Journal of Advances in Science and Technology
Vol. 20, Issue No. 1, March-2023, ISSN 2230-9659

Safety Management System in Pune Metro Rail Projects

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Abstract - ***The construction industry continues to grow as the demand for infrastructure, homes, and office spaces grows by the day. Since the construction industry is so dynamic, it is vulnerable to a range of health risks. As a result, protection is a top priority in the construction sector to ensure a healthy working environment. Safety experts have determined that risky behaviours cause the majority of workplace injuries, and that controlling these behaviours is one of the keys to effective accident prevention and a low accident rate on construction sites. Safety in construction industry is much more important. This review paper is about to increase safety in the building industry performance. The study's primarily is to define the critical success factors that affect the implementation of construction safety management. This review paper is to recognize and solve major problems in the infrastructure sector with various solutions related to work situations that affect project safety performance. Due to lake of knowledge and awareness large number of people's deaths and long-term injuries occurs. in order to reduce and control construction worker health and safety.***

The construction industry has the largest number of injuries compared to other industries. Thus,

reducing accidents and determining construction risks are extremely important. One of the essential steps for construction safety management is hazard identification, since the most unmanageable risks are from unidentified hazards

Pune metro project is the key project for city the accident at going site may causes the break in progress of work ultimately it casues the increases the duration of project as well as cost of projects .The various safety and control measures of accidents in Pune Metro projects will outlined in this project in order to mitigate accidents

Keywords - Accidents, Safety, Construction management , Pune Metro

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INTRODUCTION

General : Due to rapid industrialization, industrial workers are exposed to several types of hazards and accidents. Every year lakhs of workers are injured due to mechanical, chemical, electrical and radiation hazards and it leads to partial or total disablement. So in recent years, greater attention is given to health and safety due to pressure from government, trade unions, labour laws and awareness of employers.

The efficiency of workers depends to a great extends on the environment in which the work. Work environment consists of all the factors, which act and react on the body and mind of an employee. The primary aim is to create an environment, which ensures the greatest ease of work and removes all causes of worries.

Occupational safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at:

A) The prevention among workers of adverse effects on health caused by their

B) The placing and maintenance of workers in an occupational environment adapted to physical and mental needs.

About Safety

Safety refers to the absence of accidents. Stated differently, safely refers to the protection of workers form the danger of accidents. Safety, in simple terms, means freedom from the occurrence or risk of injury or loss. Industrial safety or employee safety refers to the protection of workers from the danger

of industrial accidents. An accident, then is an unplanned and uncontrolled event in which an action or reaction of an object, a substance, a person, or a radiation results in personal injury. Accidents are of different types. They may be classified as major and minor ones, depending upon the seventy of the injury.

Construction sites are dangerous places where injury or death or illness can cause to workers. These can happen due to electrocution, falling from height, injuries from tools, equipment and machines; being hit by moving construction vehicles, injuries from manual handling operations, illness due to hazardous substance such as dust, chemicals, .etc. Even a nail standing up from a discarded piece of wood can cause serious injury if trodden on in unsuitable shoes.

Statistics of accidents in the construction industry in India are scarce. The rate of accidents on construction industry is very high not only in India but also in many other countries including the developed. Statistics of UK, USA and some other countries indicate that the industry has a very high hazard potential and high incidence of fatal accidents. For example, the average yearly rate of accidents for 1000 worker in the construction industry in UK is approximately 4 times the corresponding average rate of all manufacturing industries. This article will focus on various aspects of safety in construction sites

Significance: The infrastructure projects progress is very important from public utilization point of view .Delay in metro infrastructure projects causes the increasing the total cost of project also of impact of social environment at that site palace .It is observed that accidents causes the impact on progress of metro projects so the proper safety measures need to consideration while planning and execution of projects

LITERATURE REVIEW

Ahmed Senouci (2015)

Author finds that 1) identify the major safety risk factors in Qatari building construction sites and 2) apply risk management technique to assess the impact of these risk factors. A questionnaire was designed based on a comprehensive literature review and feedback from safety engineers working in the Qatari construction industry. The questionnaires were distributed among practitioners with varied positions, duties, and work experiences to collect different opinions and views. The questionnaire included three main parts.

Syed Ammad (2021)

This paper indentify dentify and present patterns in occupationalnsafety and wellness studies within construction projects. The purpose of this study is to understand safety issues, causes of accidents, and site injuries. The reasons for construction project accidents are worker neglect, high-level work, non-safe working facilities, bad site management, repetitive routine, low skill level, and wrong attitude conducting work on-site. Companies are facing challenges in the management of their labour safety systems to minimise occupational accidents. In this way, the complexity of the activities is increasing. .

Umesh Patel (2021)

The current research project focuses on safety inspections, which is considered one of the main responsibilities of a safety manager A thorough examination of construction site safety is critical in avoiding accidents. UAVs can identify critical risks, and accident prevention procedures can be implemented right away A significant benefit of drone usage on jobsites occurs before and during the construction.

OBJECTIVES

1) To study the causes of unexpected circumstance on construction site by taking suitable case study

2) To analysis different roles and responsibilities of employee in the view of safety on sites

3) To prepare a separate checklist for safety norms for metro projects

METHODOLOGY

Track 1- Detailed study about necessary for infrastructure will be carried out

Track 2-Detailed study about the safety provisions can adopted in infrastructure projects

Track 3-By taking Pune metro case study To analysis different roles and responsibilities of employee in the view of safety on sites

Track 4-Prepation of checklist for safety norms for metro projects

DATA COLLECTION

INTRODUCTION

General Information

Pune Metro is an urban Mass Rapid Transit System (MRTS) with 3 lines under construction in the city of Pune, Maharashtra by Maharashtra Metro Rail Corporation Limited (Maha-Metro) and Pune Metropolitan Region Development Authority (PMRDA).

31.254 km Pune Metro Phase 1 project's Detailed Project Report (DPR) with 2 metro lines and 29 stations was prepared & submitted by the Delhi Metro Rail Corporation in July 2009, revised in

January 2013, August 2014, and finally once again in November 2015 to reflect current prices.

Although the State Government approved the project in 2012, it had run into red tape, politics and opposition from local NGOs & activists over its mostly elevated nature. The project received a final approval from the Union Government's Cabinet on December 7, 2016.

In addition, the Pune Metropolitan Region Development Authority is developing a 3rd line, mostly elevated, connecting Hinjewadi – Civil Court on the public–private partnership (PPP) model. In September 2019, PMRDA signed a 35-year concession agreement to develop the line with a consortium of TRIL Urban Transport Private Limited (a Tata Group Company), and Siemens Project Ventures GmbH (subsidiary of Siemens Financial Services).

Pune Metro Phase 2 project's detailed project report (DPR) has not been prepared yet, but is expected to comprise of new corridors and extensions of existing metro lines to Katraj, Chandni Chowk, Kharadi, Hadapsar, Loni Kalbhor, Katraj, Khadakwasla, Warje.

DATA ANALYSIS

Formation of Safety Plan : Me and My team Prepare a safety plan for Pune Metro .The process as follows

Executive Summary

The objective of this SHE plan is to promote Health, Safety & Environment of person working with Metro Projects The project specific SHE plan will provide guide line for safe execution of project.

SHE Objective

The objective is the overall SHE goal, arising from the Integrated SHE Policy, that an organization sets itself to achieve and which is quantifiable, wherever practicable.

These are the specific goals that are necessary to implement the Integrated SHE Policy. There should be a correlation between the occupational health and safety hazard(s) & risk(s) and list of significant environmental aspect(s) & the environmental objective(s) . The SHE objective should be quantifiable and measurable.

SHE Performance

Measurable results of the Integrated SHE Management System, related to an organization's control of its safety hazards , occupational health and environmental aspects, based upon its integrated SHE policy, objective and targets

Integrated SHE Policy

Overall intentions and direction of an organization related to its SHE performance as formally expressed by top management

Environmental Target

Detailed performance requirement, applicable to the organization or parts thereof, that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives

Interested Party

Persons or group concerned with or affected by the SHE performance of an organization.

Organization

Company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration. (Note – For organizations with more than one operating unit, a single operating unit may bedefined as an organization.)

Procedure

Specified way to carry out an activity or a process

Prevention of Pollution

Use of processes, practices, techniques, materials, products, services or energy to avoid, reduce or control (separately or in combination) the creation, emission or discharge of any type of pollutant or waste, in order to reduce adverse environmental impacts.

NOTE: Prevention of pollution can include source reduction or elimination, process, product or service changes, efficient use of resources, material and energy substitution, reuse, recovery, recycling, reclamation and treatment.

Record

Document stating results achieved or providing evidence of activities performed.

Work Place

Any physical location in which work related activities are performed under the control of the organization.

Definition of corrective action

The implementation of a systematic change or solution to ensure an immediate and ongoingremedy to a non-conformance

LIST OF APPLICABLE SAFETY HEALTH ENVIRONMENT LEGISLATIONS

Following are the legislations, which have been studied to review their applicability and the respective compliance assessment to the Safety ,Health and Environmental Legislations.

1. THE WATER (PREVENTION AND CONTROL OF POLLUTION) ACT, 1974 & THE WATER (PREVENTION AND CONTROL OF POLLUTION) RULES, 1975
2. THE WATER (PREVENTION AND CONTROL OF POLLUTION) CESS ACT, 1977& THE WATER (PREVENTION AND CONTROL OF POLLUTION) CESS RULES, 1978
3. THE AIR (PREVENTION AND CONTROL OF POLLUTION) ACT, 1981 & THE AIR (PREVENTION AND CONTROL OF POLLUTION) RULES, 1982
4. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 & THE ENVIRONMENT (PROTECTION) RULES, 1986
5. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 &THE HAZARDOUS WASTES (MANAGEMENT & HANDLING) RULES, 2000, 2009
6. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 & MANUFACTURE, STORAGE AND IMPORT OF HAZARDOUS CHEMICAL RULES / AMENDMENT RULES, 1989 / 1994 / 2000
7. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 & THE RECYCLED PLASTICS MANUFACTURE & USAGE RULES, 1999 and AMENDMENT RULES2003
8. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 & THE BATTERIES (MANAGEMENT & HANDLING) RULES, 2000/2001
9. THE PUBLIC LIABILITY INSURANCE ACT 1991 AND THE PUBLIC LIABILITY INSURANCE RULES 1991
10. NATIONAL ENVIRONMENT TRIBUNAL ACT 1995
11. THE ENERGY CONSERVATION ACT 2001
12. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 AND THE ENVIRONMENTAL IMPACT ASSESSMENT NOTIFICATION, 2006, 2009
13. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 AND THE NOISE POLLUTION (CONTROL & REGULATION) RULES, 2001
14. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 AND THE FLY ASH UTILIZATION RULES, 1999 AND AMENDMENT 2003
15. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 AND THE MUNICIPAL SOLID WASTE (MANAGEMENT AND HANDLING) RULES, 1999 AND AMENDMENTS
16. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 AND THE BIO MEDICAL WASTE (MANAGEMENT & HANDLING) RULES, 1998 & AMENDMENTS 2000 and 2003
17. THE ENVIRONMENTAL (PROTECTION) ACT, 1986 &THE CHEMICAL ACCIDENTS (EMERGENCY PLANNING, PREPAREDNESS AND RESPONSE) RULES 1996 (2001)
18. THE PETROLEUM ACT 1934 & RULES 1976 (AS AMENDED TILL 2002)
19. THE GAS CYLINDER RULES, 1981
20. THE CENTRAL MOTOR VEHICLES ACT 1988 & THE CENTRAL MOTOR VEHICLES RULES 1989
21. INDIAN ELECTRICITY ACT AND INDIAN ELECTRICITY RULES 1956/2003
22. THE STATIC AND MOBILE PRESSURE VESSELS (UNFIRED) RULES, 1981(AS AMENDED TILL1997)
23. THE STANDARDS OF WEIGHTS AND MEASURES (ENFORCEMENT) ACT, 1985
24. THE WORKMEN COMPENSATION ACT, 1923
25. THE CONTRACT LABOUR (REGULATION & ABOLITION) ACT 1970 & ITS CENTRAL RULE 1971
26. THE SHOPS AND ESTABLISHMENT

ACT, 1948

27. THE BUILDING AND OTHER CONSTRUCTION WORK ACT 1996 AND CENTRAL RULES, 1998. THE MAHARASTRA BUILDING& OTHER CONSTRUCTION WORK RULES 2007

28. THE MAHARASTRA FIRE PREVENTION & LIFE SAFETY MEASURES ACT 2006.

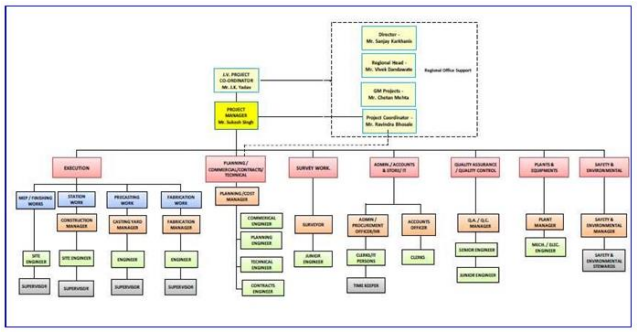
29. E-WASTE (MANAGEMENT & HANDLING) RULES 2011.

International Standards, Guidelines & ISO Certifications

The works will be undertaken in accordance with the applicable international guidelines standards and specifications on SHE:OHSAS 18001-1999 : Occupational Health and Safety Management System. ISO 14001-2004 : Environmental Management System

Site Organization Chart

Roles Responsibilities and Organization Chart for SHEMS Implementation; Subcontractor SHE Guidelines



Director (Operations) & Regional Heads

The Director (Operations) & Regional Heads of the region is ultimately responsible &accountable for Safety within the region.

1. Ensure that SHE Policy is carried out effectively at all the projects under their control.

2. Review all significant region reports on Health, Safety & Environment including those concerning accidents and reportable incidents.

3. Monitor management of the Company's SHE Policy and ensure that all recommended corrective action is implemented.

Project Managers and HODs

Project Managers and Section Heads will be responsible and accountable for the safety of the subordinate staff and operations under their control. They are expected to promote a high degree of Safety ,Health and Environment awareness among the personnel.

Their responsibilities are as follows:

1. They will have overall responsibility on SHE issues (including sub-contractors) for this project.

2. Ensure that scheduled Safety Committee Meetings are held and minutes of meetings recorded & recommended corrective actions are implemented.

3. Arrange for the scheduled training of all employees in aspects of SHE care relevant to their work.

4. Ensure that all incidents involving injury, damage to property as well as near-miss incidents are reported to the concern and are thoroughly investigated to identify the causes, so that there is no recurrence. They are also responsible for implementation of corrective actions which are recommended to avoid recurrence.

Project site SHE Manager & Officer

Responsibilities will be as follows;

1. Ensure the client and Company's procedures to be followed during construction activities.

2. Ensure the promotion of SHE Awareness among the construction personnel at all levels through audio/visual means, Safety meetings and training.

3. Ensure the Safety Inspections on Scaffolding, Equipment, Ladders, Lifting Equipment and Tools on regular basis, recommend corrective actions and monitor implementation of recommended corrective actions.

4. Ensure the preparation of safety statistics and submit on monthly basis to Project Incharge, Regional Heads and corporate

heads.

Engineers, Supervisors and Skilled Workers

All Engineers, Supervisors and Skilled Workers will be responsible & accountable to ensure the following:

1. Work under their control is executed in a safe manner in order to prevent the risk of injury to personnel and damage to property.

2. Employees are made aware of any health, potential hazards and risk to the personnel that may arise during their day-to-day or specific or out-of-work activities.

3. No unsafe activity or condition will be allowed, if any unsafe conditions of plant, equipment and any unsafe act of any employees are noticed, the same will be reported immediately to the line management.

4. Will complete all necessary reports as soon as possible in the event of any incident and submit to the Project In-Charge & SHE Officer

Individual Employees

All the company personnel have a duty to themselves, all their co-workers and any other persons who may be affected by their actions to work in the safest manner possible.

In particular, Managers, Engineers, Supervisors and employees at all level must

1. Abide by all the laid down Company's SHE requirements as well as statutory SHE at-workobligations.

2. Avoid any action that might have potential hazard to themselves or others.

3. Bring to the notice of Managers, Engineers, Supervisors or concerned personnel of any potential health or safety hazard and any practices likely to cause an accident or any unsafe practice or act being followed.

General Site Rules for all including visitors

1. The possession and use of alcohol and / or drugs at the project site is strictly prohibited. Any employee appearing to be under the influence of alcohol or drugs will not be permitted to enter or work at site.

2. Always obey instructions and comply with all safety rules, procedures and instructions.

3. Work place to be kept neat and clean, wastage / scrap to be removed after the completion ofday-to-day work.

4. Make proper use of all safety devices and guards provided. They are for your protection.

5. Wear all personal protective equipment provided for your safety, i.e. helmet, hand gloves, goggles, safety belt, dust mask, etc. It is mandatory to wear helmets by all while at work site.

6. Always walk. Never run at site (except in emergency – walk briskly).

7. Be alert and look where you are walking so that you don't slip or stumble. Use regular aisles and gangways. Do not take short cuts.

8. Do not lift the load more than safe working load.

9. Do not take undue risk or chance while at work.

10. Do not work under suspended load. Keep clear. Do not lean on stacked material.

11. No one except the driver (operator) is allowed to ride on the dumper, tipper, JCB excavator, bulldozer, crane, etc. No one is to operate such equipment without proper authority.

12. Never start, operate, adjust or repair any machine or equipment unless you are

Safety Health and Environment Committee

SHE Meetings

There will be a Safety Health Environment Committee Meeting comprising of the Management (concerned Managers, Engineers, and Supervisors of the project) and the sub-contractor's representatives in equal number as per Section 38 of BOCW ACT 1996 & M BOCW RULES Chapter 25, Rule 235. The formation of SHE Committee will be documented and circulated.

CONCLUSION

The objective of this SHE plan is to promote Health, Safety & Environment of person working

with Metro and prescribe certain rules, procedures and safe practices in order to comply with the applicable laws, Client / to create a working environment free of condition and factors that might contribute to an accident or injury / Illness. The project specific SHE plan will provide guide line for safe execution of project.The management and monitoring of the processes contained within these procedures are the responsibility of the Metro .The implementation of these procedures will provide the platform on which we seek to attain and maintain high standards of health, safety & environmental performance.

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