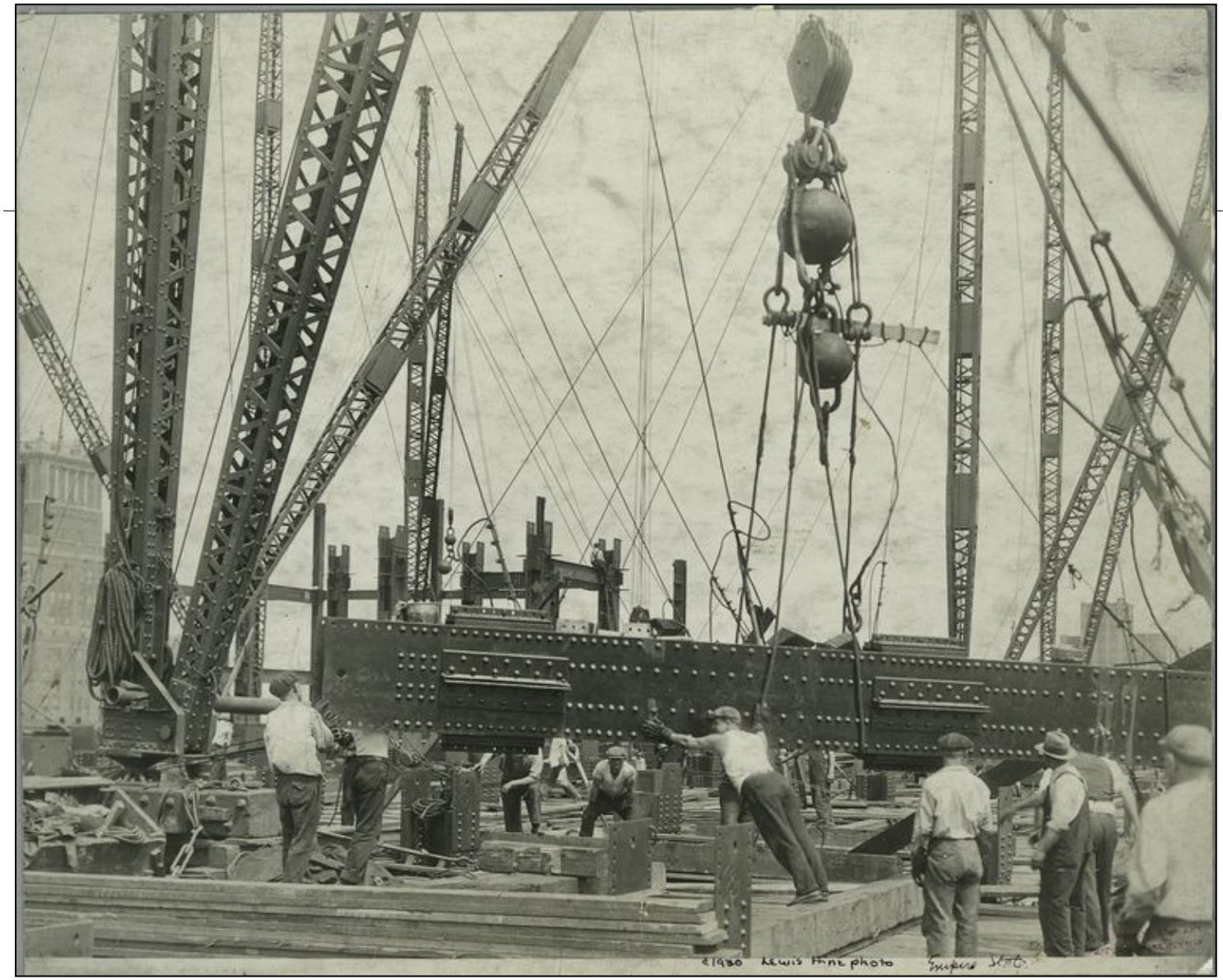
Fall Protection Training

DAVE BARKLAGE

MIDWESTERN SAFETY EQUIPMENT

Empire State Building 1930.

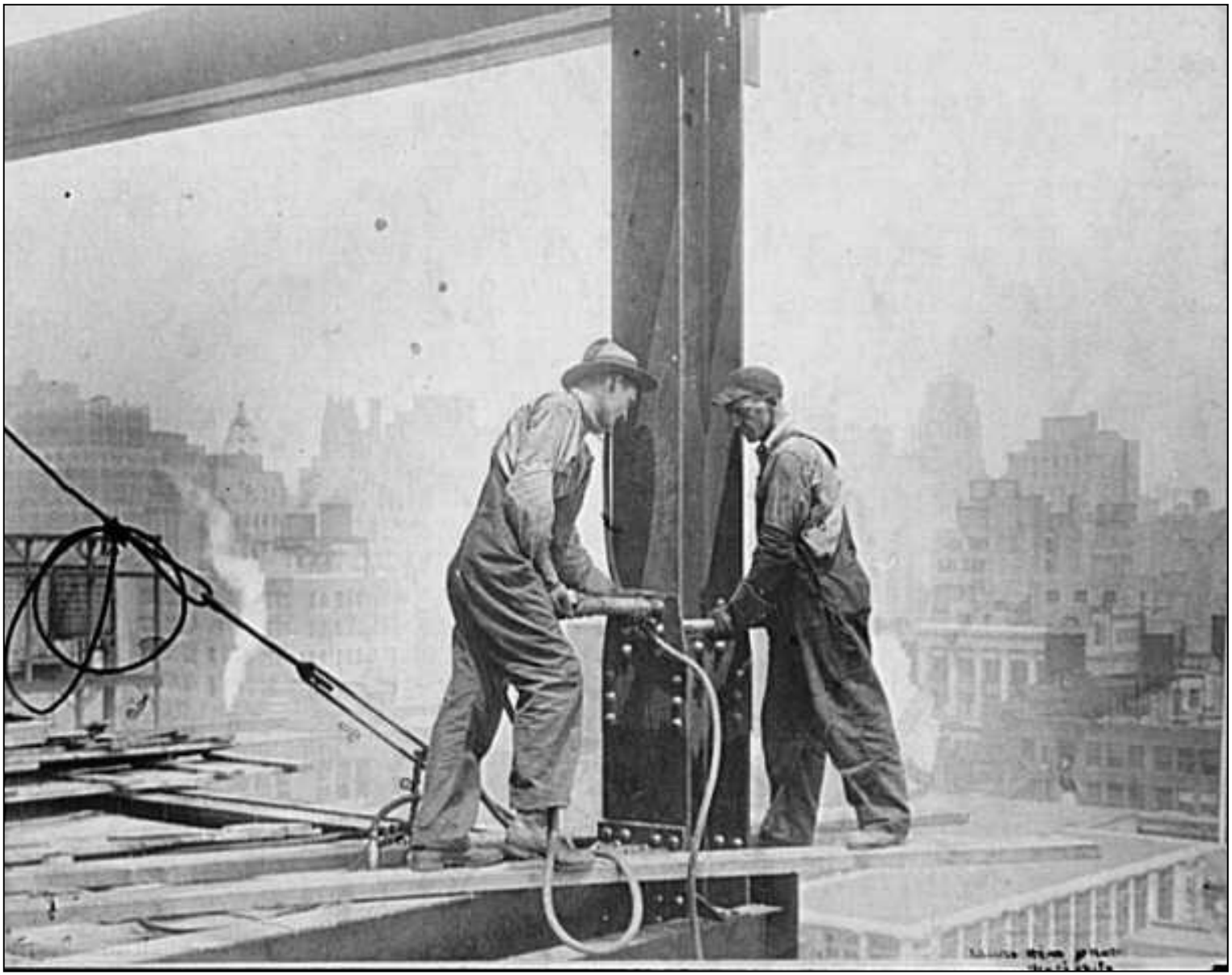


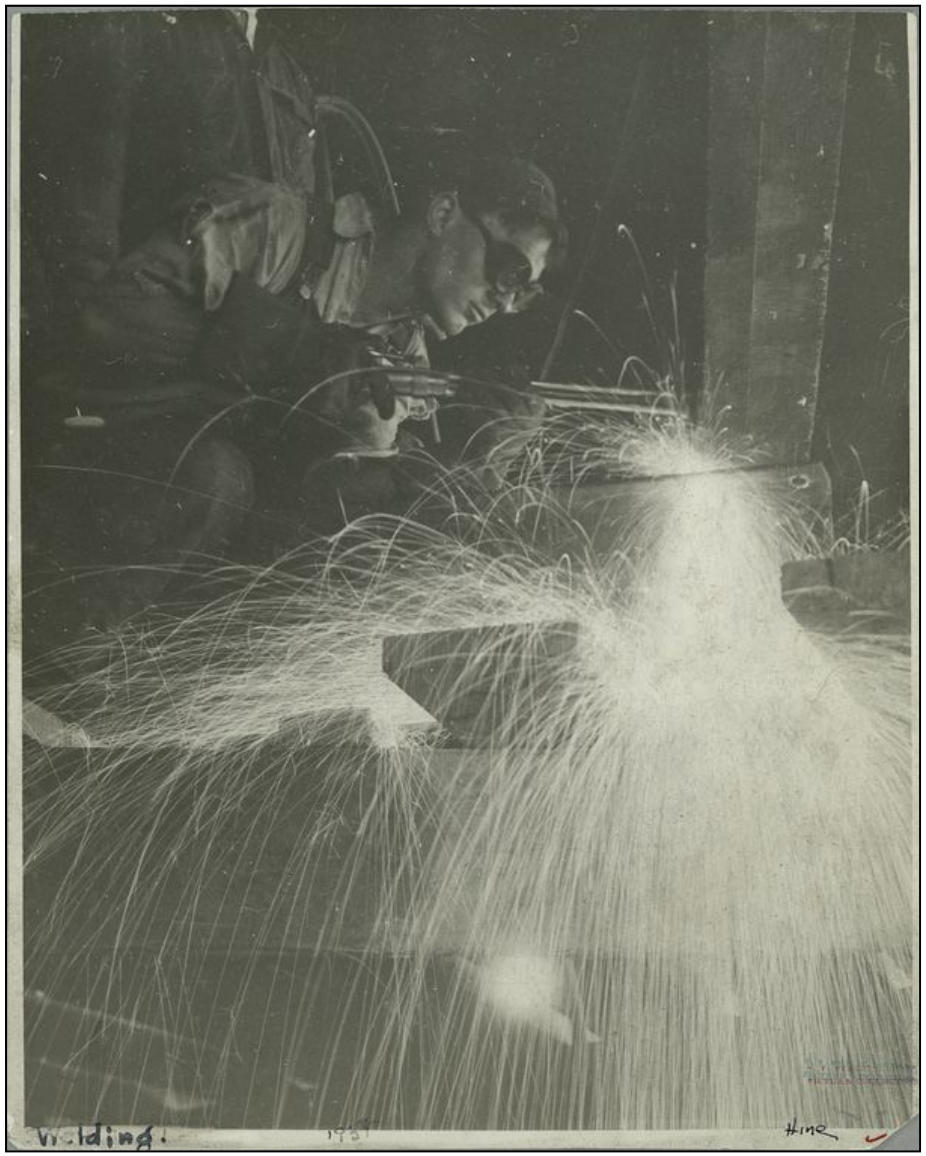
The Empire State building was built in 1930.

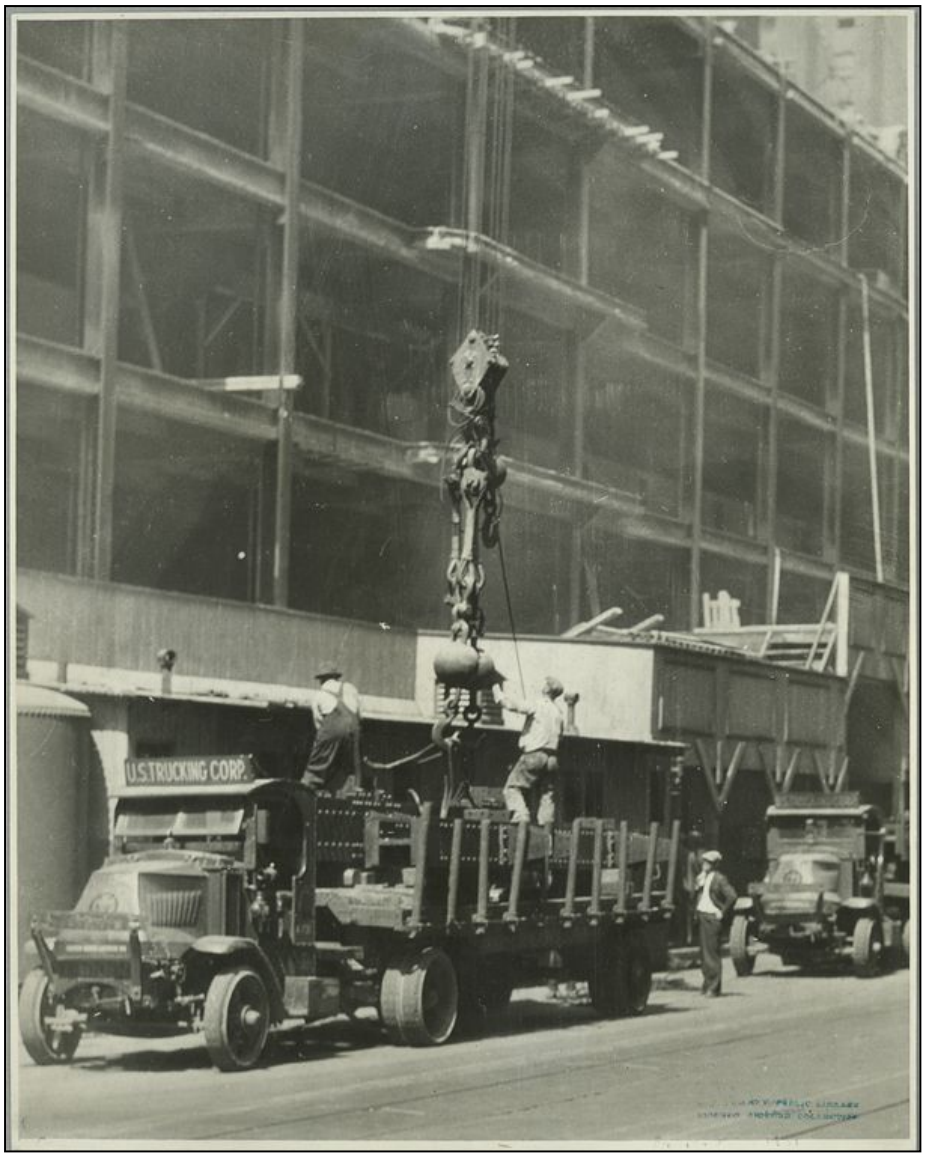

LAST

“Fall protection?”

Lunch Time, time to unwind and stress-relieve.




Welding.


U.S.TRUCKING CORP.

Fall Protection is…

Defined as the methods used to minimize injury and the associated costs, both human and monetary, due to falls.

Refers to the overall industry and process of protecting workers at height.

Bureau of Labor Statistics

According to the Bureau of Labor Statistics, out of the 4,836 fatal on-the-job injuries that occurred in 2015, 800 were attributed to falls, slips and trips.

WHO FALLS?

Fall victims ranged in age from 18 to 72 years old. Most of the accidents, however, were to workers between the ages of 20 and 39.

Falls resulted primarily from slippery surfaces, trips or a loss of balance.

The length of service did not appear to be a significant factor, however training did.

The average lost time due to a fall is 60 days.

50% of all victims fall from ladders and scaffolds.

WHO FALLS?

- 53% of the falls occurred a distance of 10 feet or less.
- Most victims were not using fall protection.
- More accidents occur in the morning than any other time of day.
- Falls are the leading causes of fatalities and catastrophes investigated by OSHA

Fall Fatalities by Length of Employment

Less than 6 months	40%
7 – 12 months	10%
1 – 3 Years	15%
3 – 5 Years	9%
5 – 10 Years	9%
More than 10 Years	12%
Unknown	5%

Source: NIOSH, November 2000

Fatal Falls Availability and Use of PPE

By PPE Status	Percentage
Not Available	19.8%
Wearing, Not Used	17.6%
Available, Not Worn	16.5%
Using Incorrectly	13.2%
PPE Not Applicable	9.9%
PPE Failed	2.2%

Source NIOSH

The Fall

How long does it take to fall?

Height	*Time*
4 ft.	0.5 seconds
16 ft.	1.0 seconds
36 ft.	1.5 seconds
64 ft.	2.0 seconds
100 ft.	2.5 seconds
144 ft.	3.0 seconds
256 ft.	4.0 seconds

Why would people have the equipment on and not use it?

Risk Taking

Too cool to use it

Lack of training

Equipment selected was not appropriate

Poor supervision

Poor enforcement of use

Standards and Legislation

- Standards
  - ANSI (American National Standards Institute)
    - Voluntary compliance board that sets standards for the manufacture of equipment
      - ANSI does not regulate or enforce any laws or regulations.
    - Z359-2007
    - Z359.1-2009 (effective November 2009) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
  - CSA (Canadian Standards Association)
- Legislation
  - OSHA
    - Sets the minimum regulations for fall protection
      - 1926, subpart M (construction)
      - 1910, subpart D & F (general industry)

OSHA 1926 Subpart M (Basics)

Six Foot Rule

Non-Locking Snaps

Body Belts

Anchorage points

- 5000 lbs.
- 3600 lbs. with shock absorber devise
- Must maintain a safety factor of 2:1

Subpart M – The Basics continued

Harnesses

- Maximum Arresting Force – 1800 lbs.

Lanyards

- Maximum Deceleration Distance – 3.5 feet

Rescue

- Prompt rescue shall be provided for employees who have fallen

Inspection

- Personal fall arrest systems shall be inspected prior to each use

Positioning Devices

- 2 foot maximum free fall distance

Anchorage Strength

Fall Arrest

- 5000 lbs. without certification
- 3600 lbs. with certification of a qualified person
- Must be independent of any anchorage used to support or suspend platforms (must support 5000 lbs. per user)

Fall Restraint

- 3000 lbs. in the direction of the restraint

Positioning

- 3000 lbs. or 2X the potential impact load (whichever is greater)

Rescue

- 2500 lbs. in the direction of the rescue

The Basics of Fall Protection

Fall Protection

Fall Prevention

Fall Restraint

Fall Arrest

Rescue

Fall Protection

Refers to the overall industry and process of protecting workers at height.

Fall Prevention

Refers to the systems and techniques that eliminate the possibility of a fall to a lower level

Engineer out or modify the work plan to eliminate the hazard

- Guard Rails
- Netting
- Warning Lines
- Controlled Access Zones

Fall Restraint

Use some type of device to restrain the worker so that he cannot get beyond the edge where a potential for a fall exists

- Harness with a predetermined lanyard length
- Harness with a rope grab

Fall Arrest

System that protects the worker after a fall from hitting the ground and/or obstructions below the work platform

- Personal Fall Arrest Systems
  - Harness with a lanyard
  - Harness with a retractable
- Passive Fall Arrest Systems
  - Safety Nets

Rescue

Rescue is specific to each situation

A plan should be in place prior to performing the work

4 Parts of a Fall Arrest Plan

1. Body Support
2. Connector
3. Anchorage
4. Rescue and Retrieval

Body Support

Harness

- Single D-Ring
- Construction Style
- Electrical

Belt

- Positioning

Harnesses

Single-D Harness

Construction Harness

Construction Strata Harness

Harnesses continued

Construction Harness with Front D-Ring

Connectors

Lanyards
- Single Leg Style
- 100% Double Leg Style
- Tie Back Style

Carabiners

Self-Retracting Lifelines & Personal SRLs
- Cable
- Web

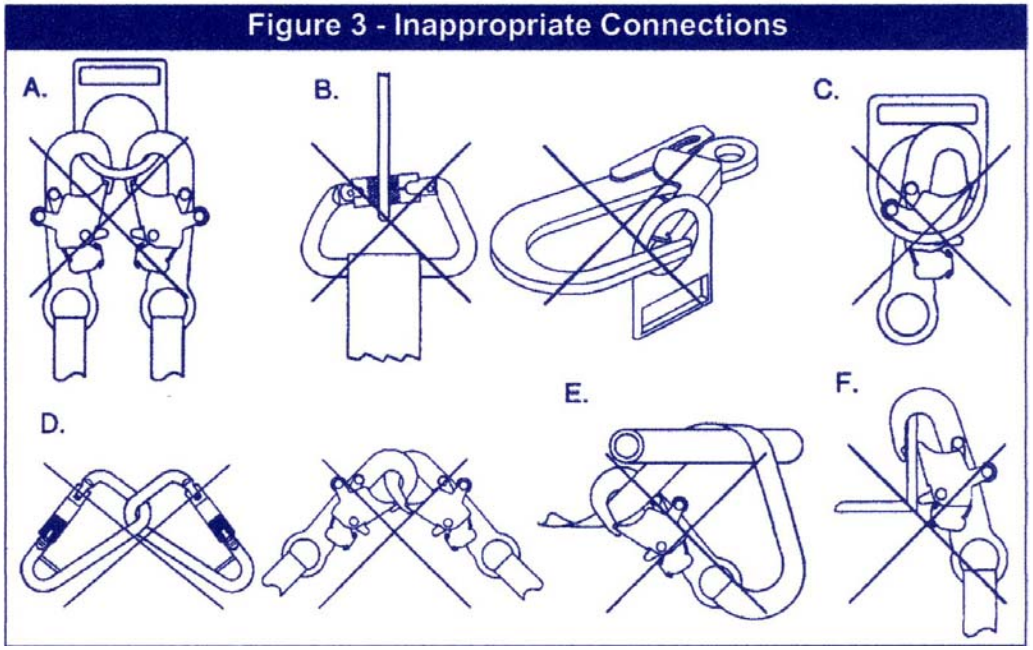
Rope Grabs

Ladder Climbing Systems

Inappropriate Connections

NOTE:

Large throat opening snap hooks should not be connected to standard size D-rings or similar objects which will result in a load on the gate if the hook or D-ring twists or rotates. Large throat snap hooks are designed for use on fixed structural elements such as rebar or cross members that are not shaped in a way that can capture the gate of the hook.



Compatibility

- Scaffold choker secured to web in dorsal area
  - Acceptable, choke off to web that crosses at dorsal d ring area (steel d ring only)
- Scaffold choker to d ring
  - Acceptable, but no snap hook can be attached
    - OK for carabiners

Compatibility

- Scaffold chokers (2 ea.) choked off to d ring
  - Acceptable
- Scaffold choker chocked off to bar on d ring
  - Acceptable, and allows 3600 lb. gated hook and carabiner to attach to d ring (steel d ring only)

DBI SALA® PROTECTA® uniline® capital SAFETY

Compatibility

- Two hooks to one d ring (or two carabiners to one d ring)
  - Not acceptable
  - Reference ANSI/ OSHA / CSA standard

Compatibility

- Snap hook or carabiner to web or cable loop
  - Not acceptable
- Snap hook to d ring occupied by choker lanyard
  - Not acceptable for snap hooks
  - OK for carabiners

Compatibility

- Snap hook to snap hook (or carabiner to carabiner)
  - Not acceptable
- Rebar hooks (large opening snap hooks) to standard d rings
  - Acceptable if hook is 3600 lb. gated

DBI SALA PROTECTA uniline capital SAFETY

Compatibility

- Rebar hooks to HLL cable
  - Acceptable if HLL is tensioned and hook is 3600 lb. gated
- Tie off adapter in basket configuration
  - Not acceptable, one hook into two d rings

Compatibility

- AJ408 series
  - Not acceptable application (wrap around with snap into O-ring, second snap into O-Ring
  - Acceptable application, using unit as drop down extension piece

Lanyards – Positioning Devices

Chain Rebar Assembly

Adjustable Web
Positioning Lanyard

Lanyards

100% Shockwave Lanyard

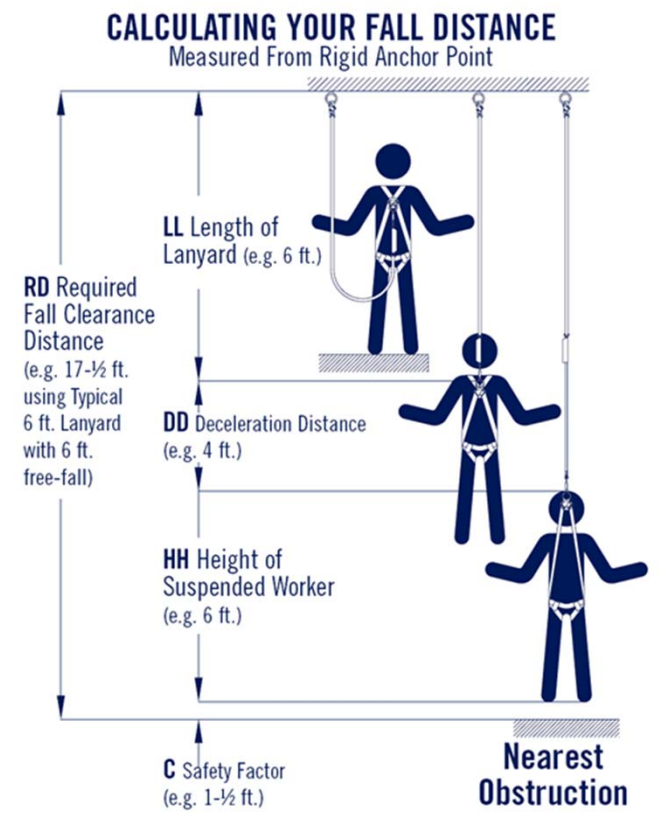
WrapBax2 Tie-Back Lanyard

Force2 Lanyard

Lanyards

Fall Clearance Distances

Know your clearance distances



RD = LL + DD + HH + C

1) Add 1 ft. to **DD** for free-fall over 6 ft. up to 12 ft. or for person over 310 lbs. up to 420 lbs. with 6 ft. max. free-fall for ANSI & OSHA compliant lanyards.
2) Add 1.7 ft. to **DD** for Canadian CSA Z259.11-05 (E6) compliant lanyard.
3) D-ring slide and harness stretch factors are built into **HH** and **C**.
4) **DD** shown in e.g. assumes maximum allowable amounts.
5) See User Instruction Manual for additional information.

Self-Retracting Lifelines

Self-Retracting Lifelines

Rebel 11’ Web Retractable

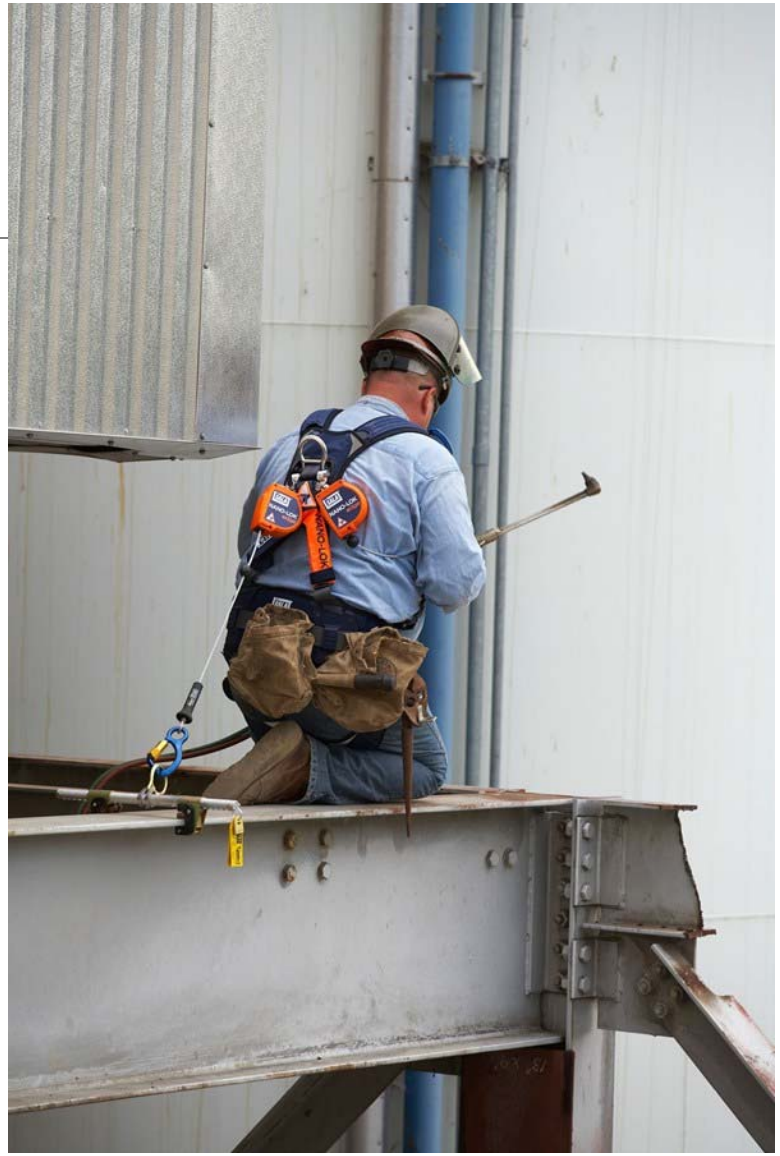
Single Talon Retractable

Dual Talon Retractable

Self-Retracting Lifelines

Nano-Lok – Personal SRLs

Nano-Lok Edge SRL



Retractables

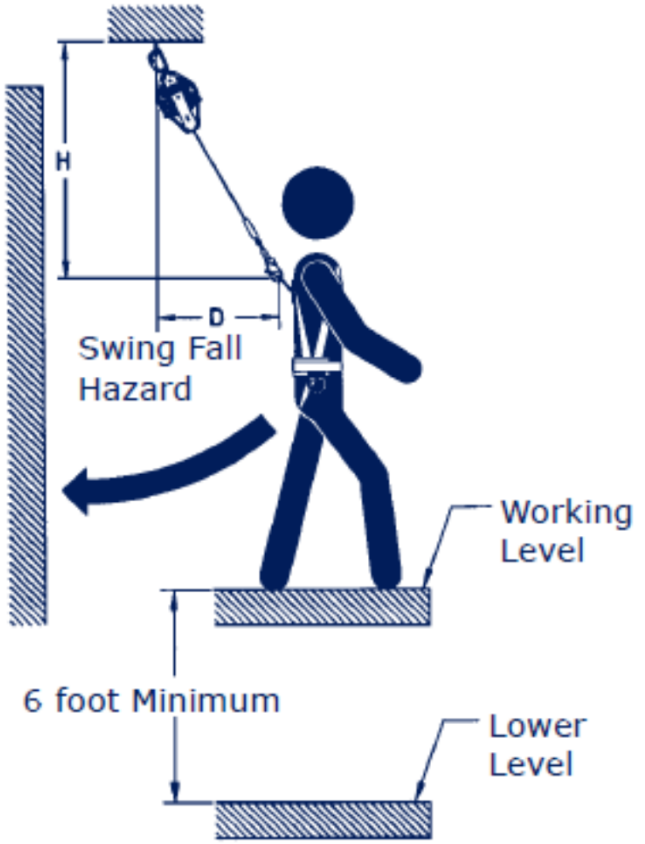
Web Retractable

Cable Retractable

Sealed Cable Retractable

Retractable Swing Fall

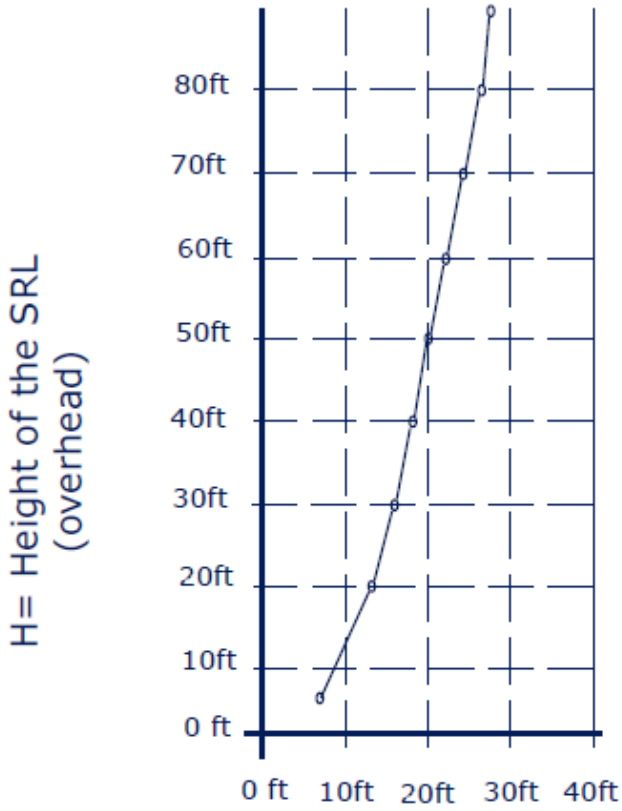
Figure 8 - Swing Fall



NOTE: The 6 foot minimum assumes the fall occurs from a standing position and the SRL is located overhead. If the worker is kneeling or crouching near an edge when the fall occurs, and additional 3 foot clearance is needed. If the worker is not directly below the SRL, additional clearance is needed.

Retractable Swing Fall

Chart 1
Working Distance From Anchorage



D= Distance person can move (horizontally)

Example: If the worker is 40 feet directly below the SRL, the recommended work zone is 18 feet in any direction.

Rope Grabs

Anchorage

Anchorage Verification

Tie-Off Straps

D-Ring Anchorage Plates

Concrete Anchors

Beam Gliders

Fixed Beam Anchors

Pipe Hooks

Roof Anchors

Roof Stanchions

Girder Grips

Trolleys

Anchorage Verification

Anchorage Equipment

Tie-Off Strap

D-Ring Anchorage Plate

Steel Plate Anchor

Concrete D-Ring Anchor

Concrete Anchor

Anchorage Equipment

Rope Termination Anchor

Cable Tie-Off

Concrete Column Anchor

Girder Grip

Anchorage Equipment

Concrete Column Strap

Fixed Beam Anchor

Beam Glider

Carabiner Hooks

Anchorage Equipment

Drop-in Ceiling Anchor

Concrete Detent Anchors

Anchorage Equipment

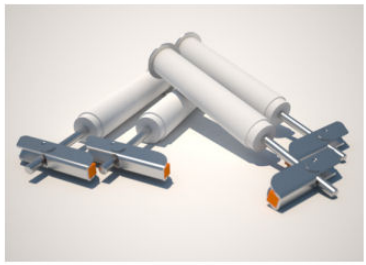
Door Jam Anchor

Anchorage Equipment

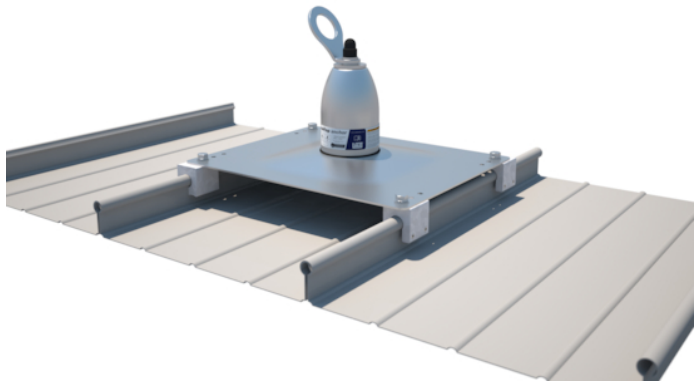
Parapet Anchor

Anchorage Equipment

Permanent Roof Anchor



Permanent Roof Anchor
(membrane roof)



Permanent Roof Anchor
(standing seam)

Anchorage Equipment

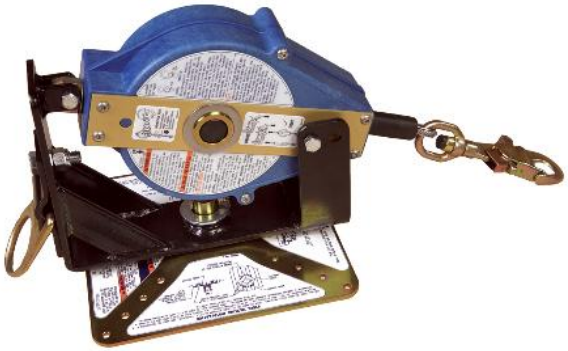
Chain Roof Anchor

Temporary Roof Anchor

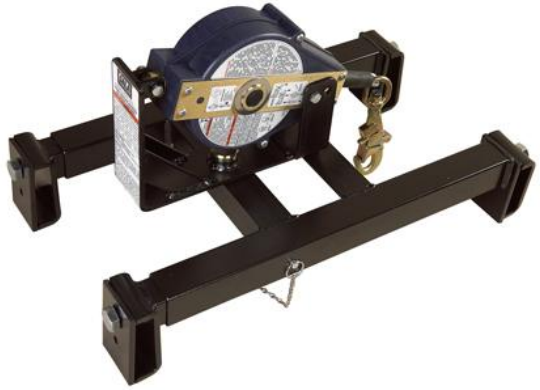
Retractable Roof Anchor

Permanent Roof Anchors

Anchorage Equipment



Swivel Deck Anchor



Standing Seam Anchor

Standing Seam Single Anchors

Anchorage Equipment

Precast Swivel Deck Anchor

Concrete Column Anchor

Anchorage Equipment

Stinger Cart – 1 person in Fall Arrest, 1 in Restraint

Anchorage Equipment

Life Point Duo Anchor – 1 person in Fall Arrest, 1 in Restraint

Roof Anchor

Tri-Rex Cat – 3 people in Fall Arrest, 2 in Restraint

Horizontal Lifelines

Specialty Anchorage Device (Engineered)

- Horizontal Cables
- Horizontal Synthetic Rope

Horizontal Lifelines

Horizontal Lifelines

Horizontal Lifelines

Steel Beam Stanchion

Concrete Beam Stanchion

Steel Beam Stanchion

Horizontal Lifelines

Pour In Place Concrete Stanchion

Horizontal Lifelines

Synthetic Rope System

Self-Contained Steel Cable System

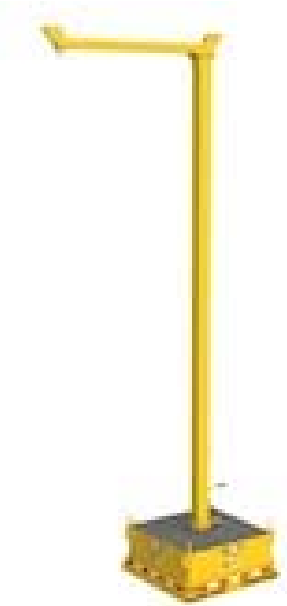
Steel Cable System

Portable Horizontal Rail System

Portable Horizontal Rail System

Portable Horizontal Rail System

Portable Anchorage Point for Loading – Safe Rig



Exosphere Mobile Anchor


4002

Nets

Vertical Debris Nets

Perimeter Debris Net Systems

Personnel Nets (adjustable)

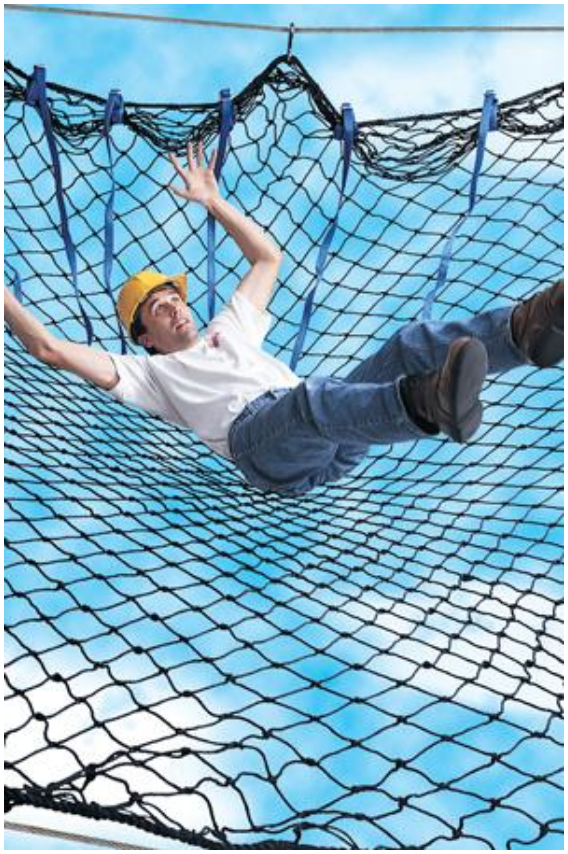
Nets

Vertical Debris Nets

Perimeter Debris Nets

Nets

Nets



Personnel Nets

Dropped and Falling Objects

Objects falling from heights are now the 4th leading cause of workplace fatalities.

553 FATALITIES IN THE US IN 2016

FROM BEING STRUCK BY AN OBJECT OR EQUIPMENT

*BUREAU OF LABOR STATISTICS

255 WERE CAUSED BY A FALLING OBJECT

EQUIPMENT STANDARDS

- ANSI/ISEA 121
  - Standard for Dropped Objects Prevention Solutions
  - Includes active controls
    - Anchor attachments
    - Tool attachments
    - Tool lanyards
    - Containers (buckets, pouches)
  - Does not include Passive Controls (toeboards) or PPE (hard hats, etc.)

ISEA INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION

ANSI American National Standards Institute

XXXV THIRTY-FIVE YEARS OF TENACITY

REGULATIONS

DROPPED OBJECTS

- United States: OSHA
  - Construction Standard 1926
    - Scaffolds: 1926.451(h) – “falling object protection”
    - Fall Protection: 1926.501(c) – "Protection from falling objects"
    - Steel Erection:1926.759(a) – “Securing loose items aloft”
  - General Industry Standard 1910
    - Walking Working Surfaces: 1910.23 – Climbing with equipment safely
    - Walking Working Surfaces: 1910.28 – “protection for employees exposed to fall and falling objects hazards”
  - General Duty Clause

*USA Department of Labor – www.osha.gov

THIRTY-FIVE YEARS OF TENACITY

COSTS

DAMAGE

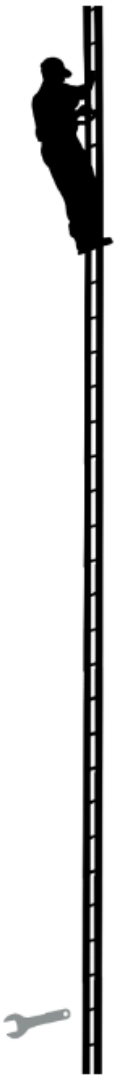
Dropped objects can cause damage to…

- The Dropped Item Itself
- An Object Below
- The Structure Being Worked On
- Equipment From Foreign Objects
- The Environment

THIRTY-FIVE YEARS OF TENACITY

COSTS

LOST PRODUCTIVITY



- Lost productivity can result from…
  - Work stoppage to investigate a near miss.
  - Descending back down and climbing back up.

THIRTY-FIVE YEARS OF TENACITY

Tool Lanyards – Fall Protection for Dropped Objects

ENGINEERING CONTROLS

ACTIVE SOLUTIONS: THE 3 T'S OF O@H SAFETY

- Trapped
  - Creates an attachment point on anchors & tools that do not have one built in.
- Tethered
  - Prevents object from falling by securing to a worker or other anchor point.
- Topped
  - Cover buckets, pouches, and other containers to avoid spilling their contents.

THE SOLUTION

A COMPLETE TETHERING SYSTEM

ONE STEP TOOL TRAPS

TWO STEP TOOL TRAPS

THIRTY-FIVE YEARS OF TENACITY

SQUIDS® TOOL ATTACHMENTS

HAND TOOL TRAPS™ - SLIPS™

» 3740 Tool Slips

THIRTY-FIVE YEARS OF TENACITY

SQUIDS® TOOL ATTACHMENTS

POWER TOOL TRAPS® - BRACKETS

3796
Drill/Driver Bracket

3797
Grinder Bracket

3798
Pneumatic Bracket

XXXV
THIRTY-FIVE YEARS OF TENACITY

TETHERED

- Tool Lanyards
  - Know the type of lanyard needed to do the job.

Shock Absorbing Tool Lanyards

Falls – By the Numbers

All Falls

- US DOL – Falls are the leading cause of Occupational Death
- 35% of Total Deaths in Construction
- Typically 700-800 fall fatalities a year

Falls from Ladders

- **2,000** – number of people that go to the hospital every day due to a ladder related incident
- **100** – number of workers that are long term or permanently disabled every day from a ladder related incident
- **1** – number of people that die every day from a ladder related accident
- **724,000** ladder related injuries per year
- **350** fatalities per year

Safety Ladder Extension

SOLUTION TO:

HANDLING INJURIES

CARRYING HEAVY EQUIPMENT

Strains and Sprains

Handling injuries to the neck, back, shoulders, and legs account for the majority of ladder-related incidents and commonly carry an average total cost of at least $75,000 in lost time, medical, and workers compensation expenses. These injuries occur when operators carry, lift, or load and unload heavy traditional ladders.

Wheels on a Ladder?

Little Giant Ladders make several fiberglass multi-use stepladders with a very compact storage size, which removes the need to transport the ladder on an overhead truck or van rack, eliminating the risk of strains of sprains while loading and unloading. Tip & Glide Wheels remove the need to carry the ladder from place to place, reducing the incidence of handling injuries.

Complying with 3 Points of Contact

OSHA requires operators to maintain three points of contact with a ladder while ascending and descending. Many safety professionals take it a step farther to require operators to maintain three points of contact, use fall protection, or work in a guardrail-enclosed platform or scaffold while working at height. In many cases, operators find it difficult and even impossible to comply with these rules and keep production going at an efficient rate.

Aerial Safety Cage Meets the Standard

The Aerial Safety Cage's guardrail system and large, stable working area prevent over-reaching and allow operators to work in full compliance without a fall protection system. The Cage's mobility and adjustability also make it quick and easy to move and adapt to each new task, and to do it safely. The Cage is a much faster, more efficient, and cost-effective solution than a powered lift or scaffold system.

SOLUTION TO:

FACING YOUR WORK

ON A STEPLADDER

Twisting and Straddling on a Stepladder

By nature of their design, traditional stepladders take you farther from your work the higher you climb them. To counteract this effect, most operators turn the stepladder sideways to get close to their work surface. Although this gets the operator closer, it also can result in the operator twisting his body or straddling the ladder unsafely. In many cases, this practice results in the operator accidentally pushing the ladder away from the work surface, destabilizing the ladder, which can result in a serious fall.

Face Your Work

The Little Giant Select Step is one of several Little Giant safety products that allows the operator to use the ladder in the 90-degree position, which allows the operator to face the work surface with his feet on a solid rung and to apply force from a much more stable foundation.

Ladders and Uneven Ground Don't Mix

Few job sites are perfectly level. To save time, operators often improvise unapproved leveling methods like bricks, boards, or rocks that are inherently unstable and unsafe. And even very slightly uneven ground can be very dangerous. On an ordinary 28-foot ladder, 1-inch out of level at the base puts you 19 inches off center at the top, putting the operator completely outside the footprint of the ladder. Even if he doesn't over-reach (which he will probably do), it takes very little force to destabilize the ladder when you're that far off center. This kind of situation often leads to the most catastrophic

Adjust the Ladder to Nearly Any Surface

Auto-leveling outriggers on each side provide the Little Giant SumoStance extension ladder with a full 9" of vertical adjustment in 1/8 inch increments for use on sloping or uneven ground. Built-in bubble levels help operators keep the rungs level and the ladder at the proper lean angle. Patented Sumo Stance outriggers double the ladder's base width, increasing side-tip stability by over 600%.

Over-Reaching Causes the Worst Falls

Over-reaching is an all-too common problem with any kind of ladder—stepladder, extension, or multi-use. It is human nature to overreach rather than climb down and reset the ladder. Even a mild overreach can easily shift the operator's weight outside an ordinary ladder's center of gravity. Once the operator is outside the center of gravity, it takes very little for the ladder to destabilize, causing the operator and the ladder to fall. These falls, especially falls from extension ladders, are the leading cause of ladder-related fatalities.

Train and Protect Operators

Training operators not to over-reach is important, but in reality, in most cases human nature will take over and operators will over-reach. The Little Giant SumoStance features leveling outriggers that double the base footprint of the ladder so the operator cannot feasibly reach outside the ladder's base footprint. Load testing has shown that the SumoStance outriggers increase the ladder's side-tip stability up to 600 percent.

Adjustable Stairways

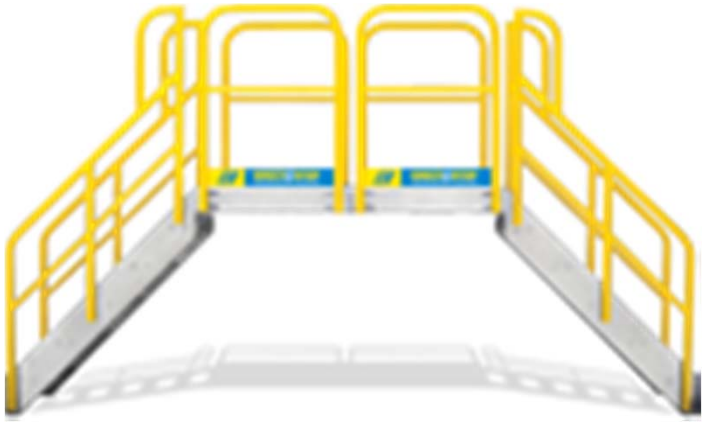
Adjustable Stairways

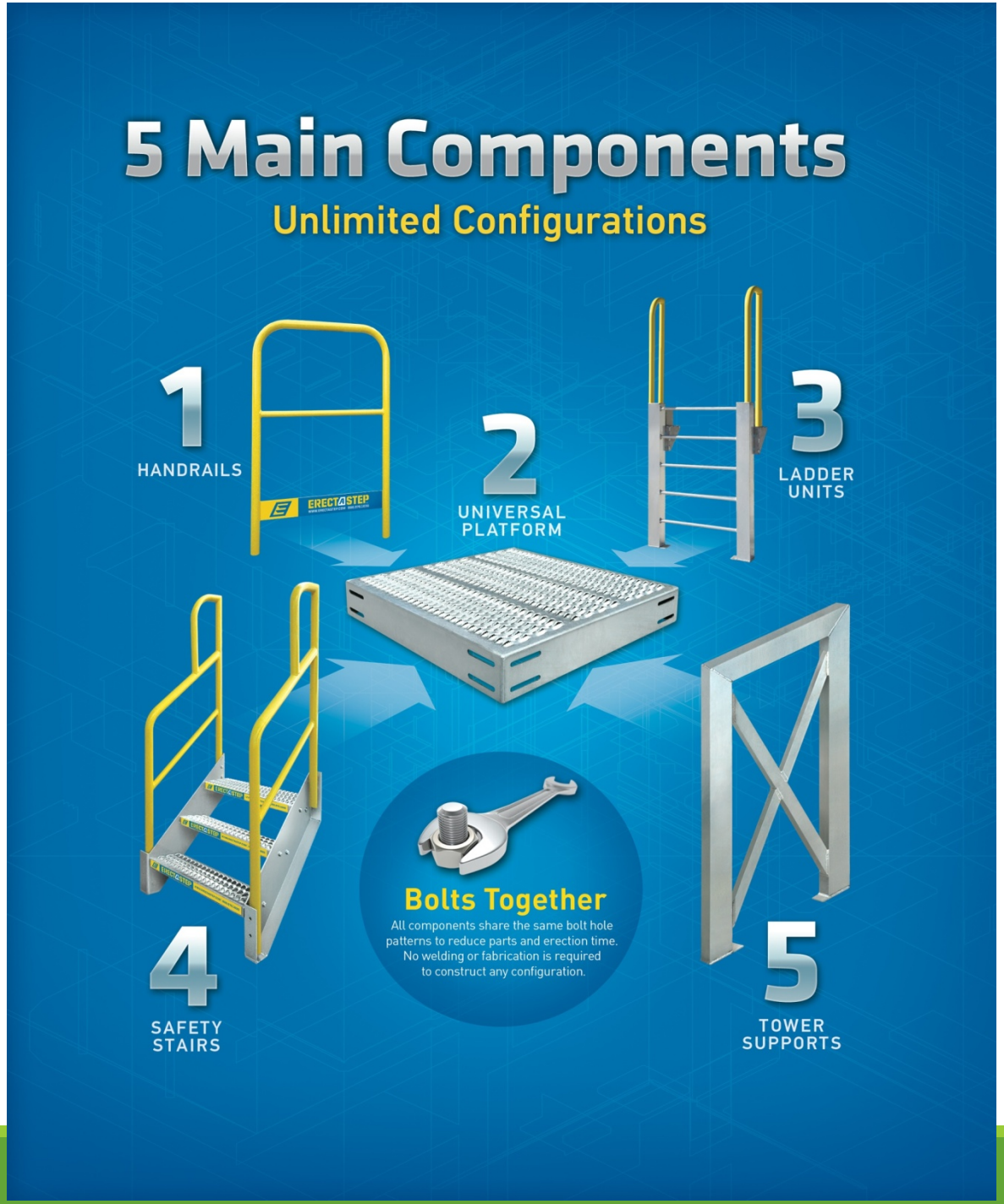
Temporary Access Stair System

Modular Platforms & Stairs

Modular Platforms & Stairs

Modular Platforms & Stairs




5 Main Components
Unlimited Configurations
1
HANDRAILS
2
UNIVERSAL PLATFORM
3
LADDER UNITS
4
SAFETY STAIRS
5
TOWER SUPPORTS
Bolts Together
All components share the same bolt hole patterns to reduce parts and erection time. No welding or fabrication is required to construct any configuration.

Guard Rails – Temporary Systems

Guard Rails

Safety Boot

Safety Boot - SurShield

Safety Boot - SurShield

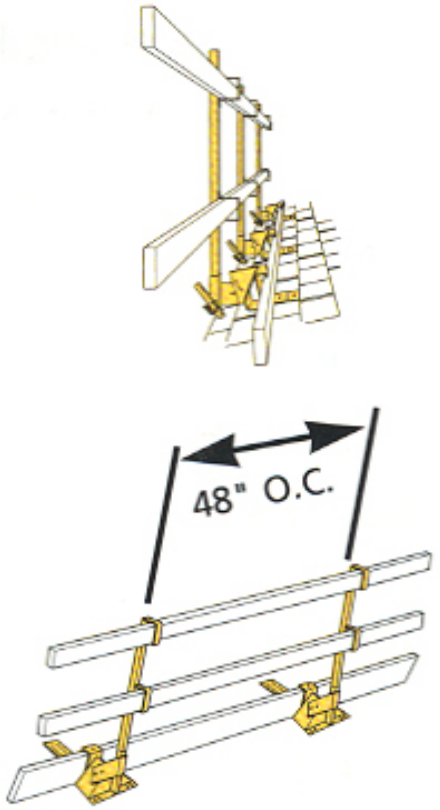
Guard Rails

Safety Boot – VersaShield

Safety Boot - VersaShield

Guard Rails

Slab Grabber Guard Rail



Roof Guard Rail

Rescue and Retrieval

Self-Retracting Lifeline with Retrieval

RPD (Rescue Positioning Device)

Rollgliss (Controlled Descent Device)

Rescue and Retrieval

RPD System

Rollgliss R520 for Controlled Descent

Self Rescue System

Suspension Trauma

How long Do you have before trauma begins?

- OSHA Says “Research indicates that suspension in a fall arrest device can result in unconsciousness, followed by death, in less than 30 minutes”

- If your in vertical position and your legs are perfectly still, then you can start feeling the first signs of shock in as little as three minutes. The average is between five and twenty minutes.

What is it?

Suspension Trauma

(Harness-induced Pathology)

(Orthostatic Intolerance)

The accumulation of blood in the legs due to the force of gravity.

Inspection

Inspect all fall protection equipment prior to use

A competent person should inspect the equipment on a regular basis

If equipment shows any sign of damage or unsafe condition, it must be immediately retired

Follow all manufacturer's directions for inspection, care and maintenance

Keep all inspection and maintenance records in a log book

Store fall protection in a cool, dry and clean environment

I-Safe Tracking System

isafe™
Powered by Pervidi™

Inspection continued

Harnesses

- Check the Following:
  - D-Rings
  - Back Pads
  - Buckles
  - Keepers
  - Webbing
  - Stitch Patterns
  - Labels

Lanyards

- Check the Following:
  - Webbing
  - Stitch Patterns
  - Snap Hooks
  - Shock Absorbers

Snap Hooks and Carabiners

- Check the Following:
  - Hook
  - Gates
  - Corrosion

Inspection continued

Self-Retracting Lifelines

- Check the Following:
  - Cable
  - Cable Locking Mechanism
  - Hook
  - Housing
  - Load Indicator
  - Labels

Always inspect all of your equipment prior to each use.