Oregon OSHA

www.orosha.org

ADSC

The International Association of Foundation Drilling

WEST COAST CHAPTER

Dedicated Drill Rigs and Mobile Cranes

Richard Marshall, CHST

Director of Safety

ADSC: The International Association of Foundation Drilling

ADSC & OSHA

The ADSC has a long history of working with OSHA in keeping the deep foundation industry a safe environment for employees to work in.

As far back as 1998, the ADSC began to take a pro-active stance to better define drill rig hoisting procedures and the inherent dangers associated with them.

ADSC & OSHA

As an association, the ADSC membership working with drill rig manufacturers, created informational procedures and warning labels describing to the user of a dedicated drill rig of the hazards associated with hoisting loads.

To this day, warnings regarding the use of a dedicated drill rigs for hoisting are found in almost every manufacturer's operator manual – giving the operator detailed instruction regarding the extremely limited ability for hoisting by the respective equipment.

ADSC & OSHA

- In November 2003, members of the ADSC were graciously invited to speak at a C-DAC (The Cranes and Derricks Negotiated Rulemaking Committee) meeting. We made a presentation asking to have dedicated drilling rigs excluded from Subpart CC requirements.

- We explained the very limited hoisting capacity of the equipment, the extremely limited working radius of a suspended load, and the limited hoisting capacities listed in what most refer to as a “load chart”.

ADSC & OSHA

- We asked the C-DAC panel to think about the ramifications of defining this type of construction equipment as a crane. If included, the standard, it would give “license” to the operator to use the equipment in a manner it was not intended to perform.
- Our fear would be that employers will use the equipment to offload material from a trailer for example, and thus create the high potential for an accident - resulting from improper use of the equipment.
- Additionally, this would require manufacturers to design and retrofit existing equipment, and then design future equipment to comply with the subpart CC crane requirements – a significant financial burden on the manufacturers and the end user.

Types of Dedicated Drill Rigs

Carrier Mount

- Drill unit is mounted on a commercial type truck frame
- Numerous sizes and capacities
- Ability to travel on most roadways
- Drill is self contained, independent of the carrier
- This drill rig has limited lifting capacity using its auxiliary hoist line

This equipment is *not* a crane

Types of Dedicated Drill Rigs

Crawler Track Mount

- **Unit is on a crawler-based frame**
- **Numerous sizes and capacities**
- **Drill is self contained, independent of the carrier**
- **This drill rig has limited lifting capacity when using its auxiliary hoist line**

- **This equipment is *not* a crane**

Types of Drill Rigs

Crane Mount

- **Drill attachment is mounted to the crane base, and suspended from the boom tip**
- **Operator use crane hoist lines to raise and lower kelly**
- **Used for large diameter and deep shafts**
- **Crane has limited lifting capacity due to existing suspended weight of drill, kelly, and tool.**

This *is* a crane with a drill attachment

“Dedicated Drill Rig”

Dedicated Drill Rig Configurations

Drilled Shaft Installation

Continuous Flight Auger Installation

Dedicated Drill Rig Configurations

Excavator Based

Small Diameter Carrier Mount

Dedicated Drill Rig Configurations

Carrier Mount – Old School vs. Modern Technology

Dedicated Drill Rig Configurations

Same Base Machine – Different Configurations = Multi-Purpose

Dedicated Drill Rig Configurations

Jet Grouting Tool

Cutter Soil Mixing Tool

Dedicated Drill Rig Configurations

Casing Driver – allows drilling and advancing casing simultaneously

Dedicated Drill Rig vs. Crane

Most drill rigs have an auxiliary or service winch to assist in the drilling operation. It is used to handle small reinforcing cages, tooling, and some casing, much like a “crane” might do. That said, drill rigs differ from a crane in the following ways:

Dedicated Drill Rig vs. Crane

The function of drill rig's mast is to contain and guide the rotating kelly or drill stem in a vertical position - not to serve as a load positioning or handling system, as does a crane boom.

The mast length is fixed, while a crane boom and / or its working radius can be variable. This function is critical to crane operation, as they are a material handling device.

Dedicated Drill vs. Crane

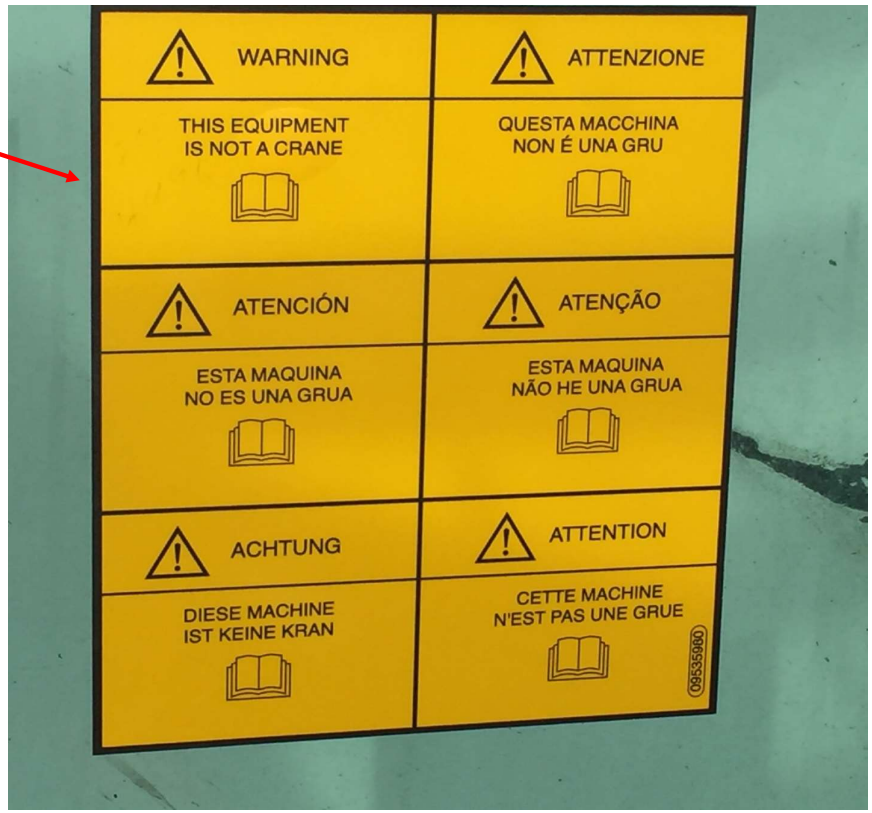
Most drill rig manufacturers have numerous warnings regarding the use of their equipment as a crane, throughout the operator's manual.

⚠ **WARNING!**

This machine is not a crane. This machine has a limited picking zone and capacity.

Casagrande B300 XP

Dedicated Drill Rig vs. Crane



Soilmec SR - 30

Watson EDT-7

Dedicated Drill Rig vs. Crane

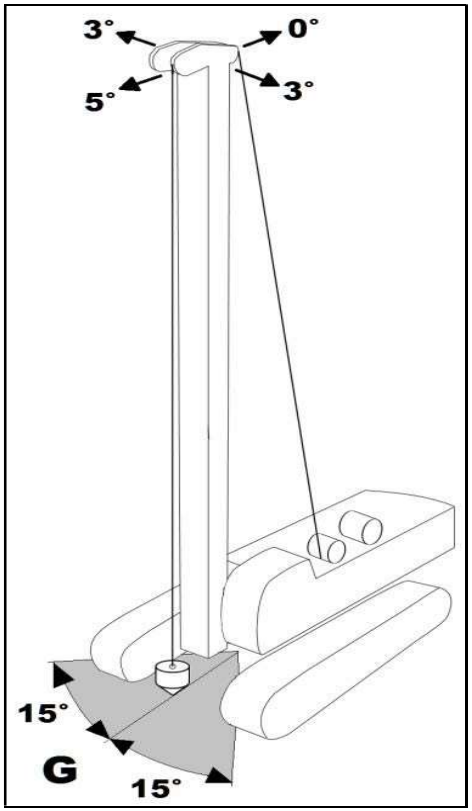
The manufacturer will state restrictions such as:

- Degree of level for the machine
- Mast inclination
- Tracks fully extended
- No travel with suspended load

⚠ **WARNING!**

This machine is not a crane. The auxiliary winch must be used only for lifting, supporting and lowering support equipment for drilling or excavating (tool, casing pipes, rope grab, chisel) and for casting operations (cage, casting pipe).

Casagrande B300 XP

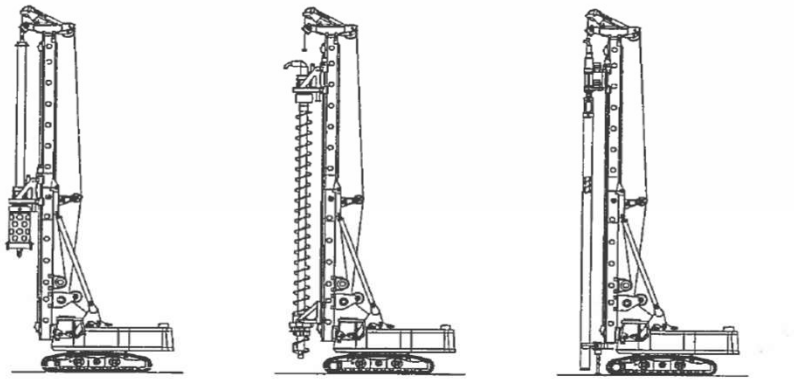


1 DESCRIPTION

The large diameter rotary drilling rig BAUER BG 36 is designed for drilling casings down to 60 m in depth or boreholes of up to 3000 mm in width.

Range of application:

- Drilling with a kelly bar
- Drilling with a continuous flight auger
- Drilling with a dual rotary drive.



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Drilling with kelly bar	Drilling with continuous flight auger (CFA)	Drilling with dual rotary drive (FOW = Front-of-Wall)
Special feature: Suitable for depths down to 53 m	Special feature: Fills the bore hole with concrete while pulling the auger out	Special feature: Can be operated in the direct vicinity of buildings, canals, etc.

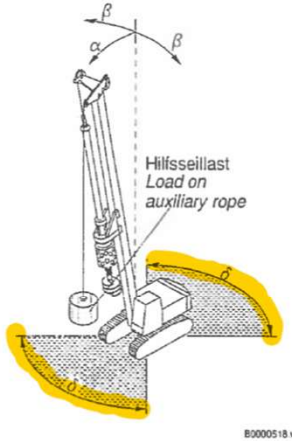
The drilling rig must not be used in other applications than those listed here; using the drilling rig as a lifting crane or a levelling tool e.g. is prohibited.

2.4.2.2 With Mast in Tilted Position

2.4.2.2.1 Auxiliary Rope

The max. load which may be slewed by $\delta = 80°$ (see shaded area) is **13.0 tonnes:**

The max. load which may be slewed 360° is **3.5 tonnes:**



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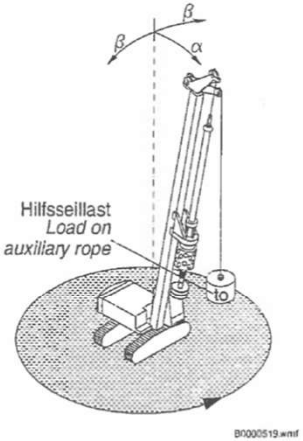

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CONDITIONS:

- Machine on firm level surface.
- Mast angle not exceeding $\alpha < 5°$ forward, $\beta < 4.5°$ sideward from true vertical.

The resulting pressure on the ground is max. 1040 kPa.

SERVICE WINCH SAFETY

The LoDril drilling machine is not a crane. It has a limited picking zone and capacity, and can tip over if limits are exceeded. Operate with extreme care.

There are factors to consider when using a service winch with your specific excavator. These factors include:

- **Ground contact area of the tracks**
- **Load capacities based on the "center of gravity"**

When preparing to perform a "pick" on a tool there are also several factors to consider. These factors include:

1) How stable is the ground surface?

Soft or unstable ground may become depressed and may cause a tipping effect to the machine. This will offset the center of gravity unexpectedly. Never pick a tool while the excavator is on soft or unstable ground, surfaces or platforms.

2) How level is the ground surface?

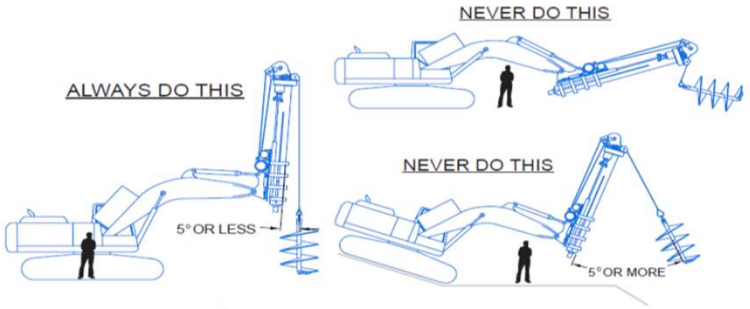
A slope of one or two degrees can have a major effect on pick capabilities, especially if the tool is picked up on the uphill side of the machine, held suspended and then swung to the downhill side. The weight shift of the load is transferred to different areas while in motion. Perform picks only on level ground.

3) Is the tool within my pick zone?

Ensure that the mast is in a near vertical position. The optimum pick area is within a five foot radius of the final service line sheave. When performing an angled pick be aware of the swing factor of the tool. Minimize angle picks as much as possible. Maneuvering the machine over a tool prior to picking is the preferred technique.

4) What condition is my equipment in?

All components utilized in the picking of a tool must be in good condition. Constant and thorough inspection of these items is essential for the safety of all personnel. Frayed cables reduce line pull abilities and increase the chance of mechanical failure. Inspection of the hook is recommended by the manufacturer and required by OSHA. Check and document the hook throat opening when new and at monthly intervals there after. Safety latches must be installed and operable. Cable slings, chokers and bridles must also be inspected for damage and deformities. Proper setting and use of picking equipment must be understood by all riggers.



Service Winch Safety

BAY SHORE SYSTEMS, INC.
14206 N. Ohio St. Rathdrum ID 83858
1-888-569-3745
www.bayshoresystems.com

WARNING

This drilling machine is ***not*** a crane.

The service winch is for drilling tool installation only.

Operate with ***extreme*** caution.

Do not travel with suspended loads.

Several factors are considered when adding a service winch on your specific base machine. These factors are:

- *Horsepower availability*
- *Ground contact area of the tracks*
- *Load capacities based on the "center of gravity."*

The service winch has been added only for the purpose of handling drilling tools at a drilling site. Large, heavy tools will have an effect on the stability of your machine. The operator and crew must be aware of the hoisting capacities of the winch (see manual). When hoisting with the service winch, the weight of the tool is transferred to the ground contact areas of the base machine when it is raised off either the ground or an elevated surface. NEVER MODIFY THE SERVICE WINCH BY MULTI-PARTING THE HOIST LINE IN AN EFFORT TO INCREASE HOISTING CAPACITY.

Thorough considerations must be made by the operator before hoisting up any tool with the service winch.

1) ***Is the ground surface stable?***
Soft or unstable ground, working surfaces or platforms may become depressed and may cause a tipping effect to the machine. This will offset the center of gravity unexpectedly. Never pick a tool while the excavator is on soft or unstable ground, surfaces or platforms.

2) ***Is the ground surface level?***
A slope of any kind can have a major effect on pick capabilities. Especially if the tool is picked up on the uphill side of the machine, held suspended and then swung to the down hill side. The weight shift of the load is transferred to different contact areas while in motion. Perform picks only on level ground.

3) ***Is the object within my pick zone?***
Ensure that the mast is in a vertical position. The pick area is within a five-foot radius of the final service line sheave. When performing an angled pick be aware of the swing factor of the object. Minimize angle picks as much as possible. Maneuvering the machine over a tool prior to picking is the preferred technique.

4) ***Pick the tool up slowly.***
A rapid hoisting movement can cause a sudden instability in the base machine. All hoisting should be performed in a manner so that the operator has complete control of the tools movement. A swinging tool is out of control. The inertia generated also changes the center of gravity of the machine.

5) ***Winch, cable and rigging equipment.***
All components utilized in the hoisting of tools must be in good condition. Constant and thorough inspection of these items is essential for the safety of all personnel. Inspection of the hoisting hook is recommended by the manufacturer and required by OSHA. Check and document the hook throat opening when new and at monthly intervals thereafter. Safety latches must be installed and operable. Cable slings, chokers and bridles must also be inspected for damage and deformities. Frayed cables must not be used under any circumstances and they should be immediately replaced.

Refer to Operators manual for additional information.

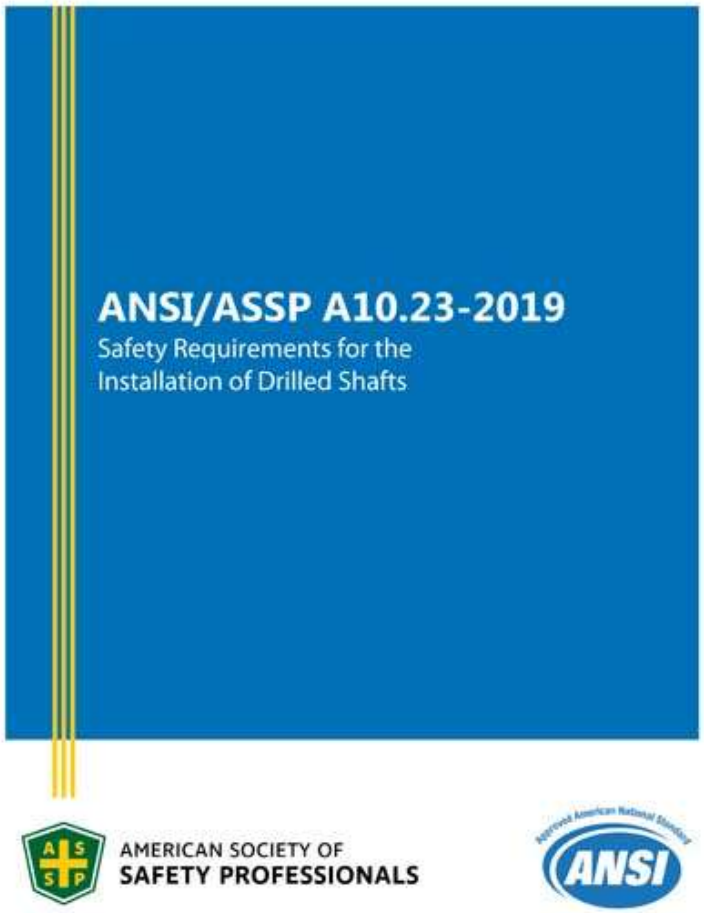
Safety First

Dedicated Drill Rig vs. Crane

Drill rig design does not provide for mast angle positioning which is critical in crane use. In many cases, mast angle is limited to no more than 5 degrees from vertical.

Even at a 5-degree angle from vertical, a drill rig mast is far closer to “vertical” than any typical crane boom will go, thus further limiting its working radius of a suspended load. Many dedicated drill rigs cannot usefully travel with a load suspended from the auxiliary winch line.

Hoisting capacity of auxiliary winch is limited due to winch design and inability to multi-part the line. Supplementary hoisting using the auxiliary winch with a strictly limited working zone, limited hoisting capacity, and the inability to raise and lower the load beyond a finite radius make this type of equipment impractical to use as a “crane”.



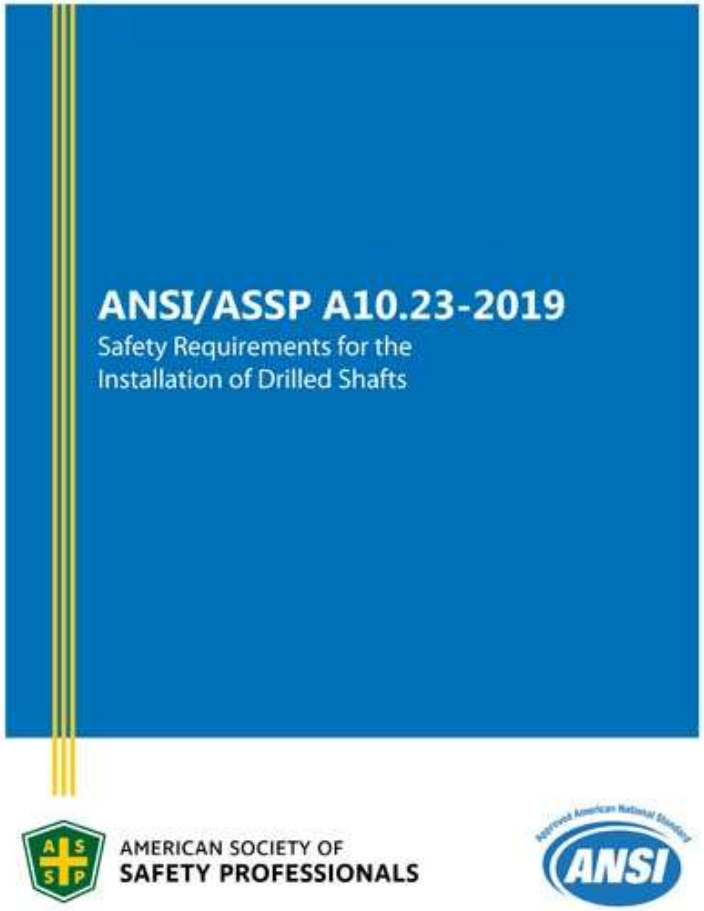
Best Practices

ANSI / ASSP A10.23 – 2019

Safety Requirements for the Installation of Drilled Shafts

This document is the result of a two-year effort of the ADSC Safety Committee. The ten-member sub-committee consisted of seven ADSC members, one member of labor, and two ANSI A10 committee members.

It is specific to our industry and establishes safe working guidelines for those who install drilled shaft foundations.



Best Practices

12. SPECIFIC DRILLED SHAFT INSTALLATION EQUIPMENT REQUIREMENTS

12.1 The drilled shaft installation equipment manufacturer's recommendations for assembly, disassembly, inspection, maintenance and operation shall be followed. Modifications to such equipment shall be subject to the equipment manufacturer's approval.

12.2 The drilled shaft installation equipment shall be inspected at least once every shift prior to operation. Additional equipment inspection and maintenance cycles may be required due to extreme conditions. If conditions warrant, maintenance and inspection cycles should change to a more frequent basis. The inspections shall be documented.

Best Practices

12.11 The use of an auxiliary winch on dedicated, self-contained, hydraulic and/or friction clutch/friction brake drilled shaft installation equipment shall be within the limits established by the equipment manufacturer.

12.12 The use of a multi-part load block to increase the capacity of an auxiliary winch line on a dedicated, self-contained, hydraulic and/or friction clutch /friction brake drill rig is prohibited without written authorization from the equipment manufacturer.

12.13 Determination of safe lifting capacities of auxiliary hoists on mobile cranes used for drilled shaft installations shall include the suspended weight of all drill equipment attachments.

Best Practices

12.19 Drilled shaft equipment operators shall be qualified and authorized by their employers to operate such equipment.

12.20 Operators of crane-mounted drill attachments shall possess a certification administered by an accredited testing organization or qualification by an audited employer program, by the U.S. military or licensed by a government entity to operate a crane.

Best Practices

Assuming the manufacturer allows the use of the auxiliary winch for lifting loads other than tooling, it is strongly recommended that a “lift plan” is created to ensure all employees involved with the lift are aware of the hazards, and limitations of the dedicated drill rig.

Compliance

The 1926.1400(c)(11) exclusion is not a “Get out of Jail, Free” card. There are numerous hazards an employer must protect employees from when a dedicated drill rig is in operation. Some examples are:

- Fall Protection
- Exposure to Pressurized Lines/Hoses
- Housekeeping
- Training
- Rigging
- Confined Space / Emergency Rescue

Compliance

For compliance issues, OSHA should enforce the correct use of the dedicated drill rig's limited lifting capacities, by referencing the operator's manual, and the ANSI A10.23-2019 Safety Requirements for the Installation of Drilled Shafts .

Failure to have the correct manual, not following the manufacturer's recommended procedures, or industry best practices should be citable offences.

Compliance

When equipment is used in construction activities, 29 CFR 1926.20(b)(2) requires construction employers to develop safety and health programs that provide for frequent and regular inspections by competent persons designated by the employee of 1) the job sites, 2) materials, and 3) equipment.

In addition, 29 CFR 1926.21(b)(2) requires construction employers to instruct employees in the recognition and avoidance of unsafe conditions and the regulations applicable in their work environment to control or eliminate hazards or other exposures to prevent illness and injury.

Compliance

If there is an apparent violation regarding the operation of a dedicated drill rig, but an existing OSHA standard does not specifically address it, then the compliance officer should use Section 5(a)(1) a.k.a. the General Duty Clause, as a basis for the citation, and reference the operator's manual and existing best practice documents – but not use Subpart CC.

Several conditions must be met for OSHA to issue a General Duty Clause violation:

- The hazard was recognized.
- The employer failed to keep the workplace free of a hazard to which his or her employees were exposed.
- A feasible and useful method was available to correct the hazard.
- The hazard was causing or likely to cause death or serious injury.

ADSC & Trade Unions

The West Coast Chapter of the ADSC conducts a Drill Rig Operator training school with Operating Engineer Locals in California and Washington.

Federal Register / Vol. 75, No. 152 / Monday, August 9, 2010 / Rules and Regulations

"Proposed paragraph (c)(11) excluded dedicated drilling rigs. This exclusion received substantial attention during the C–DAC negotiations and was discussed at length in the proposed rule (see 73 FR 59730, Oct. 9, 2008).

OSHA requested public comment on issues related to this exclusion. No written comments were submitted but, in testimony at the public hearing, a trade association supported the proposed exclusion. (ID–0341.)

Accordingly, paragraph (c)(11) is promulgated as proposed."

Oregon OSHA

www.orosha.org

ADSC

The International Association of Foundation Drilling

WEST COAST CHAPTER

Pile Driving

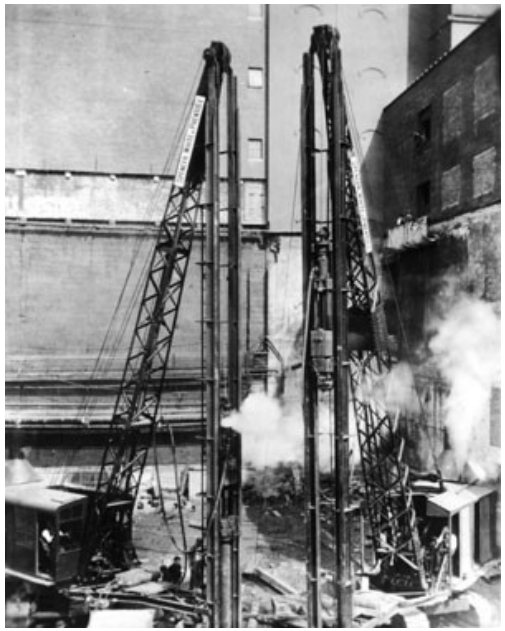
Richard Marshall, CHST

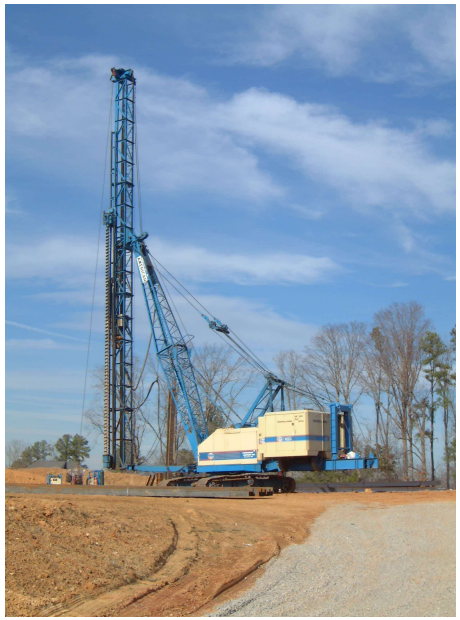
Director of Safety

ADSC: The International Association of Foundation Drilling

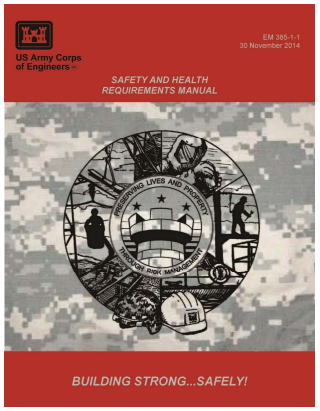
Driven Pile Safety

We have advanced in equipment technology . . . .

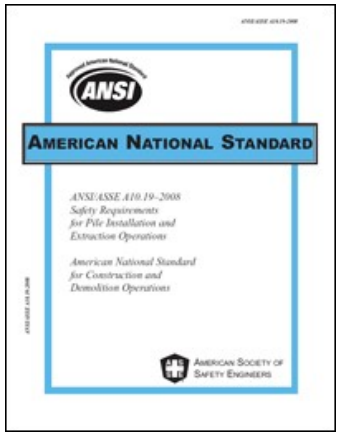




Safety Regulations For Pile Driving



US Army Corps of Engineers
EM 385-1-1



ANSI / ASSP A10.19

OSHA®
Occupational Safety and Health Administration

Federal
Construction Safety
& Health
CFR 1926

Safety Regulations

- ANSI standards are not a law but can be if they are “incorporated by reference” into an OSHA standard.
- USACE Standards are not law but must be adhered to on a project they are in control of.
- PDCA (Pile Driving Contractors Association) - Pile Driving Safety and Environmental Best Management Practices
- OSHA (Federal or State) standards are law and must be adhered to – but they are limited and outdated.

Types of Driving Rigs

Crane Mount (Fixed Leads)

- Pile Driving equipment is attached to the crane base, and from the boom tip.
- Operator use crane hoist lines to raise and lower hammer and piling.
- Crane has limited lifting capacity due to existing suspended weight of hammer and leads.
- This ***is*** a crane with a pile driving attachment.

Types of Driving Rigs

Crane Mount (Swinging Leads)

- Pile Driving equipment is suspended from the boom.
- Operator use crane hoist lines to raise and lower leads, hammer and pile.
- Crane has limited lifting capacity due to existing suspended weight of hammer & leads.
- This ***<u>is</u>*** a crane with a pile driving attachment.

Types of Driving Rigs

Crane Mount (Fly Hammer)

- Pile Driving equipment is suspended from the boom tip
- Operator use crane hoist lines to raise and lower leads, hammer and pile
- Crane has limited lifting capacity due to existing suspended weight of hammer & pile.
- This *is* a crane with a pile driving attachment

Vibratory Hammer

- Vibration is created in the gear case by rotating eccentric weights powered by hydraulic motors.
- The vibration created in the gear case is transmitted into the pile being driven (or extracted) by means of a hydraulic clamp attached to the bottom of the gear case.
- The complete vibratory hammer / extractor is typically held by a crane. To prevent the vibration created in the gear case from affecting the crane line, a vibration suppresser is attached to the top of the gear case. The suppresser contains rubber elastomers that dampen the vibration reaching the crane by 90% or more.

Impact Hammer Types

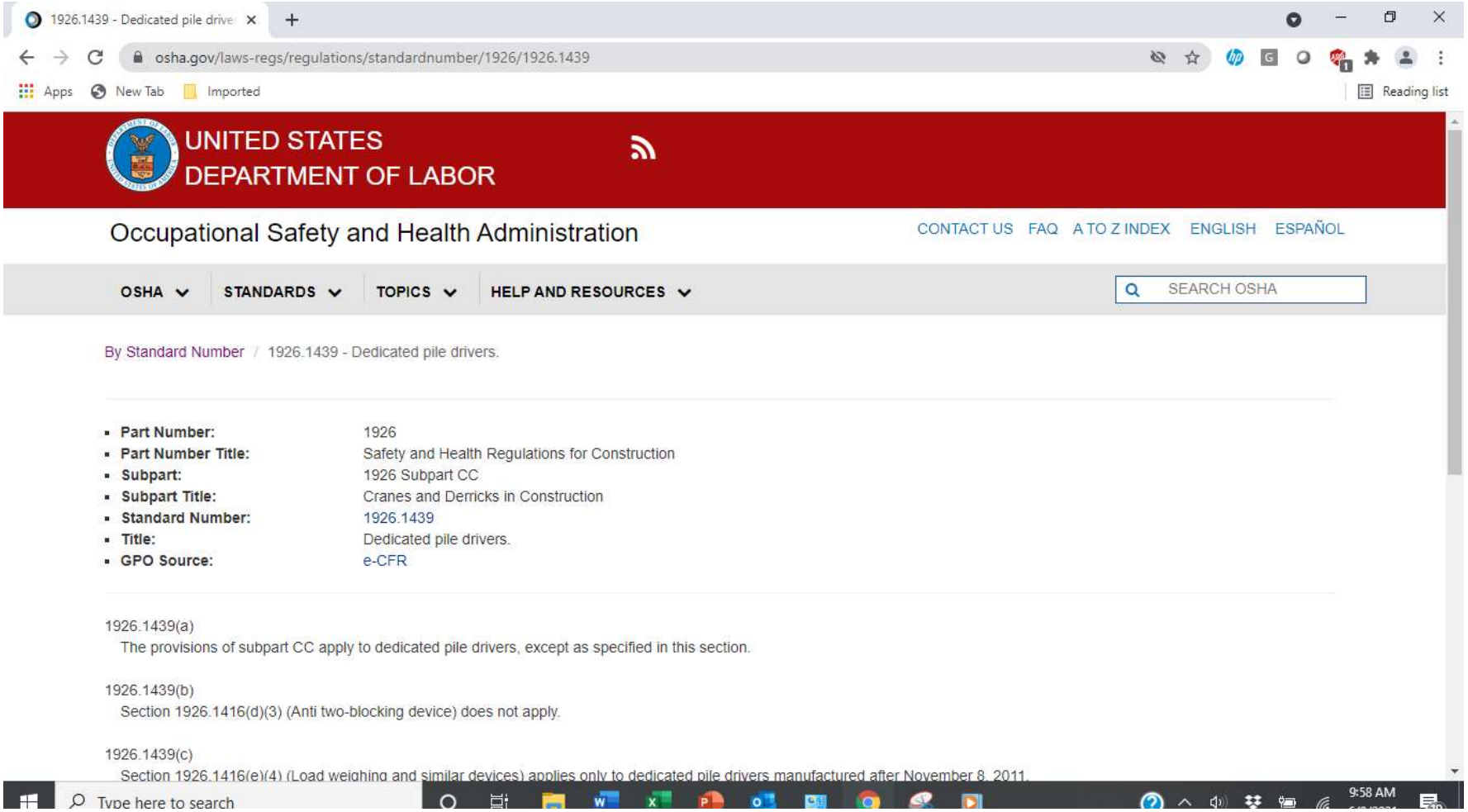
Drop	Single acting	
Air	Single acting Double acting Differential acting	
Diesel	Single acting (open end) Double acting (closed end)	Most Common
Hydraulic	Single acting Double acting	

Types of Driving Rigs

Crawler Track Mount (Dedicated Pile Driver)

- Unit is on a crawler-based frame
- Numerous sizes and capacities
- Driver is self contained, independent of
- the carrier
- This driving rig has limited lifting capacity using its auxiliary hoist line or hammer hoist line / feed chain. This equipment is now defined as a crane, according to 29CFR1926.1400.

Dedicated Pile Driver



Dedicated Pile Driver

Dedicated Pile Driver used as a crane to reposition material

Types of Driving Rigs

Track Hoe Mount Vibratory Hammer

Track Hoe Mount Impact Hammer

Dedicated Pile Drivers?

Safety Regulations

- Employers are expected to consider any existing consensus standards. Even though these standards aren't legally required, they represent a consensus on what experts consider safe.
- OSHA might regard an employer's failure to adopt a voluntary standard relating to an OSHA requirement as evidence that it didn't take reasonable steps to comply with the standard.

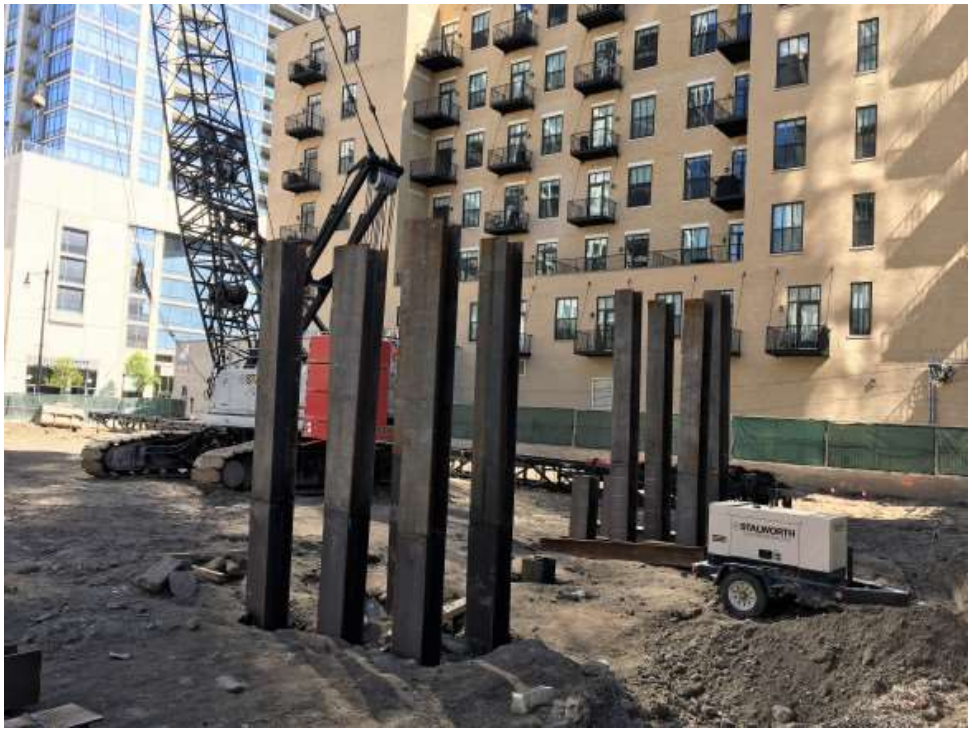
Safety Regulations

Not following such standards may also be considered a violation of the OSHA “general duty” clause [5(a)(1)] which requires employers to keep the workplace “free from recognized hazards.”

What does ANSI Say?

A10.19 4.1 - "Prior to initiating pile driving or extraction operations, the pile contractor shall develop a written site-specific safety plan. The safety plan shall identify specific steps for the intended operations, a list of the potential hazards associated with those operations, and the procedures to minimize or eliminate those hazards"

Underground Hazards



- Call Before You Drive!
- Physically locate utility prior to drilling
- Have emergency plan in place

USA

811
Know what's below.
Call before you dig.

Canada

Click Before You Dig

In Canada- -http://www.clickbeforeyoudig.com

ANSI A10.19

9.5 - “Additional (auxiliary) equipment, such as boilers, hydraulic power units or air compressors which are mounted to a crane for use in pile driving operations, shall have a platform designed to provide safe access for operation and maintenance of the unit(s) and to support the weight of the equipment.

The additional weight of such equipment shall be a factor in design and safe operation of the auxiliary equipment and shall not affect the lifting capacity or safe operation of the crane.”

ANSI A10.19

- 11.5 - “A blocking device capable of safely supporting the weight of the pile hammer shall be provided for placement in the leads under the pile hammer and used at all times while employees are working under the pile hammer.

- Exception: Where it is necessary for an employee to momentarily lean through the leads to spot a pile under the pile hammer, it is not required that the pile hammer be secured in the leads.”

ANSI A10.19

4.7 - The pile contractor shall establish a controlled access zone around the installation, driving, hoisting and/or extraction areas to prevent access by persons not directly involved in such operations.

The controlled access zone shall be maintained under the supervision of a Competent Person.

Controlled Access Zone

A10.19 11.8 – “No person shall stand under the kicker or directly under, in front of, or within at least 12 feet of the pile hammer or pile when a pile is being driven.”

What does the EM 385-1-1 say?

16.R Pile Driving Operations.

16.R.01 Pile driving equipment shall be outfitted with a positive and negative restraint device to prevent accidental hammer disengagement (i.e., preventing the hammer from falling or uncontrolled rising out of the lead, as well as preventing contact with head block or sheaves, if so equipped).

Trackhoe mounted hydraulic impact hammer and lead section for low headroom clearance driving operations

This setup was not outfitted with a positive and negative restraint device to prevent accidental hammer disengagement.

As the leads were rotated back to clear a driven pile, the hammer slid out and landed on the operator while inside the control cab.

What does the EM 385-1-1 say?

16.R.07(g).

A minimum weekly documented inspection of the pile driving leads shall be conducted. If found to be unsafe, or whenever a deficiency that affects the safe use of pile driving leads is observed, they shall be immediately taken out of service and their use prohibited until unsafe conditions have been corrected.

Fixed Leads

Just another day of pile driving.

Hard to see way up there – over 100 feet high – from the ground.

Fixed Leads

A beautiful day spoiled by major equipment component failure.

When do you inspect your piling leads?

Lead Inspection

Inspection of a similar section of leads in storage at contractor's yard facility, showed significant weld failures.

This could be the result of wear and tear and / or water freezing and expanding

What does the EM 385-1-1 say?

16.R.01 (b)

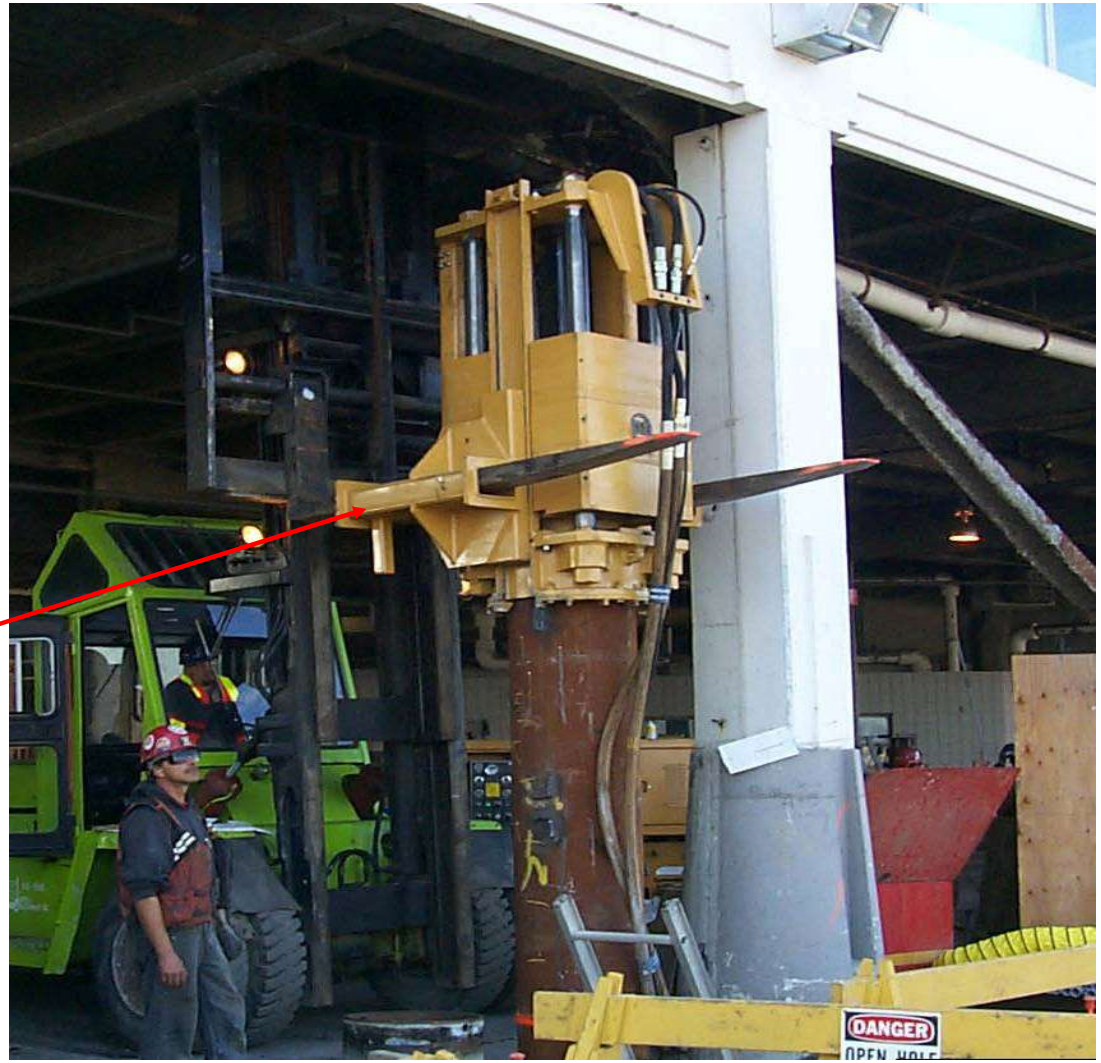
For contractor installed pile driving attachments to equipment whose original intent was for a different task, (for example an excavator or forklift modified to drive piling) the attachment must be designed by a RPE with experience designing construction equipment and comply with 16.R.01.(a).

16.R.01 (c)

The operator of this type of equipment must comply with the requirements of 16.S.03 and must be trained and authorized to operate the pile driving attachment.

Hydraulic hammer designed for low headroom operation mounted to a forklift.

Attachment points must be designed by a RPE (Registered Professional Engineer) with experience designing construction equipment.



Possible Overload?

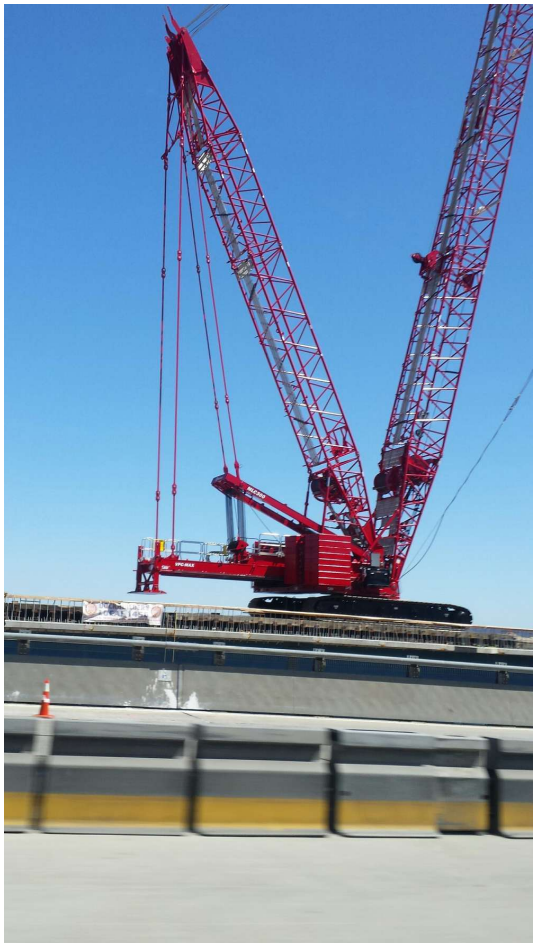
Just how much does the pile weigh?

Did you include the weight of the pre-drill auger in your calculations?

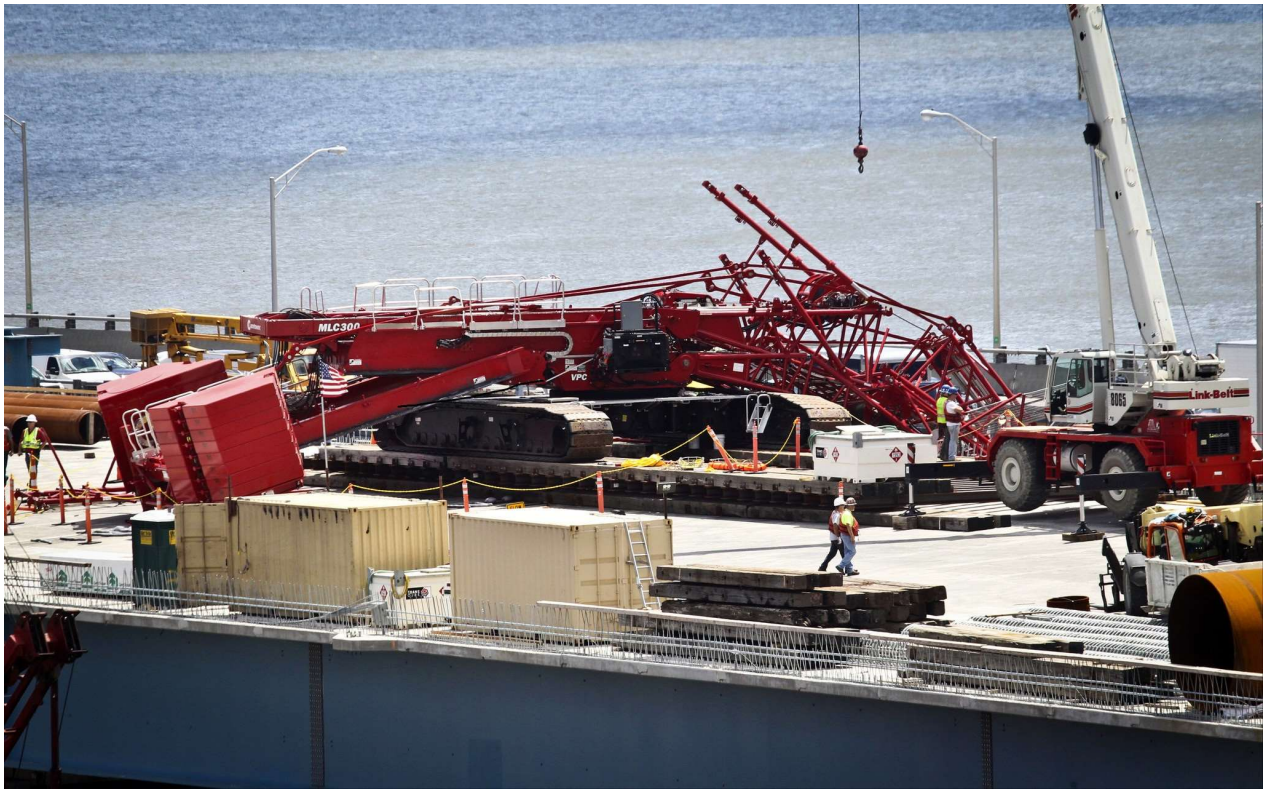
Boom Down?

Even on a reasonably level, compacted working platform, the equipment can still be overloaded by exceeding the rated safe working radius of the load – hammer, leads, and pile

Pile Extraction Hazards



Pile Extraction Hazards



Worn Parts

How often do you inspect the pile hammer, and all its components?

Multiple Activities

Proper pre-planning can often eliminate confusion and increase site safety, especially on a congested jobsite

Pile Cut Off

Pile Cut Off


Pile being driven at the time of the incident. 19'6" from the center of pile being cut
Approximate location of impact

Ground Conditions

CFR 1926.1402(b) The equipment shall not be assembled or used unless ground conditions are firm, drained (except for marshes/wetlands), and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met.

CFR 1926.1402(c)(1)

The controlling entity shall:

Ensure that ground preparations necessary to meet the requirements in paragraph (b) of this section are provided.

1926.1402(c)(2) Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the controlling entity (whether at the site or off-site) or the hazards are otherwise known to that controlling entity.

Ground Conditions

A10.19 4.6

Pile driving equipment shall not be assembled or used unless the ground conditions on which they are moved or placed are firm, graded and, unless the work is being performed in marshes or wetlands, drained, to the extent that the use of supporting materials is adequate and the equipment manufacturer's specifications for adequate support and degree of level are met.

Ground Conditions

Crane mats may be vital to the safe operation of a crane.

Crews must take measures to ensure the crane does not travel off the mat surface.

Tramming Equipment

Would the use of a spotter to guide the crane as it was tramming, be of help?

Pile Alingment

It is possible the pile will not drive straight into the soil. If not corrected, or the pile driving stopped, it is possible to have the hammer “wedge itself” in the leads and on the pile.

This makes it very difficult to remove the hammer off the pile. The crane boom can be side loaded in attempting to remove the hammer/leads from the pile – which may in turn cause boom failure.

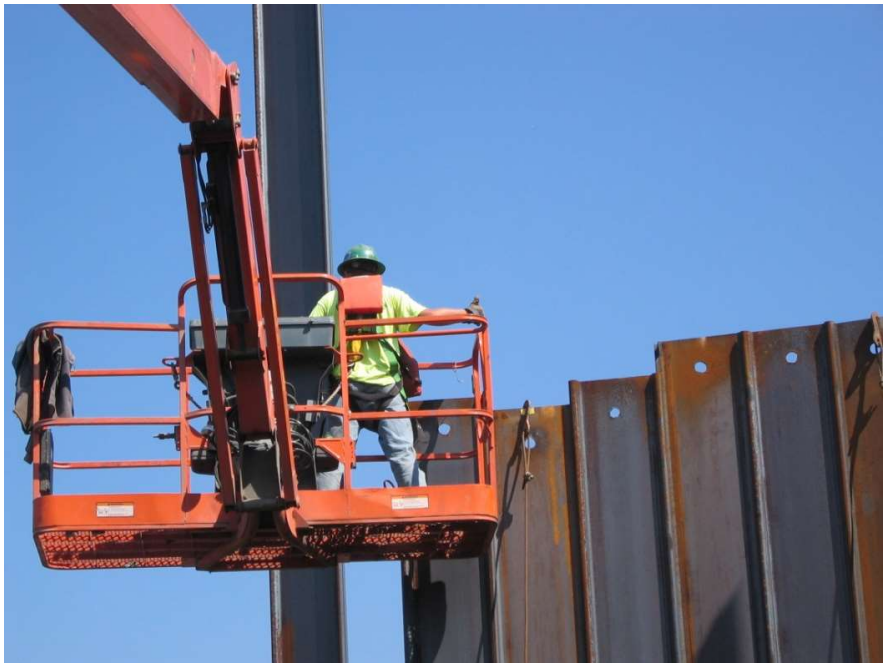
Results of Side Loading

Potential Fall Hazards

Old School Working at Height

Methods of Fall Protection

Much Faster, Much Safer



Pile Driving Compliance Requirements

- Fall protection for climbing leads/sheet pile
- Hazardous Atmospheres / Ground or Water Contamination
- Excavation Inspections
- Competent Person onsite
- Equipment Inspections
- Employee Training
- Utility Locate
- SDS Information
- Emergency Rescue Plan from height
- Use of Whip Checks on pressurized hose (compressed air)
- Swing Radius Protection
- Shop Drawings w/Engineer's Stamp for mounting power units or pile driving equipment on cranes or other machines
- PPE Use – eye, face, hearing, respiratory (as necessary), hand, leg, feet
- Eye Wash Available
- Falling debris from above
- Safe Working Platforms for equipment
- Welding and Torch Cutting/Pile cut-off plan
- Fire Extinguishers
- Qualified Rigger & Signal Person(s)
- Working From a Barge

Questions??

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Thank You!

"Safety is a journey in search of continuous improvement. However, there is never a final destination."