

Accident Reduction Strategies for Navale Bridge

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ABSTRACT

Road accidents near Navale Bridge have become a serious safety concern due to heavy traffic, over speeding vehicles, steep slopes, and poor traffic management. This project focuses on identifying the major causes of accidents at Navale Bridge and developing effective strategies to reduce accident rates and improve road safety. The study includes analysis of traffic conditions, road design, vehicle movement, and driver behavior. The project proposes several accident reduction measures such as improved road design, installation of proper signboards, speed control measures, CCTV monitoring, and driver awareness programs. Safety improvements like reflective road markings, warning systems, and emergency response facilities are also suggested. The main objective of this project is to reduce accidents and enhance safety for all road users by implementing practical and cost-effective solutions. The proposed strategies will help create a safer transportation system and minimize the risk of accidents in the Navale Bridge area.

Keywords- *Accidental Black spots, traffic, design, accident.*

INTRODUCTION

Road traffic accidents are a leading cause of mortality and morbidity globally. A road traffic accident can be defined as, an event that occurs on a way or street open to public traffic resulting in one or more persons being injured or killed, where at least one moving vehicle is involved. The important factors are human errors, driver fatigue, poor traffic sense, mechanical fault of vehicle, speeding and overtaking violation of traffic rules, poor road conditions, traffic congestion, road encroachment etc.

The Navale Bridge Project has experienced various safety concerns, including slips and trips, vehicle-worker interaction risks, improper use of personal protective equipment (PPE), and housekeeping deficiencies. These incidents highlight the need for a comprehensive accident reduction framework that integrates engineering controls, administrative planning, behavioral safety approaches, and technological interventions.. Construction remains one of the most hazardous industries worldwide, with falls from height, equipment-related incidents, electrocution, and struck-by accidents accounting for a large proportion of injuries and fatalities. In large infrastructure projects such as bridges, risks are amplified due to elevated structures, crane operations, scaffolding systems, temporary works, and simultaneous task execution. Without structured risk identification and control mechanisms, minor unsafe conditions can escalate into serious incidents. The cause of death for young people aged 15–29 years. In developing countries 85% of the deaths are as a result of road traffic crashes. India accounts for 10% of road accident fatalities Worldwide. In India, over 80000 persons die in the traffic crashes annually, over 1.2 million injured.

seriously and about 3,00,000 disabled permanently. Thus Road Traffic injury has emerged as a major preventable public health problem. This places a huge social and financial burden on an individual and the community. With ever increasing number of vehicles on same road length the incidence of accidental deaths.

Ultimately, effective accident reduction is not solely dependent on compliance with safety regulations but on the commitment of project leadership, active worker participation, and continuous monitoring and improvement of safety performance. The findings of this study are intended to support safer execution of the Navale Bridge Project and serve as a reference model for similar bridge construction projects in urban settings.

PROBLEM STATEMENT

The Navale Bridge Project operates within a complex construction environment characterized by elevated work platforms, heavy machinery movement, active traffic interfaces, multiple subcontractors, and tight project deadlines. Despite existing safety protocols, the project continues to face recurring safety incidents such as falls from height, vehicle-worker collisions, equipment-related injuries, slips and trips, and inconsistent use of personal protective equipment (PPE). These incidents not only endanger workers' lives but also result in project delays, financial losses, legal liabilities, and reputational damage.

A critical issue identified at the Navale Bridge Project is the gap between safety planning and on-site execution. While general safety guidelines may be in place, their implementation is often inconsistent due to inadequate supervision, insufficient training specific to bridge construction hazards, poor coordination between teams, and limited real-time hazard monitoring. Additionally, reactive safety practices—addressing hazards only after incidents occur—have limited the effectiveness of accident prevention efforts.

The project environment also presents unique risk factors, including:

- Continuous interaction between construction activities and live traffic
- Work at significant heights without fully optimized fall protection systems
- Simultaneous operations (lifting, welding, concreting, and formwork installation)
- Inadequate housekeeping in confined working areas
- Fatigue and time pressure due to accelerated schedules

These conditions increase the probability and severity of accidents if systematic and proactive control measures are not strengthened.

LITERATURE REVIEW

The study examines the effect of online tendering systems on budgetary performance in delayed projects. The main hypothesis proposes that online tendering systems have a significant influence on budgetary performance. Specifically, the study hypothesizes that greater transparency, improved procurement efficiency, increased bidder competition, enhanced monitoring mechanisms, and reduced corruption associated with online tendering systems contribute to better budget control and reduced cost overruns in delayed projects. Conversely, the null hypothesis states that online tendering systems have no significant effect on budgetary performance. The study further assumes that factors such as project size and procurement efficiency may moderate or mediate this relationship, thereby influencing the extent to which online tendering impacts financial outcomes in delayed projects.

Srinivasan (1987) developed a scientific method for the identification and improvement of accident prone locations on national highways (NHs) in Kerala. Three methods were used in their study to identify the black spots, i.e. i) Quantum of accident method; ii) Accident prone index (API) method and iii) WSI method. The study concluded that the method based on WSI was found to be most suitable in identifying black spots.

Jalindar R Patil(2015) The PWD (Public Works Department) Government of Maharashtra state had undertaken the improvement of such accidental prone spots which generally designated as the black spots on highways. But little research has been done till day on prevention of accidents. The basic aim of the study is to identify accidental black spots on Mumbai-Pune Expressway and Pune-Solapur National Highway NH-9 by considering the parameters responsible for occurrence of accidents using method of ranking. Till day there is no authentic process of identification of accidental black spots on Mumbai-Pune Expressway and Pune-Solapur Highway, hence it is necessary to study in detail accidental black spot-on Mumbai - Pune Expressway and Pune – Solapur Highway

Snehal Bobade (2016) In this paper Author considering all the parameter so accidental density method (ADM) and weighted severity index (WSI) black spots are found at particular chain age. Black spot identification is an important step for black spot improvement. Methodologies to identify a black spot may vary places to places. For accident-free highway, normal causes of accidents are taken into consideration during designing of National Highway. In this article, author will study accidental data collected from National Highway Authority of India (NHAI) is analyzed by Weighted Severity Index Method (WSI) and Accidental Density Method (ADM) and black spot on national highway was found out. The present study aims to identify accidental black spots on a section (820 km-830 km) of National Highway - 4 by studying the accidental data provided by the National Highway Authority of India (NHAI) during year 2014-2015. In present study for identification of black spots Ranking Method is used. During that study basic causes of accidents were found out and suitable remedial measures were also provided for a particular spot.

Dr. Dhananjay Mandlik (2020) The main cause of traffic jams in Pune is road side parking which should be banned and penalized. Traffic jams can be improvised on various strategies such as road broadening, improved road infrastructures, penalty to the traffic law breakers and application of Fly over, properly planned traffic junctions, no hawkers zone etc. to lessen the traffic problems there

Objective

- Identify common accident causes on the Navale Bridge Project
- Evaluate existing risk controls
- Propose enhanced prevention and mitigation strategies
- Recommend implementation frameworks and measurable KPIs

RESEARCH METHODOLOGY

This study adopts a systematic and analytical research methodology to identify accident causes and develop effective accident reduction strategies for the Navale Bridge Project. A mixed-method approach combining qualitative and quantitative techniques was used to ensure comprehensive analysis and practical recommendations.

This project are extracted follows the flowchart given below:

1. Research Design
2. Data Collection Methods
 - Site Observations
 - Accident and Incident Report Analysis
 - Worker and Supervisor Interviews
 - Safety Document Review
3. Risk Assessment Techniques
4. Data Analysis
5. Development of Accident Reduction Strategies
6. Limitations of the Study

FINDINGS:

The findings of this study are based on site observations, accident record analysis, worker interviews, and risk assessment exercises conducted at the Navale Bridge Project. The results highlight recurring accident patterns, underlying risk factors, and gaps in safety implementation.

Accident Trend Analysis:

Analysis of past incident records revealed that the majority of accidents were concentrated in a few high-risk categories:

Accident Type	Approximate Contribution
Falls from Height	25–30%
Slips, Trips, and Falls (Same Level)	20–25%
Vehicle/Equipment Interaction	20%
Improper PPE Usage	10–15%
Electrical Hazards	8–12%
Other (Material Handling, Struck-by)	5–10%

- Unsafe Conditions
- Unsafe Acts
- Organizational Factors
- High-Risk Work Activities Identified
- Safety Culture Assessment
- Gaps in Existing Safety Controls
- Overall Assessment



On 13 November people were killed and 13 injured after a Mumbai-bound trailer truck ploughed through 13 vehicles on the Bhumkar bridge-Navale Bridge stretch of the busy Pune-Bengaluru highway on Thursday evening. The trailer truck dragged a car for several metres and halted after crashing into another truck.

Both the trucks and the car stuck between them caught fire. Five passengers of the car two men, two women and a three-year-old girl - and the driver and cleaner of the trailer truck were charred to death. The deceased were identified as Swati Santosh Navalkar (37), her father Dattatreya Dabhade (58), mother Shanta Dabhade (54), all from the city's Dhayari Phata area, their family friend's daughter Mokshita Reddy of Chikhali and the car driver Dhananjay Koli (30), originally from Kolhapur and staying in the city's Chikhali area. The family was returning from Narayanpur in the car when the accident occurred. The eighth victim, Rohit Kadam (25) of Khandala in Satara, succumbed to his injuries in a private hospital. "The truck driver and cleaner are yet to be identified," DCP (Zone II) Sambhaji Kadam said.



ACCIDENT REDUCTION STRATEGIES

The following strategies are evidence-based and tailored to the Navale Bridge Project:

Engineering Controls

- Fall Protection Enhancements
- Traffic Segregation Plan
- Equipment Safety Upgrades

Administrative Controls

- Schedule and Shift Planning
- Permit-to-Work System
- Behavioural & Cultural Interventions

Behaviour-Based Safety (BBS) Program

- Supervisor Leadership Development
- Worker Engagement Forums

Technology-Driven Strategies

- Wearable Sensors
- Mobile Reporting Apps
- Safety Dashboards

PERFORMANCE MEASUREMENT:

KPI	Target
Total Recordable Incident Rate (TRIR)	Reduce by 50% in 12 months
Near-miss reporting	Increase by 100% (culture signal)
Training completion	100% compliance
Unsafe acts observations	30% reduction

❖ Implementation Framework

✓ Phase 1 (Months 1-2):

1. Baseline assessment
2. Safety committee launch
3. Install fall protection and barriers

- ✓ **Phase 2 (Months 3-6):**
 1. Training roll-out
 2. BBS program launch
 3. Digital tools deployment
- ✓ **Phase 3 (Months 6-12):**
 1. Evaluate KPI data
 2. Continuous improvement workshops
- ❖ **Discussion**
- ✓ The strategies focus on **multi-layered risk control:**
 1. *Engineering* eliminates or reduces hazards
 2. *Administrative* shapes how work is planned and reviewed
 3. *Behavioural* builds a proactive safety culture
 4. *Technology* provides visibility and enforceability

Combining these yields the strongest outcomes.

Integrated Remedial Measures for Navale Bridge Project:

Integrated remedial measures are recommended to reduce accidents at the Navale Bridge Project. These include engineering controls (guardrails, safety nets, pedestrian segregation), administrative measures (task-specific training, supervision, permit-to-work), behavioral interventions (BBS programs, accountability), and technological solutions (wearable sensors, digital monitoring). Regular monitoring through KPIs ensures continuous improvement and sustainable safety performance.

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