

# Study of Road Safety Audit of Four Lane Roads in India

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## ABSTRACT

Road network of any country has a notable role to play for country's economy and growth. Transportation through road networks satisfies the basic needs of people. Many lives are lost and huge amount of property damage occurs due to accidents. This study is an attempt to analyze the traffic safety situation on Gurgaon Faridabad road (MDR 137), Ballabgarh Sohna road (MDR 133) and few other connecting roads in Gurgaon and Faridabad Districts of Haryana (India) and to identify counter measures for stretches in which the total harm caused by crashes can be substantially and readily reduced. The scope of this study is identifying road safety aspects and carrying out safety audit of four lanned road of Gurgaon – Faridabad road MDR 137 and Widening of Ballabgarh Sohna road MDR 133 and few other connecting roads in Gurgaon and Faridabad District of Haryana. The length of project road is 66.185 kms which was started in June 2009 and completed in June 2012. This was developed on BOT mode of delivery by M/S GF TOLL ROAD PRIVATE LIMITED a subsidiary (SPV) of M/S Reliance Infrastructure Ltd Mumbai. The necessity of this study arises from the fact that any project of this size should be examined at various stages to achieve the objective of safe operation of highway. It ensures safety for all road users and minimizes the risk and severity of accidents with minimal cost and high benefit-cost ratio.

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## INTRODUCTION

To keep the pace of development in country, India has taken up the up-gradation of highways in a big way. The funds collected as cess @ Rs 2/litre on petrol and diesel have been ring fenced and are being used for road development only to cater to the demands of growing population for sustained economic growth. Funds are allocated for development of state highways and MDR's to the states under CRF. Pradhan Mantri Gram Sadak Yojna has also been launched for improvement of Rural Roads in the states, in addition to their own Budgets.

Up-gradation of Highways have provided, great mobility but with no added safety. The increase in number of vehicles coupled with higher speed and neglect of vulnerable road users at planning and design stage have enhanced the threat of exposure to road accidents. Road accidents are now one of the greatest hazards to human safety today and kill more people than most of the deadly diseases. Number of injuries and deaths due to road accidents has steadily increased globally and in India as well.

Road fatalities have emerged as a serious threat to human life and are causing a serious challenge to highway planners, designers and construction agencies. This has placed the added responsibility on all the stakeholders in highway sector to think seriously in providing safe roads by all means. Road network has expanded since last many years to cater to the increasing demand of transportation of people and goods but the safety aspects came to focus when the accident rate continued ascending trend. For the first time in two consecutive years, i.e. 2012 and 2013, there was a decline in the number of road accidents, the number of persons killed and the number of persons injured in road accidents. The total number of road accidents declined from 4,90,383 in 2012 to 4,86,476 in 2013.

Not only was there a decline in the absolute number of road accidents in the country during 2013, as compared to 2012, there was also a decline in the number of accidents per lakh population from 39.9 in 2012 to 38.9 in 2013. The number of persons killed in road accidents too declined to 1,37,572 in 2013, in comparison to 1,38,258 in 2012. In terms of total number of persons killed in road accidents per lakh population, there was a reduction from 11.2 in 2012 to 11.0 in 2013. The number of persons injured in road accidents reduced both in absolute as well as relative terms. In 2012, as many

as 5, 09,667 had got injured in road accidents, in 2013, there were 4, 94,893 persons injured. The number of persons injured in road accidents per lakh of population declined from 41.4 in 2012 to 39.6 in the number of persons injured in road accidents per lakh of population declined from 41.4 in 2012 to 39.6 in 2013.

India lost about 1, 38,258 lives in the year 2012 and 1, 37,572 in 2013 which accounts for 10% of world fatalities. The matter of concern is the factor that the accidents, fatalities and casualties have increased at the rate of almost 5% over last 20 years and death rate per vehicle is 10 to 20 times higher in India compared to any other developed nation. The economic burden on account of these fatalities is estimated to be 3% of GDP.

Road sector plays a vital role in the development of the nation and the society. Government of India has declared this decade as the decade of innovation for inclusive growth and the U.N. has declared this decade ,year 2011 to 2020, as the decade of action for road safety and bring down the road crashes @ 5% per annum and bring down at 50% level by the end of this decade. India is signatory to this resolution. The focus is now being shifted on the people and services for inclusive growth and the road safety and the Indian Roads Congress (IRC) has itself adapted to this shift by adopting the resolution that the “Roads be built not only for the vehicles but for the people, safety and services” in its Coimbatore Session in January, 2013. The resolution that the Council of Indian Roads Congress passed at Coimbatore, reads as under:

“Roads should be considered as active infrastructure facility for people, for safety and services, besides a catalyst in development of economy in place of passive approach of exclusivity. The IRC will evolve itself through synchronization and synergization with other sectors of economy based on interdependent model, wherein the need of safety of all stakeholders of highway sector is fulfilled through inclusive approach. Accordingly, the IRC is to adopt multi-modal transport concept while developing guidelines and codal practices”.

Convincing with the seriousness of road Fatalities, Government of India and States have expressed serious concerns and taken a number of policy initiatives to address the problem on various fronts such as Engineering, Enforcement, Education and Emergency services. Government of India has approved National Road Safety Policy on 15.03.2010 on the recommendations of a Committee headed by Sh. S. Sunder, Former Secretary, MOST. National Road Safety Council has been established under section 215 of the Motor Vehicle Act which is the apex body. Many States have also constituted Road Safety Councils and District Committees.

### **Road Safety Concern**

Nearly 80% of road accidents are attributed to the human error of momentary judgment (primarily drivers and vulnerable road users i.e. pedestrians, cyclist, rickshaw/cart pullers) which is observed to be directly proportional to the degree of mental stress/anxiety of the road user. The primary reason of omission and commission is observed to be over speeding. Overloading an economic constraint and deficient road geometry, lack of setback/ sight distance are among other reasons causing accidents. In our country about 70 percent are vulnerable road users. Huge loss of life in addition to loss of property is causing every year. It is regretful that in India, there are hardly any emphases on research/study to assess the behavioral aspects of different categories of road users, especially the vulnerable road users.

The factors responsible for accidents are very complex in nature; however these can be divided in to four major categories i. e. the driver, the road, the vehicle and the environment. Realizing the fact that more than 90% loss of lives in road accidents occur in developing world which has less than half of the world's vehicles, the UN has declared a Decade of Action for Road Safety 2011-2020. Hon'ble Supreme court of India taking into cognizance the state of affairs on the traffic scenario, in the matter of a civil (writ) petition in its judgment dated 22 April,2014 has constituted a three –member committee under the chairmanship of Hon'ble Mr. Justice K. S. Radhakrishan, Supreme Court of India to monitor the progress in the matter and directed the

## **LITERATURE REVIEW**

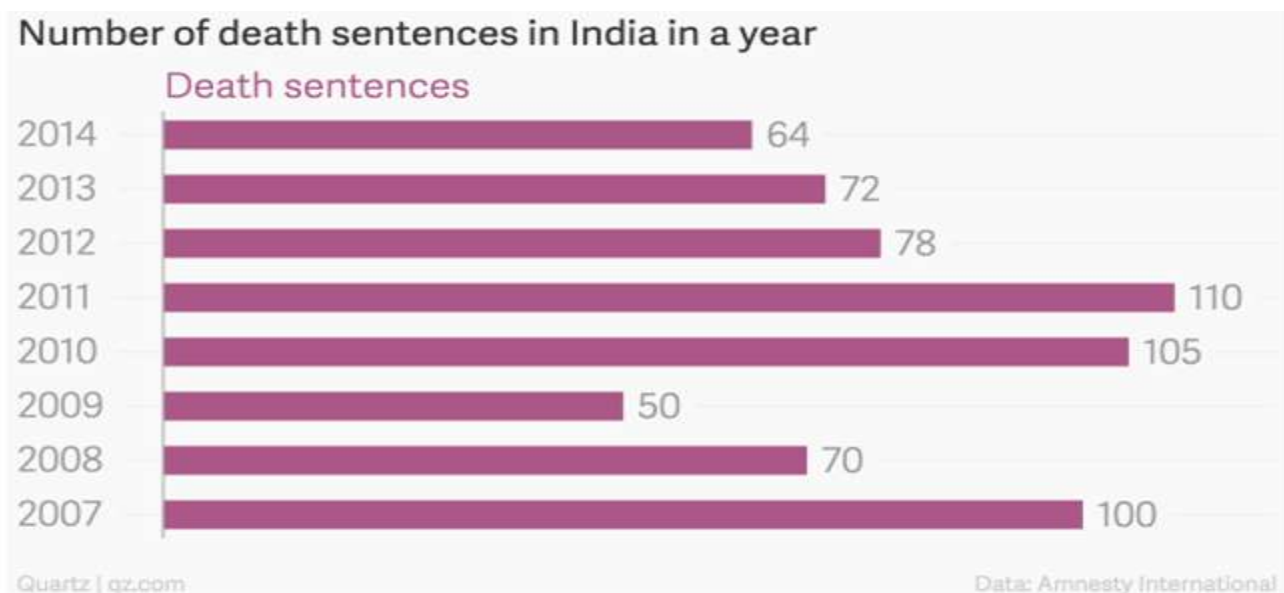
### **Road Safety Scenario**

Road fatalities in India during the year 2012 consumed almost 1, 38,258 lives which is about 10% of World fatalities. Many more are severally injured. The worrying factor is that the road safety scenario is worsening in the country. Accidents, fatalities and casualties have increased at the rate of almost 5% during last 20 years and death rate per vehicle is 10 to 20 times higher in India compared to countries like Sweden, Norway, Japan, Australia, UK and USA.



**Figure 1: Traffic scenes on road**

Road injuries and fatalities cause huge economic burden on developing economy like India which is estimated to be 3% of GDP (Tenth Five Year Plan Vol-II). Vulnerable Road Users (VRUs) like pedestrian, bicyclists and two wheeler users constitute 60-80% of all traffic fatalities. More than half of the road accident victims are in the age group of 25-65 years, the relevant wage earning and child raising group. The loss of main bread earner and head of house hold due to death or disability can be catastrophic, leading to lower standards and poverty, in addition to the misery and bereavement. The details given below herein explains the degree of seriousness of this problem. Various charts show the current situation of accidents in India which has been prepared by Ministry of Roads Transport and Highways, GOI.



**Fig. 2: Prime Causes of Accidents, Fatalities and Injuries**

**Driver Related** – Over-speeding, drink-driving over-loading overtaking on bridges/culverts, mobile phone use, fatigue, neglect of traffic signals, negligence, disregard to road signage and value of life, inadequate training, old age, improper eyesight etc.

**Vehicle Related** – High vehicle density, lack of speed locks, overloading and overcrowding, unsafe vehicle design, poor operating and maintenance condition, defective/lack of automatic door locks and emergency windows, nonavailability of breaking hammer near windows, non-display of safety instructions, lack of reflective signage on rear and sides of vehicles etc.

**Operator Related** - Lack of safety vision, mission and implementation, proper permits, owner/lease agreements, insurance, pollution certificates, load protruding, maintenance management, vehicle safety auditing, proper training and sensitization to drivers, cleaners and mechanics in emergency management like response, reporting and coordination with regulators, provision of necessary GPS, RFID systems for real-time tracking of the vehicles, flouting of safety norms like lack of second driver in long distance travels, provision of fire extinguishers, public address system, awareness video, lack of established systems or communication with public regarding safety in Private or Public Transport Operators displaying passenger safety provisions/Safety Manual/Safety Plan/Citizen’s Charter in their websites.

**Vehicle Manufacturer** - Non-adaptation of modern high speed vehicle design to suit Indian road and traffic conditions, passenger behavior, operation and maintenance systems and practices, software, sensors and hardware, lack of speed governors, faulty central locking system, lack of GPS enablement, occasional flames etc. though Volvo company claims installation of Electronically-controlled Brake System in its Volvo 9400 bus.

**Road Engineering and Signage Related** – Lack of road signage (indicating speed limits, blind curves, sudden change in carriageway/alignment), reflective sticking at bridges, culverts, dividers/medians, speed breakers/rumble strips, service roads, junction improvement, cat eyes, crash barriers, guide stones proper signaling at junctions in cities and rural areas on Highways, load limits, lay-byes, road and culvert alignments, direction and diversion boards etc., poor maintenance of road infrastructure, damaged shoulders and even base course on some NHs, old/damaged bridges etc.

**Regulator/ Government Related** – Non-enforcement of rules relating to issue of vehicle permits, fitness certificates, driving licenses, speed limits, drink-driving, helmets, seat belts, child restraints, safety provisions, overloading, load protruding, road geometry, road maintenance, highway patrolling, ambulance services, trauma care, liquor shops, vehicle testing centres, drivers’ training and refreshment rooms, benchmarking safety levels, road safety audit, certification systems, vehicle record maintenance at toll gates, creation of awareness, legal and police apathy to good samaritans, rating of operators, public disclosure, non-availability of Highway Patrol Vehicles, Highway Ambulances and Trauma Care supposed to be available every 50 KM of Highway, low flash point of Indian diesel at 350C enabling diesel from fuel

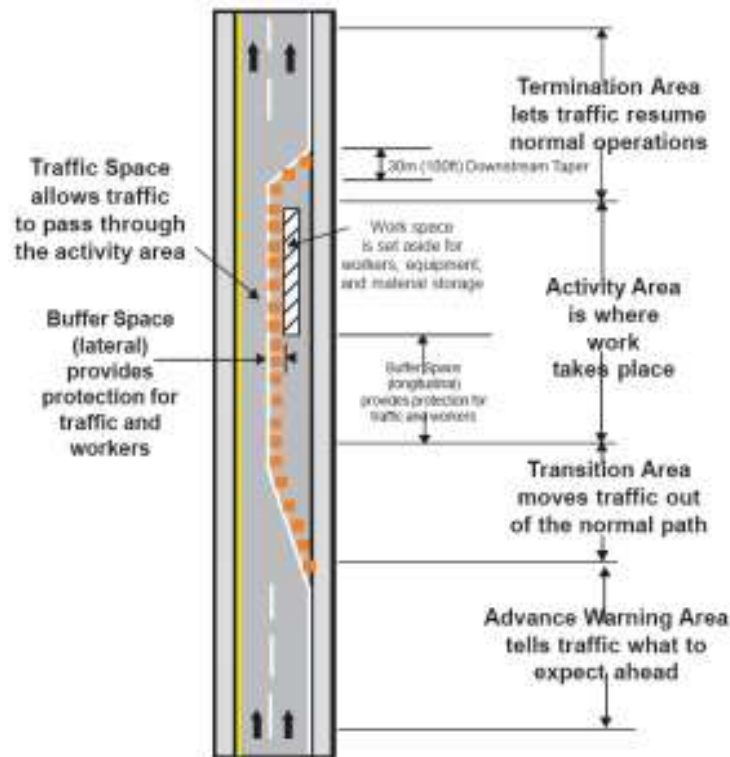
### TRAFFIC MANAGEMENT PLANS

The Construction is under progress at many places as shown in Fig 4, accordingly the traffic diversion observed in many places. However at most the places the diversions are not properly provided without any proper warning signs speed limits, Blinkers etc.. User shall be given enough time and information before entering in to the diversion zone.



Fig 3: safety at night and adopting diversion as per IRC specifications

Provide the diversion according to plans and type of widening taking place as given in Fig4., along with adequate warnings and its placement on the project highway shall be maintained.



**Fig.4: Work zone components, supplemented with the diversion plan**

## CONCLUSION

According to the various reviews, it has been observed that no any definite trend is observed with month wise distribution, the accidents have occurred all through the year. Majority of accidents have occurred during 8am to 12pm and 4pm to 6pm of the day and it is difficult to explain the particular trend. Analysing kilometer wise accident occurrence has shown that KMS 0 to 1 and 2 to 3 have shown higher accidents. The analysis has indicated that the most severe accident prone locations are KM 0 to 1, KM 2 to 3 and KM 1 to 2. These stretches needs geometric improvement, pavement resurfacing etc., and needs Before and After studies to be conducted for economic and financial evaluation.

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