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Full Length Research Paper

Risk evaluation of fall and management measures in a construction company worksite in Effurun, Delta State

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Abstract: This research is based on the investigation of the risk of fall in a construction site in Effurun roundabout. The study evaluated the risk of falls in a construction worksite and management measures to abate them. Workers' exposure to the risk of falls was assessed. Checklist and observation carried out showed that most of the ladder used, the distance between the steps was not uniform. The ladder had a 10% risk of fall than non-risk of fall and the walkway had a 20% risk of fall than non-risk of fall. They were placed below the wall of the top support, a proper shield between the side of the excavation and the work area was not in place and the walkways were very poor. These were not in accordance with OSHA standard requirements in a construction site. Therefore, workers should be trained and informed about the basic requirement for a standard ladder and scaffold, and the need for well-organized workplace.

Keywords: Safety, Risk Management, Construction company

INTRODUCTION

Falls are a significant public health risk and a leading cause of non-fatal and fatal injuries among construction workers worldwide.

Most falls do not result in serious injury, but there is a risk of problems such as broken bones and also have an adverse psychological impact on elderly people. Confidence, become withdraws and may feel as if they have lost their independence (www.nhs.uk/conditions/fallspage/introductions.aspect).

In terms of safety, construction work is a high-hazard sector. Between April 2014 and March 2005, 71 workers died and more than 7500 suffered injuries reported under RIDDOR as a result of construction work in UK (HSE, 2005). With the main cause of this accident including: falling through roofs, falling from ladders and scaffolds, being struck by falling loads and equipment.

In an advance society, the construction sector is known to employ a large number of people. These individuals perform a vast array of jobs including general site labourers, Engineers, Surveyors, Architects, pipefitters, Welder, Ironworkers, crane operators, safety personnel's and site and project managers with a large breadth of project types and activities. Construction projects especially large ones are complex and dynamic and workers tend to change from one work to the other due to many uncertainties as the work must be completed with a limited period. Thus, construction workers are exposed to a wide range jobs which results in great deal of risk to their health (Turner, 1993). Workers in a construction industry have always been plagued with an abundance of work accidents as report of accident statistics has shown from various findings including the media that issues of fatalities and injuries are constantly increasing among construction workers who during their job are exposed to multiple hazards as a result of the scope and variety of their job schedules. Hence the study evaluated the risk of falls in a construction worksite and management measures to abate them.

The construction industry faces many occupational injuries and fatality risks, making it both unique and challenging to study. Construction is always risky because of outdoor operations, working at heights, and often working in dynamic and complex environments. Equipment Operations coupled with workers' attitudes,

behaviours, and physical characteristics relevant to safety also contribute to the relatively higher risk content in the industry (Rivara and Thompson, 2000).

In theory, most construction injuries can either be prevented or controlled, unfortunately, achieving this goal has been very slow in practice.

Hazard prevention and control in construction is a persistent and global challenge with construction having one of the worst safety records among diverse economic sectors including high-risk industries such as chemical, mining, electrical, and transportation (Rivara and Thompson, 2000).

In the United States, the Construction Industry accounts for 21.7% of all occupational fatalities, while making up only 8% of the workforce (Lipscomb et al., 2003). Major construction injury rates in Great Britain have risen over recent years with reportable non-fatal injury of 16 per 1000 workers between 2004 and 2007.

In addition to the loss of life and reduction in the quality of life of construction workers, construction incidents lead to project delays, increased project cost, medical burden, and other negative consequences (Horvitz 2004). In 2008, the Bureau of Labor and Statistics (BLS) reported that 680 workers died in fatal falls, a 20 percent decline from the series high of 847 fatal falls in 2007. In 2008, fatal falls to a lower level accounted for 85 percent of falls. The percentage of falls from roofs and ladders decreased in 2008. Falls from ladders and roofs still account for the majority of falls. Identifying fall hazards and deciding how best to protect workers is the first step in reducing or eliminating fall hazards. People have fallen from considerable heights and received only a few broken bones, while others fall to the floor from a standing or sitting position and die from their injuries (Arboleda and Abraham, 2004).

Work at height

The management of health safety at work regulation supported by the work at height regulations, require you to assess the risks presented by working at height before any work begins, and should therefore appoint someone competent to undertake such an assessment. The following diagram indicates the route endorsed by the Health and Safety. Executive (HSE) under the new regulations and the general approach to work at a height that must now be followed (Figure 1). Falls are the most common cause of fatal injuries in the construction industry, they account for more than half of those accidentally killed each year. Much of the work carried out on a construction site is done above ground at height, commonly more than two metres (http://www.cantraltruksales.net/home). Typical activities that involve working at height are:

(i) Steel erecting
(ii) Fixing of cladding, roof work
(ii) Pointing and decorating
(iii) Demolition and dismantling
(iv) Bricklaying
(v) Scaffold erection
(vi) Electrical installation and maintenance

The risks of falls from height are substantial however long or short the work. Risks related to work activities at height are increased by the presence of fragile roofs, roof lights, voids, deteriorating materials and the weather.

Hazards of working at height

Vertical distance

Through some construction work involves work activities to be carried out at a significant height (vertical distance), for example, on a roof or scaffold, it should not be assumed that work at less significant height is without risk. Where work is conducted above 2 metres the risks of major injury or death are considered to be significant (Bentley et al., 2006).

Some National legislation reflects this risk and requires controls to be in place to manage the risk of falling, whatever the height; for example, in the UK this is required by the work at height Regulations (WAH) 2005. This legislation applies to workplaces in general and therefore includes construction activities.

Under these regulations, the interpretation of work at height includes any place of work at ground level, above or below ground level that a person could fall a distance liable to cause personal injury and includes places for obtaining access or egress, except by staircase in a permanent workplace.

The work at height Regulation (WAH) 2005 Regulation 6 states that work at height must only be carried out when it is not reasonably practicable to carry out the work otherwise, if work at height does take place, suitable and sufficient measures must be taken to prevent a fall of any distance, to minimize the distance and the consequences of any fall liable to cause injury.

Roofs

\Working at height and on the roof carries a high risk of accident unless proper procedures and precautions are taken. The danger of people or materials falling affects the safety of those working at height and those working beneath. The particular danger arises from two types of roofs – fragile roofs and sloping roofs.

Fragile roofs

Sheets used in roofing material may deteriorate over time leaving the remaining material in a, particularly fragile state. Materials such as asbestos, cement, glass,

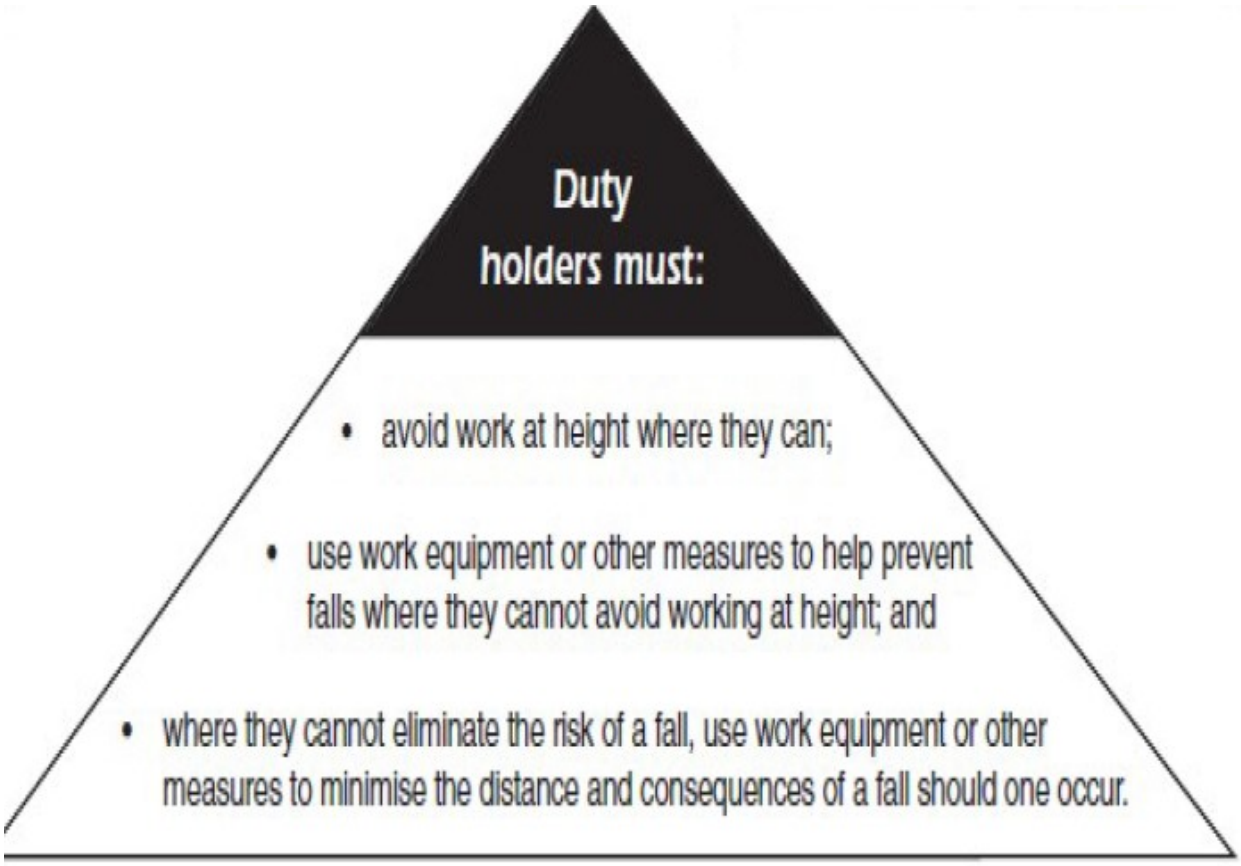

Figure1: Route endorsed by HSE under new regulation and work approach at height.

or plastic are likely to be unable to bear the weight of a person, though the sheet may look intact it could only have a small fraction of its original strength. Similarly, plastic roof material used in roof lights will be affected by exposure to sunlight, leaving it brittle; it should not be assumed that it is safe to work on newly installed roof material, even though it will have its original strength this may not be enough to bear the weight of a worker.

Sloping roofs

Sloping roofs are those with a pitch greater than 10 degrees, falls from the edge of sloping roofs can cause serious injury even when the eaves are relatively low. The hazard of sloping roofs is less obvious when the pitch is small, causing people to underestimate the possibility of workers sliding off the edge. The material and therefore the surface of the roof have a significant influence on the hazard, for example, a smooth sheet metal surface can present a significant hazard even when the pitch is small. The chances of an accident are increased when working on roofs that are wet or covered in moss growth and in extreme weather conditions such as high winds. The other significant influencing issue is the footwear used by the worker, smooth flat-soled footwear may seem suitable in dry conditions, but may not provide sufficient grip to deal with surface water in wet conditions (A guide to international health and safety at work 2012, second edition).

Deterioration of materials

The condition of the structure on which people are working can deteriorate with time. The rate of deterioration will accelerate if the structure is exposed to adverse weather conditions (including extremes of temperature) or attack by chemicals, animals, insects etc.

Unprotected edges

Roofs, scaffolds, unfinished steelwork, and access platforms may sometimes have open sides. This

increases the likelihood of someone or something falling, particularly if people have to approach them, work at them or pass by them repeatedly (Dong and Fujimoto, 2009). It is very easy in these circumstances to lose perception of the hazard and forget that it is there, Errors, such as stepping back over an edge, overreaching, or being pushed over the edge can easily lead to fatal falls.

Unstable/poorly maintained access equipment

An employer having committed to providing access to a height by the provision of work equipment might yet have workers using it who are at risk from basic hazards relating to its stability and maintenance. Working with mobile elevated work platforms (MEWPs), ladders and scaffolds have their specific stability and maintenance issues, the hazard of falling from a height whilst using them being the common theme, each is influenced by the problem of the stability of the ground conditions they are placed on and the height they are used at compared to their stability base (Adam et al., 2009). Scaffolds need periodic maintenance to ensure load-bearing parts are still secured and those critical items such as brakes on mobile scaffolds are in place and effective cracks may occur in the sides of ladders and loose rungs can lead to failure, these detect in ladders may be hidden if they are painted or covered in construction materials.

Weather

Adverse weather can have a significant effect on the safety of those working at height. Rain, snow, and ice increase the risk of ships and falling from a roof. When handling large objects, such as roof panels, high wind can be a serious problem and may cause the person to be blown off the roof.

Construction site hazards

Construction sites are considered the most potentially hazardous and accident-prone part of any working environment, exposure to these construction site hazards exposure workers to injury and possible death. To prevent this, a company should know how to identify and be aware of all possible dangers that can be encountered during normal business operations. Below are the construction site hazards.

Falls

Falling from scaffolding over six feet or a fixed ladder over twenty feet is the most dangerous and common construction site hazard falling from high places such as ladder scaffolding and roofs account for more than fifty percent of the accident that happens at the workplace. The usual causes of this incident are slipping, tripping, and using an unstable ladder. There are thousands of reasons for all hazards and to eliminate such risk, employers must have a fall protection program as part of any overall workplace safety and health program. Workers should be trained to identify and evaluate fall hazards and be fully aware of how to control exposure to such risks as well as know-how to use fall protection equipment properly.

Scaffolding

Every year, approximately 60 workers die by falling from scaffolding, one out of five construction site falls are fatal and the most potential risk of scaffolding is due to moving scaffold components, scaffold failure related to damage to its component, loss of the load, being truck by suspended materials, electrical shock, and improper set-up. Construction workers who assemble and dismantle scaffolding and work platforms at construction sites face the risk of serious injuries due to fall (Rivara and Thompson, 2000).

Stairways and ladder

According to OSHA's construction safety and health standard, stairways and ladders are major sources of injuries and fatalities among construction workers. These recorded injuries are serious enough to put a worker out on sick leave. OSHA registered approximately 24882 injuries ad 36 fatalities yearly that are related to falling from stairways and ladders used at the construction site. To prevent such accidents and injuries, employers and employees must comply with OSHA's general rule for the safe use of ladders and stairways. (http://www.centraltrucksales.net/home)

Causes of construction injuries

Falls are a primary cause of construction injuries, in the US, between 1992 and 2006, falls accounted for 32% of fatal occupational injuries in general (Dong and Fujimoto, 2009) and 37% of fatalities in the construction industry (Kaskutas et al., 2009). Internationally, falls from height in new Zealand are the leading cause of occupational injuries (Bentley et al., 2001) falls account for approximately 57% of injuries in China construction industry (Yung, 2009). In Hong Kong, work-related falls from height represent more than 47% of the total fatal incidents in 2004, reported that more than 30% of fatalities in Taiwan can be attributed to falls. As a result, falls are the most costly occupational hazard in many countries (Lipscomb et al., 2003).

In the USA, the annual cost of all related occupational injuries was approximately six billion dollars in 2000 in

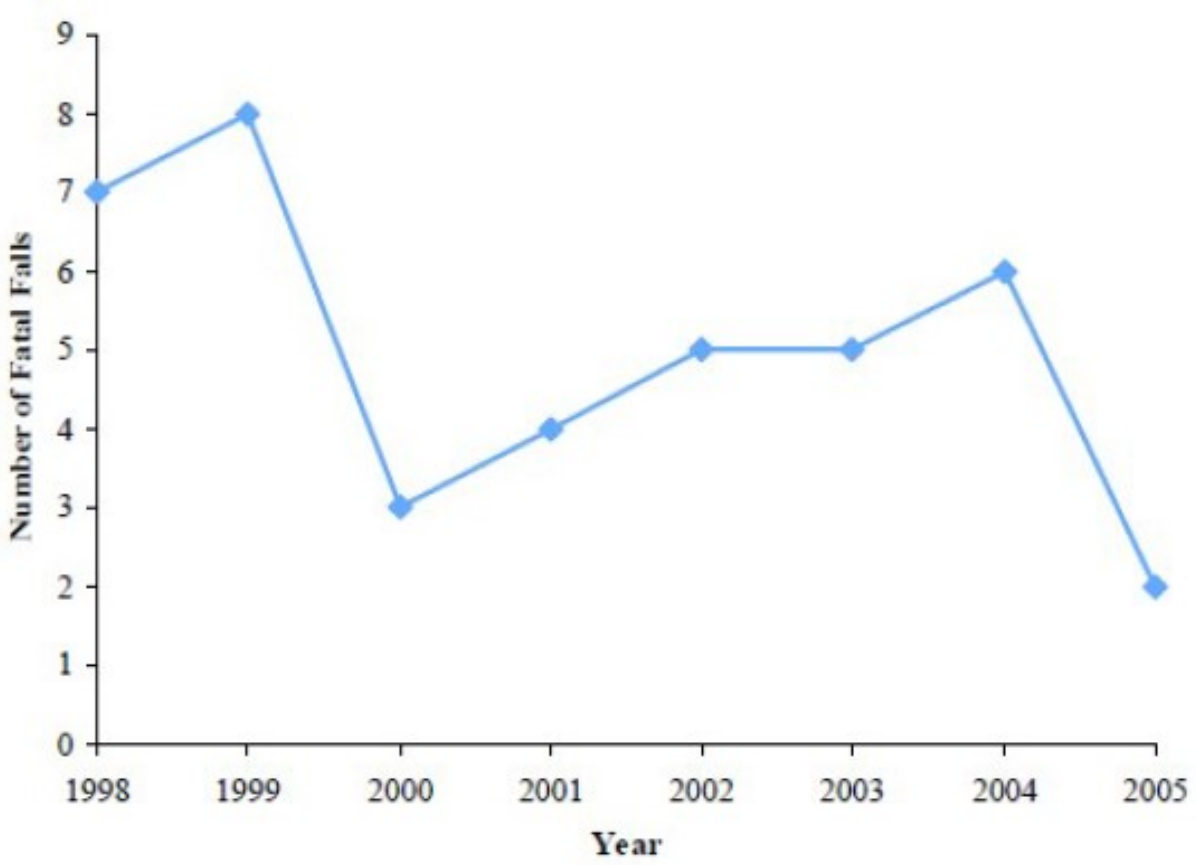

Figure 2. Fatal construction falls from elevation in Washington State, 1998-2005.

the Netherlands, total health care costs due to work-related injuries were £1.15 billion in 2004 from which 44% of injuries resulted from falls. Similarly, statistics across many different countries indicate that work-related falls represent an extraordinary global financial burden consequently; the prevention of falls is an important priority in the construction industry.

Fall hazard

Fall hazards are present at most worksites and many workers and exposed to these hazards daily. A fall hazard is anything at your worksite that could cause you to lose your balance or loss bodily support and result in a fall. Any time you are working at a height of four feet or more you are at risk. OSHA generally requires that fall protection be provided at four feet in the general industry, five feet in maritime, and six feet in construction. However, regardless of the fall distance, fall protection must be provided when working over dangerous equipment and machinery (Adam et al., 2009).

The years 1998 and 1999 had the highest number of fatal construction falls. The average was 5 per year over the 8 years, with the most (8) in 1999 and the least (2) in 2005 (Figures 2 and 3). Ladders were the number one location of fatal falls with 13 incidents. Scaffolding, roofs, and roof/floor/skylight openings all had 7 incidents each.

Evaluating fall hazards

(a) Identify tasks that could expose workers to falls
(b) Identify hazardous work area
(c) Determine how frequently workers will do tasks that expose them to fall
(d) Determine whether workers need to move horizontally, vertically, or in both directions to do their tasks
(e) Determine the number of workers exposed to fall hazard
(f) Determine fall distance from walking/working surface to lower levels
(g) Identify fall hazard that you can eliminate
(h) Identify fall hazard that you can't eliminate

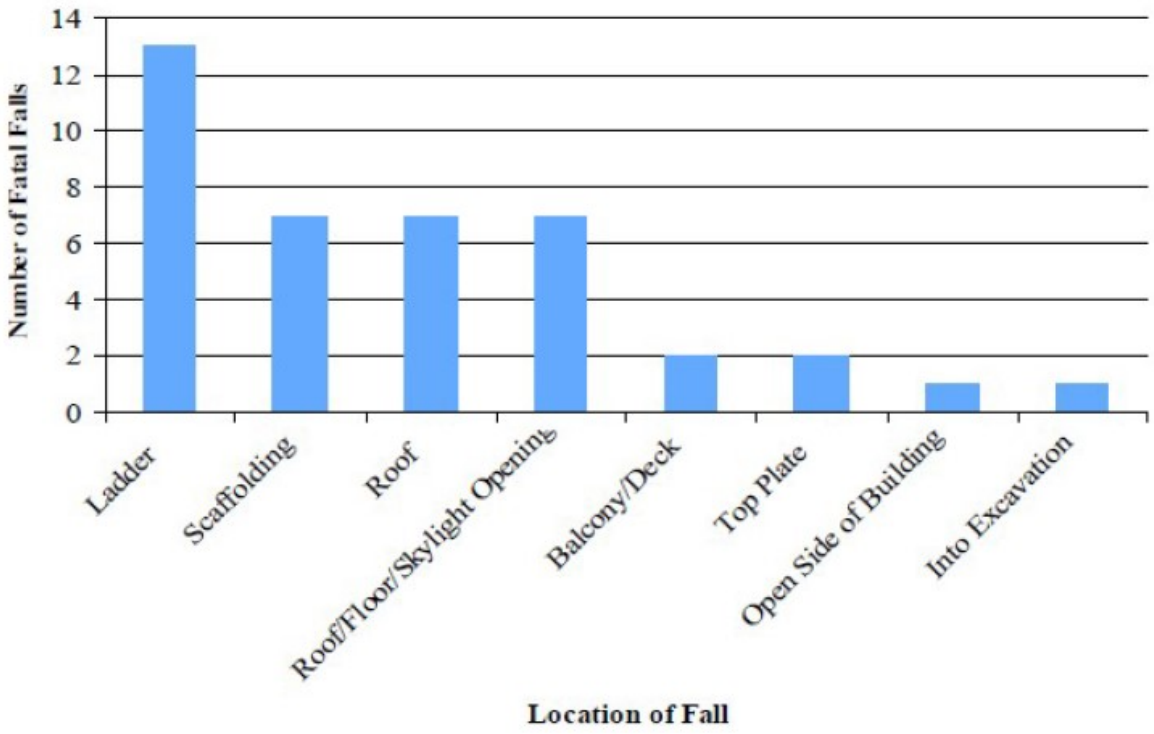

Figure 3. The number of fatal falls in construction by location of the incident in Washington State, 1998-2005.

(i) Consider other factors that could increase the risk of falls

Methods of avoiding hazard of working at height

Where possible, work at height should be avoided by conducting the work at ground level. This could be achieved by using different equipment or method of work, this may affect those that manually fill equipment hoppers located at a height, requiring consideration of bulk delivery and automatic feed systems, and assessment of the risks presented by working at height before any work begins should be carried out using the following guidelines.
Recommended that you do not undertake work at height unless

(i) All work at height is properly planned and organized.
(ii) All work at height takes account of weather conditions that could endangers health and safety issues.
(iii) Those involved in work at height are trained and competent.
(iv) The place where work at height is done is safe.
(v) Equipment for work at height is approximately inspected.
(vi) The risks from fragile surfaces are properly controlled.
(vii) The risks from falling objects are properly controlled.

Also recommended that you

(viii) Ensure that no work is done at height if it is safe and reasonably practical to do it other than at height.
(ix) Ensure that the work is properly planned, appropriately supervised, and carried out in as safe a way as is possible.
(x) Plan for emergencies and rescue
(xi) Ensure that the work is postponed while weather conditions endanger health or safety.
(xii) Carefully consider what can be done to prevent accidental falls and protecting people if they do fall – for example, the use of safety nets, air mats, harness.
(xiii) Ensure that everyone involves in the work is competent.
(xiv) Provide other means of protection for employees and members of the public who may be affected by the

work that is being carried out.

Fall protection

This is a broad concept that includes, training, procedure, rules, systems, and methods intended to protect workers from fall hazards. Fall protection does not mean bulky or cumbersome equipment, it does not interface with work tasks, and it does not get in the way of co-workers if you understand the concept and apply it appropriately fall protection also complies with shared responsibilities.

In North Carolina, from October 2003 through September 2009, a total of 395 fatalities were reported, 19 percent resulting from falls. In the fiscal year 2006, there was a series high of 29 construction fatalities, 14 of which were from falls, in the fiscal year 2009, 27 percent of the construction fatalities were from falls. Each year falls consistently account for the greatest number of fatalities in the construction industry and are always a major concern in other industries.

North Carolina established a special emphasis program (SEP) for construction activities to decrease fatalities related to the construction industry because falls have been the leading cause of death in construction, preventing them is a major component of this program.
Events surrounding these types of accidents often involve several factors, including unsafe working surfaces, misuse of fall protection equipment, and human error. Studies have shown that the use of guardrails, fall arrest system safety nets, covers, and travel restriction system can prevent many deaths and injuries from falls.

Fall protection can be accomplished by doing the following:

(a) Ensure that everyone has a role to play in preventing falls
(b) Identify and evaluate fall hazards
(c) Eliminate fall hazards, if possible
(d) Train workers to recognize fall hazard
(e) Use appropriate systems and methods to prevent falls and to protect workers if they do fall.
(f) Inspect and maintain fall-protection equipment before and after using it.

Fall protection system and methods

A fall protection system refers to equipment designed to control fall hazards. Fall protection system either prevent fall from occurring or safety arrest falls.
The typical fall protection system includes the following:

(j) Personal fall arrest systems
(k) Guardrail systems
(l) Safety net systems
(m) Warning line systems
(n) Safety monitoring system
(o) Controlled access zones

The personal fall arrest systems

A personal fall arrest system (PFAS) consists of an anchor connector and a body harness that works together to stop one from falling and to minimize the arrest force. Another system component may include a lanyard, a deceleration device, and a lifeline. However, the personal fall arrest system is effective only if you know how the component arrests a fall.

Guardrail systems

Guardrail systems are vertical barriers consisting of top rails, midrails, and intermediate vertical members. Guardrails system can also be combined with toe board, which is barriers that prevent material and equipment from dropping to lower levels.

Safety net systems

Safety net systems consist of mesh nets, panels, and connecting components. They are typically used as protection for those who work 25 feet or more above lower levels on bridges and at building construction sites. Safety net systems are rarely used for roofing work. The maximum size of each mesh net opening must not exceed 36 square inches or longer than 6 inches on a side, measured center to center. An installed net must withstand a drop test consisting of a 400-pound bag of sand 30 inches in diameter dropped from a working surface and must be able to withstand the impact without pounding anything below it. The outer edge of a safety net must be at least 8 feet from the edge of the working surface. However, the minimum distance varies depending on how far the net is below the working surface.

Warning line systems

Warning line systems consist of ropes, wires or chains, and supporting stanchions that form a barrier to warn those who approach an unprotected roof side or edge. The warning line marks off an area within, which one can do roofing work without using guardrails or safety nets. Warning line systems can be combined with a guardrail system, personal fall arrest system, or safety monitoring system to protect those doing roofing work on low slope roofs.

If you decide to use warning lines, keep the following in mind.

(i) Set up the warning line around all exposed sides of the roof, 6 feet from the edge.
(ii) Make sure the line has a minimum 500-pound tensile strength.
(iii) Mark the line with high visibility material every 6 feet.

Safety – monitoring system

A safety – monitor system is a set of procedures assigned to a competent person for monitoring and warning workers who may be unaware of full hazards. Safety-monitoring systems are appropriate for roofing operations on low-slope roofs less than 50 feet wide. A safety – monitoring system combined with a controlled access zone and fall protection plan is acceptable for a situation where conventional fall protection is not feasible to keep in mind that a safety monitoring system consist of a fall protection procedure rather than a substantial barrier.

Controlled access zones

The controlled access zone defines an area where workers can do leading-edge, overhand bricklaying and related work, or work under a fall protection plan without using a conventional fall protection plan without using conventional fall protection. All others are prohibited from entering a controlled access zone. These consist of a line or line warning workers, that access to the zone is restricted to unauthorized persons.

Controlling the risk of falls

Eliminate the fall hazard

During the design stage of a new building, a design professional would take into consideration the life cycle of a building from construction through expected activities such as maintenance by designing out the risk of falls, Do work on the ground when possible for example, construct wall frame, on ground and fill-up.

Substitute with the safer surface

Use a passive fall prevention device such as temporary work platforms which would include scaffolds and elevating work platforms.

Isolate hazard/Engineering controls

Create physical barriers, install guardrails around the perimeter of a roof, make sure floor and roof opening are guarded, and safety nets and catch platforms are installed where necessary. Use a work positioning system (for example, travel restraint system or rope access system), portable ladders should be used sparingly.

Administrative controls

These may include employer-mandated safe work practices and the use of signs (such as writing in a temporary covering of a floor opening to Warri workers not to step on it).

Personal protective equipment

Use individual fall arrest or restraint system (Table 1).

Problem areas

The top four locations for construction fall in Washington State are:
(i) Ladders
(ii) Scaffolds
(iii) Roofs
(iv) Roof/Floor/Skylight Openings

Ladders

Consider whether there is a safer alternative to using a ladder:

(i) Can the work be done from the ground using an extension tool?
(ii) Can an elevating work platform, such as a cherry picker or scissor lift be used?
(iii) Can the building component or equipment be relocated to the ground, either temporarily or permanently?

The risk of falls from portable ladders can be reduced by using safe work techniques that include:

(i) Use the type and length of ladder that provides the safest application for the work being done.
(ii) Set up straight ladders and extension ladders using the “4 to 1” rise to run rule to obtain the most stable working position.
(iii) Ensure that the ladder remains stable by appropriately using ladder footings, stabilization and site preparation.
(iv) When straight ladders are used to access an upper landing, secure the ladder at the top and bottom.
(v) Ladders should extend at least 3 feet above the

Table 1: Number of Fatal Construction Falls in Washington State by 6-Digit NAICS Industry Description, 1998-2005.

NAICS Description Number of fatalities 236115	New Single Family Housing Construction (Except Operative Builders)	7
236220	Commercial and Institutional Building Construction	6
238160	Roofing Contractors	6
238130	Framing Contractors	4
238990	All Other Specialty Trade Contractors	3
238120	Structural Steel and Concrete Contractors	2
238320	Painting and Wall Covering Contractors	2
236118	Residential Remodelers	2
238220	Plumbing, Heating and Air Conditioning Contractors	2
236210	Industrial Building Construction	1
236116	New Multifamily Housing Construction (Except Operative Builders)	1
237110	Water, Sewer line and Related Structures Construction	1
238110	Poured Concrete Foundation	1
238140	Masonry Contractors	1
238310	Drywall and Insulation Contractors	1

Table 2: The risk of fall in various section of the study.

Item	Number of risk fall	Number of no risk of fall	% of the risk of fall	% of no risk of fall
Scaffolding	8	9	31	69
Ladder	11	9	55	45
Walkways	12	8	60	40
Excavation	3	6	33.0	67
Total	30	33	47.6	52.4

(vi) upper landing surface.
(vii) Maintain 3-points of contact with a ladder while climbing.
(viii) Do not stand on the top two steps of a stepladder.
(ix) Follow manufacturer's recommendations.

METHODOLOGY

Adapted checklist from OSHA checklist was used to investigate the risk of fall in a construction site (Consolidate Contractors Company work site in Effurun Roundabout). Photographs were also taken for a better and clearer overview of facts. The data presented in this research work was based on a simple Bar chart showing total numbers of compliance and non-compliance Tables, Bar chart, and a simple percentage were used to analyze data in this research work.

RESULTS AND DISCUSSION

From observation, it was revealed that some of the ladder used in the site was not up to standard and the distance between the steps of the ladder are not uniform throughout the length of the ladder which is not up to the requirement of ladder given by OSHA, as a result of improper implementation of safety practices by management and workers. According to OSHA, the distance between rungs, cleats, and steps shall not exceed 12 inches and shall be uniform throughout the length of the ladder. Workers were at a risk of fall, from the observation made most of the ladder was placed below the wall of top support which is not in line with the requirement of a standard ladder.
According to OSHA a ladder must be placed at an angle so they are 1ft away from the wall of every 4ft of working ladder height to prevent fall.

Finding also shows that most of the ladder used during construction were kept outside after usage and are not made of high-density wood, OSHA also states that a standard ladder should be constructed of high-density wood that is free of sharp edge and splinters and properly maintained to avoid decay, wane, and compression failure or other weakness that could lead to falling (Table 2 and Figures 4, 5 and 6).

From the investigation made it was observed that there is no proper shield between the side of the excavation and the work area this exposed workers to a risk of fall in the excavation as stated by OSHA, that supporting the sides of the excavation, or placing of a shield between the side of the excavation and the work area will prevent fall in the excavation. From observation also it was observed that there is no proper walkway in the construction site another factor that could lead to the risk of fall in the site as stated by HSE, that construction sites should be well organized with any walkways and stairs free from obstruction and work area should be clear of unnecessary materials to avoid fall of workers in the site.

Figure.4 manufacturer's recommended ladder position.

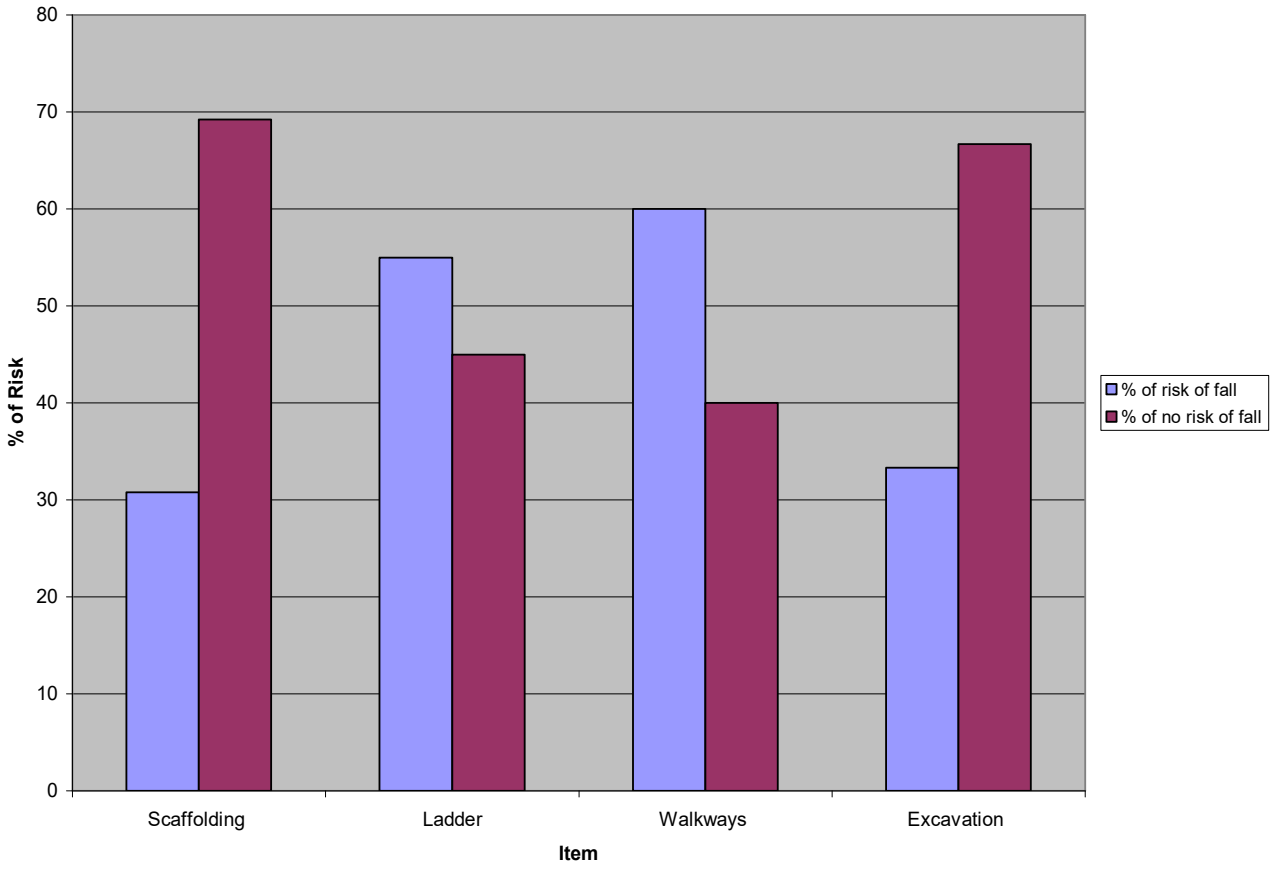

Figure 5: Bar chart showing percentage risk of fall of various sections.

Figure 6: The pictures of construction site of unsafe evidence (a, b, c and d).

Through the investigation scaffold used are furnished and erected under the standard, it was also observed that the footing of the scaffold, are sound, rigid and capable of carrying the maximum intended load without displacement and also discovered that it was not loaded with excess of the working load for which they are intended which are under OSHA standard. It was also observed that the scaffold was fixed to and securely braced against the building at intervals not exceeding 30 feet horizontally and 26 feet vertically. The similarities from the research carried out when compared with other authors is the management show less concern for safety issues and also because of improper implementation of safety practices in the company. The difference is that companies have different management policies and implementation. Finally, the study reveals the CCC Construction site has a risk of falls.

Conclusion

After critical investigation of risk of all in Consolidated Contractors Company construction site in Effurun Roundabout, the percentage of risk of fall is high in the usage of ladder and walkways and low in scaffold and excavation. Therefore, concluded that workers are at risk of fall in the construction site. Finally, it is our utmost belief that the recommendation made in this project will yield spectacular results in the construction site if properly and honestly adopted**.**

Recommendation

(a) The wood ladders should be constructed of a high density wood that is free of sharp edges.
(b) They should be kept clean, so they do not become slippery.
(c) Then portable metal ladder must be designed for use by only one person.
(d) The distance between ring, cleats and step shall not exceed 12 inches and shall be uniform throughout the length of the ladder.
(e) The construction site should be well organized, with any walkways and stairs free from obstruction, and work area should be clear of unnecessary material.
(f) A competent person should inspect the excavation an adjacent area for possible care-ins on a daily basis.
(g) Make some a shield is placed between the side of the excavation and the work area.
(h) Scaffold shall not be loaded in excess of the working load for which they are intended.
(i) Tools, material and debris shall not be allowed to accumulate in qualities to cause a hazard.

(j) Employee shall not work in scaffolds during storms or high wards.
(k) Employee shall not work on scaffolds which are covered with ice or snow, unless all ice or snow is removed.
(l) Lear to scaffold is prohibited.

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