Abstract

Most Indian metro cities are facing the problem of traffic congestion, arising from indiscriminate use of personal vehicles, due to lack of an effective transport system to meet the demands of increasing population. An effective public transport system can not only ease the traffic flow but also improve the air quality of a region by taking personal vehicles off the road in large numbers.

Providing an effective rail or road transport system requires construction of viaducts for safe and congestion free movement of traffic. Viaducts also facilitate connecting existing network over otherwise difficult terrain and optimized use of available land. Construction of rail and road network requires working in hazardous environment. Rail and road construction work at ground level is hazardous but this hazard increases manifold for work above ground level.

As per estimates given by Occupational Safety Administration (OSHA), UK more than 10% of the workers involved in viaduct construction meet accidents ranging from minor injuries to fatality. Therefore, the importance of reviewing the existing safety measures and suggestions to improve the existing safety record cannot be undermined.

Minimization of injuries starts with identification of hazards and quantification of risk. Hazard identification and risk assessment (HIRA) techniques are available to identify hazard at construction site and assessing their risk level,. Although HIRA is implemented in construction industry all across the country, and is a part of the management system, some crucial aspects, which would enhance the effectiveness of HIRA, are still missing. Due to this certain inherent hazards are not identified resulting in accidents during execution of work. These aspects
affect the project directly or indirectly. This also results in below par safety performances at site and also breeds poor safety culture.

This thesis reviews the existing safety practices and standards followed by viaduct construction industries. The causes of high accident rate are identified and suggestions are given to improve the safety of workers involved in viaduct construction, thereby, drastically bringing down the number of injuries.

Various aspects overlooked, intentionally or unintentionally, during hazard identification and risk assessment using HIRA are identified and included in order to strengthen the existing techniques. A framework, based on the twelve different considerations identified after rigorously sifting through various method statements has been developed. Each consideration, in the developed framework, has six sub categories or concern areas. Quantification of each area is done based various study and analysis of data and set of questionnaire and survey conducted at work site.

These considerations have been quantified and risk multiplication factor (RMF) is generated. Finally, a modified risk level (MRL) is obtained by multiplying initial risk level with RMF.

Control action plan can be revised based on the new MRL. Using this framework for risk assessment various areas/ concern, which would have otherwise been overlooked if classical HIRA technique was used, can be identified. The framework has also colour codes or risk rating – red for critical (all work is to stop unless corrective steps are taken), yellow requires immediate attention, and green for acceptable risk levels. The developed framework for risk assessment is effective from site selection stage to execution stage of a construction project. Using this framework the occurrence of accidents can be eliminated, or at least the number of accidents that happen during construction activities can be considerable reduced.