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STAR RATING FOR BH ROAD, SHIVAMOGGA CITY USING iRAP ASSESSMENT

Sricharan R Mr.

Dept. of Transportation Engineering & management, Jawaharlal Nehru New College of Engineering, Shivamogga-577204, Karnataka, India, iamsricharanr@gmail.com

Syed Yaseen Afshad Mr.

Traffic and Transportation Engineer, Muhel Consulting Ltd. Doha – Qatar., afshad09@gmail.com

Anirudh N Mr.

Assistant Professor, Dept. of Civil Engineering, Jawaharlal Nehru New College of Engineering, Shivamoga, Karnataka, India., anirudh.n@jnncce.ac.in

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STAR RATING FOR BH ROAD, SHIVAMOGGA CITY USING iRAP ASSESSMENT

Mr. Sricharan R¹

Post Graduation student, Dept. of
Transportation Engineering &
management
Jawaharlal Nehru New College of
Engineering Shivamogga,
Karnataka, India.
E-mail: iamsricharanr@gmail.com

Mr. Syed Yaseen Afshad²

Traffic and Transportation
Engineer,
Muhel Consulting Ltd.
Doha – Qatar.
E-mail: afshad09@gmail.com

Mr. Anirudh N³

Assistant Professor
Dept. of Civil Engineering
Jawaharlal Nehru New College of
Engineering Shivamogga,
Karnataka, India
E-mail: anirudh.n@jnncce.ac.in

Abstract –Road traffic crashes kill over millions of children and young people each year. Understanding the emergency of the situation and the need to act, governments from all over the world unanimously reducing road deaths and injuries by using this software. The major goal of this study is to conduct a road safety evaluation utilising the iRAP visualizer in Shivamogga, India. For this length of road, a traffic video graphics study was conducted. The iRAP's road attributes are then coded. Star Rating demonstrator to obtain the Star Rating for each road users.

Key Words: Road Traffic Crashes, Road Safety, Star Rating Demonstrator.

I. INTRODUCTION

Nearly a million individuals die each year as a result of a road traffic collision, with thousands more dying every day, and more than half of these victims are not in a car. Non-fatal injuries occurs more persons as a result of collisions, and these injuries are a leading source of disability globally.

Low- and middle-income countries, which account for less than half of the world's registered vehicle fleet, account for the majority of road traffic deaths. Shivamogga is a city in the Indian state of Karnataka. We blocked off a section of road starting at BH Road Terminal, which is adjacent to the Shivamogga Bus Terminal, and ending at the Old Shimoga Bus Stop, also known as Hole Bus Stop, which forms a bridge over the Tunga River and is an important arterial road carrying

A. What are Star Ratings for a Road?

The severity of a road crash is determined by the iRAP Star Ratings, which are an objective evaluation of the chance of a collision occurring. Based on scientific evidence-based research, the focus is on identifying and tracking the road factors that influence the most prevalent and severe types of crashes.

significant traffic. Here the accidents occur very frequent.

This analysis is based on a 2.5-kilometer stretch of road. The study area is a two-lane split urban roadway that serves as a primary urban thoroughfare connecting Shivamogga's main hubs.

Road traffic accidents are one of the top three causes of death for people of all ages. Road traffic injuries are expected to become the world's top cause of mortality unless fast and effective action is taken. This is due in part to significant growth in motorization combined with inadequate improvements in road safety and land use planning.

Road traffic accidents are the main cause of death among the world's youth. The International Road Assessment Programme (iRAP) was created to address the catastrophic social and economic consequences of traffic accidents. Without action, the yearly number of road deaths in the world is expected to rise to almost a million by the end of this decade. The majority of deaths will occur in poor and middle-income nations, with vulnerable road users such as motorcyclists, bicyclists, and pedestrians accounting for over half of those killed.

iRAP evaluation produces star ratings and Safer Roads Investment Plans (often referred to as a 'SRIP'). Star Ratings indicate the inherent danger of the evaluated road network, whereas an Investment Plan directs future road network safety upgrades.

In this method, the level of risk to a road user on a specific road section or network can be determined without the requirement for extensive collision data, which is frequently the case in low- and middle-income nations with poor data quality. According to studies, a 1-Star Road has the highest chance of death or major injury, while a 5-Star Road has the lowest.

Vehicle occupants, motorcyclists, pedestrians, and bicycles all have star ratings assigned to them.

B. Relationship between Star Rating and Crash costs

Several studies have shown that there is a clear link between Star Ratings and the cost of fatalities and major injuries.

The cost of fatalities and major injuries is typically half with every incremental increase in Star Ratings.

The iRAP methodology factsheet 7, Star Rating Bands, contains more information

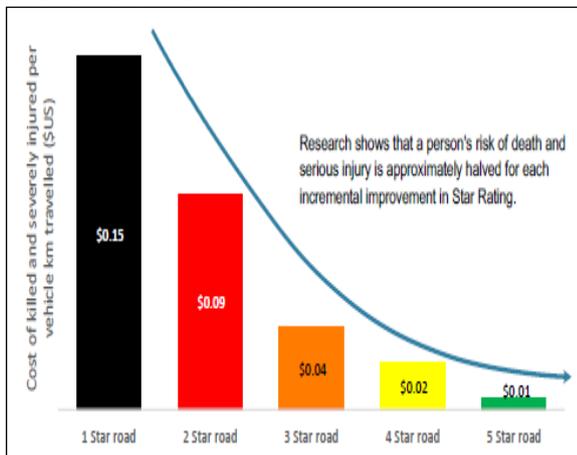


Fig -1: Star Rating and Crash costs relationship

C. Star Rating Bands

As stated in the table below, Star Rating Scores are assigned to Star Rating bands to determine the Star Rating for each 100 metres of road.

Because their scores are determined using distinct formulae, separate bands are utilised for motorised road users (vehicle occupants and motorcyclists), bikers, and pedestrians.

Motorized road users are scored based on head-on, run-off, and intersection crashes; pedestrians are scored based on walking along and crossing the road crashes; and bicyclists are scored based on riding along the road and intersection crashes.

Star Rating	Star Rating Score				
	Vehicle occupants and motorcyclists	Bicyclists	Pedestrians		
			Total	Along	Crossing
5	0 to <2.5	0 to <5	0 to <5	0 to <0.2	0 to <4.8
4	2.5 to <5	5 to <10	5 to <15	0.2 to <1	4.8 to <14
3	5 to <12.5	10 to <30	15 to <40	1 to <7.5	14 to <32.5
2	12.5 to <22.5	30 to <60	40 to <90	7.5 to <15	32.5 to <75
1	22.5 +	60+	90 +	15 +	75 +

Fig -2: Star Rating score assigned

D. How do Star Ratings Improve road safety

The United Nations has developed 12 global road safety targets to promote the fast adoption of effective road

safety initiatives around the world in support of the Sustainable Development Goals (SDGs).

Two of the goals are directly related to iRAP assessments.

They are as follows:

- For all road users, all new roads are built to a 3-star or better quality (Target 3)
- By 2030 (Target 4), more than 75% of all travel will be on the equivalent of 3-star or better roads for all road users.

iRAP is dedicated to assisting road agencies in improving road network safety and establishing Star Rating targets.

It is advised that a target be formulated in the following fashion for road upgrade projects:

Subject to the availability of economically effective infrastructural counter measures, the route shall attain a smoothed 3-Star Rating for car occupants, motorcyclists, pedestrians, and bicyclists.

Lowering operation speeds should be considered in situations where it is not economically feasible to raise the Star Ratings to at least 3-Stars utilising infrastructural remedies.

The initiative should not result in a drop in star ratings.

This is in line with the UN Decade of Action for Road Safety Framework, which runs from 2011 to 2020.

E. OBJECTIVE

The primary goal of this study is to collect video graphics data from the stretch of road under study, conduct traffic counts at various points, and use the collected data to provide star ratings for the stretch of road under study using the iRAP assessment tool.

II. METHODOLOGY

In this paper, we used the iRAP Survey manual to collect video graphical data from the BH road.

The information gathered was then coded in the iRAP Assessment tool's Star Rating Demonstration.

In the visualizer, the attributes matching to the existing situations were meticulously coded.

The flow chart of the actions carried out in the proposed study is shown below.

The star ratings collected for each segment of the research area road were presented and discussed in the final stage.

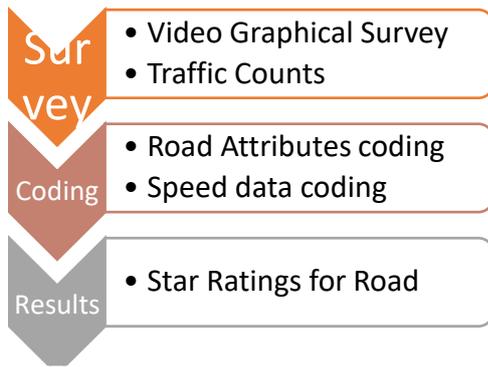


Fig -3: Flow chart of Methodology

A. Study area

For the purpose of this study, we cordoned out a stretch of road starting from BH Road Terminal point abutting the Shivamogga Bus Terminal and until the Old Shimoga Bus stop commonly known as Hole Bus stop which forms a Bridge over Tunga River. The length of road considered for this study is 2.5 km. The stretch of road considered as study area operates as two-lane divided urban carriageway and functions as main urban road connecting the Main Hubs of the Shivamogga city. There are several commercial and retail developments across the stretch which has been captured in the video graphical survey. Figure 4 below presents the study area stretch for this study.



Fig -4: Study Area

B. Surveys conducted

As per iRAP survey manual, following survey data has been collected to undertake the iRAP Star rating for the studied road in Shivamogga city:

- Video Graphical data
- Traffic volume counts

A team of two personnel were deployed to undertake the video graphical survey. Adequate and sufficient health and safety measures were undertaken as per iRAP Survey manual. The survey team drove along the mainline carriageway at the design speed and a video graphical survey was carried out using sophisticated camera. The camera had an in-built GPS technology

which allowed to collect the co-ordinates of the surveyed road.

The survey was carried out on xxx date and during dry conditions. Roadside attributes which are essential in the coding steps have been collected accordingly. The video graphical data was made available to the coding team and the activities of the coding team is explained in detail in subsequent sections.

C. Segments along the Stretch

For the purpose of accuracy of Star Rating for the study stretch, the study road was divided into ten segments. Road attributes for each road segment was coded individually to obtain the segment specific Star ratings. Table below presents the details of disaggregated stretches of the study road.

Segment Number	Chainage	Description
1	0.00 km	Starting point of the survey
2	0.40 km	Near State Bank of India
3	0.74 km	Towards approach into Ameer Ahmed Circle (four-legged rotary junction)
4	0.88 km	Near Shivamurthy roundabout connecting into Gandhi Bazaar area of Shivamogga city
5	1.29 km	Karnataka Sangha Signal
6	1.46 km	Near Union Bank
7	1.59 km	Near Sacred Heart Church
8	1.6 km	Near Science Field
9	2.02 km	Honnali Road Junction
10	2.1km	Near Old Shimoga Bus stand - End point

Table 1- segment details

D. Coding using ViDA Assessment

ViDA is the iRAP internet software for creating road star ratings. The ViDA tool's demonstrator is an interactive tool for learning about the Star rating model. ChinaRAP created the ViDA model, which is backed by the FIA Foundation, the Road Safety Fund, and the Global Road Safety Facility (GRSF).

Figures below show several screenshots from the Star Rating Demonstrator.

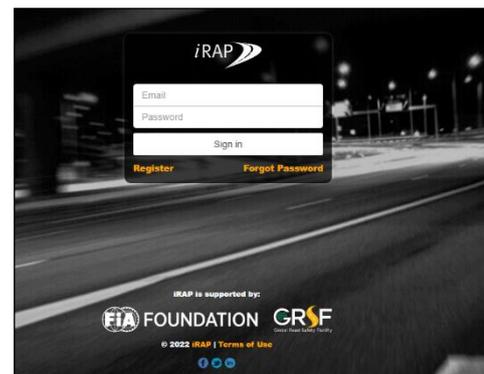


Fig 5 – Login page

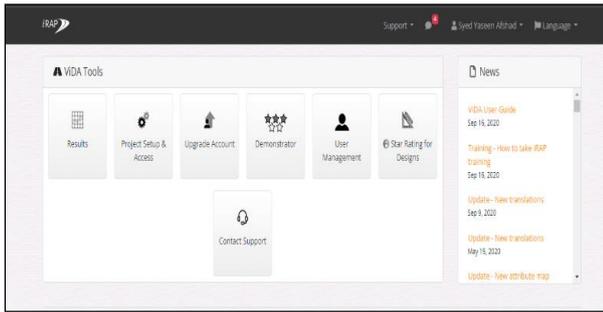


Fig 6 – Dashboard of the ViDA

1) Steps involved in coding

This section briefly explains the steps and attributes which influence the star ratings for a particular stretch of road.

Step 1 – The initial step in developing star rating for any road is to select the Standard most similar cross-section of the surveyed road. There are fifteen (15) different types of cross-sections available in the demonstrator. Figure xx below shows the different cross-sections and the selected cross-section for this study.



Fig 7 – Standard cross sections

Step 2 – The next step is to code the roadside features of a particular stretch of the surveyed road. Attributes such as driver side severity and passenger side severity are to be coded here. The provision for rumble strips and paved shoulder can also be included in this section.

Step 3 – This step considers the mid-block details of the stretch. The lane widths, number of lanes, centerline rumble strips, presence of street lightning, provision of service road and the adequacy of sight distance are the

main attributes in this section which influences the star rating of any stretch.

Step 4 – In this step the presence of intersection within the considered stretch influences the star rating of the road. Different type of intersections and the quality of intersection must be coded in this section of the demonstrator. Also, this step considers the volume of intersecting vehicles.

Step 5 – Step 5 of the demonstrator deals with the traffic and pedestrian flow along and across the surveyed stretch of the road.

Step 6 – This step deals with Vulnerable Road users facilities and land use information on the driver and passenger side of the surveyed road. Provision of sidewalk on driver side and passenger side is also considered in the determination of star rating for the stretch of the road.

Step 7 - The final step in the demonstrator is to code the speed information. Usually, this information is obtained through surveys. The posted and design speed limit sections must be coded in this section. By default, and considering the worst-case scenario, the demonstrator considers the maximum among design and posted speed in the analysis. The speed factor plays very important role in the estimation of the star ratings of the stretch of the road. Road safety investment plans usually considers reducing the speed factor in order to achieve safer and better star ratings for the road users.

III. RESULTS

The data collected by the video graphical survey is coded in the Star Rating Demonstrator tool of the iRAP. The cordoned-out road was further disaggregated into ten segments. Road attributes for each segment of the study area was considered as input in the demonstrator. The results obtained are presented and explained briefly in subsequent sections.



Fig 8

Figure 8 presents the Star Ratings for Segment 01. It is observed that the Star Rating for Vehicle occupants is 15.27 and the road is classified as 2-star road. The segment 01 shows 2-star rating for motorcyclists and the score is 18.69. In case of Pedestrians and cyclists,

segment 01 operates as 2-star road. The score for Pedestrians is 66.89 and for bicyclist is 30.3.



Fig 9

The Star ratings for Segment 02 is presented in the above Figure 9. It is evident that this section of stretch operates as 1-star for Vehicle occupants and Motorcyclists. The Star rating score for vehicle occupants is 27.03 and for motorcyclists is 35.43. In case of pedestrians and bicyclists the stretch operates as 2-star road. The star rating score for pedestrians is 92 and for bicyclists is 40.39.



Fig 10

The segment 03 of the stretch is located near the Ameer Ahmed circle of Shivamogga city. It is evident from Figure xx above that the star rating for Vehicle occupants, Motorcyclists and Bicyclists is 1-star. The score for vehicle occupants is 24.88, for motorcyclists is 70.82 and in case of bicyclist is 132.3. The star rating for pedestrians is 3-star and this is due to the provision of pedestrian fences at the mid-block sections of the surveyed road. The star rating score for pedestrians is 21.7.



Fig 11

Figure 11 above presents the star rating for Segment 04 near Shivamurthy junction at the connection between Gandhi Bazar and BH Road. The surveyed stretch operates as 2-star for vehicle occupants and the star rating score is 19.98. In case of Motorcyclists and Bicyclists the stretch operates as 1-star road with star rating score for motorcyclists as 66.92 and for Bicyclists as 131.15. This segment offers 3-star rating for pedestrian movement, and this is because of the

provision of pedestrian fences along the median. The star rating score of the pedestrians is 17.15.



Fig 12

The star rating for Segment 05 is presented in Figure 12 above. It is evident that the stretch of road operates as 1-star for Vehicle occupants, motorcyclist and Bicyclists. The star rating score for vehicle occupants is 41.75, for motorcyclist is 54.3 and for Bicyclists is 68.07. The star rating for Pedestrians is three-star and is because of provision of pedestrian fence along the median. The star rating score for pedestrians is 38.65.



Fig 13

The segment 06 of the surveyed road is located near the Union Bank Branch of Shivamogga city. This stretch of the road offers three-star rating for vehicle occupants and the star rating score is 12.35. For Motorcyclists the stretch operates as 2-star road with star rating score of 15.05. In case of pedestrians, the stretch of road operates as 1-star road and the score is 143.58. In case of Bicyclists this segment of road operates as three-star with star rating score of 25.3.



Fig 14

Figure 14 above presents the star ratings for Segment 07 of the surveyed road. This segment is located near the Sacred Heart Church of Shivamogga city. It is evident that the stretch of road operates as two-star road for vehicle occupants, motorcyclists and pedestrians. The star rating score for vehicle occupants is 14.26, for motorcyclists is 18.11 and for pedestrians is 82. In case of bicyclist this segment of road operates as three-star road and star rating score of 29.15.



Fig 15

Figure 15 above presents the star rating scores for Section 08 along the Surveyed Road. The star ratings for this segment is one-star for most of the road users. This stretch offers one-star rating for vehicle occupants, motorcyclists, and bicyclists. The star rating scores for vehicle occupants is 38.03, for motorcyclists is 52.46 and for bicyclists is 64.2. In case of Pedestrians the stretch of road operates as two-star road and star rating of 96.71.



Fig 16

The segment 09 of the surveyed road is located near the Honnali-cross junction. It is evident from Figure xx above that the road operates as one-star road for vehicle occupants and motorcyclists. The star rating score for vehicle occupants is 22.86 and for motorcyclists is 30.61. In case of Pedestrians the road offers three-star rating and is mostly due to the presence of pedestrian facilities. The star rating score for pedestrians is 32.53. In case of Bicyclists this segment of road operates as two-star with star rating score of 40.26.



Fig 17

Segment 10 of the surveyed road is located near the end point of the study road. This segment operates as two-star road for vehicle occupants, bicyclists, and pedestrians. The star rating score for vehicle occupants is 19.78, for bicyclists is 34.26 and for pedestrians is 60.72. In case of motorcyclists the stretch of road operates as one-star with star rating score of 26.72.

IV. CONCLUSIONS

The following major conclusion are obtained from this study:

- The entire stretch operates as two-star or worse for vehicle occupants at all sections exception on segment 06 wherein the star rating for vehicle occupants is three-star. This is because of lack of safety elements for vehicle occupants.
- The star ratings for motorcyclist is two-star or worse at all sections. This is to due to heterogenous mode of traffic and also absence of motorcycle facilities along the surveyed road
- The star rating for pedestrians vary from being three-star rating at locations where there is provision of pedestrian facilities to locations where the star rating is one-star for pedestrians.
- In case of bicyclists the star rating band varies from three-star road to locations where there is higher risk and the one-star road.

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