

Proactive Approach to Assess Road Safety Audit on Collector Roads

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ABSTRACT

It is important to ensure the safety on collector roads, as most of the safety audits are done mainly on highways and expressways, but as a result of the increasing number of vehicles in this scenario, and to avoid the queuing and congestion and to reach the destination in least time through easy route, most of the drivers nowadays choose these collector roads. But the implement of improvement programs on these roads are difficult due to the limitations on funding, expertise, time, and less availability of land. So, the better option for supporting the local transportation agencies about the safety issues is by conducting RSA. Through proactive approach, this project give rise to simple and cost-effective way of conducting the local RSA program. The study area was examined to analyse the existing condition of the road with reference to IRC manuals then based on observation certain ratings were provided and then given to experts to receive their judgements and it is analyzed by Analytical Hierarchy Process (AHP) in identifying the parameters which causes more road safety risk. The five parameters considered here are sight distance, drainage, signs and markings, cross sections, lighting and nighttime issues. As a result, this study prioritizes the parameters which need to give more importance at the time of design which is expected to be useful to various decision makers.

Keywords: Analytical Hierarchy Process, Road Safety, Pavement distress

1 Introduction

1.1 General

We know that transportation plays important role in the development of economic activities of the country by promoting goods and services. Assignment of socioeconomic development of the country is one of the key indicators. As the number of vehicles are increasing day by day but not providing any Improvement for the infrastructure of road. Providing the safety to roads is necessary. It is also necessary that the roads constructed, or which are to be constructed in future are according to proper design, Accident prevention measures should be taken, provision of safety signs and symbols, proper road markings etc. So, it is necessary to improve the transportation safety, which is needed worldwide. Among the vehicle related crashes, the increased number of serious injuries related to the motor vehicle crashes which leads to even death. Most of the collector roads or low-volume roads crash data are not reported in crash statistics. So, for identifying and thus to reduce the crash potential on roadways, Road Safety Audit (RSA) concept has been considered as an effective tool worldwide, by doing this we are able to analyse the safety aspects of the road at present and we can suggest the safety remedial measures and can be designed accordingly on the future construction or during maintenance.

1.2 Objectives of study

- To examine the current safety conditions on the road of the study area.
- To conduct a proactive approach study for the road safety audit using Analytical Hierarchy Process.
- To suggest preventive measures, need to consider in future design.



1.3 Scope of study

- The study focuses on the importance of using proactive approach for conducting a road safety audit.
- The scope of work is limited to collector road.

2 Literature review

2.1 General

Improving road safety on collector road is a tremendous challenge. One way of improving the road safety is conducting road safety audit. Proactive approach is one of the key tool for conducting road safety audit.

2.2 Road safety audit

Most studies are conducted by methods of assessment of road accidents. Most of the road safety Audit requires accident data to improve understanding about the safety functionality of roads. Road traffic accidents increases because of number of potholes on the road which cause the spinal injuries, bone injurie etc. [1]. As a result of the expeditious modernization, the number of vehicles for transportation are rapidly increasing day by day without improving the infrastructure of the road and finally results in the increasing rate of accidents worldwide even for developing countries. The main reason for the increasing rate of accidents is the poor and inadequate services of public transport in cities, which urge most of the resides to use private modes of transport instead of using public transportation. As a result, the number of vehicles on road increases which increase the rate of accidents [2]. The RSA is a method to improve the safety issues on roads. In this a selected road stretch is examined either individually or with experts and identify the safety issues, prioritizes the findings and reports on safety issues. There is no need to redesign the project as a result of RSA, but by conducting these audits it provides the recommendations, findings, suggestions, and remedial measures which need to be considered once the project is renewed [3]. Typically, with short resources and focusing mainly on maintenance and operation of the existing roads, Road Safety Audit Review is one of the practical safety tool for the local agencies. The two-track which is taken towards this safety tool are training and prioritizing practical and providing low-cost solutions [4]. Normally, safer roads be the properly planned and constructed roads than older ones, but due to the differences occurred in traffic volume and mix in the road environment several problems arise out of the blue. Generally, for older roads, some of the popular remedial measures are used to improve site related accident factors suitably. The main objective of RSA process is to improve the safety through a proactive approach [5]. Local roads have a greater impact on wildlife with respect to habitat destructions, noise load and traffic mortalities [6].

2.3 AHP Model

In the AHP model, superior alternatives can be identified. AHP has been applied to almost all fields involving decision-making, since its invention. Rather than pursuing complex mathematical methods, AHP employs pairwise matrices and their associated right-eigenvectors to generate appropriate priority sequences of alternatives. AHP is tolerant of different math tools, like linear programming, fuzzy logic, etc., whose merits can thus be extracted to achieve a desired outcome. Further, AHP organically combines qualitative and quantitative methods and decomposes a decision into a multi-level hierarchical structure. In this way, decision makers' thinking processes are systematized and simplified. Both cartographic experience and the relations between indicator values can be incorporated into the evaluation system. This is the first application of AHP in road selection. As a line-based method, our method is suitable for small-scale generalization. In addition, the surrounding habitations and facilities of a road can influence the importance of roads. In this regard, apart from summarizing structural characteristic indicators, an indicator reflecting

the contextual characteristics of roads is built by scoring different categories of POIs. The importance values of strokes can be calculated in the AHP model, and the result of AHP serves as the fundamental basis for road selection. This method fully captures the attribute information of roads and conducts the road evaluation process in a structured and organized manner, which can be easily accepted. AHP delves deeper into the nature of road evaluation, multiple indicators, and the internal relations of roads.

3 Methodology

3.1 General

The auditing a road project are conducted in five stages:

STAGE 1: Feasibility stage/Preliminary design stage

In this stage study about the attributes of the selected stretch such as design parameters such as the design standard values, sight distances, cross section etc. Careful inspection during these periods help to minimises the costs and avoid the loss of time.

STAGE 2: Detailed design stage

In this stage present out the final DPR that is occurs only on finalization of fussy design of road. But it will do before the provision of legal documents. Those typic considerations includes geometric features, about the lighting provided on the stretch, the road ideograph, the leeway on roads, delineators, etc.

STAGE 3: Systematization stage

During construction of the roadwork this audit stage will be conducted. At this stage the safety of the traffic mainframe plans will be examined at each stage of the construction. Typical issues examined at this stage include the provisions for pedestrian protection, worker protection, efficient number of reflectors, valid speed limits, available light, and diversions at intersections.

STAGE 4: Before road opening stage

During this stage, in advance to the new road opening on the stretch of road a detailed inspection will be carried out. At the audit time the audit team will be operate, hazed, patrol to fulfil the needs of the road users. Mainly the inspection is important during night-time, to check the visibility of signs, markings, etc.

STAGE 5: Safety audit of at present roads

The audit of existing roads was done so as to ensure the safety parameters of the selected stretch of the road compared with the design standards. This audit was also aims to identify any parameters that need to develop in future which improves safety. The safety problems identified during this stage should be solved with low cost in simple manner [7].

3.2 Checklists

Departure from standards, transversion, transversional variations, cant, shrubbery, lay-bays, access to roads, future widening, adjacent development, visibility and sight distances, new and existing road interface, provision for pedestrians, cyclists signs, lighting, pavement marking, on-street parking facilities [2], [7].

4 Conclusions

In roads where increasing number of vehicles and due to this heavy traffic, so as to rehabilitate the roads, Road Safety Audit (RSA) is used as one of the guiding tool, by conducting this RSA we can reduce the risk of accidents as well as we can save the cost spend as for maintenance work and the loss of our valuable time. As a result of conducting this audit continuously on highways, it helps the agencies to identify the

spot on which it help the agencies to identify the spot on which safety improvements want to provide, accordingly they can prioritize. By this, they can develop a plan for the safety improvement. By providing proper connectivity to these roads throughout the network, help to expand the traffic volumes and capacity in an effective way. The proactive approach is one of the key tool for conducting RSA. For this Analytical Hierarchy Process (AHP) was done using MS. Excel. For reducing the risk of accidents occurring in the future as a result of renovation of roads will be minimize by RSA. RSA reduces the long-term costs associated with a planning decision or a road scheme. AHP method based analysis mechanism of proactive road safety inspection helps to identify which road section is better, which section is worse and what are the parameters and problems need to be considered during the design period and the probability of occurrences of future road traffic accidents.

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