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Road Safety Audit of Rural Ghat Road at Vikarabad District

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Abstract: A Road Safety Audit (RSA) is the formal safety procedure of an existing Road by an independent, multidisciplinary team. This paper explores the hazards of the roads and the confusing factors of the drivers. The road-selected area is from Vikarabad to Kerelli Towns. The road length is of 10 Kilometres. The road connects Vikarabad – Tandur towns of Telangana State. It is a busy road connecting the industrial, commercial areas, has a mixed traffic and Hilly terrain, which leads to accidents. The Audit had conducted following the guidelines of, IRC: 67-2012, IRC: 35-1997, IRC: SP: 88. Correction of Road signs, markings, message signs, hazard markers, traffic safety barriers, identification of Blackspots, delineators had done based on the requirements. This paper worked for Safe roads, Forgiving roads. In conclusion, we argue that significant measures need to take on Road Safety aspects to mitigate the accidents and ensure the safety to vehicular traffic.

Keywords: Blackspots, Forgiving roads, IRC: 67-2012, IRC: 35-1997, IRC: SP: 88, Road Safety Audit, Self-Explaining roads.

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I. INTRODUCTION

RSA is a formal road safety examination of the carriageway or traffic project, or any other type of project, which affects road users, carried out by an independent auditor or team of auditors who report on the accident potential and safety performance for all kinds of road users. The RSA identifies any road safety deficiencies and formulation of recommendations aimed at removing/ reducing those deficiencies. Road traffic injuries are the No.1 cause of death among those aged 16 to 32. The Behaviour of road users appears to be a main contributing factor in all the road accidents.

The principles of the Safe System approach should be,

i. Recognition of human error in the transport system
ii. Recognition of human physical vulnerability and limits
iii. Promotion of system accountability
iv. Promotion of ethical values in road safety
v. Promotion of societal values

Drivers use visual cues along the roadway to make decisions regarding steering, braking, and throttle inputs. Regarding self-enforcing roadways, drivers using the roadway context to select an operating speed. While there are many factors that affect speed choice, some of these factors include cross-section dimensions, horizontal and vertical alignment, visibility of pavement markings, presence, and visibility of signs, posted speed limit, ambient weather conditions, and enforcement presence. (Shinar 2007) Smiley (2016) noted that the primary focus of driver attention is speed control, while a secondary focus is responding to signs. While signs and pavement markings are important driver decision-making inputs, the "human capacity to process information is limited." (Smiley 2016) Consistent road designs allow drivers to "accurately predict the correct path while using the least visual information processing capacity" in addition to reducing the workload of the driver. (Fitzpatrick et al. 2000b)

Signs and pavement markings communicate information to drivers regarding speed choice and safety. RSA is a highly efficient and cost-effective engineering tool for improvement of safety on roads. RSA's are among the most cost-effective investments a Road Authority can undertake

II. ROAD SELECTED

The road selected for this study is an existing Ghat road from Kerelli Town to Vikarabad Town of Telangana State, India. This is the road connecting two major cities, Tandur and Hyderabad. The District Highway serves an enormous number of heavy vehicles, Lorries for the transport of flooring stone, blue limestone and cement materials to the other parts of the state and the country.

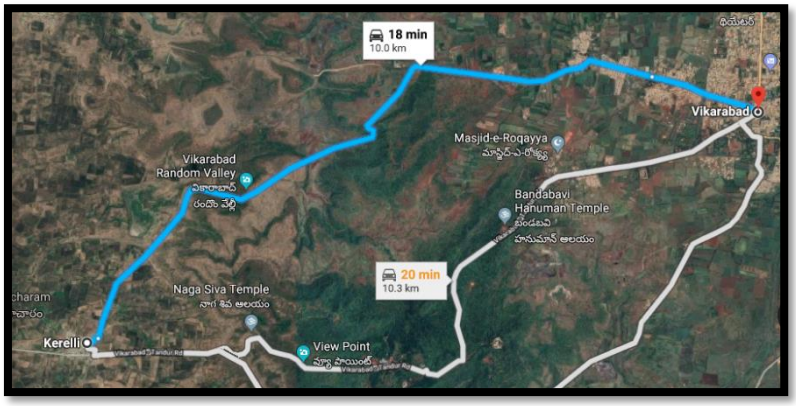
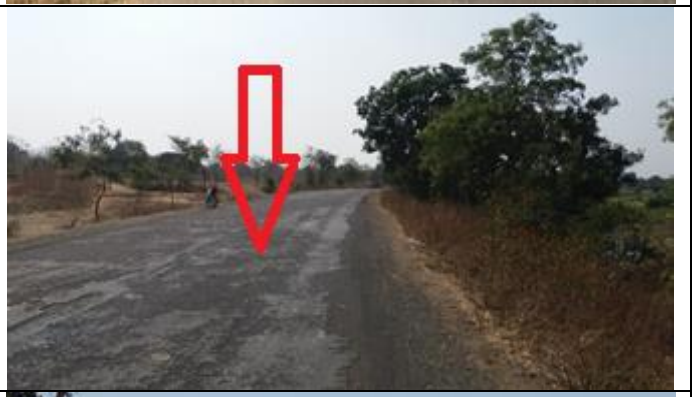
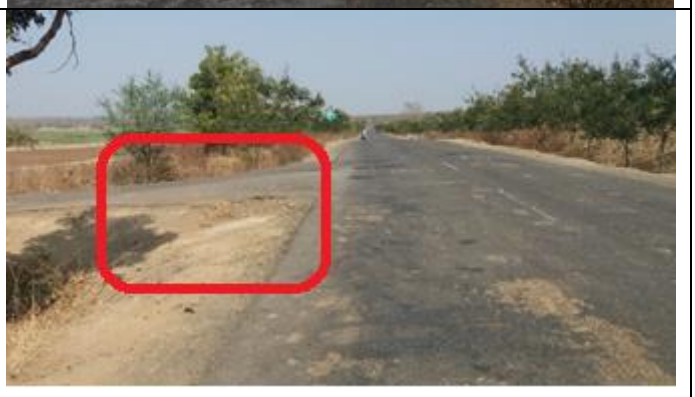
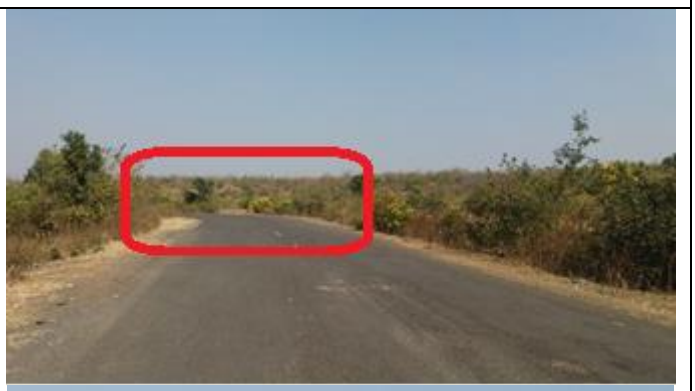
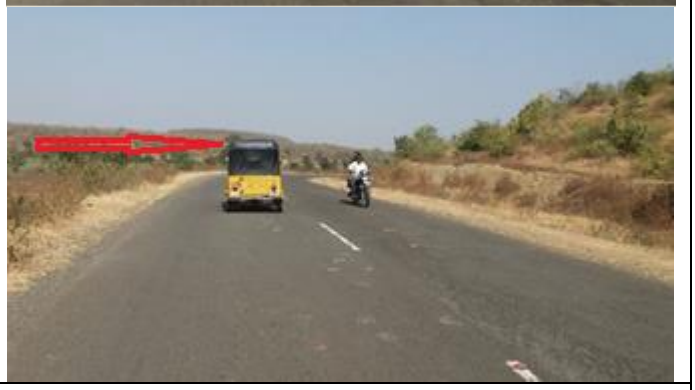


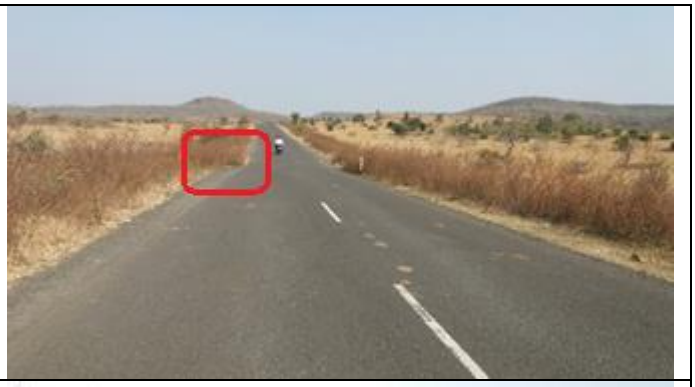
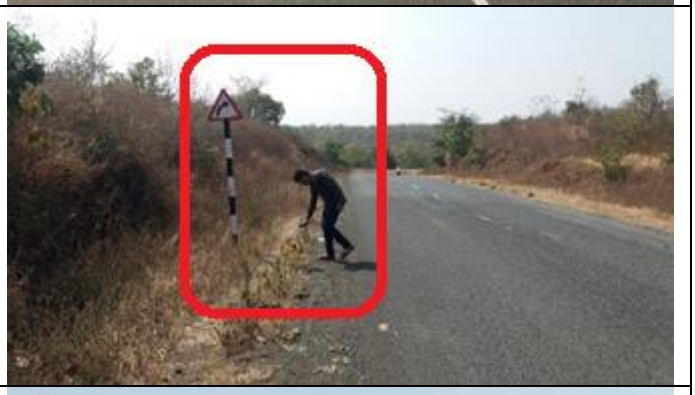
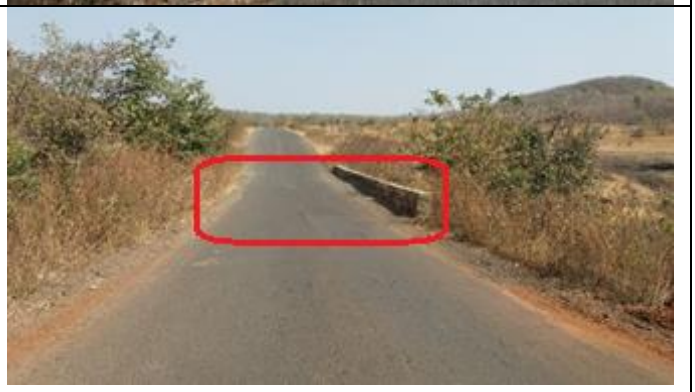
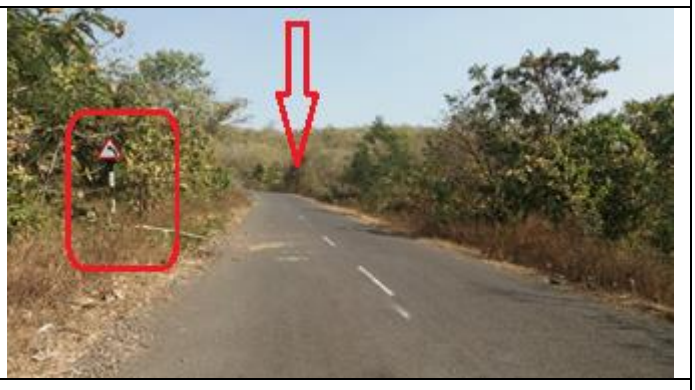
Fig 1: The image showing the Blue line is a Ghat Road, connecting Kerelli and Vikarabad Towns.

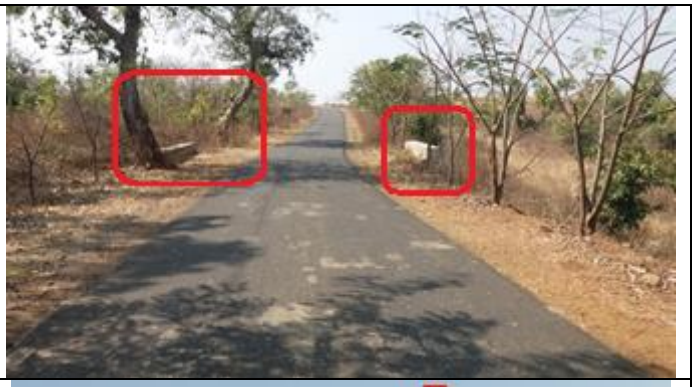
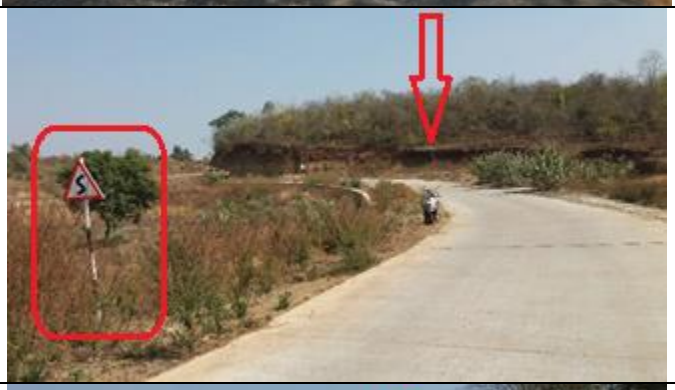
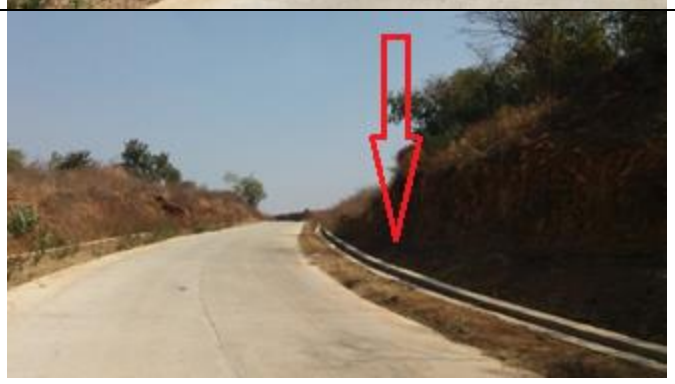
The road (Fig 1), length of 10 Kilometers from Kerelli to Vikarabad. This is a one-way road for Heavy Vehicles to climb the Hills of Ananthagiri Forest Area. The Substantial number of vehicles fly on this road. Safety Audit had done considering the Sign boards, Road markings, and Roadside Hazards.

III. INVESTIGATIONS AND RECOMMENDATIONS

Observation: Cattle on the main carriageway. **Reason for Concern:** These animals causes a disturbance to the heavyweight, fast - moving vehicular traffic. **Recommendation:** Cattle should be avoided on this carriageway or the shoulder width of 2.0 Meters needs to maintain. **Priority:** Required	
Observation: Unevenness of the road **Reason for Concern:** The road surface should ensure adequate grip to the tires and should be a stable driving surface. Vehicles may slip and skid on these surfaces easily. **Recommendation:** Surface needs to dress neatly with bitumen. Friction needs to be maintained on the surface. **Priority:** Very Essential	
Observation: Extra width provided for the turning is not at a level surface and with a dangerous dip. Hazardous to the vehicles that take a turn to the left road. **Reason for Concern:** Steep side slopes, do not allow a driver time/ space to recover in situations where he leaves the carriageway, and thereby add to the like hood of a crash. **Recommendation:** Warning sign needs to be placed indicating the road width. Rumble strips need to be provided to alert the driver. Widening of the curve needs to do with at grade level. A stop sign has to place on the minor road.	

22 – 48% of potential crash reduction can do by implementing the above things. **Priority:** Very Essential	
Observation: Insufficient site distance at the curve. Highway without markings and turning sign Boards. Nice shoulder width. **Reason for Concern:** Sudden turning will cause havoc in drivers mind and lead to a crash or runoff of the road. **Recommendation:** Warning and speed limit signs need to place. Rumble strips have to provide to alert the driver. Red – Yellow chevrons signs need to place at the turnings. Guard Rails need to install at the outer edge of the road. 15 – 60% potential crash reduction can be done. **Priority:** Very Essential	 
Observation: No Guard Rail/side barriers at the curve of the road. No indication of the Culvert. **Reason for Concern:** Drivers may lose control of the vehicles at Turnings due to centrifugal force and may runoff of the road. **Recommendation:** Warning and speed limit signs need to place before the Culvert to give a caution. Markings and Rumble strips need to be provided to guide along the curve and alert the driver. Red – Yellow chevrons signs need to place at the turnings. Retroreflective stickers or paint has to do on the culvert walls facing the traffic. **Priority:** Essential	
Observation: Sudden contraction of the road but clearly mentioned it with white boarder lines. **Reason for Concern:** This sudden contraction of the road gives no time to the vehicular to respond to the situation on the road and may lead to a vehicle moving out of control. The white border line attracts the vision of the driver and tells that the width of the road is decreased. **Recommendation:** Along with Good markings, Warning sign has to place to make the driver known about the situation of the carriageway. **Priority:** Essential	

	
Observation: Maintained 1.8 meters distance from highway edge to the signboard as per the safety guidelines. **Reason for Concern:** A minimum distance of 2 meters from highway edge to sign board need to maintain under safety considerations**.** There is a chance of vehicle hitting the signboards and can a hazard for window seaters too. **Recommendation:** As per the guidelines, 2.0 Meters of space is maintained there. **Priority:** Essential	
Observation: Culvert walls very near to the carriageway. **Reason for Concern:** This roadside object is very hazardous to the two - wheelers and they can be hazardous to the window seaters in the buses. The culverts may pose greater damage when vehicles hit them. **Recommendation:** Warning sign indicating culvert and speed limit signs need to place. With impact absorber, 20% of the potential crash reductions can be reduced. **Priority:** Essential	
Observation: warning or information sign placed on the wrong side **Reason for Concern:** warning or Regulatory sign may sometimes be so sited that they have poor conspicuity. **Recommendation:** As the road is only 3 meters width, left turn directional sign, need to place at the outer side of the curve. Red – Yellow chevrons signs need to place at the turnings. **Priority:** Essential	
Observation: Maintained a clear distance between the road edge and the culvert wall. Big trees near the road edges. **Reason for Concern:** Great care should be taken concerning the positioning of roadside features, which may obstruct visibility, lead to crashes or increase crash severity. **Recommendation:** The hazard (Tree) need to move away to create a larger clear zone	

of 1.5 meters width or recovery area. The crash cushions need to install to the culverts and trees. The roadside hazards are to be marked in white color to enhance visibility. **Priority:** Very Essential	
Observation: Sign indicating the curved road but placed very near to the curve. **Reason for Concern:** As the speed of the vehicles reaching this curve is more than 40 KMPH, they require more reaction time for controlling the vehicle. **Recommendation:** S-Curve needs to place ahead of 80 - 120 meters of the curve. Red – Yellow chevrons signs need to place at the turning edges. **Priority:** Essential	
Observation: PMGSY Road constructed with well drainage facility without proper covering the top side. **Reason for Concern:** Hazardous to the vehicles that run off the road. Unprotected U and V type ditches present a hazard to motorized vehicles particularly motorcyclists. **Recommendation:** Covering of the drainage system should have done. **Priority:** Very Essential	
Observation: At T-junction, a minor road connecting the major road. The end of the Minor road clearly shows the end with trees as background. **Reason for Concern:** The end of the road is clearly known to the drivers by seeing the trees in the background. **Recommendation:** Rumble strips need to provide to alert the driver before entering the T Junction. Adding trees at secondary roads, which shows that there is intersection ahead and the road is closed. **Priority:** Essential	

IV. CONCLUSIONS

This Audit had presented and highlighted issues in safety engineering showing the good and bad practices in Road safety maintenance. It examined the defects in the road features and situations in relation to motorized traffic, especially heavy Vehicles.

We have noticed a few issues, which should be considered for the improvement of safety. Improper/ Inadequate sign boards creating confusion/Fatigue & tension to the drivers. Chevron signs not placed at the

sharp curves. Road markings were not at all marked throughout the road. Center markings, carriageway border markings, chevron alignment markings were not marked. This inadequate traffic regulators and roadside objects will cause a hazard to, day and night driving.

The paper followed the guidelines of "**Practical Guide for Road Safety Auditors and Inspectors, PIARC**", and suggested the various recommendations which are easy to do and at low cost. Self-Explaining Roads and Forgiving Roads will save the lives of drivers and Passengers. The audit had applied to the risks outside the framework of standards and codes, to ensure safety.

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