were
Hispanic



23%
of fatal falls occur on
FRIDAY



Fatal Falls from Roofs - 28%
Fatal Falls from Ladders - 18%
Fatal Falls from Scaffolds - 13%



Average Age of Worker: 44
35% of Workers were 50+



OSHA Protecting Roofing Workers:

<https://www.osha.gov/Publications/OSHA3755.pdf>

NIOSH Falls from Ladders Resource:

<https://www.cdc.gov/niosh/topics/falls/mobileapp.html>

CDC Scaffold Safety:

<https://www.cdc.gov/niosh/docs/2004-101/chklists/r1n74a~1.htm>

Sources

- Private Residence Specifications. <https://www.realtor.com>
- Historical Weather. <https://www.wunderground.com/history>
- Grand Mal Seizures. <https://www.mayoclinic.org/diseases-conditions/grand-mal-seizure/symptoms>
- Fall Protection.
<https://www.osha.gov/Publications/OSHA3146.pdf>
- OSHA Training Standards. <https://www.osha.gov/laws-regs/regulations/standardnumber/1926/1926.503>
- Job Hazard Analysis.
<https://www.osha.gov/Publications/osha3071.pdf>
- Epilepsy. <https://www.eeoc.gov/laws/types/epilepsy.cfm>



KENTUCKY

State **FACE** Program

Fatality Assessment & Control Evaluation

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



DISCLAIMER

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

PROGRAM FUNDING

The Kentucky Fatality Assessment & Control Evaluation Program (FACE) is funded by grant 5U60OH008483-16 from the National Institute for Occupational Safety and Health (NIOSH).

NIOSH - Division of Safety Research

Mast Climbing Work Platform Daily Inspection Walkthrough Tool

Bryan Wimer

Brianna Eiter, Christopher Pan,
Tim Orr, and Sydney Webb
September 18th, 2020

National Institute for Occupational Safety and Health



What is a Mast Climbing Work Platform (mast climber)?

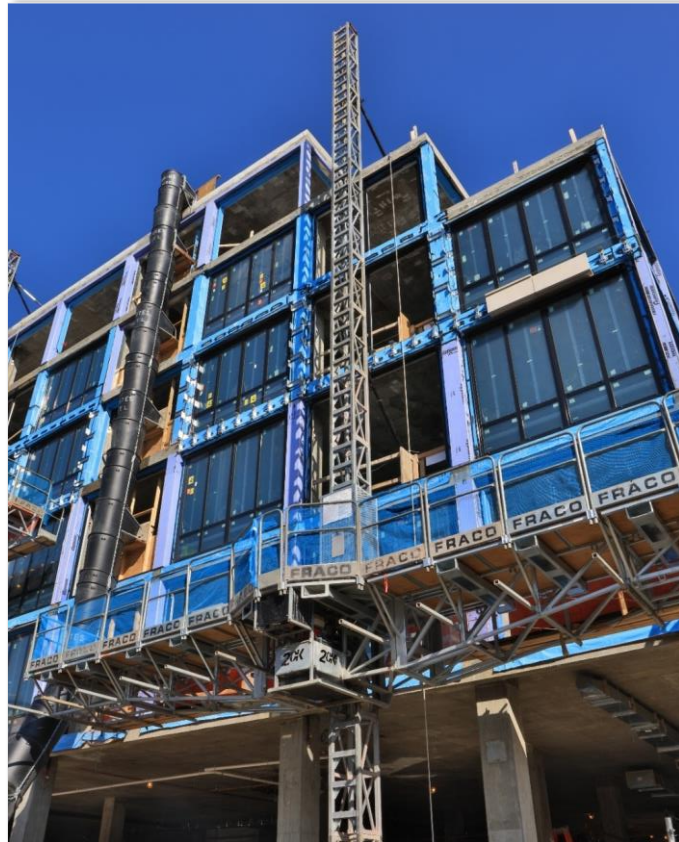


Photo: Bryan Wimer

- Powered work platform that climbs a vertical tower (mast)
- Varying platform configurations and sizes
- Can be freestanding or fixed to an adjacent structure
- Becoming more popular in the U.S. as a way of replacing traditional scaffolding



Photo: Bryan Wimer

- Up to 15,000 mast climber units total being used daily (U.S.)
- Approximately 50,000 workers on them daily
- Estimated dis- and re-assembly 4-5 times per year

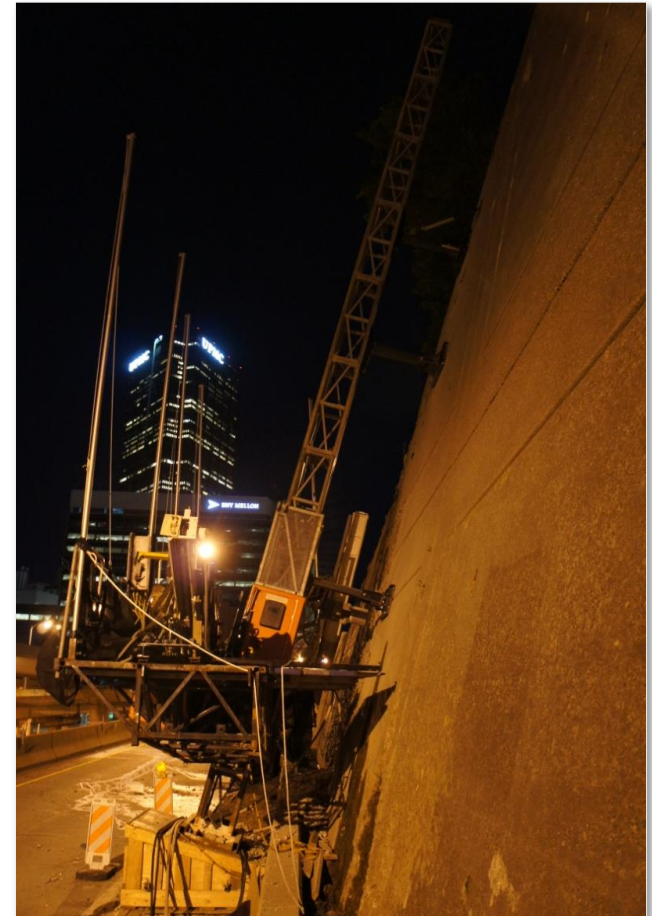


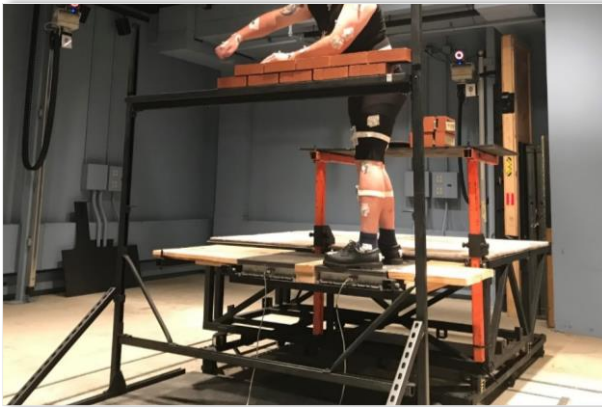
Photo: Bryan Wimer

Previous NIOSH Mast Climbing Work Platform Research

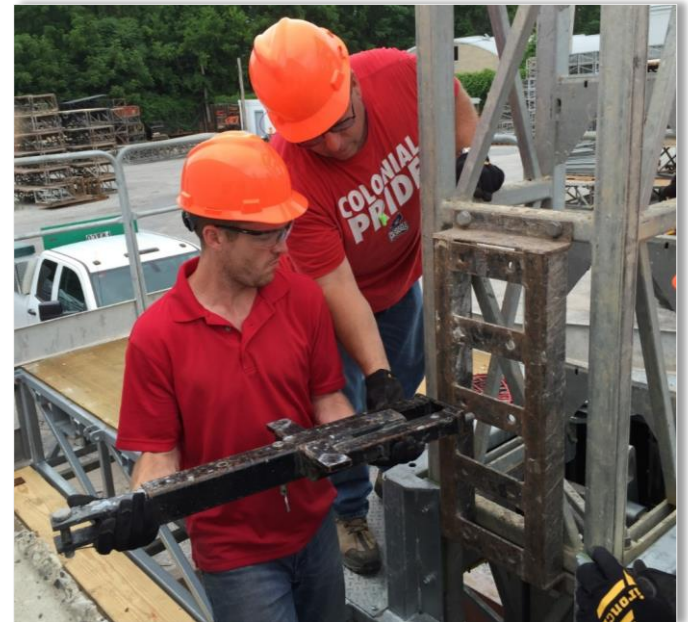
Stability of a freestanding mast climber



Material handling



Research team completed operator and installer course



Photos: Bryan Wimer & Chris Pan

Mast Climbing Work Platforms require a daily inspection

- “Ground” up
- Manufacturer-specific inspection
- Site visit completed in Sept. 2018



Photos: Bryan Wimer

FRM-20K User's Guide FRACO

Daily inspection grid

Name of user:		Name of site:	
Address of site: Number / street		City	Province/State
Type of lifting unit: Single mast <input type="checkbox"/>	Double mast <input type="checkbox"/>	serial #:	
Autostable <input type="checkbox"/>		Walls attachments <input type="checkbox"/>	
FRH on lifting unit <input type="checkbox"/>		serial #:	
Note: Mark the verified items with your initials and indicate N/A when not applicable			
Inspected items	Checked	Comments	
Ground safety perimeter			
Stability of the floor surrounding the base of the platform			
Leveling of the base and verticality of the mast			
Stabilizers/wooden blocks			
Tires and Wheels / Steering Drives			
Lateral and vertical clearance of the platform			
Condition of platform power cable			
Structure of bridge and extension sections			
Mast structure (rail/bars)			
Safety bolts, nuts and pins			
Condition of platform floor			
Condition of plankings/ planking attachments in place			
Outriggers			
Guardrails and protective wire mesh			
Mast end and mechanical descent stop			
Anchor strength: bolts and pins in place			
Loads distribution on the platform			
Warning signs/stickers			
Fuel engine and hydraulic oil level			
Condition of hydraulic hoses			
Presence of leaks			
Condition of electrical wiring			
Battery and cables securely fixed			
User Manual, Daily inspection grid			
Platform Operation / Safety Mechanism			
FRF Operation, Cable and hook status			
Load maintained			
Emergency stop button			
Emergency descent			
Comments:			
Date		Name of operator:	
Name of employee:		Signature of operator:	

Any irregularity or malfunction of the platform must be corrected by a qualified and FRACO certified installer or mechanic before the platform is returned into service. A complete inspection of the platform must be carried out every 3 months.

Source: Fraco Products

Consequences of missing daily inspection issues could have serious implications



Photo: Anonymous Eyewitness



Photo: Harry Lynch

MCWP Daily Inspection Walkthrough

- 7 pictures – 19 inspection points
- Aims to help users familiarize themselves with potential safety issues
- Users are shown highlighted areas to select prior to being shown what to look for in that area
- Guides users through the inspection of a typical mast climber set-up
- Explains what to look for and potential issues
- Ties in relevant OSHA regulations

Who would use this tool?

- Operators and Installers – as a refresher
- Those who have never used the equipment
- Non – competent persons who use the equipment

THIS TOOL DOES NOT REPLACE OFFICIAL TRAINING !

MCWP Daily Inspection Walkthrough

Click on the highlighted areas to learn more.

To move to the previous step of the inspection walkthrough, select the button below labeled 'Previous'.

Previous



MCWP Daily Inspection Walkthrough

Check the horizontal level of the base, as well as the vertical level (both front and side directions) of the mast structure.

To move to the next step of the inspection walkthrough, select the button below labeled 'Next'. To move to the previous step, select the button below labeled 'Previous'.

Previous

Next



MCWP Daily Inspection Walkthrough

Click on the highlighted areas to learn more.

To move to the previous step of the inspection walkthrough, select the button below labeled 'Previous'.

Previous



MCWP Daily Inspection Walkthrough

Check that guardrail and end plank guardrail sections are in place and secured and that protective mesh is in place to stop debris from falling and that each meet the requirements set in OSHA 1926.451(g) and 1926.541(h).

To move to the next step of the inspection walkthrough, select the button below labeled 'Next'. To move to the previous step, select the button below labeled 'Previous'.

Previous

Next



Current Progress


June 2020

MAST CLIMBING WORK PLATFORMS

Best practices for using Mast Climbing Work Platforms (MCWPs or mast climbers):

- ✓ Inspect the equipment according to manufacturer guidelines and recommendations.
- ✓ Conduct ongoing checks for changes to the equipment and the job site.
- ✓ Refer to the rate load chart on equipment to avoid overloading a mast climber.
- ✓ Make sure all workers have been trained by a qualified person.*
- ✓ Select a competent person* to oversee the mast climber.
- ✓ Use a personal fall arrest system when working at heights and near an open edge.
- ✓ Monitor changes in weather.

NIOSH offers an online inspection tool to help identify hazards and prevent falls:




Scan the QR code with your phone's camera to visit the Mast Climbing Work Platform page and use the Daily Inspection Walkthrough tool. Using the inspection tool is not a substitute for OSHA training requirements for MCWPs.

<https://www.cdc.gov/niosh/topics/falls/mastclimb.html>

PLAN PROVIDE TRAIN
Three simple steps to preventing falls.

Join the Campaign to Stop Construction Falls!
www.stopconstructionfalls.com



#StandDown4Safety

Infographic has been translated to Spanish

CDC Translation team is currently translating the walkthrough

Link: [MCWP Daily Inspection Walkthrough Tool](#)

Questions?

Contact: Bryan Wimer
E-mail: Bwimer@cdc.gov
Phone: 304-285-6267

Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

National Institute for Occupational Safety and Health



Investigating Fall Fatalities: Lessons Learned and Tools for Prevention

QUESTIONS?

