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Work Height Safety In a Delhi Metro Rail Corporation Construction Site

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ABSTRACT

Work – related injuries and illness occur every day in the workplace. These injuries often occur because workers are not trained in the proper Ergonomics procedure. One way to prevent workplace injuries is to establish proper Ergonomics procedure and possible solutions and train all employees in safer and more efficient work methods. Establishing proper Ergonomics is one of the benefits of conducting a Ergonomics carefully studying and recording each step of a work in processing, identifying existing or potential hazards (Both Safety and Health), and determining the best way to perform the job or to reduce or eliminate these hazards. Attention to the ergonomics principles to reduce work place injuries, illness, that result in workers compensation costs, medical claims, and loss work time, many disorders and injuries are preventable when work conditions are designed for human safety and comfort people need training in how to recognize hazards and safety problems as well as how to control own behavior for maximum comfort and health.

Improved Ergonomics methods can reduce cost resulting from employee absenteeism and workers compensation, and can often lead to increased productivity. This report explains what Ergonomics studies in Construction industry is and contains guidelines for conducting your own step-by-step analysis.

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1. Introduction

Construction is noisy, duty, hazardous and sometimes the most uninhabitable work place one can ever be exposed to. It is also an industry that contributes persistently to high accident rates; especially fatalities. Everything that is taboo in the safety practitioner's book can be found in the construction site. For example, employees are easily exposed to hazardous substances such as paints, thinners, glues, varnishes, asbestos, and also to toxic agents mainly from underground work. Sites can easily accumulate debris, which can be a fire hazard or a health hazard. Drilling and excavation work can cause accidental fires or even explosion. Working at height can result in debris falling on workers or even workers falling from heights. Fire, noise and dust are common constituents in construction sites, can be an inconvenience or danger to the neighbourhood, especially in built-up areas. The issue of hygiene may also be a problem especially in the demolition of old buildings, which may have been a haven for drug addicts. The exposure of demolition workers to HIV from hypodermic needles or even tetanus is not remote. Fast moving vans, forklifts and heavy-duty land movers moving

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haphazardly pose a threat to others. The uniqueness of the construction industry is that it is always evolving and no two days are the same. Whether it is building work or demolition work, new hazards are created by the hour. For example, one moment an electrician could be carrying out some electrical work at ground level, and later he could be doing a wiring job up on the roof where there can be a host of other different problems. To make matters worse, the contractual clauses attached to the construction work can result in a rushed up job, which can indirectly lead to major accidents. The problems in the construction sector is not limited to the above mentioned areas can range from an unreported little bruise, to the collapse of the Highland Towers. Even the smallest construction site has the potential to cause a catastrophe. The construction site indeed versatile and accident are increasing both in absolute terms and by percentage. Take for example the statistic on permanent disablement cases in the construction sector, which has risen from 190 in 1991 to 305 in 1993. The appalling safety record is a clear indication that things are not right, and something has to be done about the construction site. We shall now look at issues of why managing safety and health is necessary, and how it can be achieved. In almost every industry, there are areas where workers are subjected to fall hazards. The 635 fatal falls in 2010 resulted in billions of dollars in workers-compensation costs. According to Liberty Mutual, the leading private provider of workers' compensation insurance in the United States, on-the-job injuries cost employers nearly $1 billion per week in payments to injured employees and their medical providers.

Developing and implementing comprehensive fall protection programs in the workplace can prevent many of these injuries and fatalities. Once fall hazards have been identified by a competent person, fall hazard elimination should be considered first. This is typically known as "engineering out the hazard" and consists of redesigning the working environment and the work processes and procedures. If this is impractical due to extensive modifications and cost, fall prevention should be considered next.

Fall prevention may be handled in a number of ways. Scaffolds, handrails, barriers and movable platforms can be constructed to protect workers employed at heights. Where these devices are impractical, personal fall protection equipment such as full body harnesses, lanyards and retractable lifelines may be used. The Occupational Safety and Health Administration (OSHA) require personal fall protection for workers at various heights depending on the job. The International Safety Equipment Association has prepared this use and selection guide to provide practical, hands-on guidance for fall protection users and administrators in their selection, use, maintenance and inspection of fall protection equipment. For additional information on specific personal fall protection equipment, contact the manufacturer of the fall protection used in your workplace.

This study aims to analyse the hazards associated for fall from such as scaffolds, ladders, and various hazardous activities in construction and to give corrective & preventive actions.

Project location

This project was done at a construction site of Phase-3 of Delhi Metro Rail Corporation.

Delhi Metro has been instrumental in ushering in a new era in the sphere of mass urban transportation in India. The swanky and modern Metro system introduced comfortable, air-conditioned and eco-friendly services for the first time in India and completely revolutionized the mass transportation scenario not only in the National Capital Region but the entire country.

Presently, the Delhi Metro network consists of about 193 operational kilometres with 141 stations along with six more stations of the Airport Express Link.

2. Methodology

The methodologies adopted for work height safety:

Workplace Evaluation using checklist:

Consists of using a detailed list of prepared questions about the design and operation of the facility. Questions are usually answered "Yes" or "No". Used to identify common hazards through compliance with established practices and standards.

Observation and Visual Inspection of Plant:

Visual inspections are not typical function of management system review, but the condition at the workplace does reveal much about the safety program effectiveness. Worksite condition can also be observed indirectly by examining documents such as inspection reports, hazards reported by employees and incidents investigation. Here the workplace condition was observed by direct method of visiting the plant frequently. This was also useful in revealing many aspects about safety of the site.

Document Review:

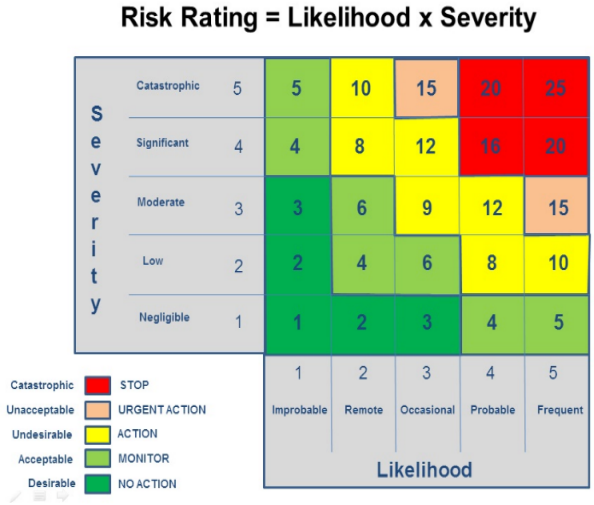
Reviewing documentation is a standard safety conformance appraisal technique. It was important in understanding whether the hazards are

tracked to completion and if the tracking system is effective. It was used to determine the quality of specific activities such as training, regulatory compliance, etc.

Conducting all the hazardous inspection in the Site particularly for fall from heights activities. Hazards of each and individual activities such as Ground Soil Condition, Lack of skill of the people, Inadequate Support, Improper handling of scaffold materials Loose materials, Poor weather condition, Improper dismantling method, Throwing the material from height , Improper work method are the some of the areas where the improvements should be taken. Possible Outcome, Existing Control Measure Probability Rating Impact Rating Risk / Impact Level Additional Control Measures is drawn. For example of scaffold for poor ground condition-possible outcome is scaffold collapse, Probability rating will be 5, Impact rating-5, Risk level-H.

3. Results and Discussions

After conducting the hazard identification and risk assessment at site of phase 3 construction project of Delhi metro rail corporation, the risk of the various construction activities have been found out using the formula risk = severity * frequency. The severity and frequency ratings were given based on the past accidents on this site and by consulting with the experienced safety officers of the site.



Risk Matrix

Based on the risk matrix those activities with risk rating from

1-6: low risk

8-12: medium risk

15-25: high risk

4. Conclusion

The study extends the importance of having awareness towards the existing of potential hazards on the construction site. Thus, it may contributes positively to the safety precaution that need to be incorporated on the construction sites so that to ensure the safety aspect of workers is not been neglected. Other than that, this study also may enrich the present knowledge and the understanding of having awareness of the hazards and safety issues on the construction site. The information gained also perhaps could be used as a guide in order to prevent accidents in the future. Future works will be on the main potential hazards while working on scaffolds is falls, Additional support and safe operation for platform. Rather than toe board, safety mesh as well as PPE such as lifeline, safety harness, safety helmets and so forth that are currently available, some efforts need to be imposed in order to improve this area and to come with new technologies or techniques of falling protection. This is important in order to enhance the safety protection of the workers. Perhaps, the level of safety awareness and the falling protection implementation on the construction site will be increasing and complying with the OSHAS regulations.

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ACTIVITY	Hazards	Risk	Severity (S)	Probability (P)	S x P	LEGAL	RISK LEVEL	Controls to be Introduced to Reduce the Risk/s
Working at height	a) Person can fall down	a) May sustain severe injuries or prove fatal	5	3	15	Y	H	1) Provide Guard rails (Top and Middle)/barricade at the work place.
								2) Provide toe guard to working platform
								3) Use PPE like safety belts, lifeline, helmets, safety shoes, etc. and ensure safety belt is wear properly and tied to fixed support, use chinstrap of helmet.
								4) Fall arrest systems like safety nets, etc. may be installed.
								5) Use H Frame for Scaffolding.
								6) Work should be stopped during lunch hour
								7) Required close supervision
								8) Provide proper working space (min 0.6m).
								9) Tie/weld working platform with fixed support.
		b) May hit the scrap/material stacked at the ground or in between	5	3	15	Y	H	1) Keep the work place neat & clean.
								2) Remove the scrap immediately.
	b) Material can fall down	a) May hit the workers working at lower levels and prove fatal	5	3	15	Y	H	1) Keep the work place neat & clean.
								2) Remove the scrap immediately.
								3) Do not throw or drop materials or equipment from height.

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								4) All tools to be carried in a tool -kit bag. 5) Remove scrap from the planks. 6) Ensure wearing of helmet by the workers at low level.
Working at height	**Poor housekeeping**	**May sustain severe injuries**	3	4	12	Y	M	All surface should be clean, debris to be removed from location and platform.
	Falling of loader or materials	**May sustain injuries.**	3	3	9	Y	M	Fixing points/joints should be checked by competent person.
	Hit by falling objects	**May sustain injuries**	3	3	9	Y	M	All elevated working areas should be kept clean and tidy.
Scaffolding erecting and dismantling	**Damaged scaffolding, fall of material**	**Fall of person**	3	3	9	Y	M	1.Provide double landyard safety harness to all the scaffolders. 2.All scaffold materials as per IS code. 3.Scaffolding to be erecting and dismantling by competent person only. 4.Conduct tool box 5. Talk prior to start of job. 6.Scaffold shall not be used without having valid scaffold tag. 7.Barricading the scaffolding area.
Working at height during welding, bolting and grinding of middle body, rear body, cutter head, and backup cars, etc.	Ladder collapse	Falling of material/person may sustain injury.	2	3	6	Y	M	1.Use of scaffold if possible. 2.Safety harness shall be worn while working at height. 3.Continuous supervision.