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Safety Auditing for Highway during Construction Stage

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ABSTRACT: In developing nations such as India the economy is mainly maintained by the transportation facilities. Most of the transportation in India is mainly done by two ways firstly by roads and secondly by railways. In this transportation system people and loads are moved by roadways as it can be gives door to door facility and end to end connectivity. In India's transportation there is mix type of traffic such as non-motorized and motorized. Due to this there are chances of fatal accidents. Many lives are lost and tremendous of property is harmed due to mishaps. This research is an endeavour to break down the activity wellbeing circumstance from College of Engg. & Tech., Akola to Vyalla on Kolkatta-Nagpur- Dhule- Hajira NH No-53(Old NH-6), Maharashtra, India. Identification of different factors which leads to accident causing situation and project delays are noted down and are suggested to be rectified before its too late. As a result of conducting Road Safety Audits, it was discovered that safety barricading is not provided on most of the places. Illegal land acquisition is done on some places. Heavy vehicles are parked on the insufficient shoulder. Old structure remains are not removed at some place. Drain inlet are not cleaned properly. For future implementation, the appropriate recommendation was provided for quality improvements taking into account different co-ordinates of the entire study area.

KEYWORDS: Road Safety Audit, Road Safety Analysis, Traffic Safety, Construction Stage Audit, Safety Program, Road Accident, Safety of Vulnerable Road User

I. INTRODUCTION

Road accident is one of the rising problems in most of the countries. The accident rate and the death rate in the developing countries are alarmingly high during recent years. Every year large number of people gets injured and also succeeded in accident. Central government and State government spends large amount of money for reconstructing and improving roads in an effort to reduce accidents. The streets of India are incredibly dangerous. We essentially don't have a mutual understanding of the nature and degree of wellbeing related issues on the streets. There is because of poor mishap records, lack of information about the severity of the issue that renders it difficult to frame an assessment. Considering different regular factors such as overloaded goods vehicles and traveler vehicles, unregistered and uncertified vehicles, unlicensed and under experience drivers and a lack of consistency in the enforcement of street rules it is difficult to reduce the road accident. Inadequately maintained streets do not fit within basic security-related outline guidelines, such as movement isolation, partitioned carriageways, crossing points, and path markings and inadequate shoulder length and illegal acquisition on road shoulder. Additionally, these people tend to be low financially capability and likewise bear an unequal risk of wounds and fatalities. Immediate hospitalization and first aid facilities at mishap locations is frequently slow and untimely, adding to the prominent reason why so many fatalities happen on Indian roadways.

A road safety audit is a method by which a design for a road can be assessed for its accident potential and safety performance and can be improved in the near future. Assessing the likely effects of proposed traffic and road schemes is done through a road safety assessment. Roads are designed by considering large number of factors such a travel time, user comfort and convenience, fuel consumption, construction costs, environmental impact, etc. Safety audit procedures ensure that independent skills are used to make detailed safety implications of an entire design and which lead to safer design of both new and modified roads. The goal of a safety audit is to prevent future accidents from occurring or reduce their severity by employing safety principles in the design of new or modified roads. Vehicular traffic began to increase, and the streets became congested, making it increasingly difficult to move traffic safely and efficiently. In order to achieve new efficiency levels in highway transportation, it is essential to improve geometric



design, capacity, intersections, traffic regulations, signals, signs, markings, parking structures, and street lighting design. The rapid urbanization of the world results in a huge increase in the number of vehicles and a confusing amount of traffic on the roads due to the increasing number of vehicles.

Since traffic congestion is such a serious issue, an RSA engineer must understand its economic effects as well as the methods of mitigating it. Due to a rapidly rising population, the existing street system was never intended to cater to future development. In many metropolitan cities, finding a safe parking spot is nearly impossible. Congestion causes delays and time loss. This reflects in increased traffic and an increase in road accidents, which have taken a heavy toll on human life. The Road Safety Audit must survey on the basis of street client users, qualities and aptitudes, day/night, wet and dry street conditions, etc.

II. LITERATURE REVIEW

I. **Road Accidents: (NCRB - 2015)** Traffic Accidents were reported during the year 2015 was 4,64,674 throughout India. Maximum number of traffic accidents occurred in the month of May (45,215) and as per time wise analysis, maximum number of traffic accidents (80,113) were reported during 1500 hrs to 1800 hrs (day) of day. 29.3% victims of road accidents were riders of Two Wheelers. Trucks/Lorries Cars and Buses have accounted for 19.4%, 12.4% and 8.3% of road accidental deaths respectively. Most of road accidents were due to over speeding accounting for 43.7% of total accidents which caused 60,969 deaths and 2,12,815 persons injured.

II. **Cyberabad Traffic Police (2017)** Data from the official website about Nehru Outer Ring Road reveals some guidelines like, the maximum speed on Lane 1 and Lane 2 of the ORR will be 120 KM per hour and minimum speed will be 80 KM per hour. The maximum speed on Lane 3 and Lane 4 of the ORR will be 80 KM per hour and minimum speed will be 40 KM per hour. The minimum speed on ORR will be 40 KM per hour. No vehicle is permitted to travel on ORR below this speed. Faster moving vehicles should move in Right Lanes (Lane 1 and 2) and slow-moving vehicles should move in Left lanes (Lane 3 and 4) within the above speed ranges. Heavy vehicles should move in Lane 3 or Lane 4 only. All vehicles which change their speed shall have to go to the lane having the concerned speed range and no Zig – Zag movement between the lanes is permitted. All vehicles wanting to change lanes as per the above speeds should do so only after using indicator lights and all precautions shall be taken while changing lanes. No Vehicle shall stop on any of the 4 lanes of ORR.

III. **Francis John Gichaga et al.** Road Safety and Road Safety Audit in India: A Review. ISSN: 2347 - 4718 This paper had reviewed the concept of the road safety audit and its stages. Objective of the RSA is to evaluate ventures for potential mishaps end / lessening on the premise of road client learning, characteristics and aptitudes, day/night, wet/dry road conditions. It suggested on outline and before planning of agreement archives, to evaluate itemized intersection design, markings, signs, signals, lighting points of interest, Detail Design of junctions, Design of geometrics, Cross-fall Marking and Signs, Side drains, Embankment slopes, Presence of clear zone, Traffic Signals Lighting.

IV. **Arun S Bagietal.** Road Safety Audit (IOSRJMCE) ISSN:2278 -1684 This study had identified accident prone areas on the road from FIR, it studied the effect of roadway geometrics and traffic conditions on the road stretch and development of statistical relationship between accident rates and numerous factors causing accidents. The scope of the study was to reduce accidents on road network, reducing severity of accidents and the need for costly remedial work is reduced.

III. METHODOLOGY

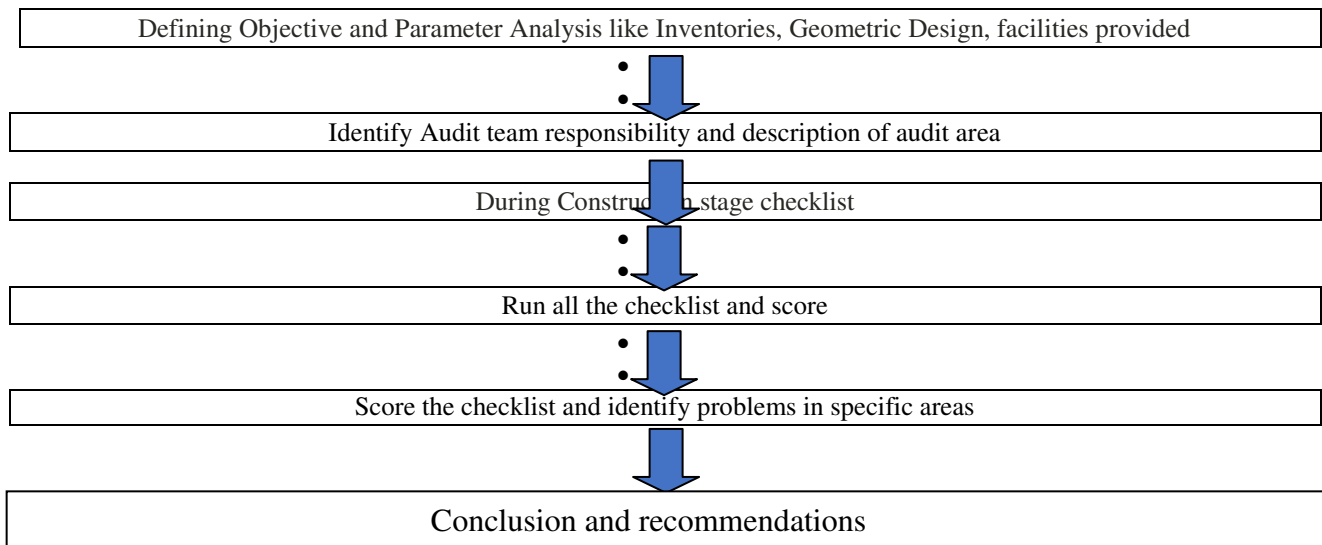
A. Objectives

The goals of the Audit are:

- To reduce the possibility of accidents.
- To ensure the safety and accessibility of vulnerable road users.
- Reducing the long-term costs of a planning and decision on road project.
- Raising policymaker's and scheme designer's awareness of the importance of road safety.
- To make it clear to all types of users of the new or modified road how to use it safely and at which limit.
- Determine the effectiveness of the installed road safety measures.
- Identifying existing safety hazards.
- Recommendation of cost-effective appropriate corrective actions for overall safety improvement.



A. Methodology Flow Chart



IV. SITE SELECTION STUDY AREA

The extension of Highway from College of Engg. & Tech., Akola to Vyalla on Kolkatta-Nagpur - Dhule-Hajira NH No-53 (Old NH-6), had been chosen for the research purpose. The area delineated guide and course guide are appeared in Figure 1 and Figure 2. This highway is being constructed under the vigilance of National Highway Authority of India (NHAI).

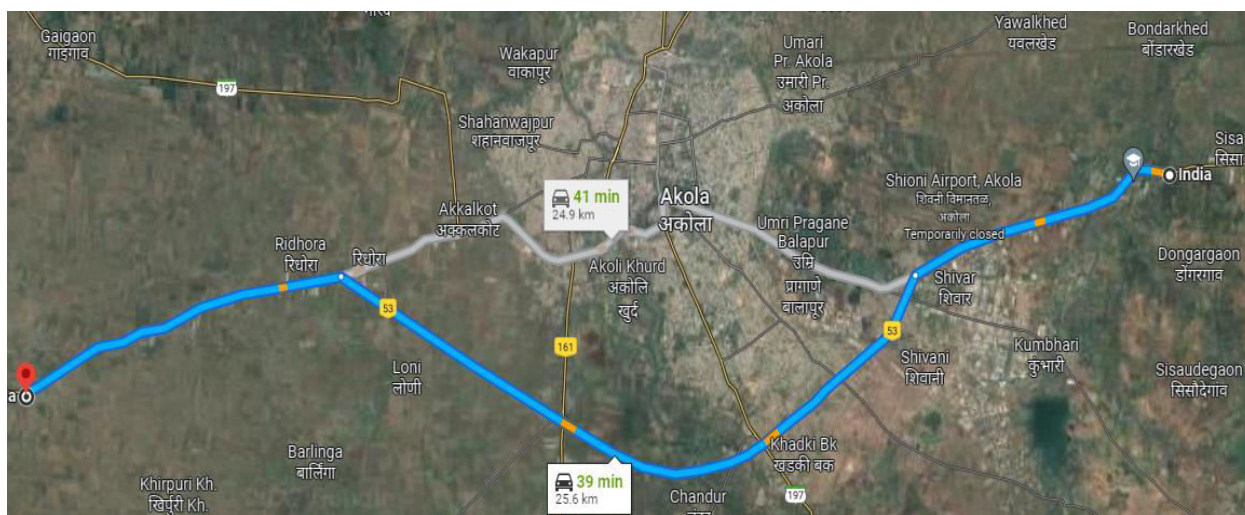


Fig 1: Study Area Terrain Map (Source: Google Maps)



Fig 2: Study Area Route (Source Google Maps)

V. DISCUSSION AND CONCLUSION

A. Illegal Land Acquisition:

At many places illegal land acquisition is done which causes parking of vehicles in front of shops and sometime causes accident due to instant stopping of vehicles for purchase of products at shop and at some places old land acquisition is also not removed. At many places ramps are not provided to connect the main vendors to the shoulder of the highway.





B. Old Structure Remains:

At some places old gantry structure and other old structure remains are there near the main carriageway which may cause damage to the loading vehicles / containers at night time.



C. Informatory Sign Board

Informatory sign boards should be provided well in advance to inform the drivers about bypass and the arterial roads which will not cause last minute turning or stoppage for fast moving vehicles.



D. Hazard Marker Sign:

At many places hazard marker signs and cautionary sign board are missing which may causes accident prone zone. Mainly this affects the two wheeler road user at night time due to presence of sand and small aggregates on shoulder. Also there are open pits of drainage with open bars which is highly dangerous.



E. Drain Inlets:

At some point drainage inlets are not cleaned properly as the rainy seasons is near it is essential to drain off the rain water as early as possible as it may cause damage to main carriageway.



F. Roadside Danger:

The RSA group recognized areas where the roadside barrier was hindered short separation. This would



bring about an errant vehicle entering the unprotected zone to be "caught", with no plausibility to hold control and collide with roadside impediments behind the obstructions. The establishment of a solid boundary of suitable stature and length and exceptional treatment of move ranges between the diverse sorts of restriction frameworks was suggested.



VI. RECOMMENDATION

Recommendation on the basis of IRC

Based on the present investigation of road safety audit for selected national highway, the accompanying conclusions have been drawn:

1. It is recommended to remove illegal vendors / shops from the shoulder.
2. Old structure remains should be removed before starting the work on that specific highway patch.
3. Informatory sign boards should be provided in advance before 100 m to 150 m before turning.
4. Hazard marker and cautionary sign board should be provided at all the places where there is ongoing construction site near the shoulder and main carriage way before 100 m of actual site so as the driver have time to slow down the vehicle.
5. Drainage inlets should be cleaned regularly if not possible then atleast before the rainy season.
6. An eye should be provided at roadside hazard by installing CCTV camera on specific area where there is frequently hauling of heavy vehicles on the shoulder and warn the drivers about the same

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