



TCM 2430 – Construction Safety

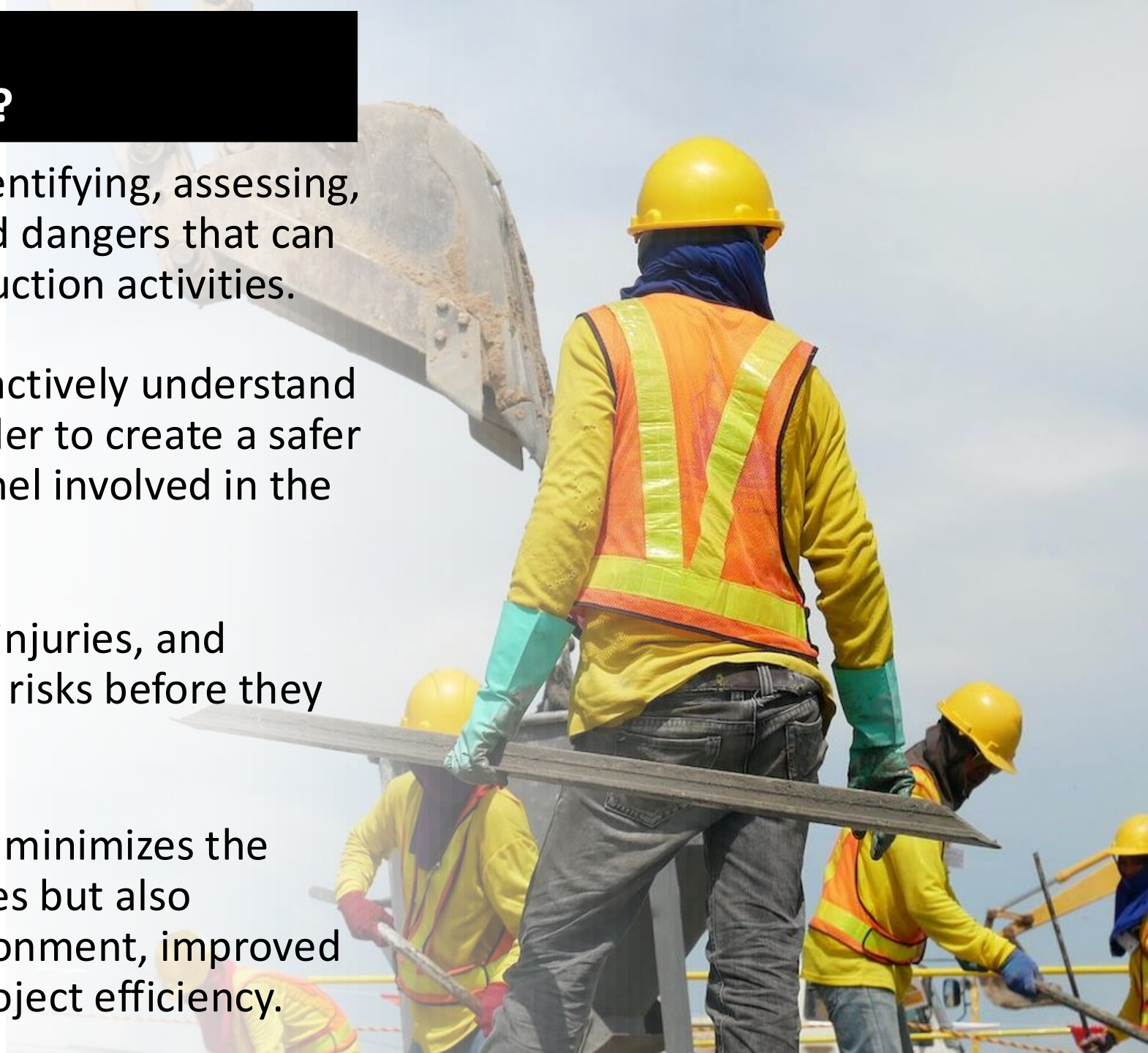
Week 4: Analyzing Construction Hazards



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What do we mean by Analyzing Construction Hazards?

- It is the systematic process of identifying, assessing, and evaluating potential risks and dangers that can arise during the course of construction activities.
- This analysis is conducted to proactively understand and mitigate these hazards in order to create a safer work environment for all personnel involved in the construction project.
- The goal is to prevent accidents, injuries, and incidents by addressing potential risks before they lead to harm.
- This proactive approach not only minimizes the likelihood of accidents and injuries but also contributes to a safer work environment, improved worker morale, and increased project efficiency.



**Look at the construction site below;
can you analyze the potential hazards?**



What is the process of analyzing construction hazards?



What is the process of analyzing construction hazards? *(Slide 1 of 2)*



Identify the Hazard: This step involves **recognizing** and listing all possible hazards that could occur on the construction site. Hazards can be related to various aspects, such as the work environment, equipment, materials, processes, and tasks being performed.



Assess the Risk: Once hazards are identified, a risk assessment is conducted to determine the likelihood and potential severity of each hazard. This assessment involves considering factors such as the frequency of exposure, potential consequences, and the number of people at risk.



Evaluate Risks : The results of the risk assessment are then evaluated to prioritize hazards based on their level of risk. Hazards that pose a higher risk in terms of severity and likelihood are typically addressed with greater urgency.



Develop Control Measures: For each identified hazard, appropriate control measures are developed and implemented to mitigate or eliminate the associated risks. These measures could include engineering controls (modifying equipment or processes), administrative controls (changing work procedures), or personal protective equipment (PPE).

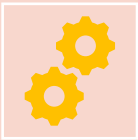
What is the process of analyzing construction hazards? *(Slide 2 of 2)*



Implement the measures: The identified control measures are put into **practice** on the construction site. Workers are **trained** on the new **procedures** or safety **measures**, and proper **equipment** is provided.



Monitoring and Review: The **effectiveness** of the control measures is continuously monitored and reviewed. This involves checking if the measures are being **followed correctly** and **assessing** whether any **new hazards** have **emerged**.



Adjust and Improve: Based on the monitoring and review process, **adjustments** and **improvements** are made to the **control measures**. This might involve **refining procedures**, **enhancing training**, or **updating equipment**.



Document: Throughout the process, **documentation** is important. Hazard identification, risk assessments, control measures, training records, and incident reports should all be documented to provide a **record** of the **safety efforts undertaken**.

Watch the video below about
“Risk Assessment
Construction - Hazard, Risk &
Safety & Understanding Risk
Assessments”

- <https://www.youtube.com/watch?v=z5ZWolvr2tl>



Click on me (in full screen)

What is a pre-construction conference?

- A pre-construction conference is a **meeting** that typically takes place **before** the actual construction work begins on a construction project.
- It serves as an important step in the project **planning** and **preparation** process, bringing together key **stakeholders** to discuss various aspects of the project and ensure that everyone is on the **same page**.
- The specific **details** and **objectives** of a pre-construction conference can **vary** depending on the **type** and **size** of the project, but it generally includes the following components:



Stakeholder Introduction

Project Overview

Project Documents

Roles and Responsibilities

Safety Procedures

Construction Schedule

Communication and Reporting

Permits and Inspections

Budget and Payments

Questions and Clarifications

Next Steps

How can safety topics be discussed in the preconstruction conference?

- A pre-construction conference is a crucial step in ensuring the safety of a construction project.
- It is a meeting that brings together key stakeholders, including project managers, contractors, subcontractors, safety personnel, and others, to **discuss safety measures** and **establish a comprehensive plan** for **maintaining a safe work environment** throughout the construction process.



What are the safety goals of a pre-construction conference?

Establish a Safety Culture

Set Safety Expectations

Identify Hazards

Maximize Collaboration

Reviewing Safety Plans

Clarify Roles and Responsibilities

Plan for Emergency Response

Check Safety Training Requirements

Discuss Equipment and PPE

Building Relationships



What are the safety goals of a pre-construction conference? *(Slide 1 of 3)*



- 1. Establish a Safety Culture:** One of the primary goals of a pre-construction conference is to **set the tone for a strong safety culture** on the project. This includes emphasizing the **importance of safety**, creating a **shared commitment** to safety among all **stakeholders**, and **fostering** a sense of **responsibility** for **maintaining** a **safe** work environment.
- 2. Set Safety Expectations:** The conference provides an **opportunity** to clearly **communicate** safety **expectations** to all **parties** involved. This includes outlining specific safety **policies**, **procedures**, and **guidelines** that everyone must follow.
- 3. Identify Hazards:** Stakeholders discuss **potential hazards** and **risks associated** with the construction **project**. This helps ensure that everyone is **aware** of the specific **risks** and can collectively **brainstorm** ways to **mitigate** them.

What are the safety goals of a pre-construction conference? *(Slide 2 of 3)*



4. **Maximize Collaboration:** The conference promotes **collaboration** among all **stakeholders**, encouraging them to share their **insights** and **concerns** related to safety. This collective input helps in identifying **potential blind spots** and finding **effective solutions**.
5. **Reviewing Safety Plans:** Any **safety plans**, **protocols**, or **procedures** that have been developed prior to the conference are **reviewed in detail**. This ensures that everyone understands the safety measures in place and how to implement them.
6. **Clarify Roles and Responsibilities:** The conference clarifies the **roles** and **responsibilities** of each party in terms of safety. This **prevents confusion** and ensures that everyone **understands** their **role** in maintaining a safe work environment.

What are the safety goals of a pre-construction conference? *(Slide 3 of 3)*



- 7. Plan for Emergency Response:** Emergency response procedures, including **evacuation plans**, **first aid** protocols, and **communication strategies**, are discussed and established. This ensures that all stakeholders know how to **respond** in case of accidents, incidents, or emergencies.
- 8. Check Safety Training Requirements:** If there are specific **training** requirements, they are discussed during the pre-construction conference. This includes ensuring that all workers have the necessary **training** and **certifications** to perform their tasks safely.
- 9. Discuss Equipment and PPE:** Discussions about the **proper use** of equipment, machinery, and personal protective equipment (PPE) are held. Stakeholders ensure that workers have access to the right tools and gear to **protect** themselves.
- 11. Building Relationships:** The pre-construction conference also provides an opportunity for stakeholders to build **relationships** and establish open lines of **communication**. A positive working relationship enhances the **effectiveness** of safety efforts.

Examples of pre-construction meeting forms

DATE OF CONFERENCE: _____

LOCATION OF CONFERENCE: _____

CONSTRUCTION MANAGER'S:

Name: _____

Address: _____

Telephone: _____

Jobsite Telephone: _____

Superintendent: _____

JOBSITE:

Location: _____

Date of Start: _____

Duration of the Project: _____

PERSONNEL INVOLVEMENT:

_____ Subcontractor.

_____ Forepersons.

_____ Workers.

EXCAVATION:

_____ Equipment.

_____ Type of Soil.

_____ Shoring System.

_____ Trench Box.

_____ Blasting.



FOUNDATION:

_____ Footing for Forms.

_____ Type of Forms.

_____ Pouring Procedures.

_____ Curing Times.

_____ Schedule for Form Removal.

_____ Backfill and Soil Stability and Solidification.

ERECTION:

_____ Types of Cranes and Hoists.

_____ Safety Harnesses, Nets and Decking Requirements, and Procedures.

_____ Worksite Access (Personnel Hoists, Stairways, Walkways).

_____ Scaffolding Procedures and Responsibilities.

_____ Welding Procedures.

SANITATION:

_____ Sanitary Facilities.

_____ Potable Water.

_____ Shower and Change Areas.

ACCIDENT PREVENTION:

_____ New Employee Orientation to Hazards and Safe Work Practices.

_____ Accident Prevention Training Programs.

_____ Safety Bulletin Boards.

_____ Location of Emergency Telephone Numbers.

_____ Monthly Safety Meetings.

WHAT IS JOB HAZARD ANALYSIS?



What is JOBSITE HAZARD ANALYSIS

- Worksite analysis is the process of **identifying hazards** related to a project's construction activities and the construction site.
- In this process, we identify the **workplace** hazards before **determining** how to **protect employees**.

Watch the following video about job site hazard analysis and continue the slides

- <https://youtu.be/8XpNhrMrggE>
- <https://www.youtube.com/watch?v=PUjZ7UaDLIw>
- https://www.youtube.com/watch?v=UUQQC_srGMA



What hazards must be considered in worksite hazard analysis?

- In performing worksite analyses, consider not only hazards that currently exist in the workplace, but also those hazards that could occur because of **changes** in operations or procedures or because of other factors, such as **concurrent** work activities.



How do we perform worksite hazard analysis? *(Slide 1 of 3)*

1. Gather Relevant Information:

- Collect detailed information about the construction project, including project plans, blueprints, schedules, and task lists.
- Identify the types of work to be performed, equipment to be used, materials to be handled, and specific tasks involved.

2. Form a Hazard Analysis Team:

- Create a multidisciplinary team that includes project managers, safety officers, supervisors, experienced workers, and any other relevant stakeholders.
- Ensure that team members have knowledge of the construction process and potential hazards.

3. Identify Potential Hazards:

- Review each task, operation, and work area to identify potential hazards. Consider hazards related to equipment, machinery, materials, processes, and environmental factors.
- Consult safety regulations, guidelines, and industry standards to ensure comprehensive hazard identification.

4. Determine Potential Risks:

- Assess the likelihood and severity of each identified hazard. This involves evaluating the frequency of exposure and the potential consequences of an incident.

How do we perform worksite hazard analysis?



(Slide 2 of 3)

5. Rank Hazards by Risk Level:

- Prioritize hazards based on their risk level. Focus on high-risk hazards that have the potential for severe consequences and are more likely to occur.

6. Develop Control Measures:

- For each high-risk hazard, develop appropriate control measures to mitigate or eliminate the risks. Control measures can be engineering controls (changing equipment design), administrative controls (revising work procedures), or personal protective equipment (PPE).

7. Implement Controls:

- Put the identified control measures into practice. Ensure that workers are trained on the new procedures and are provided with the necessary equipment and PPE.

8. Review and Verify:

- Regularly review and verify that control measures are being effectively implemented.
- Ensure that workers are adhering to safety protocols and using PPE as required.

How de we perform worksite hazard analysis?



(Slide 3 of 3)

9. Continuous Monitoring:

- Monitor the worksite for changes in conditions that could introduce new hazards or affect existing ones. This includes changes in weather, equipment, tasks, and personnel.

10. Periodic Reassessment:

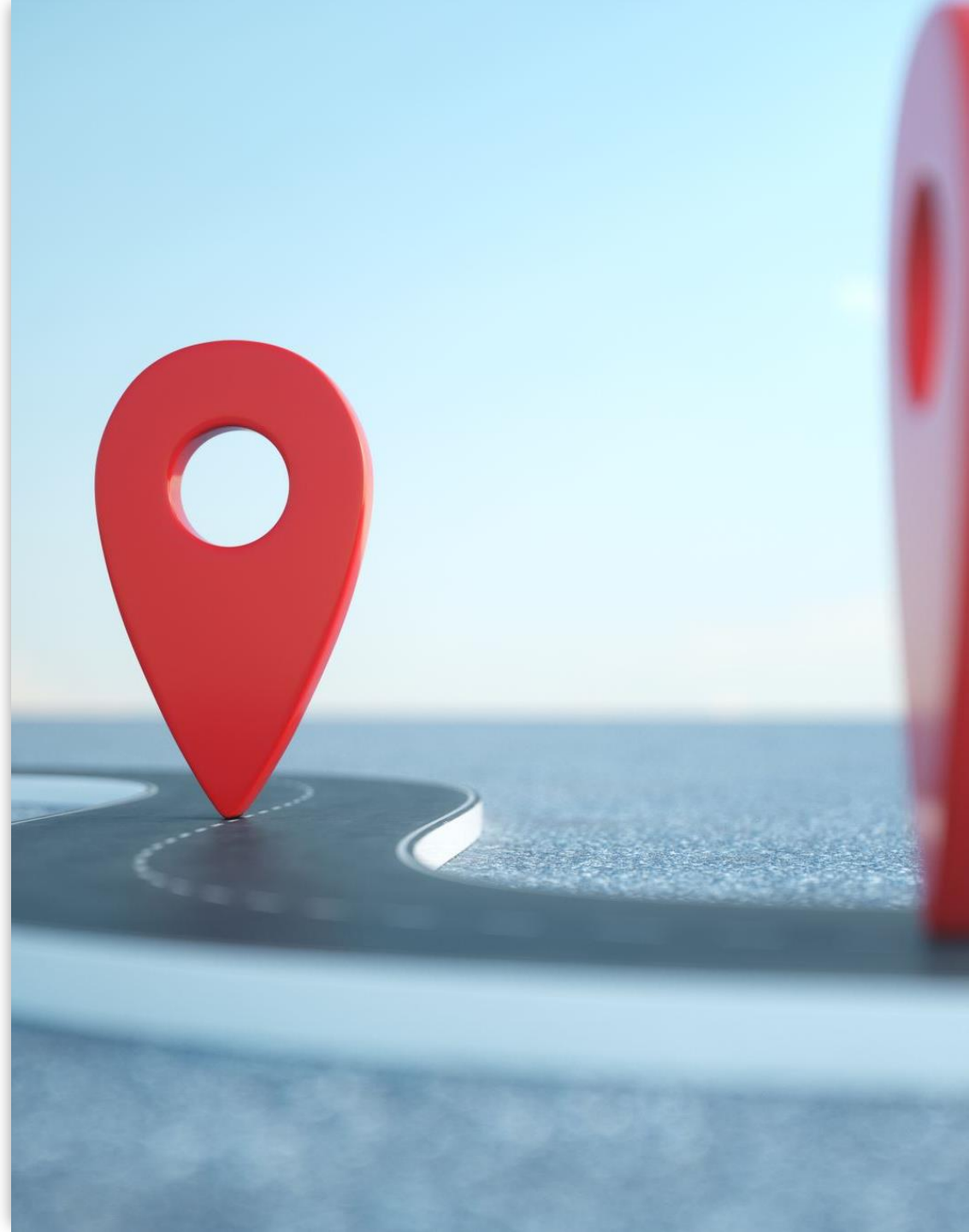
- Conduct regular reassessments of hazards as the construction project progresses or changes occur.
- Consider feedback from workers and any incidents or near-misses that have occurred.

11. Documentation:

- Document the hazard analysis process, identified hazards, risk assessments, control measures, training records, and any incidents or near-misses.
- Maintain a record of changes, improvements, and updates to the analysis over time.

Find Sample forms of Jobsite Hazard Analysis

- <https://www.powerconstruction.net/sites/default/files/docs/Power-Construction-Job-Hazard-Analysis.pdf>



What are the direct causes of accidents in construction projects?

- Direct causes are the **immediate** and **tangible** factors that directly lead to an accident. They are often the **last event** in a sequence of events that results in the accident.
- Direct causes are usually more **visible** and **straightforward** to identify.



What are examples of direct causes of accidents?

Examples of direct causes in construction accidents include:



- **Unsafe Acts:** These are actions taken by individuals that **violate** safety **procedures**, such as using equipment without proper training or not wearing required personal protective equipment (PPE).
- **Unsafe Conditions:** These are **physical** conditions in the work environment that create a hazard, such as inadequate lighting, slippery surfaces, or unstable scaffolding.
- **Equipment Failures:** **Malfunctioning** or **improperly maintained equipment** can directly lead to accidents, such as machinery breakdowns or tools malfunctioning during use.
- **Lack of Communication:** **Miscommunication** or **lack of clear communication** regarding tasks, procedures, and potential hazards can lead to accidents.
- **Improper Procedures:** **Failure to follow established safe work procedures and protocols** can directly result in accidents.



What are the indirect causes of accidents in construction projects?

Indirect causes, also known as **root causes** or underlying causes, are factors that contribute to creating an environment where **direct causes** become more **likely**. Indirect causes are often **systemic** or **organizational** issues that influence worker **behavior** and work **conditions**. Addressing indirect causes is essential for preventing accidents at their source.

What are some examples of indirect causes of accidents?

Examples of indirect causes in construction accidents include:



- 1. Inadequate Training:** Insufficient or inadequate training can lead to workers not fully **understanding** safety **procedures** or how to **operate equipment** correctly.
- 2. Lack of Supervision:** Inadequate supervision can lead to workers taking shortcuts, **neglecting safety procedures**, or **not receiving timely guidance**.
- 3. Poor Safety Culture:** A weak safety culture within an organization can influence workers to **prioritize productivity** over **safety**, leading to increased risk-taking behavior.
- 4. Inadequate Planning:** Insufficient planning, scheduling, and coordination can create **rushed work situations** where safety protocols are **overlooked**.
- 5. Inadequate Resources:** A lack of necessary resources, such as proper equipment, tools, and materials, can force workers to **improvise** or take **shortcuts** that **compromise safety**.
- 6. Time Pressure:** **Tight** project **deadlines** can encourage workers to **skip safety** steps to save time, leading to accidents.
- 7. Ineffective Communication:** Poor communication between workers, supervisors, and management can lead to **misunderstandings** about safety **requirements** and **procedures**.

Unsafe Acts and Conditions

Unsafe Acts

1. Failure to wear PPE
2. Failure to warn coworkers or to secure equipment
3. Ignoring equipment/tool defects
4. Improper lifting
5. Improper working position
6. Improper use of equipment:
 - At excessive speeds
 - Using defective equipment
 - Servicing moving equipment
7. Operating equipment without authority
8. Horseplay
9. Making safety devices inoperable
10. Drug misuse
11. Alcohol use
12. Violation of safety and health rules

Unsafe Conditions

1. Congested work areas
2. Defective machinery/tools
3. Improperly stored explosive or hazardous materials
4. Poor illumination
5. Poor ventilation
6. Inadequate supports/guards
7. Poor housekeeping
8. Radiation exposure
9. Excessive noise
10. Hazardous atmospheric conditions
11. Dangerous soil conditions
12. No firefighting equipment
13. Unstable work areas/platforms

What are examples of basic causes of accidents in policies and decisions ?



Basic Causes

Policies and Decisions

1. Safety policy is not
 - in writing
 - signed by top management
 - distributed to each employee
 - reviewed periodically
2. Safety procedures do not provide for
 - written manuals
 - safety meetings
 - job safety analysis
 - housekeeping
 - safety audits/inspections
3. Safety is not considered in the procurement of
 - supplies
 - equipment
 - services
4. Safety is not considered in the personnel practices of
 - selection
 - hiring
 - training
 - placement
 - medical surveillance
 - authority
 - responsibility
 - accountability

What are accident report forms?

- They are documents used to capture essential information about accidents incidents, and near-miss occurrences that happen on the construction site.
- These forms are a critical component of a construction project's safety management system, as they provide a standardized way to record and document incidents for analysis, investigation, and reporting purposes.
- Accident report forms help in understanding the causes of accidents, identifying trends, and implementing corrective actions to prevent similar incidents in the future.
- Accident report forms serve as a valuable tool for learning from incidents, improving safety measures, and maintaining a record of safety-related events on the construction site.
- They facilitate communication between workers, supervisors, safety officers, and management, contributing to a proactive approach to safety management.

INCIDENT REPORT FORM

Use this form to report accidents, injuries, medical situations, criminal activities, traffic incidents, or student behavior incidents. If possible, a report should be completed within 24 hours of the event.

Date of Report: _____ 20____

PERSON INVOLVED

Full Name: _____ Address: _____

Identification: ☐ Driver's License No. _____ ☐ Passport No. _____
☐ Other _____

Phone: (____) _____ E-Mail: _____

THE INCIDENT

Date of Incident: _____ 20____ Year _____ ☐ AM ☐ PM

Location: _____

Describe the incident: _____

INJURIES

Was anyone injured? ☐ Yes ☐ No

If yes, describe the injuries: _____

WITNESSES

Were there witnesses to the incident? ☐ Yes ☐ No

If yes, enter the witnesses' names and contact info: _____

Page 1 of 2

Samples of accident report forms



EMPLOYEE INCIDENT REPORT FORM

Use this form to report accidents, injuries, medical situations, criminal activities, traffic incidents, or student behavior incidents. If possible, a report should be completed within 24 hours of the event.

Date of Report: _____, 20____

PERSON INVOLVED

Full Name: _____ Address: _____

Identification: ☐ Driver's License No. _____ ☐ Passport No. _____

☐ Other: _____

Phone: (____) ____ - ____ E-Mail: _____

THE INCIDENT

Date of Incident: _____, 20____ Time: ____:____ ☐ AM ☐ PM

Location: _____

Describe the Incident: _____

INJURIES

Was anyone injured? ☐ Yes ☐ No

If yes, describe the injuries: _____

WITNESSES

Were there witnesses to the incident? ☐ Yes ☐ No

If yes, enter the witnesses' names and contact info: _____

What information should an Accident Report Form include? (slide 1 of 2)



- ***Date and Time:*** The exact date and time of the incident.
- ***Location:*** The specific location on the construction site where the incident occurred.
- ***Description of Incident:*** A detailed description of what happened, including the sequence of events leading up to the incident.
- ***Injured Persons:*** Information about individuals involved in the incident, including their names, job roles, and contact details.
- ***Witness Information:*** Contact details and statements from any witnesses to the incident.
- ***Type of Incident:*** Indicating whether it was an accident, near-miss, injury, property damage, or any other relevant incident type.
- ***Severity:*** The extent of injuries, property damage, or other consequences resulting from the incident.

What information should an Accident Report Form include? (slide 2 of 2)



- **Equipment or Tools Involved:** Identification of any equipment, tools, machinery, or materials involved in the incident.
- **Contributing Factors:** Identification of direct and indirect causes that contributed to the incident, such as unsafe acts, hazardous conditions, lack of training, etc.
- **Root Causes:** Identification of underlying or systemic factors that played a role in the incident.
- **Weather Conditions:** If weather played a role, relevant details about conditions at the time of the incident.
- **Photographs or Diagrams:** Visual documentation of the accident scene, if available, to provide additional context.
- **Supervisor or Manager's Comments:** Comments from supervisors, managers, or safety officers who responded to the incident or were involved in its investigation.
- **Actions Taken:** A summary of the immediate corrective actions taken after the incident and plans for further investigation or preventive measures.
- **Follow-Up Actions:** Details of any follow-up actions required, including changes to procedures, additional training, equipment repairs, etc.
- **Report Filer:** Information about the person filing the report and their contact details.