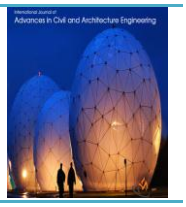
International Journal of Advances in Civil and Architecture Engineering

Journal homepage: www.mcmed.us/journal/ijacae



IMPLEMENTATION OF HSE REQUIREMENTS AS PER OHSAS 18000-18001 AND EMS 14001 AT CONSTRUCTION OF RESIDENTIAL PROJECTS

Rajapandian Ramadass[1]*, B. Jose Ravindraj[1], Vijayasarthy[1], Rajadurai[2]

[1*]Final Year, Department of Civil Engineering PRIST University, Thanjavur, Tamil Nadu, India.
[1]Profs & Head, Department of Civil Engineering PRIST University, Thanjavur, Tamil Nadu, India.
[1] ASST Profs, Department of Civil Engineering PRIST University, Thanjavur, Tamil Nadu, India.
[2] HSE Manager, Facilities and Building Solutions Ltd, Karnataka, India.

Corresponding Author:- **Rajapandian Ramadass**
E-mail: raja1980.rr@gmail.com

Article Info
Received 15/04/2015
Revised 27/04/2015
Accepted 20/05/2015

Key words: HSE, Responsibility, Construction, OHSAS. Safety methods.

ABSTRACT
In the field of residential and building construction ventures the workings met lots of practical hitches like procedure, responsibility, monitoring, evaluation housekeeping at Construction Sites and associated offices, perimeter area, stores, workshops, batching plant, stock yards and labor camp etc. it describes requirement of housekeeping activity at different stages of work & periodicity to maintain site neat & tidy, which should be budgeted, planned & adhered. Before commencing this activity site execution team is recommended to evaluate the foreseeable risk by conducting risk assessment of the particular activity so as to prevent any harm to the engaged team. So we emphasis to resolve this practical hitches by safeguard methods in venture works has been undertaking. We also focused is to address the safe work practices for different activities in construction work, considering its practical and engineering aspects and its implementation at site level under the responsibility of Project Head. Our study is being used for implementation HSE at site. We specifies the topic such as to fill a knowledge gap on site safety issues, to provide handy reference of best practices for frontline management teams, to offer site safety management techniques and tools for use, by practicing these documents effectively , prevention of incidents. This process of technique will help to ensure housekeeping standards and a safe & healthy work environment at all time.

ABBREVIATIONS
CEO- Chief Executive Officer; SF-Safety Format; SP- Safety Procedure; HO- Head Office; SMS- Safety Management System; HOD- Head of the Department; IA-Internal Audit; ISO-International Organization for Standardization; NCR- Non Conformity Report; OCP- Operational Control Procedure; OH&S- Occupational Health & Safety; PC-Project Coordinator; PIC- Project In-charge; PM-Project Manager; EMP- Environment Management Programme; PPE-Personal Protective Equipment; RO- Regional Office; ROR-Register of Regulations; SE-Safety Engineer; SS - Safety Supervisor; HIRA - Hazard Identification & Risk Assessment; EPR - Emergency Preparedness & Response.

INTRODUCTION

The Safety Management System of Construction Company shall be applied during the construction Project and will be in full compliance with the Owner's Health, Safety and Environment Specifications.

Construction Company will apply their in-house Safety Management Systems, described herein. As a Contractor having an excellent health, safety and environmental record, we treasure this reputation and we will manage a project-specific Safety Plan to the highest standards in order to:

• Protect the health of our workforce and other personnel
• Maintain and improve safety performance.

• Protect our environment during all phases of the Project

Safety of people has a high profile in Construction Company entrepreneurial business activities. Consequently the Board of Directors supports all measures to maintain the health and safety of company workforce. We believe that personal harm, injury and damage are avoidable through effective planning of work, implementing risk-based control measures and monitoring performance.

This is achievable through:-

• Careful selection of company workforce and ensuring that they have the required skills.
• Providing employees with appropriate classroom and on-the job training.
• Delegating responsibility and authority for safety and the environment to line management;
• Holding line management accountable for performance in respect of the total job.
• Full attention, without compromise, to the issue and use of personal protective equipment.
• Being a good, personal example at all times.

Company commitment will be further demonstrated by:-

• Attendance and participation in safety meetings
• Conformance with the safety rules.
• Regular corporate safety audits
• Observance of the Owner's Safety Specifications and relevant national legislation.
• Provision of competent and experienced safety supervision for the project

To promote work safety and good health is one of the predominant tasks of each Manager. Success in this respect is an indispensable proof of qualification.

However, it is only through the full co-operation of all personnel at the worksite including the Owner's / Employees that this safety plan can be a success.

This Work Instructions is to provide housekeeping procedure for maintaining good housekeeping at Construction Sites and associated offices, perimeter area, stores, workshops, batching plants, stock yards and labor camp etc. It will help to ensure housekeeping standards and a safe & healthy work environment at all time.

This Work Instruct the procedure, responsibility, monitoring and evaluation procedure for housekeeping at Construction Sites and associated offices, perimeter area, stores, workshops, batching plant, stock yards and labor camp etc. And also it describes requirement of housekeeping activity at different stages of work & periodicity to maintain site neat & tidy, which should be budgeted, planned & adhered. Before commencing this activity site execution team is recommended to evaluate the foreseeable risk by conducting risk assessment of the particular activity so as to prevent any harm to the engaged team.

It might be safeguards and guides the client and responsible contractors. And the respective Contractor is responsible to transmit this work instruction to their sub-contractors and ensure that the contents are clearly understood by them. In case of not adherence to work instructions and non-performance by Contractor, the Client Project Head has the right to get this done by other contractor and back charge the same to defaulting contractors. Work Instruction As Per BOCW Act; Housekeeping, Housekeeping Hazard Identification & Risk Assessment, Demolition, Scaffold, Excavation Façade, Permit To Work.

Work Instructions on Housekeeping:

Housekeeping: is the general term referring to the orderliness and organization of work areas and the treatment of all waste materials with the view to ensuring safe and healthy work conditions for site personnel, the protection of the environment and material resources, and to maximize the efficiency and quality of the work.

- User/PMC Site Safety Engineer **:** Monitor on daily basis and evaluate fortnightly along with Project Head.
- Client Project Head**:** Monitor & evaluate fortnightly along with Safety Engineer.
- Client Regional Head**:** Evaluate on monthly basis.

i. HO Safety Team**:** Quarterly evaluation

We have maintain periodicity and timely feedback should be given to respective Contractor for continual improvement.

- We Maintain Hygiene at Workplace, Labour Camp and Canteen
- Emergency Procedures and Details of Site Features:

Work Instructions on Hazard Identification & Risk Assessment

Hazard identification is the process used to identify all the possible situations in the workplace where people may be exposed to injury, illness or disease.

Risk assessment is the process used to determine the likelihood that people may be exposed to injury, illness or disease in the workplace arising from any situation identified during the hazard identification process.

Risk control is the process used to identify all practicable measures for eliminating or reducing the likelihood of injury, illness or disease in the workplace, to implement the measures and to continually review the measures in order to ensure their effectiveness.

Risk: Combination of likelihood of an occurrence of a hazardous event (P) and the severity of injury or ill health that can be caused by the event (S).

Risk (R) = Probability (P) X Severity (S)

Acceptable Risk: Risk that has reduced to a level that can be tolerated by the organization having regards to its legal obligations and its own OH&S policy.

Not Acceptable Risk: A 'Not Acceptable Risk' is one which exceeds some threshold for significance.

Fatal Incident: Loss of life / bodily injury, which may permanently, disables a person to carry on his daily work.

Ill Health: Identifiable, adverse physical or mental condition arising from and/or made worse by a work activity and/or work-related situation.

Procedure:

To identify & evaluate hazard involved in every activity during execution & to find appropriate practical control measure to avoid harm to Personal & Property of the company.

HIRA is a part of planning stage & it should be prepared well before start of every activity.

❖ **HIRA Preparation**

❖ **HIRA Preparation Team (HPT):**

❖ **Identification of Hazard & Subsequent Risk:**

❖ **Sources of Information or Inputs to be considered during HIRA:**

❖ **Method of Risk Classification:**

In order to identify level of risk associated to identified hazards, the hazards will be evaluated in accordance with their probability & severity and classified in category indicated below,

Step 1 Hazard Identification

Step 2 Risk Rating (R) without control

Step 3 Risk Rating R with control

Step4: RISK Calculation / Evaluation:

	Severity (S)			
Probability (P)	**1. Negligible**	**2. Minor**	**3. Severe**	**4. Extreme**
1. Improbable	---	---	D	C
2. Remote	---	C	C	B
3. Possible	D	C	B	A
4. Probable	C	B	A	A

A: Hazard must be avoided (or the level of risk reduced significantly and reliable by controls).

B: Hazard should be avoided (or the level of risk reduced significantly and reliable by controls).

C: Risk to be controlled as far as reasonably practicable.

D: Risk is controlled as far as reasonably practicable.

---: No control measure necessary.

Step 5: Implementation of Control Measure:

❖ Eliminating the hazard
❖ Substitution
❖ Engineering Controls
❖ Redesign
❖ Isolation
❖ Prevent or minimize exposure to the risk:
❖ Administrative controls
❖ Personal Protective Equipment (PPE)

Step 6: Submission of HIRA:

	Name	Org / Sec.	Signature	Date
Prepared By Contractor				
Reviewed By PMC				
Approved By Client Site Head				

Work Instructions on Demolition

he work incidental to or connected with the total or partial dismantling or razing of a building or a structure other than a building and includes the removing or dismantling of machineries or other equipment.

❖ **Demolition:** For workplace with risk of fall of wall, adjacent structures endanger to the public and damage to underground utilities than full protection has to be in place at all time while doing the demolition work.

The following priority of proactive measure has to be applied at all times:

1. Technical Measure (e.g. barriers, signage's, opening covers, underground utilities etc..)
2. Organizational Measures (e.g. selection of different type of equipment's, safe methodology, etc…)
3. Personal Protective equipment's (PPE)

Demolition methodology has to be chosen carefully taking into account the building height above ground level to be demolish, adjacent structure, utilities, type of building etc… Methodology of the work has to be communicated to all the crew members. For carrying out demolition work using manually or mechanically, a rescue plan for any possible accidental fall of wall/ building has to be prepared and the deployed personnel has to be inducted accordingly. A rescue team should be identified, trained and available at the place while doing the demolition in case of emergency.

Before commencing the demolition work, it is important to consider the following.

❖ Demolition Requirements.
❖ Preparation of Demolition Area
❖ Protection of Adjacent Structures
❖ Access egress and illumination
❖ Storage of Material and Articles
❖ Warning Signs, Barricades and Floor Openings
❖ Fitness of all mechanical & powered equipments and vehicles and hand tools etc by inspection.
❖ Emergency Procedures and Details of Site Features.

Work Instructions on Scaffolding Erection & Dismantling

Scaffold means any temporary elevated platform (supported or suspended) and its supporting structures (including point of anchorage), used for supporting employees or material or both. It is erected during new construction or renovations projects from which persons can perform maintenance, dismantling operations, or support equipment/materials when such work cannot be safely performed from ladders. Scaffolding can also be used to provide access to a secondary work area.

- ❖ Ladder Access Safety:
- ❖ Fall Protection :
- ❖ Scaffold Tag Procedure :
- ❖ Type of Scaffold :
  - Putlog Scaffold:
  - Independent Scaffold:
  - Interlocking Modular Scaffold:
  - Tower Scaffold:
  - Mobile Tower Scaffold:
  - Trestle Scaffold:
  - Frame Scaffold:

❖ **Tubular And Coupler Scaffold:**

In the construction of tubular and coupler scaffold following classification shall be used.

- ➢ Light Duty
- ➢ Medium Duty
- ➢ Heavy Duty

All tube and coupler scaffolds shall be constructed and erected to support three times the maximum intended loads, as set forth in Tables below or as set forth in the specifications by a licensed professional engineer competent in this field.

	Light Duty	**Medium Duty**	**Heavy Duty**
Maximum intended load	11.34 Kg/Sq.ft	22.68 kg/Sq.ft	34 kg/Sq.ft
Posts, runners, and braces	Nominal 2 in. (1.90 inches) OD steel tube or pipe	Nominal 2 in. (1.90 inches) OD steel tube or pipe	Nominal 2 in. (1.90 inches) OD steel tube or pipe
Bearers	Nominal 2 in. (1.90 inches) OD steel tube or pipe and a maximum post spacing of 4 ft. x 10 ft.	Nominal 2 in. (1.90 inches) OD steel tube or pipe and a maximum post spacing of 4 ft. x 7 ft. or Nominal 2-1/2 in. (2.375 in.) OD steel tube or pipe and a maximum post spacing of 6 ft. x 8 ft.	Nominal 2-1/2 in. (2.375 in.) OD steel tube or pipe and a maximum post spacing of 6 ft. x 6 ft.
Maximum runner spacing vertically	6 ft. 6 in.	6 ft. 6 in.	6 ft. 6 in.

❖ Work Methodology: Prior to authorizing erection of the scaffolding, the scaffolding design shall be planned, and the work site inspected as to the soil characteristics, slope/grade of the ground and to determine if any hazards may be encountered.

- ❖ Safety Practices
- ❖ Scaffold Erection

Step 1:

Place sole plate on even or compacted surface,
The sizes should be as per Figure II.8a
or depend upon the surface or soil condition,
then set base plate under the post as shown on

Step 2:

➢ Check level of post (standard), Runner (ledger) and Bearer (Transom) See Figure II.8c

➢ Use level tube for checking the verticality of the scaffold.

Step 3:

➢ Ensure that height of scaffold platform or first inter connection is not more than 4 times of base width (transoms). Base width should not be less than 1.8m .See Figure: II.8d (if not connected through inside).

➢ Distance between two posts (standard) or Connecting point of runner should not be more than a length of platform or more than 2.4 Meter. See Figure: II.8d (This is for light weight working platform)

Step 4:

➢ Height of base lift (kicker lift) should not be more than 6 inch from base plate.

➢ Height from base lift to 1st lift should not be more than 2 Meters. See Figure II.8e

Step 5:

➢ Transverse bracing should be in angle between 35^0 - 55^0 and bracing connecting should not be more than 300mm from post connecting point.

➢ Transverse bracing should be erect after leaving max. 3 open bays (in long span). (See Figure II.8f).

➢ Transverse bracing should be erect after leaving max. 2 lift at height. (See Figure II.8f)

Step 6:

- Longitudinal (Façade) bracing should be erect same angle and post node as transverse bracing.
- First bracing should be start from first post bottom node point. See Figure II.8g

Step 7:

- Erect platform, should be secured properly with G.I Wire or nylon rope, J-hooks; ends shall extend a maximum 15 cm. (6 inches) over end supports.
- Erect Top rail and Mid rail, should be between 950mm to 1150mm & 450mm to 600mm from platform respectively.
- If required to erect Toe-board, should be at a minimum of 10 cm. (4 inches) and a maximum of 15 cm. (6 inches) high with the clearance between the toe-board and the platform to be a maximum of 0.6 cm. (¼-inch).
- Access opening in landing platform should be wide not less than 900mm and shall be protected by a sturdy guardrail system with a self-closing drop bar (at top-rail height). See Figure II.8h

Step 8:

- Fixed ladder at an angle of 65°- 75° or in 4:1(1 meter distance from bottom on every 4 meter top landing).
- Secured properly to avoid sliding, and should be minimum 1 meter height from landing platform.

Step 9:

- The 'Scaffolding Supervisor' shall inspect the scaffold, after meeting with necessary requirement, will provide Scaff-Tag "GREEN" on scaffold access. See Figure II.8j and if not meeting the requirement provide Scaff – Tag "RED" See Figure II. 8k.

❖ Scaffold Dismantling

Scaffolding shall be removed upon completion of the scope of work. If the work is incomplete or suspended, access to the work areas should be prevented by attaching "RED" Scaff-tags to all ladders and access ways to that scaffold.

❖ Emergency Procedures and Details of Site Features.

Work Instructions on Excavation

It means the removal of earth, rock or other material in connection with construction or demolition work. (BOCW-1998, Rule-2(q))

Excavators And Dumpers:- Excavators are hydraulic machinery used for excavation and such excavated earth is transported using dumper .

Excavation: Excavation Requirements

Soil Type	Maximum Allowable Slope	
	Ration H:V	Slope with horizontal
Stable Rock	Vertical	90º
Type - A (Clay, silty clay, sandy clay etc.)	¾:1	53º
Type- B (Crushed rock, silt, silt loam etc.)	1:1	45º
Type-C (Submerged soil from which water is freely seeping, sand, loamy sand etc.)	1½:1	34º

- **Excavation Plan**

Before digging any excavations, it is important to plan against the following:

❖ Avoiding Underground And Above Services
❖ Undermining Near By Structures
❖ Excavation Collapse
❖ Material Falling Into Excavation
❖ People Being Struck By Plant & Machinery
❖ Access and Egress
❖ Fumes
❖ Water Flooding / Logging
❖ Impact Of Vibration
❖ Blasting
❖ Protecting The Public
❖ Supervision
❖ Inspecting Excavation

Make sure the necessary equipment needed such as trench sheets, props etc, and is available on site before work starts.

Work Instructions on Façade Work

This work instruction will help to ensure all façade work operation carried out within GPL site are controlled to prevent any incident occurrence at site and provide a safe & healthy work environment at all time.

❖ Handling of Glass
❖ Glass Handling (Manual)
❖ Mechanical

In today's market there are a very wide range of cranes, conveyors and powered mobile trucks, electrical winches (devita) available, which could be used as mechanical handling equipment in a modern glass handling , shifting and storing.

- Cranes and Hoists
- Storage of Glass
- Façade Work Lifting (Glass Panel Erection)

❖ Fall Protection
❖ Emergency Procedures and Details of Site Features.

Work Instructions on Work to Permit System

This work to permit system shall be applicable.

❖ Confined Spaces Entry
❖ Hot Works
❖ Excavation Permit

- ❖ Height Work Permit
- ❖ Night Work
- ❖ Electrical Work – LOTO
- ❖ Blasting etc…

➢ **Performance Monitoring**

A permit to work can be used over a series of dates and times provided the permit is for the same location and work activity, date and time of work must be listed on the permit.

- ➢ The Permit States / Includes
- ➢ Permit Handover:-
  - o Responsibilities of Supervisor or Authorised person issuing a Permit to Work
  - o Responsibilities of the person undertaking the work (permit holder)
  - o Display of Signs:
  - o Record Keeping:
- ➢ Completion of a PTW application Form:
  - o Starting Work With a PTW
  - o Completion of Work:
  - o Resetting Action
  - o Permit Extension:
- ➢ Emergency Procedures and Details of Site Features

Figure 1.

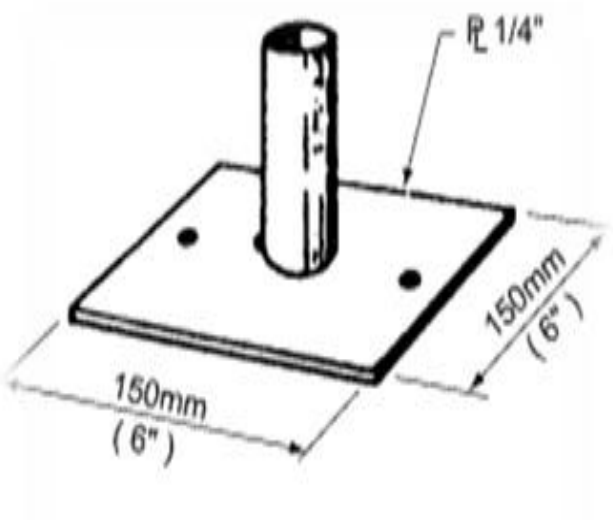


Figure 2.

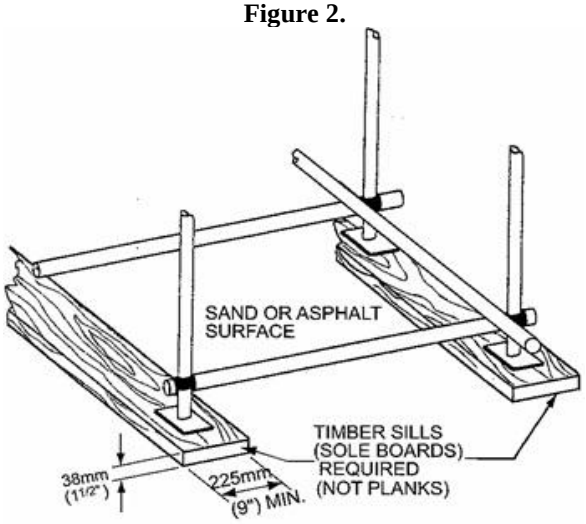
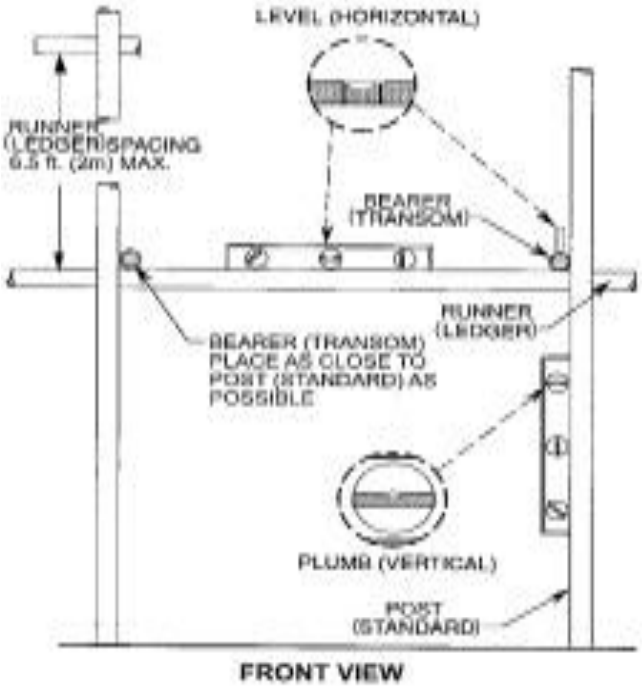


Figure II.9.43
GROUND SUPPORT

Figure 3.



FRONT VIEW

Figure 4.

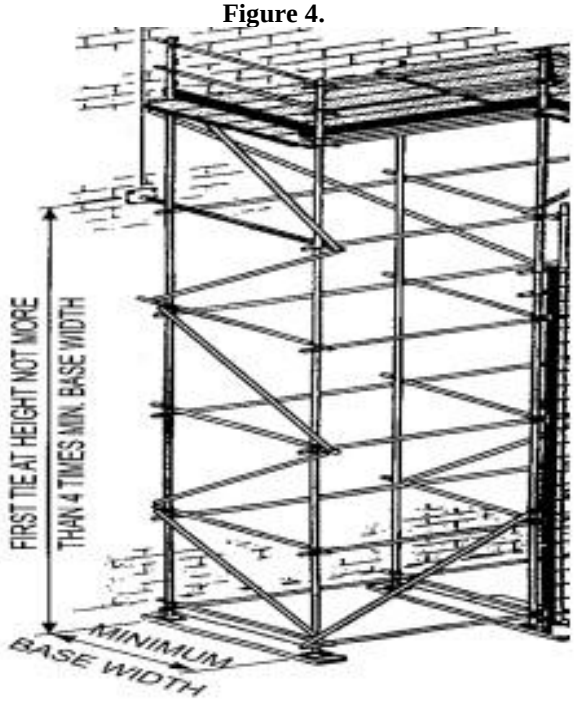


Figure 5.

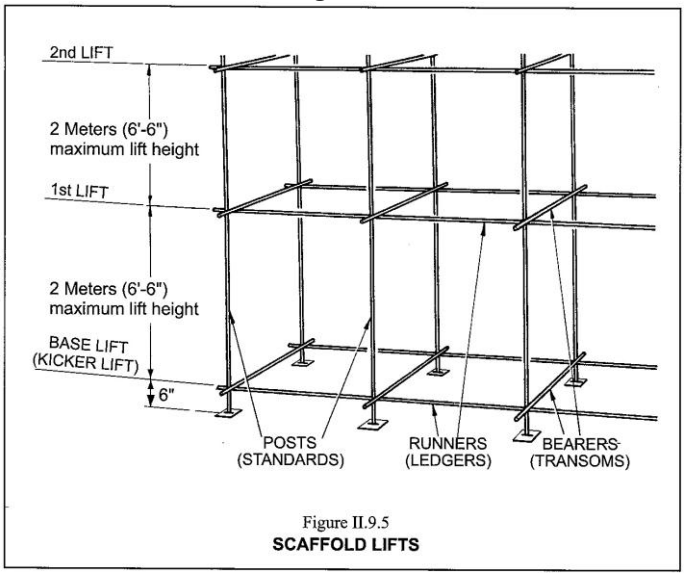


Figure II.9.5
SCAFFOLD LIFTS

Figure 6.

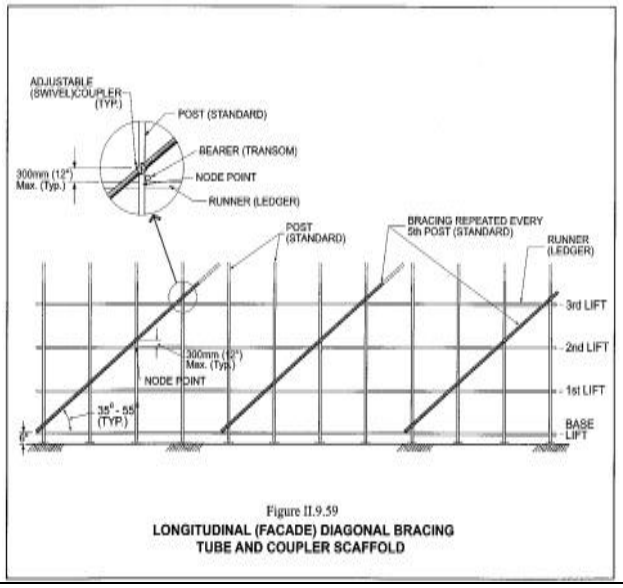
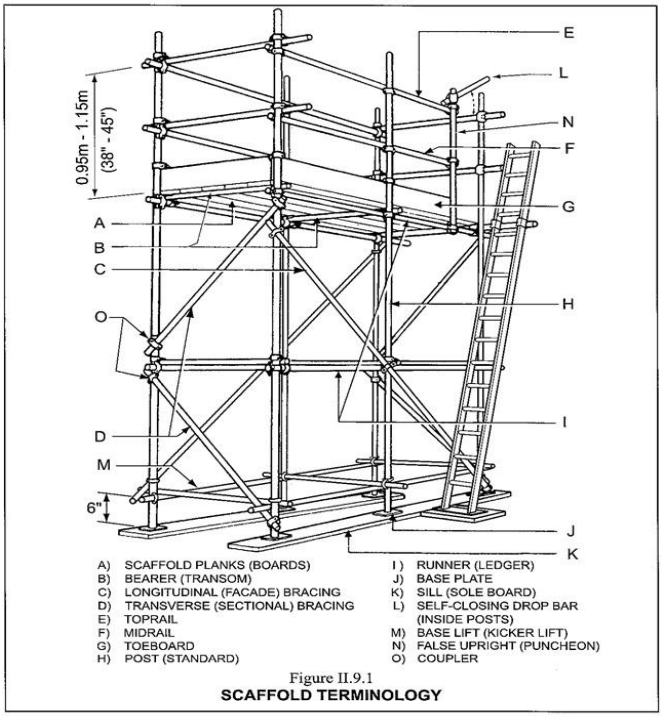


Figure II.9.59
LONGITUDINAL (FACADE) DIAGONAL BRACING TUBE AND COUPLER SCAFFOLD

Figure 7.



A) SCAFFOLD PLANKS (BOARDS)
B) BEARER (TRANSOM)
C) LONGITUDINAL (FACADE) BRACING
D) TRANSVERSE (SECTIONAL) BRACING
E) TOPRAIL
F) MIDRAIL
G) TOEBOARD
H) POST (STANDARD)
I) RUNNER (LEDGER)
J) BASE PLATE
K) SILL (SOLE BOARD)
L) SELF-CLOSING DROP BAR (INSIDE POSTS)
M) BASE LIFT (KICKER LIFT)
N) FALSE UPRIGHT (PUNCHEON)
O) COUPLER

Figure II.9.1
SCAFFOLD TERMINOLOGY

Figure 8.

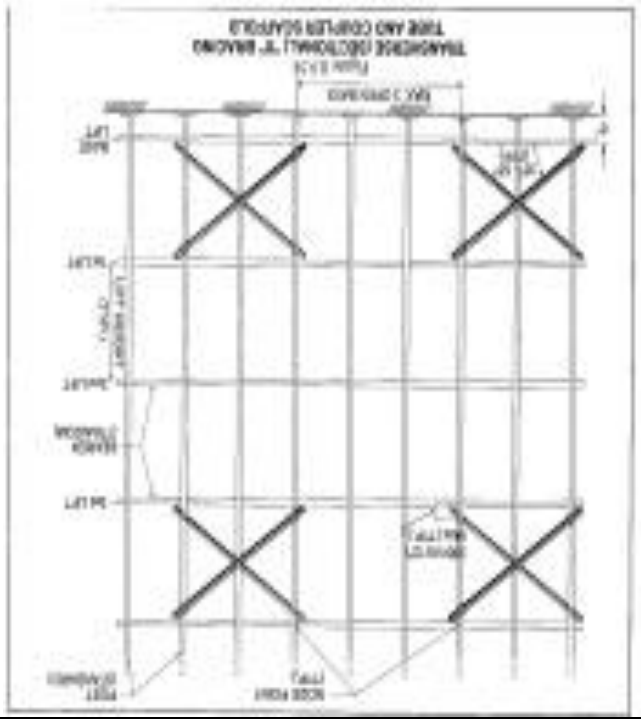


Figure 9.

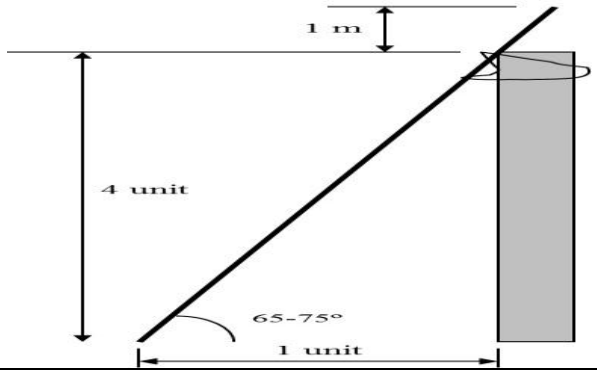


Figure 10. Scaff-Tag "GREEN"

Figure 11. Scaff-Tag "RED"

CONCLUSION

Entry into construction industry without HSE awareness could result in Minor injury, Major injury, Fatal, MINOR INJURY, The injured person will appear in the duty within 48 hrs is called minor injury. MAJOR INJURY, The injured person will not appear in the duty within 48 hrs is called major injury. FATAL Human drop.

REFERENCES

1. Work at Height Regulations 2005 SI 2005/735. The Stationery Office 2005 ISBN 0 11 072563 8.
2. Construction (Design and Management) Regulations 1994 SI 1994/3140. The Stationery Office 1994 ISBN 0 11 043845 0.
3. Safe use of vehicles on construction sites: A guide for clients, designers, contractors, managers and workers involved with construction transport HSG144 HSE Books 1998 ISBN 0 7176 1610 X.
4. Protecting the public: Your next move HSG151 HSE Books 1997 ISBN 0 7176 1148 5.
5. Fire safety in construction work: Guidance for clients, designers and those managing and carrying out construction work involving significant fire risks HSG168 HSE Books 1997 ISBN 0 7176 1332 1.
6. Health and Safety (First Aid) Regulations 1981 SI 1981/917. The Stationery Office 1981 ISBN 0 11 016917 4.
7. Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 SI 1995/3163. The Stationery Office 1995 ISBN 0 11 053751 3.
8. Preventing falls in scaffolding and false work SG4:05 National Access and Scaffolding Confederation 2005 ISBN 0 9549 5151 4.
9. Health and safety in roof work HSG33 (Second edition) HSE Books 1998 ISBN 0 7176 1425 5.
10. Lifting Operations and Lifting Equipment Regulations 1998 SI 1998/2307 The Stationery Office 1998 ISBN 0 11 079598 9
11. Manual Handling Operations Regulations 1992 SI 1992/2793. The Stationery Office 1992 ISBN 0 11 025920 3 (as amended).
12. Safe use of lifting equipment. Lifting Operations and Lifting Equipment Regulations 1998. Approved Code of Practice and guidance L113 HSE Books 1998 ISBN 0 7176 1628 2.