



## What is a Working Platform?

Richard Marshall, CHST

Director of Safety

ADSC: The International Association of Foundation Drilling

# Working Platforms

A deep foundation contractor is typically one of the first Subcontractors to arrive on a project site.

Historically, we took the site “as is” and got to work.

This is no longer an acceptable practice!





# Safe Working Platforms

The FPS (Federation of Piling Specialists) initiative had this effect:

- Drove Industry Change
- Improved safety for foundation piling rigs
- Gained universal acceptance in the UK
- Has a proven track record

And so can the ADSC-IAFD, PDCA, and DFI Guidance Initiative here in North America.





## Working Platforms

**Working Platform** – A temporary geotechnical structure or existing subgrade that provides a stable support surface for a piece of construction equipment working in a semi-static condition or in transport between operating locations on a single site.

This includes areas designated for unloading or loading and setup of a Tracked Plant or similar machine.

A Working Platform may consist of the existing subgrade, or may be improved using aggregate, geosynthetics, soil, steel or timber crane mats, or other constructed features.





## Tracked Plant

**Tracked Plant** - any large construction equipment on either tracks or wheels that operates in a semi-static position but may be mobile between operating locations.

The Tracked Plant designation does not apply to dump trucks, skid steers, or any other equipment that operates primarily in transport mode but **does** pertain to concrete trucks and other equipment functioning along a confined path.



# Evolving Foundation Equipment

Modern equipment is more powerful, have higher centers of gravity, and may have a static weights upwards of 300+ tons.

This is to keep up with the demand for deeper and larger diameter foundations (either driven or drilled) necessary to take higher load capacities, combined with the need for more environmentally friendly installation techniques.



# Foundation Drilling Equipment Evolution

Early 1960's

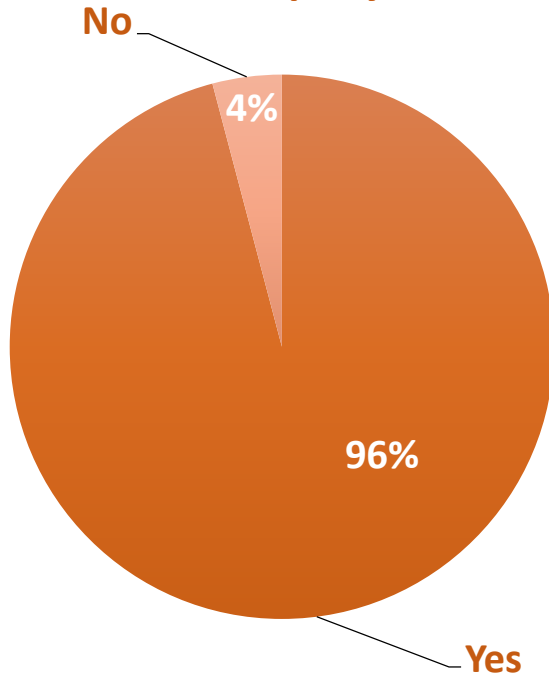


Modern Foundation Drill Rig

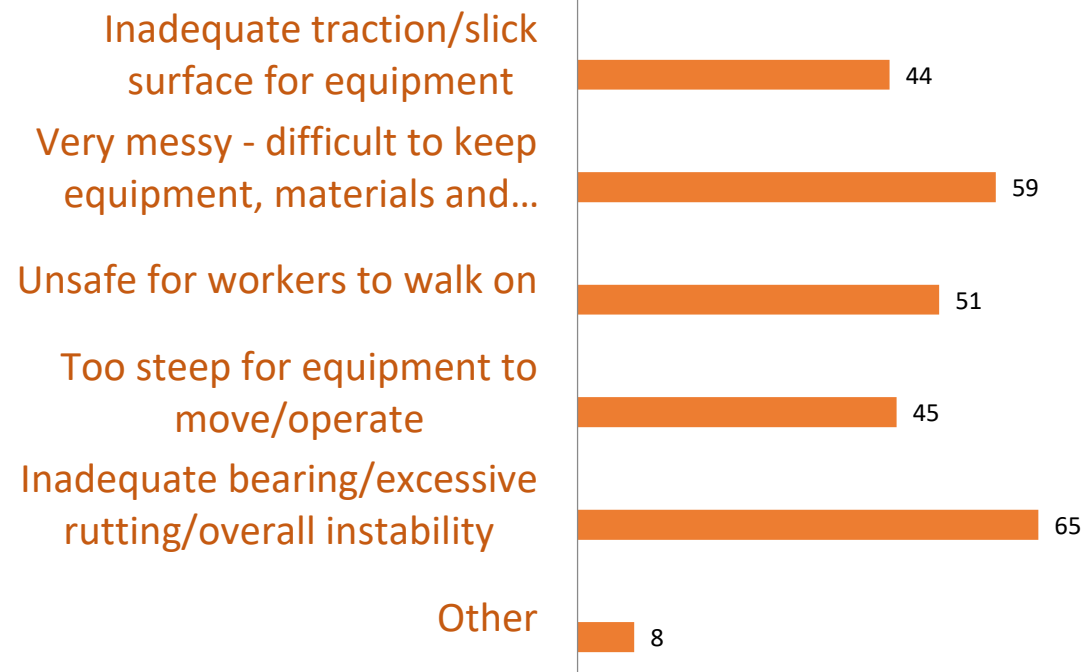


# DFI MEMBER SURVEY RESULTS

Have inadequate working surfaces ever caused operational issues for your company?



If you have experienced safety or operational issues due to an insufficient working surface, what types of issues have you had? (select all that apply)

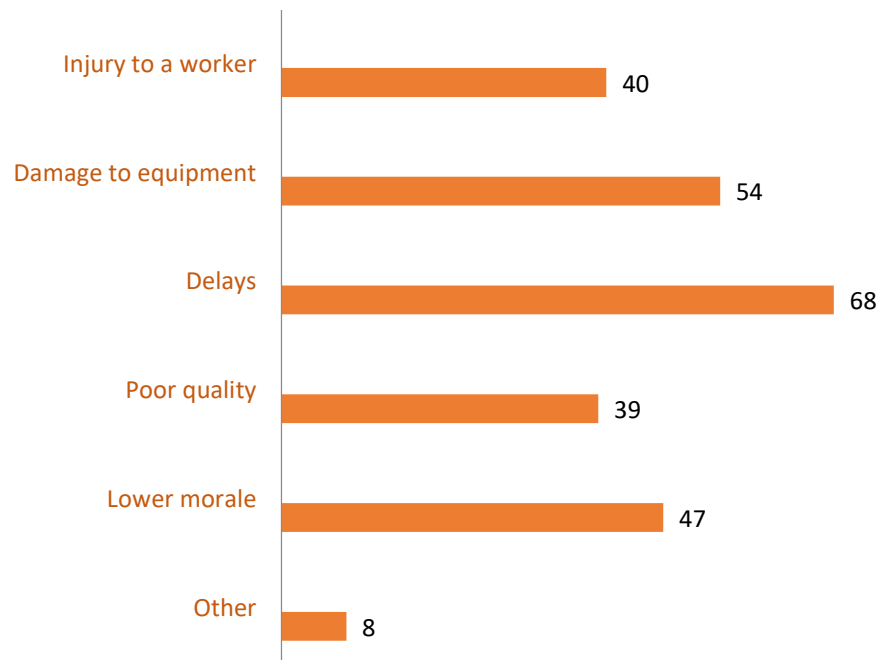


*\*Based on 74 individual survey respondents with 272 responses*



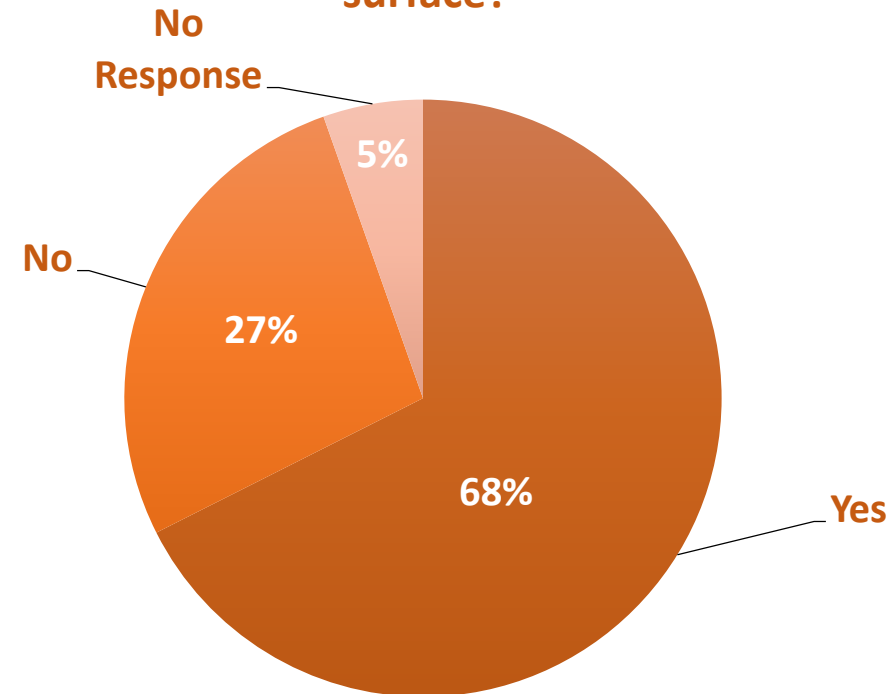
# DFI MEMBER SURVEY RESULTS

## What have been the consequences of the inadequate working surface?



*\*Based on 74 individual survey respondents and 256 responses*

## Has your company ever tipped a rig, crane, excavator, or other large piece of equipment due to an inadequate working surface?





There is a lack of understanding amongst owners, general contractors, construction managers regarding the importance of preparing a safe working platform capable of supporting the equipment to be used.



There is also much disagreement as to whose responsibility it is to design, prepare and maintain such a platform throughout the course of the project. Is it “Us or “By Others”?





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Safe or Unsafe Platform



# Profit vs. Loss

*“The first duty of business is to survive, and the guiding principle of business economics is not the maximisation of profit – it is the avoidance of loss...”*

*Peter Drucker* - described as "the founder of modern management"





Risk – Does it exist?

- Contractual Risk
- Financial Risk
- Occupational Risk
- Quality Risk
- Legal Risk



# Contractual Risk

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Penalties you may have to pay for not completing a job on time.

How can you maintain schedule if your working platform cannot support the necessary equipment needed to install a deep foundation?







# Contractual Risk

If you cannot get your equipment onto the jobsite, let alone safely unload or load it, how will that impact your schedule?

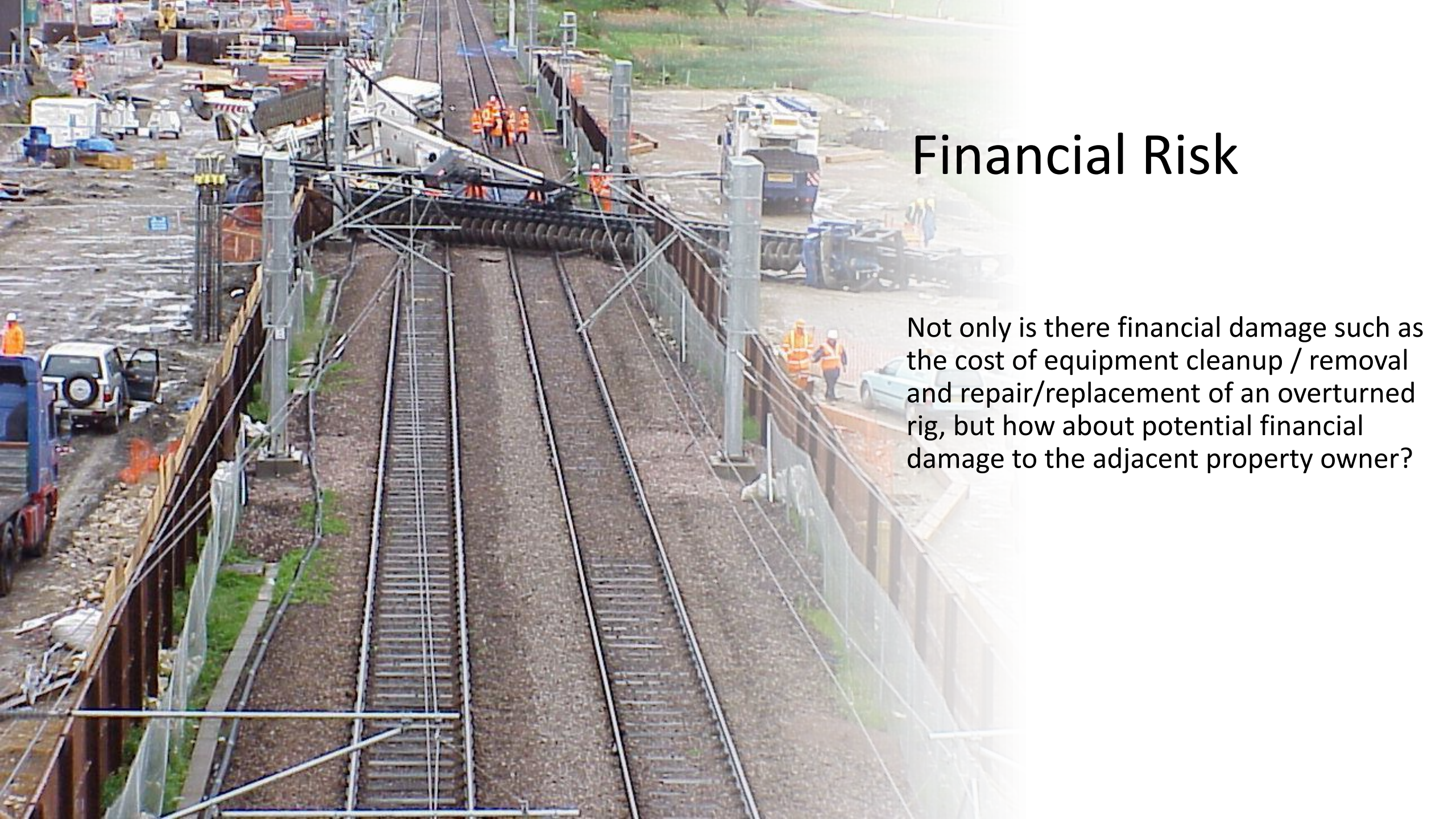
# Contractual Risk



You cannot be productive if you must battle the jobsite conditions, just to install an anchor







# Financial Risk

Not only is there financial damage such as the cost of equipment cleanup / removal and repair/replacement of an overturned rig, but how about potential financial damage to the adjacent property owner?





## Financial Risk

- Lack of productivity
- Difficulty in achieving high quality control
- Worker injury/fatality, equipment damage, risk to adjacent structures, utilities, and the public at large



# Financial Risk

## Equipment Downtime

Cost of up righting equipment:

- Rented crane(s)
- Tractor trailer(s)
- Labor – crew is not productive when working to salvage the overturned unit
- Travel – Office personnel making site visit, conduct investigations
- Travel – Manufacturer’s representative to assess damage, assist in clean up
- The “Blame Game”





- Cost of repairing damaged equipment
- Possible rental of equipment to maintain schedule
- Cost of replacing damaged equipment
- Environmental Clean-up (spilled fuel & oil)
- Increased insurance premiums – due to overturn accident

Financial Risk



# Occupational Risk



Possible injury or a fatality to an employee as a result of a poor working platform.



# Occupational Risk



Emergency Equipment Access ??





# Quality Risk

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Machine set up level.

Mast is Plumb.

Rig does not tip forward (sink into the platform) during tool removal or spin-off.

This helps drill a straight, plumb shaft – every time!

**Risk is mitigated by having a safe working platform to operate from.**



# Legal Risk

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If a member of the general public is injured or killed as a result of a poor working platform, what are the legal risks?








## Prioritize Risk

- Once you've identified the potential risks, the next step is to prioritize those risks. To do this, you need to determine what impact each risk will have and the probability that it will occur.
- High impact, high probability risks should go to the top of your list. A risk with low impact and a low probability of occurrence at the bottom.
- **Working platforms have historically been very low on the priority list – until a piece of equipment overturns due to poor ground conditions.**



# Legal Requirements for Working Platforms

In North America, there are two requirements that specifically address safe working platforms (ground conditions) for deep foundation equipment:

- Rotary Foundation Drill Rigs – Province of Ontario, Canada
  - Mobile Cranes (including Dedicated Pile Drivers) – OSHA in the U.S.
  - And there are two OSHA state plan requirements that may also be applicable . . .
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# Working Platforms - Ontario

ONTARIO REGULATION 213/91

CONSTRUCTION PROJECTS

ROTARY FOUNDATION DRILL RIGS

Effective July 1, 2016

**156.3** Sections 156.4 and 156.5 apply when a drilling operation at a project uses a rotary foundation drill rig that can exert a ground pressure of 200 kilopascals or more under its tires, crawlers or outrigger pads in any configuration, including during its operational activities.





# Working Platforms Ontario

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**156.4 (1)** Before a drilling operation described in section 156.3 begins, a *professional engineer shall*,

- (a) design a supporting surface for the drill rig in accordance with good engineering practice to adequately support the drill rig during all drilling and drill rig set-up activities;
- (b) designate and design a path of travel for the drill rig to use on the project to ensure the path of travel safely supports the drill rig; and
- (c) prepare a written report described in subsection (2). O. Reg. 345/15, s. 19.







# Ground Conditions – Mobile Cranes

## OSHA - CFR 1926 Subpart CC

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**1926.1402(b)** - The equipment must not be assembled or used unless ground conditions are firm, drained, 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. The requirement for the ground to be drained does not apply to marshes/wetlands.

**1926.1402(c)** - The controlling entity must:

**1926.1402(c)(1)** - 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.

# Definitions



***Project Constructor*** - A person, firm, or corporation, (i.e., the construction manager, general contractor, prime contractor or other entity), as designated in the project documents, responsible for supervising and controlling all construction work performed on the project.



***Controlling Entity*** - means an employer that is a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project--its planning, quality and completion.





# CFR 1926 Subpart O - Motor Vehicles, Mechanized Equipment, and Marine Operations

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## CFR 1926.602(a)(3)(i)

No employer shall move or cause to be moved construction equipment or vehicles upon any access roadway or grade, unless the access roadway or grade is constructed and maintained to accommodate safely the movement of the equipment and vehicles involved.





# OSHA State Plans

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- CAL-OSHA - §1711 (c) - Reinforcing Steel and Post-Tensioning in Concrete Construction
- Washington L&I - WAC 296-155-680 – Subpart O, General provisions (Effective October 1, 2020)



# CAL-OSHA - Construction Safety Orders

§1711



(c) Site Access and Layout. The controlling contractor shall ensure that the following is provided and maintained:

(1) Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, the material to be erected, and the means and methods for pedestrian and vehicular control.

(2) Except where infeasible due to space constraints in dense metropolitan areas, a firm, properly graded, and drained area, that is readily accessible to the work with adequate space for the safe assembly, rigging, and storage of reinforcing and post-tensioning materials, and the safe operation of the reinforcing contractor's equipment.



# Washington L&I

**WAC 296-155-680**



**(7) Site access and layout.** The controlling contractor must ensure that the following is provided and maintained:

(a) Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, the material to be erected, and the means and methods for pedestrian and vehicular control.

(b) A firm, properly graded, and drained area, that is readily accessible to the work with adequate space for the safe assembly, rigging and storage of reinforcing and post-tensioning materials, and the safe operation of the reinforcing contractor's equipment.

# OSHA Rules of Construction

1926.16(a)



*“The prime contractor and any subcontractors may make their own arrangements with respect to obligations which might be more appropriately treated on a jobsite basis rather than individually.*

*Thus, for example, the prime contractor and his subcontractors may wish to make an express agreement that the prime contractor or one of the subcontractors will provide all required first-aid or toilet facilities, thus relieving the subcontractors from the actual, but not any legal, responsibility (or, as the case may be, relieving the other subcontractors from this responsibility).*

*In no case shall the prime contractor be relieved of overall responsibility for compliance with the requirements of this part for all work to be performed under the contract.”*



# OSHA Rules of Construction

1926.16(c)



*“To the extent that a subcontractor of any tier agrees to perform any part of the contract, he also assumes responsibility for complying with the standards in this part with respect to that part.*

*Thus, the prime contractor assumes the entire responsibility under the contract and the subcontractor assumes responsibility with respect to his portion of the work.*

*With respect to subcontracted work, the prime contractor and any subcontractor or subcontractors shall be deemed to have joint responsibility.”*

# Multi-Employer Worksites

The Occupational Safety and Health Review Commission noted that the duty imposed on a prime or general contractor is a reasonable one, and that the prime or general contractor will not be held liable for violations which it could not reasonably be expected to detect or prevent.

In addition to whatever responsibility it may have as an exposing employer, the prime or general contractor would also share responsibility for those violations by its subcontractors which it could reasonably have detected and have corrected.

OSHA expects prime or general contractors to take the steps necessary to satisfy themselves that subcontractors engage the involvement of competent persons, as well as a general inspection obligation.



# OSHA Field Operations Manual (FOM), CPL 02-00-164 Effective - 04/14/2020 – Multi-Employer Worksites

## The Hazard Must Be Recognized.

Recognition of a hazard can be established on the basis of employer recognition, industry recognition, or "common-sense" recognition. The use of common sense as the basis for establishing recognition shall be limited to special circumstances. Recognition of the hazard must be supported by the following evidence and adequate documentation in the file.

## Employer Recognition.

A recognized hazard can be established by evidence of actual employer knowledge of a hazardous condition or practice. Evidence of employer recognition can consist of written or oral statements made by the employer or other management or supervisory personnel during or before the OSHA inspection.



**OSHA NOTICE**

U.S. DEPARTMENT OF LABOR Occupational Safety and Health Administration

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**OBJECTIVE NUMBER:** CPL 02-00-164  
**SUBJECT:** Field Operations Manual (FOM) - Update, Chapter 11, Recognition of Hazard Agents  
**DIRECTORATE/REGION:** Directorate of Enforcement Programs  
**ISSUANCE DATE:** December 11, 2019 **EFFECTIVE DATE:** January 20, 2020

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**ABSTRACT**

**Purpose:** To provide OSHA offices, State Plan programs and Federal agencies with policy and procedures concerning the enforcement of occupational safety and health standards, also that update to Chapter 11 - Recognition by Other Agencies, provide current information and ensure that occupational safety and health standards are enforced with uniformity.

**Scope:** OSHA-wide

**References:** 29-CFR 1917

**Generalization:** This Chapter supplements Chapter 11 in OSHA Initiatives OSHA 3093-004, Field Operations Manual (FOM) issued April 24, 2019.

**State Impact:** None of Interest and Equivalency required.

**Admin Offices:** National, Regional, and Area Offices.

**Originating Office:** Directorate of Enforcement Programs (DEP)

**Contact:** Directorate of Enforcement Programs  
Office of Chemical Process Safety and Enforcement Initiatives  
200 Constitution Avenue, NW/OS-3020  
Washington, DC 20510

By and with the Authority of:

Douglas L. Parker  
Assistant Secretary

# RECOMMENDED INDUSTRY PRACTICES

*For Safe Working Platforms  
For Construction Equipment*

December 15, 202

## OSHA Field Operations Manual

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### Industry Recognition

A hazard is recognized if the employer's relevant industry is aware of its existence.

Although evidence of recognition by an employer's similar operations within an industry is preferred, evidence that the employer's overall industry recognizes the hazard may be sufficient. The Area Director shall consult with the Regional Administrator or designee on such an issue. Industry recognition of a hazard can be established in several ways:

Evidence of implementation of abatement methods to deal with the particular hazard by other members of the employer's industry;



# OSHA Field Operations Manual

## Industry Recognition

Manufacturers' warnings on equipment or in literature that are relevant to the hazard;



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*Make sure that the ground is firm and can withstand the pressure of the machine in the different configurations.*

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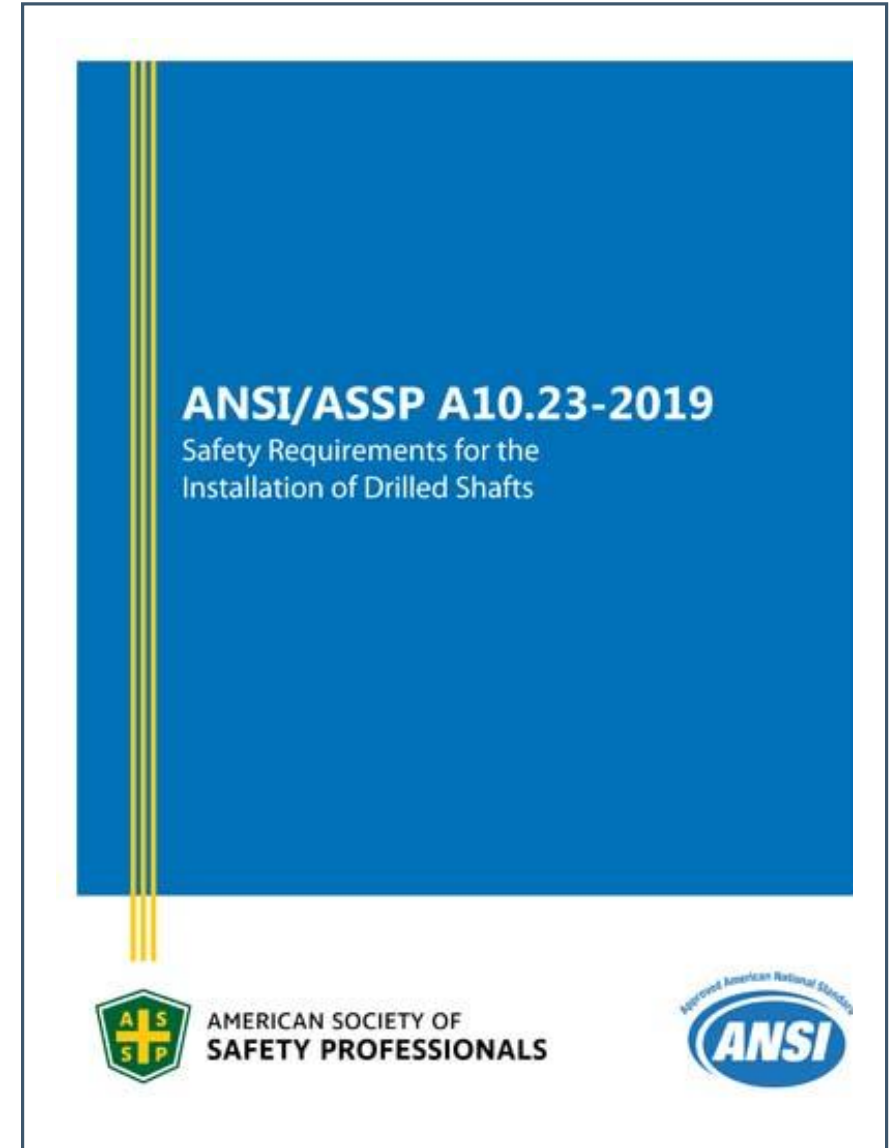
From SoilMec SR 30 Operations and Maintenance Manual

# OSHA Field Operations Manual

If the relevant industry participated in the committees drafting national consensus standards such as the American National Standards Institute (ANSI), the National Fire Protection Association (NFPA), and other private standard-setting organizations, this can constitute industry recognition.

Otherwise, such private standards normally shall be used only as corroborating evidence of recognition. Preambles to these standards that discuss the hazards involved may show hazard recognition as much as, or more than, the actual standards.

However, these private standards **cannot** be enforced as OSHA standards, but they can be used to provide evidence of industry recognition, seriousness of the hazard, or feasibility of abatement methods.







- Each project requires different pre-planning for successful completion.
- While the project type may be repetitious - (Drilled Shafts, Earth Retention, Micropiles), the projects themselves are unique.
- We must manage potential risk before the project begins.

# Risk Management – Internal Education

- Educate your office and field personnel on the hazards associated with an unsafe working platform by adopting the “Recommended Industry Practices for Safe Working Platforms for Construction Equipment”.
- You must learn methods you can use to calculate your equipment’s bearing pressures – it is strongly recommended that you work with a “friendly engineer” to ensure you are solving for the bearing pressures correctly.
- Note: The total rig weight including tooling, divided by total track or contact area Assumes a uniform, rectangular pressure – It does not consider positions of components and hydraulic forces.
- **Should NOT be used for working platform design!**



# Risk Management – Internal Education

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- Educate office and field personnel on the different configurations of your foundation installation equipment – and how it may change center of gravity and ground pressures.





## Employee Training

- The Guidance Document recommends that each specialty contractor conduct annual training for operators and employees working near heavy equipment.
- Employees must be aware of the need for Initial Project Assessment and corresponding evaluation of the subgrade for proper support of Tracked Plant and similar equipment.
- Site personnel should be advised to constantly observe whether the prepared Working Platform is performing well or needs to be modified.



A photograph of a large piling rig on a construction site. The rig is tilted significantly to the left, resting on uneven, loose soil. The rig's tracks are visible in the foreground, and its complex mechanical structure, including a crane arm and various cables, is visible in the background. The scene is hazy, suggesting a dusty or foggy environment.

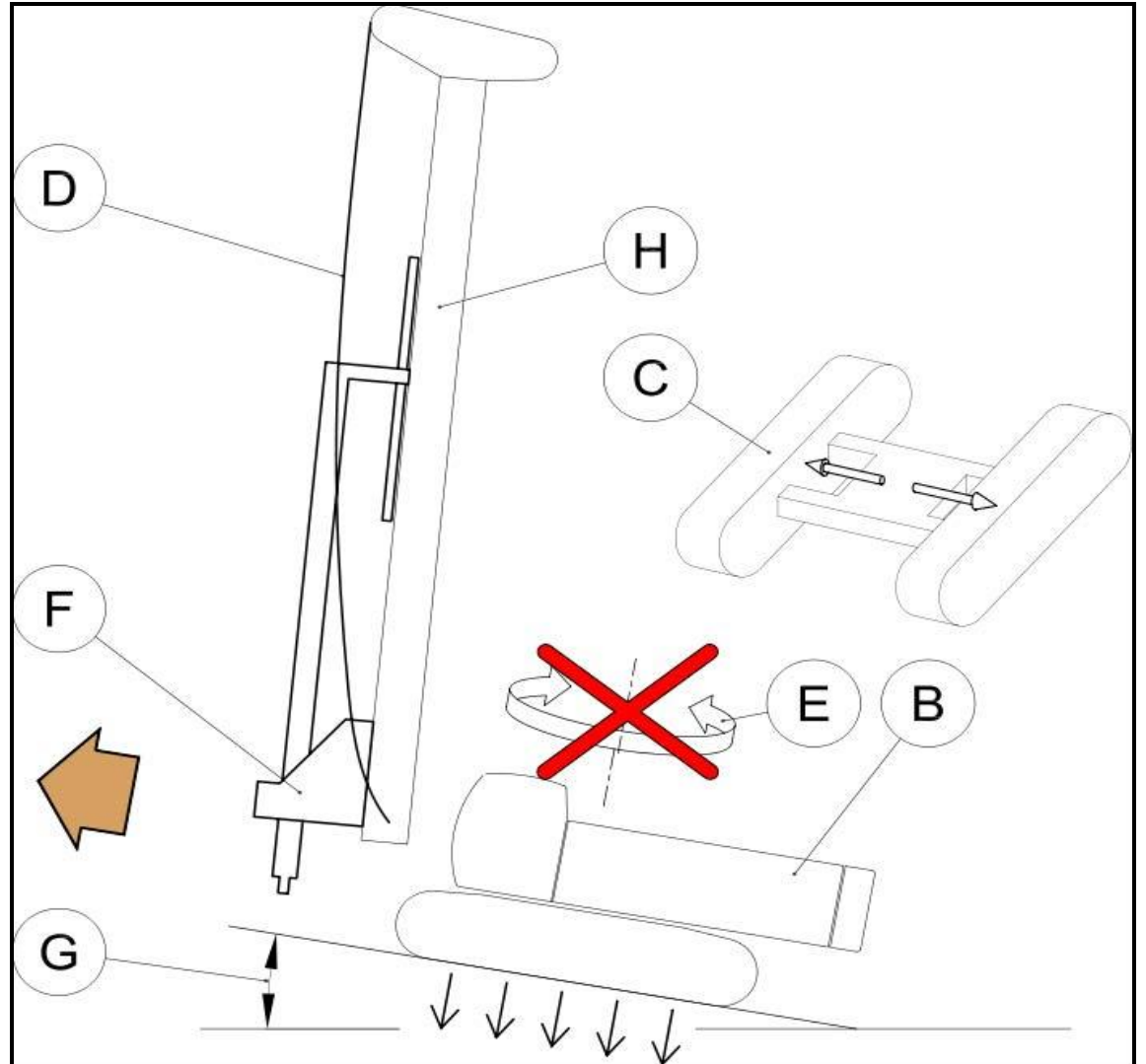
# Piling Rig Stability

- Most piling rig overturn accidents occur during tramming of the machine on a poor working platform.
- Overturns can result from encountering naturally soft soils, improperly compacted backfill, existing underground utilities, vaults, voids, tanks, or when the machine trams up or down sloping ground.

# Drill Rig Stability

Most manufactures give important procedures for tramming a machine up a slope. Here is an example:

- No Tool
- Upper structure aligned with tracks.
- Crawler tracks completely extended.
- No load applied to the rope of the auxiliary winch.
- The upper structure must not turn.
- Rotary in the lowest position. The rotary must be below the mast joint.
- The maximum permitted slope of the ramp is 10°.
- Mast completely inclined forward.

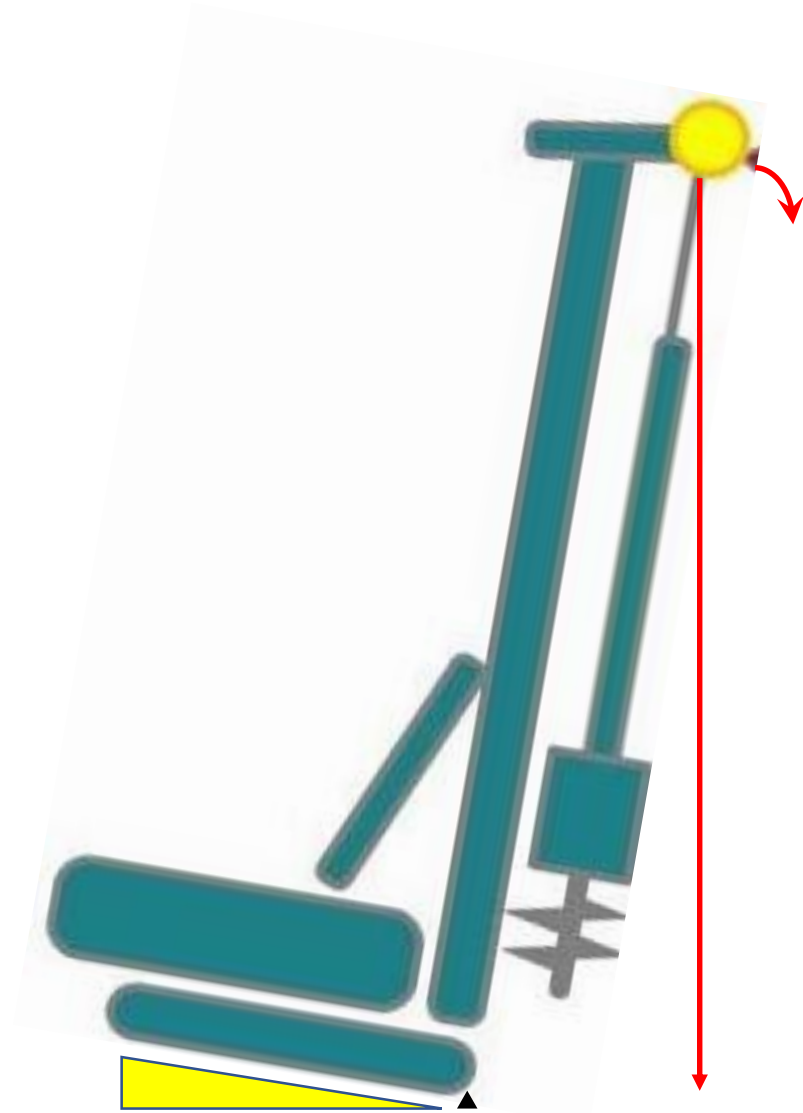
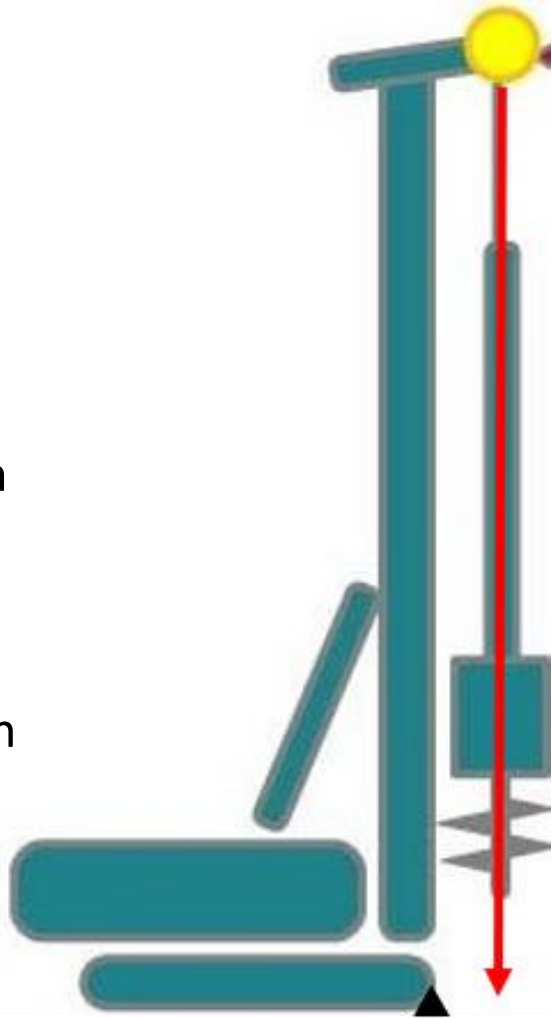




# Drill Rig Stability

The red arrows represent the force of gravity on the drill rig.

When tramming down a slope, the weight is further away from the tipping axis, which increases the risk of an overturn.



# Risk Management

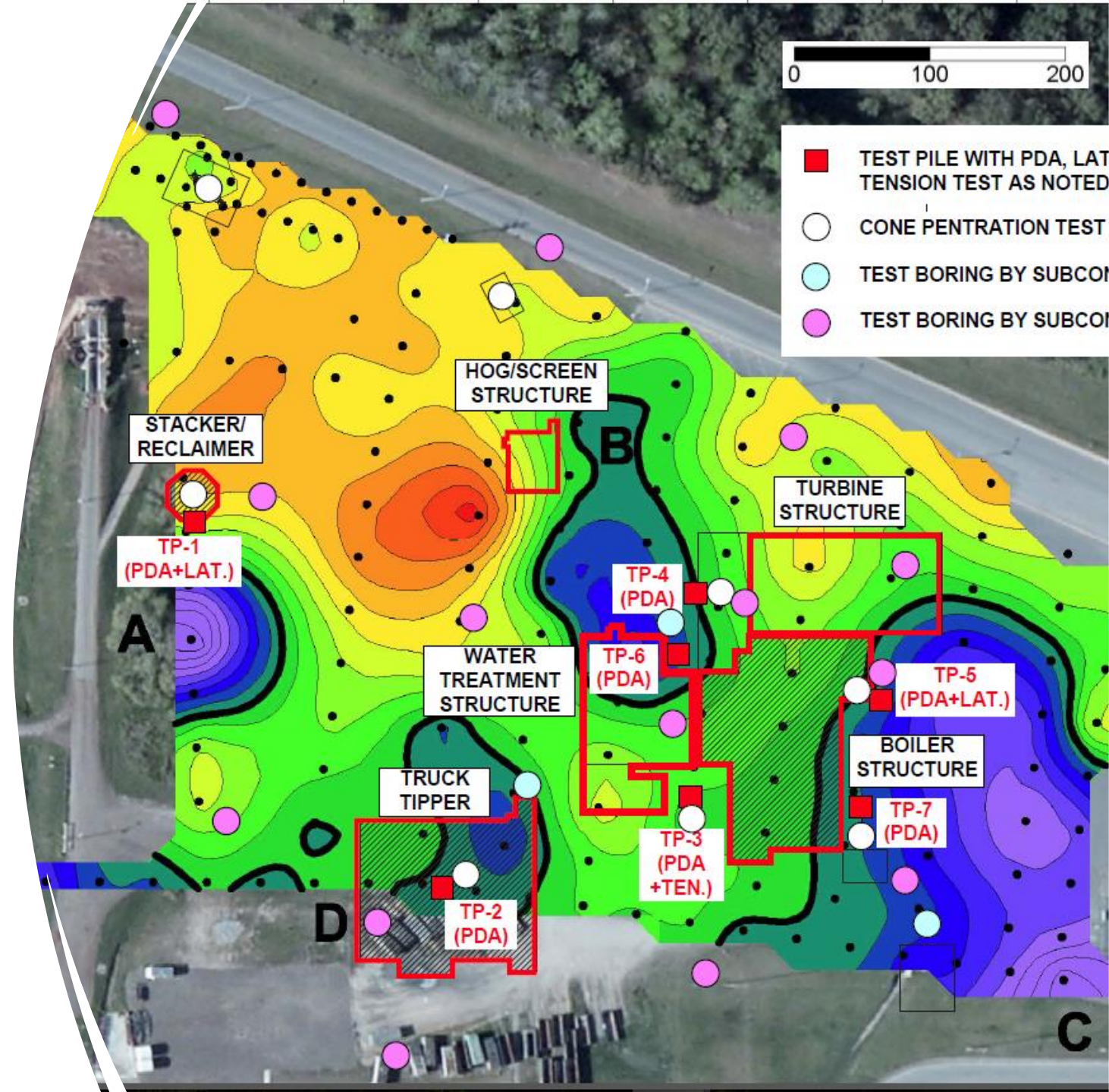
- Pre-Bid Stage
- Estimating Stage
- Onsite Stage

Each stage of the project requires pro-active involvement 100% of the time in order to minimize or hopefully eliminate risk.



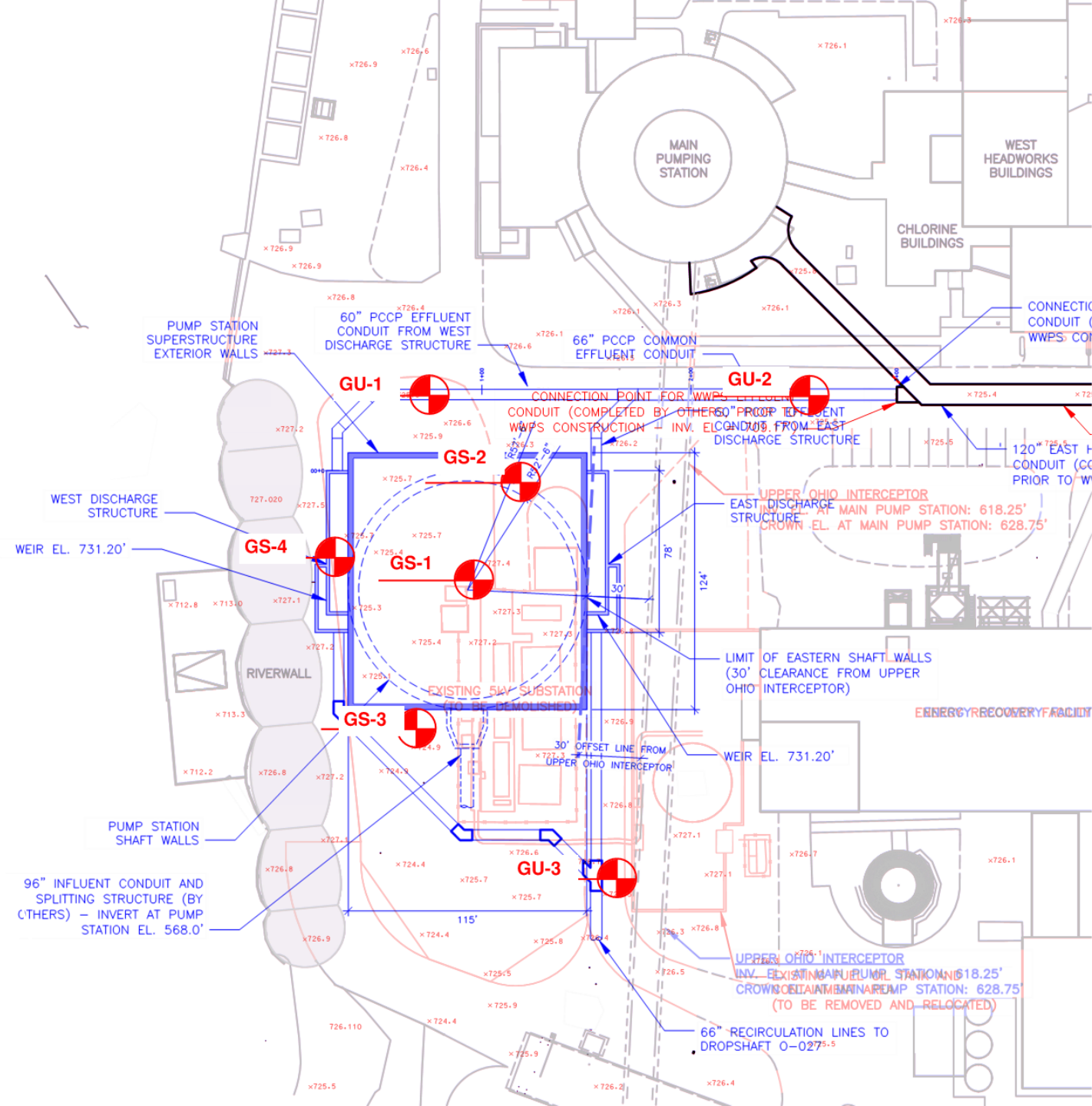
# Bidder's Site Visit – Preparatory Work

- Review bid documents, RFP/SOW, site-civil drawings, foundation drawings, geotechnical report(s)
- Develop initial idea of your equipment relative to lengths and diameters of shafts or piles, sequence, and logistics, no. of rigs
- Catalog your experience in same area, same anticipated site conditions



# Bidder's Site Visit – Preparatory Work

- Understand relationship between current site grades, proposed grades, site utilities
- Know previous site history (old maps, Google Earth aerials from previous years)
- Overlay of plans using common contractor software such as Bluebeam, Acrobat, CADD





# Bidder's Site Visit

- “Kick the dirt” and get a feel for current site conditions at grade and what you think lies at installation grade.
- How much cut or fill and where is groundwater?
- Existing site utilities?
- New utility installations to be added during foundation installation?



# Bidder's Site Visit

- Site entrance and equipment unloading/assembly area?
- Has GC/CM or other already prepared the site to installation grade?
- Is installation zone down within an excavation or requiring transit up/down ramps?
- What are the slopes and who established suitability and stability?
- Are there retaining walls or slopes adj. to install zone, underground structures?





# Mobilization

How will you get this super load trailer onto the jobsite for unloading, and later, when loading out when the project is complete?

Did you discuss assembly and disassembly of your equipment with the Project Constructor? Is there language in your contract language to cover this activity?



# Mobilization



Cement Silos must be set up level on level stable ground.

Don't forget you must have access for transport to re-fill the silo.



# Contractor Pre-Bid Meeting

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- Should have separate meeting for bidders on drilled foundation or heavy Support of Excavation (SOE) scopes.
- Request specific topics of agenda planner ahead of time.
- Should request participation by Geotechnical Engineer, Civil Engineer, Owner/Rep, CM, GC.
- Start with review of conditions and anticipated construction by Geotechnical Engineer.
- Have conversation other than just “dry, level, and stable” – **This is the time to introduce Safe Working Platforms into the conversation and educate your perspective client on its necessity, in order to achieve a safe, productive, quality deep foundation installation .**

# Contractor Pre-Bid Meeting

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## Tough Questions

- Does CM/GC understand the expected sizes of equipment and their responsibility for overall site safety and stability?
- What is opinion and recommendation of Geotechnical Engineer regarding Engineered WP (need, type, thickness, install, verification, etc.)?
- What information does GC/CM expect in bid/proposals relative to equipment demand(s), required or anticipated WP?
- Who is responsible for design, installation, testing, verification, and maintenance of WP (allocation of responsibilities and cost)?



# Contractor Pre-Bid Meeting

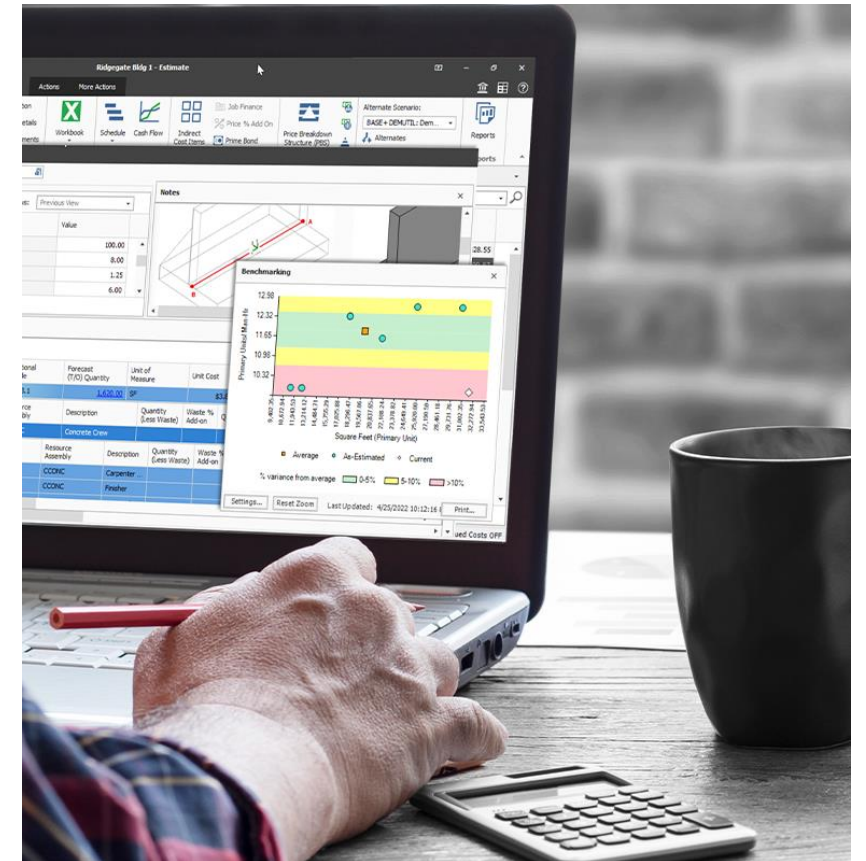
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## Tough Questions

- Does the controlling entity's safety director and on-site personnel understand the mechanics of drill rig instability and have direct experience with promoting safety for foundation drilling operations?
- Does CM/GC have a specific line item in the schedule for design, construction, and verification of the WP?
- Will foundation contractor written proposal be appended or explicitly included in the Subcontract?
- Will there be a formal handover and release of WP upon completion of foundation construction ops?

# Estimating Elements

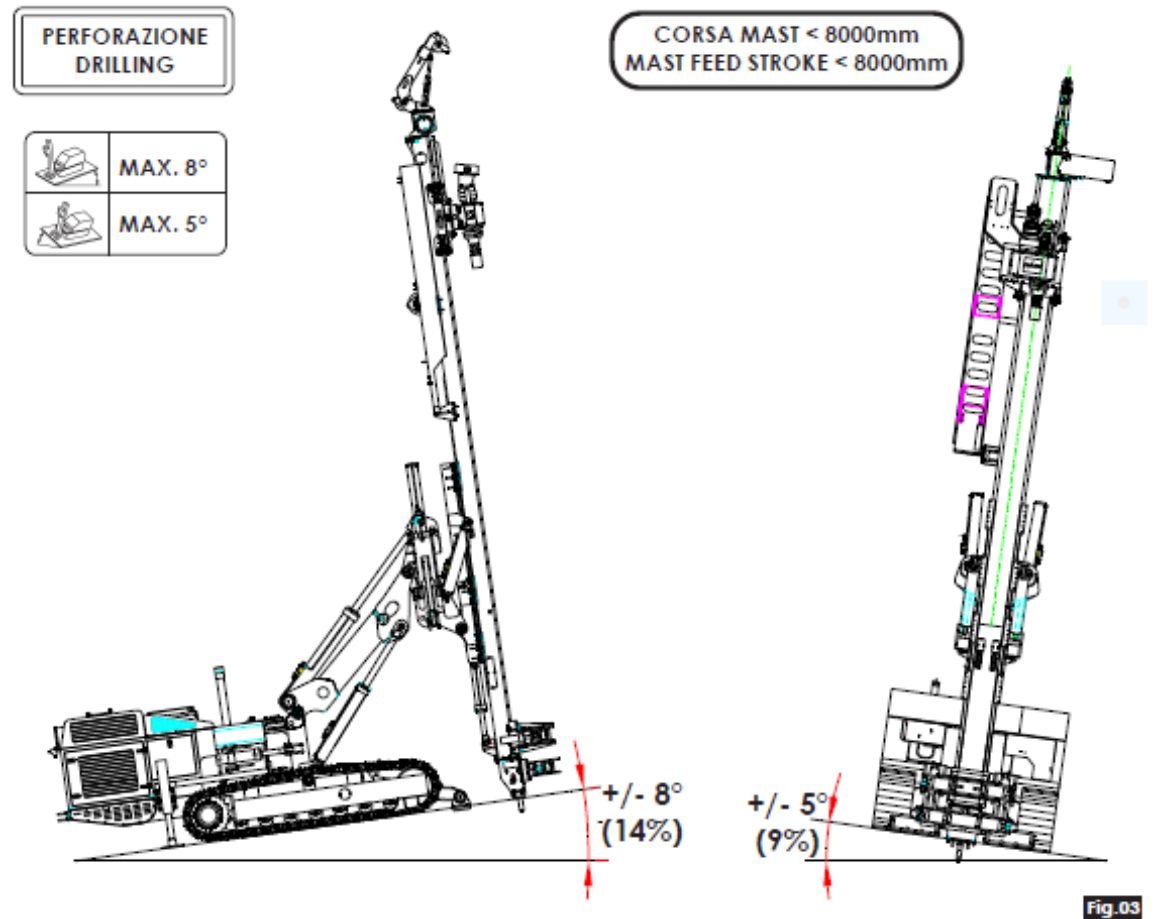
1. Determine Scope & Project Requirements
  - Plans - Specs - Standards
2. Determine conditions at the site
  - Geotech – Climate – Access - Inspection
3. Develop relevant work plan
  - Equipment – Tools – Method of Installation
4. Develop corresponding cost estimate





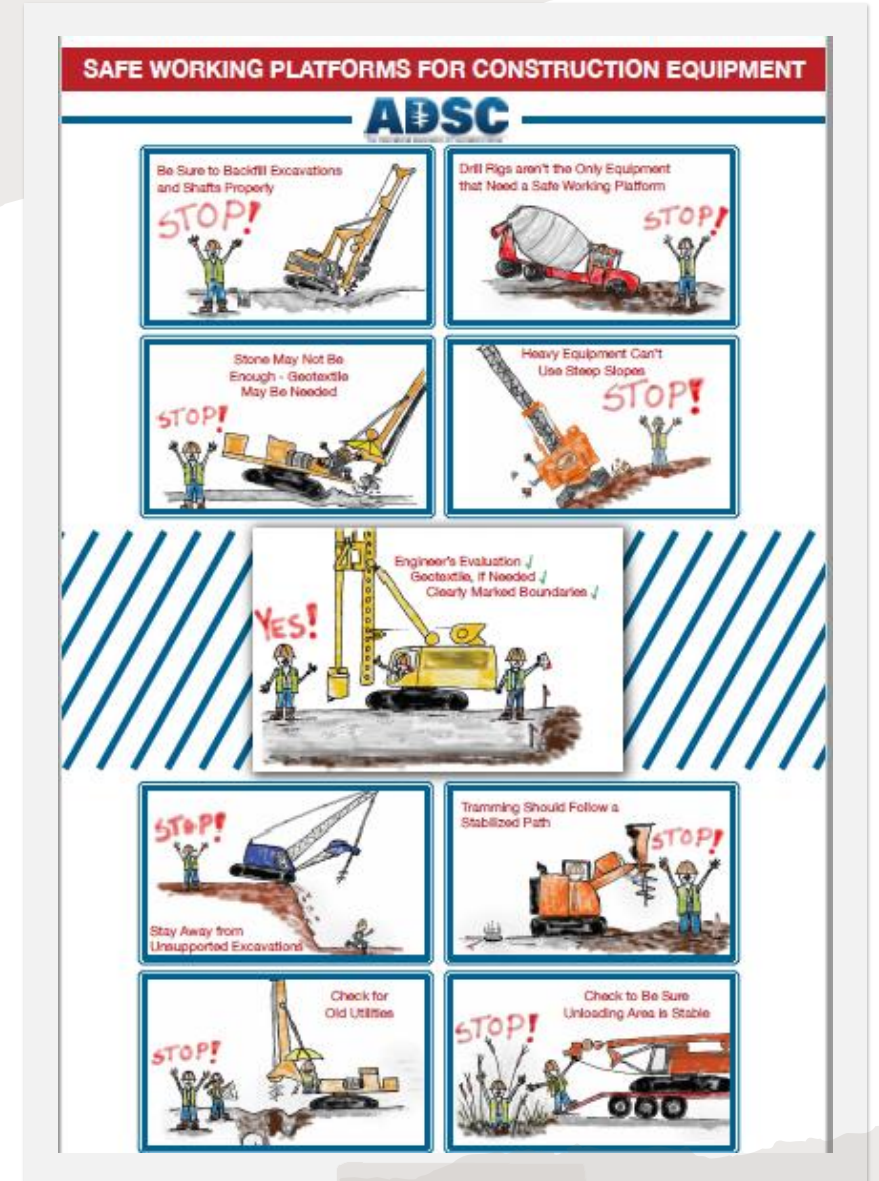
# ESTIMATING AND PROPOSALS

- Rig Stability and Working Platform are key elements of planning and estimating the work.
- Platform requirements need to be presented in your proposal.
- Bring to the table as early as possible – Budget estimates can educate client on issues and set aside line items before final project costs are set.



# On-Site Conditions

- Competent person onsite – trained in the recognition of a change of conditions of the platform which would render it unsafe to work/tram from. Conduct documented pre-shift platform inspection.
- Ground personnel have received training to ensure that employees operating and working near heavy equipment are aware of the need for initial project assessment and corresponding evaluation of the subgrade for proper support of foundation installation equipment and support equipment.
- Site personnel should be advised to constantly observe whether the prepared Working Platform is performing well or needs to be modified.



# On-Site Conditions

- Ongoing maintenance of the platform (housekeeping, ground leveling, keeping site as dry as possible).
- Pre-shift briefing of personnel regarding the hazards of a poor working platform.
- Ensuring exclusion /restricted access zones are established and maintained around mobile cranes and piling rigs to reduce the number of people required to work around the equipment.
- Carrying out risk assessments for any or your new equipment expected to arrive onsite, and any from other subcontractors.





# Safe Working Platforms

Due to existing ground conditions at a given site, it may take some engineering to construct a safe working platform . . .



# Safe Working Platforms

Or, it could be the addition of a simple dry, level compacted pad or the use of crane mats for you to work from . . .







# Safe Working Platforms = Risk Management

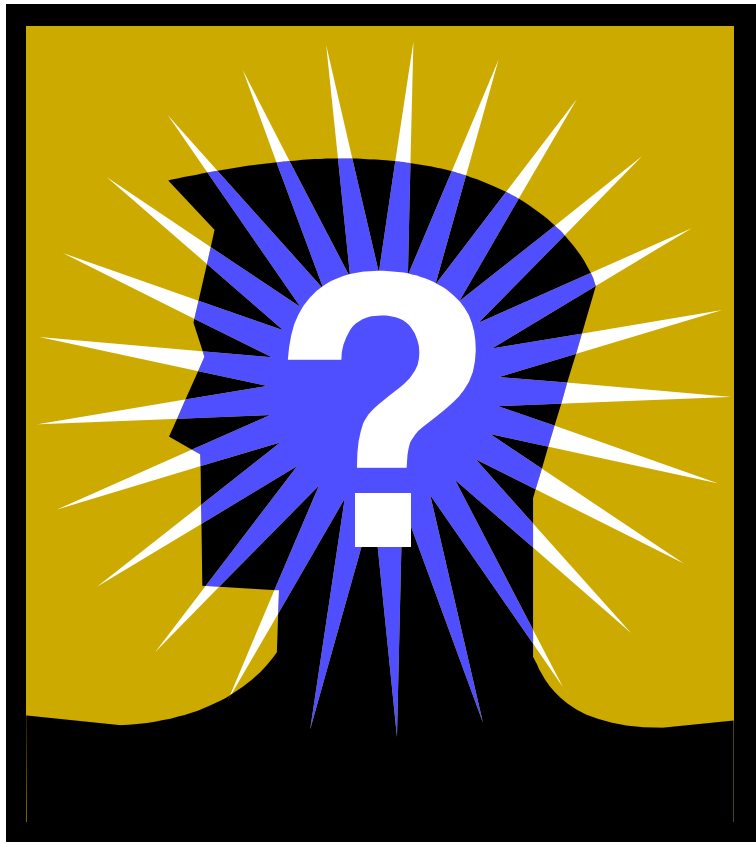
- This risk management tool provides a framework for administering a responsible program for maintaining jobsite safety while promoting communication among project stakeholders concerning roles and responsibilities in the process.
- Additionally, it supports the practice of Prevention through Design (PtD) and Design for Construction Safety (DfCS) which encourages consideration of the safety of construction and maintenance workers during the pre-construction phase of a project.
- Safety is without a doubt the most crucial investment we can make. The question is not what it costs . . . . but what it saves!





# Safe Working Platforms

We can make a difference – but we all must commit to doing so – for every job we do!



# Questions and Answers

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