

CONSTRUCTION MANAGEMENT

UNIT-10

Safety Management in Construction

Importance of safety :

An unintended occurrence arising out of and in the course of employment of a person resulting in injury or an accident is defined as an event that is unplanned, undesired, unexpected and uncontrolled, and one that may or may not result in damage to property or injury to person, or both, in the course of employment or occupational accident as an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work, which results in one or more workers incurring a personal injury, disease, or death..

Accidents in the construction industry tend to be costly in both human and financial terms. These expenses are concentrated in the areas of health care, litigations, management time, and workers compensation. Safety is not a luxury and may be considered an important function to be used against unnecessary loss of property, injury or death. Preventing occupational injuries and illness should be a primary concern of all employers. Especially in developing countries, there must be an effort to raise the level of awareness among both employees and employers of the importance of health and safety at work-sites

Hazard's condition at construction site

Several accidents are caused by the following factors:

1. Unsafe mechanical or physical condition Example: Over loading, poor light.
2. Unsafe acts Example: Working under suspended loads, operating without authority, using damaged tools.
3. Personal factors

Construction accidents that can occur include

1. defective and collapsing scaffolds

2. falls from ladders,
3. falls from roofs and roofing structures; cranes,
4. injuries from faulty machinery like tractors and forklifts, toxic welding rod injuries; crane accidents,
5. electrical accidents,
6. power tool accidents,
7. holes in flooring,
8. construction debris accidents,
9. lift accidents,
10. fires and explosions,
11. burn injuries,

The effects of accidents in construction industry are

1. Loss of human life.
2. Temporary or permanent injuries to workers.
3. Loss or damage of materials and equipment's.

4. Loss of time in completion of work.
5. Loss of money by way of compensation, medical expenses and cost involving in re-doing the work.

In construction industry accidents due to the following causes:

1. Failing to identify an unsafe condition that existed before an activity was started or that developed after an activity was started.
2. Deciding to proceed with a work activity after the worker identifies an existing unsafe condition.
3. Carelessness of workers during the work i.e. the workers carrying heavy materials such as stones, bricks, cement concrete etc., at higher level by moving over temporary support and the painters and masons during plastering or masonry work..
4. During dismantling of the building, loose unprotected and unsafe parts such as walls, beam etc., results in accidents.
5. Due to overcrowding of workers at a particular spot of support there may be accident occurs due to failure of support
6. The greediness of contractor will lead to the accident

The objective of safety managements are:

1. To help increase in speed in construction,
2. To increase the standard of living,
3. To reduce cost of construction,

4. To conserve the available labour force by minimizing idle time,
5. To reduce human suffering.
6. Safety in Planning and Design
7. Plan the works to meet the complete requirements.
8. Design the structure considering all the loads and to meet the codal requirements.
9. Procure and use standard material.

SAFETY PRECAUTIONS TO PREVENT ACCIDENTS

1. The supports provided at higher levels over which the workers move in connection with the work should be strong and stable.
2. For workers moving at higher levels the support should have side protections to prevent the workers from falling due to slipping.
3. Before dismantling the building all unsafe parts should be properly protected to prevent any accidents to the workers.
4. No unskilled person should be engaged on jobs such as operation of heavy equipment's like bulldozers, cranes, etc.
5. For workers engaged in operations such as welding, etc., effective screens or proper goggles should be provided to the workers for the protection of eyes.
6. No workers should be allowed to enter into pits or chambers or confined spaces where danger fumes are present.
7. Safety training is provided for workers.
8. Making use of personal safety devices and protective equipment's(wearing Helmet, Safety belts etc.)

SAFETY MEASURES TO BE ADOPTED FOR

Excavation

The following safety measures should be adopted at the time of excavation

1. In all works, an experienced and competent foreman or supervisor should look after the excavation work. He should have authority to enforce safety rules and prevent the use of defective/unsafe appliances.
2. Before doing the excavation work, a complete knowledge of underground structures (such as sewers, water pipe lines, gas mains, etc.) is essential.

3. Safety helmets should be worn by all persons entering a trench where hazards from falling stones, timber or other materials exist.
4. Whenever workmen have to excavate in trenches in soil, soft or fissured rock, or hard soil exceeding 2m in depth, the trenches should be properly shored and timbered.
5. Sheathing should be placed against the side of the trench so that the length of each piece of sheeting is vertical. Where the trench is excavated in loose or soft soil, each piece sheathing should be driven into the bottom of the trench so as to be firmly held in a place.
6. Excavated material should be kept away from the edge of the trench in order to provide a clear berm width not less than one third the final depth of excavation. However, in special cases where disposal area is limited, the minimum berm width should not be less than 1 m.

Scaffolding, Ladders, Form work and other equipment

Various safety measures to be adopted while using ladders, formwork and scaffolds are:

1. Every scaffold should be securely supported or suspended and properly braced to ensure stability
2. If independent of a building, they should be braced properly.
3. If scaffolds are to be used to a great extent for long periods of time, a regular plank stairway, wide enough to allow two people to pass, should be erected with handrails on both sides.
4. When work is being performed above a scaffold platform, a protective overhead covering should be provided for the men working on the scaffolds. The protection should not be more than 3m above the scaffold platform and should be made of planks.
5. All scaffolds should be erected and dismantled by workmen who are thoroughly experienced in the erection and dismantling of scaffolding.
6. All scaffolds should be inspected by a competent person at least every three days after erection, and the results of inspections recorded and the records shall be kept available for checking by the Employer's representative.
7. Tags shall be fitted to all scaffolds to show whether they are safe for use or not: All Safe for Use tags shall be signed by a senior site engineer from the Contractor
8. All scaffolds shall be constructed of sound materials free from patent defect.
9. For wooden ladders, no rung should be fixed to the stringer with nails spikes or other similar fixings. In case of bamboo ladders, rungs may be fixed to the rails with spikes of appropriate design and strength.

10. Ladders employed in heavier trades should not exceed 6m in length. For lighter trades, ladders should not exceed 8m in length.
11. During dismantling of scaffolds, necessary precautions should be taken to prevent injury to persons due to fall of loose materials, bracings and other parts of scaffolds.

12. Care should be taken to see that non-insulated electric wires exist within 3metres.
13. The supporting balies for formwork should be checked for each individual member. The ballies should be properly braced. Many accidents occur due to negligence on this account.

14. All operators and supervisors of machines should be thoroughly trained in operation the machines and equipment. All persons handling construction equipment should be completely acquainted with the safety aspects of machines and then operation.

15. Safety in terms of both main and auxiliary equipment should be considered at all construction sites. Unauthorized persons should not be allowed to handle or operate any equipment.

16. Ropes, guys and connection should be thoroughly checked before use.

Fabrication and Erection

The following safety measures should be adopted during fabrication and erection:

1. All equipment such as gas cutting and welding sets, drills, power hacksaws, grinders, etc.

2. Should be checked periodically to ensure their safe working.
3. Moving parts of all equipment should be provided with safety guards.
4. Rubber pipe-lines for oxygen and acetylene gas should be regularly checked for leakage or damage. Leakage of gas from regulators, pipe lines or connections with the gas torch should be rectified immediately.
5. Workers engaged in gas cutting and welding operation should wear suitable gloves and aprons and use proper welding screens.
6. Power cables for all equipment should be properly insulated and protected from damage and cuts.
7. Danger signs should be prominently displayed on all poles of overhead electric lines/conductors used at site
8. Cut pipes and scrap should be stored at an appropriate place to avoid accidents.
9. All lifting tools and tackles such as wire ropes, U-clamps, shackles, chain-pulley hooks, etc., should be checked thoroughly before undertaking erection work.
10. Worker engaged in erection work should wear helmets and use safety belts to avoid accidents.

Demolition

Various safety measures to be adopted at the time of demolition of buildings are:

1. On every demolition work, danger signs should be provided all around the structure and doors giving access to the structure. Barricades should be erected around the

structure. and at least two exit must be provided for the escape of workmen during any emergency.

2. During night time, lights should be placed around the barricades and entry of unauthorized persons restricted.
3. At the time of demolition work, workers should use all safety appliances such as helmets, goggles, gloves, etc.
4. The process of demolition may weaken the side walls of an adjoining structure and to prevent possible damage, these walls should be supported until permanent protection is provided.
5. The power on all electrical service lines must be shut off and all such lines disconnected before the demolition work is started.
6. If a structure to be demolished has been partially wrecked by fire, explosion, the walls and damaged roofs should be braced suitably.
7. No demolition work should be carried out at night especially when the structure to be demolished is in an inhabited area.

SAFETY MEETINGS

Safety meetings are frequently carried out to review the safety measures at project site at different levels:

- Job Site Safety Meetings

Since conditions are constantly changing on a construction site, regular and frequent jobsite safety meetings are essential to the safety performance on the site. The contractor should be required to host and conduct the meetings to monitor safety activities on the project.

Two types of jobsite safety meetings commonly included on construction projects are initial project orientation and weekly safety meetings.

- Project safety orientation

New employees to the project should be required to attend an initial project safety orientation that covers the site-specific rules and procedures that must be followed, along with the disciplinary action that may result if such procedures are violated or ignored.

- Weekly safety meetings

Weekly safety meetings should be held by all contractors on the site to review safety conditions and corrective actions taken. The Prime contractor should be required to attend all of these meetings, to hear the concerns that are raised and make sure they are addressed in a timely manner. Documentation in the form of minutes, of all meetings should be required in the contract documents. On larger or complex projects, a separate meeting may be held weekly to discuss safety health and environmental liaison.

- Monthly safety meetings

A monthly safety meeting is normally held at a higher level on larger projects, in order to decide strategic issues rather than the detail of day to day work. Discussion between the most senior management of the participators in the work, to review reports and recommendations and to review minutes of the weekly meetings held on site to identify trends and points where executive action is required to implement necessary changes.

- SAFETY CAMPAIGN

With the increase in the number of accidents in the construction industry, it has become essential to educate people in regard to safety measures. It is the duty of management to provide a safe working environment to workers at construction sites. Unsafe practices must not be tolerated at any cost and proper safeguards must be provided at all times.

Frequent exchange of ideas between the labour and the management would help in minimizing the accident rate.

A continuing education programme using posters, booklets, films lectures and discussions with emphasis on supervisory safety training will prove effective in reducing the accident rate. It should be understood both by management and the workers that all accidents occur due to negligence on the part of someone. Accidents result in loss of life, property and reputation of the construction agency apart from financial loss and litigation. Accidents adversely affect the progress of work and have a demoralizing effect on the construction team. Safety play an important role in executing a construction project with speed, economy and efficiency.

EMPLOYER'S LIABILITY FOR COMPENSATION

1. If a personal injury is caused to a workman by an accident in the course of his employment, then the employer should pay the compensation according to the provision of the act. The compensation is provided if the employer shall have:
2. The injury disabling the workers for a period more than three days.

3. Have the injury resulting in death caused by an accident, if the worker being not under the influence of drinks or drugs.
4. No disobedience of the worker to the orders issued for the safety of the workers.
5. No removal of any safe guard.

If the worker refuses to undergo medical examination and other medical free of charge and by a medical qualified doctor and if any injury resulted in disablement of the worker, then the worker will not be entitled for compensation.

SAFETY THROUGH LEGISLATION

In construction industry the legislation is needed for:

1. Improving the working condition
2. Determining the terms of employment
3. Providing social security i.e. compensation
4. Regulating the relationship between employers and employees
5. Safe guarding the lives of workman for the welfare of worker

Workmen Compensation Act (1923)

This act covers all persons employed in construction, maintenance, repairs or demolition of any building, dam, roads, bridges, tunnel works, plastering operations, etc.

The salient features of the Act are

1. The Act defines partial and total disablement and fatal accidents while on duty.
2. It sets a schedule of compensation to be paid for various injuries.
3. The Act protects workers against injuries arising out of and in the course of employment. But no compensation is payable in respect of
4. Injury which will not result in partial or total disability
5. Non-fatal injury caused by the worker under the influence of alcohol

6. The Act identifies important occupational diseases.
7. The Act decides the quantum of loss of earning capacity in terms of percentage in the event of injury.
8. The Act prescribes rate of compensation to be paid by employer to the injured or deceased person in proportion to the quantum of injury.
9. The Act provides appointment of commission for workmen's compensation whose functions are:
 10. Settlement of disputed claims
 11. Disposal of claims in case of fatal cases
 12. Revision of periodical payments
13. It is liable on the employer to pay compensation to workers as per provisions of the Act, failing

CONTRACT LABOUR(REGULARATION & ABOLITION) ACT,1970

Object of the Act

To regulate the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances and for matters connected therewith.

Applicability

- Every establishment in which 20 or more workmen are employed or were employed on any day of the preceding 12 months as contract labour.
- Every contractor who employs or who employed on any day of the preceding twelve months 20 or more workmen.

Registration of Establishment

Every Principal employer employing 20 or more workers through the contractor has to register with the Authority by paying prescribed fees.

Licensing of Contractor

- Every Contractor engaging 20 or more workers should obtain License from the Authority by required fees and keeping specified Security Deposit.
- The License is issued for specified period.

Prohibition of Employment of Contract Labour

Only by the appropriate Government through issue of notification after consultation with the Board (and not Courts) can order the prohibition of employment of contract labour.

Welfare measures to be taken by the Contractor

- 1.Canteen facility (if workers are 100 or more)
- 2.First Aid facilities.
- 3.Rest Rooms
- 4.Drinking water, latrines and washing facilities.

Liability of Principal Employer

- To ensure provision for canteen, restrooms, sufficient supply of drinking water, latrines and urinals, washing facilities.
- Principal employer entitled to recover from the contractor for providing such amenities or to make deductions from amount payable.

Registers of Contractors

By Principal employer

- To maintain a register of contractor in respect of every establishment in prescribed form.

By Contractor

- Maintain Muster Roll and a Register of Wages in Form XVI and Form XVII respectively when combined.
- Register or wage-cum-Muster Roll in **prescribed** Form
- Register of Deductions for damage or loss.

- Register or Fines
- Register of Advances
- Register of Overtime
- To issue wage slips to the workmen at least a day prior to the disbursement of wages.
- Obtain the signature or thumb impression of the worker concerned against the entries relating to him on the Register of wages or Muster Roll-Cum-Wages Register.
- When covered by Payment of Wages Act, register and records to be maintained under the rules
- To display an abstract of the act and Rules in English and Hindi and in the language spoken by the Majority of workers in such forms as may be approved by appropriate authority.
- To display notices showing rates of wages, hours of work, wage period, dates of payment, names and addresses of the inspector and to send copy to the inspector and any change forthwith
- To issue an employment card to each worker in prescribed form.
- To issue service certificate to every workman on his termination in prescribed form.

Penal Provision

- For contraventions of Provisions of the Act, imprisonment upto 3 months or fine upto Rs.1,000/-.
- For continuous contraventions of the Act, fine of Rs.100/- per day