

## **ROAD SAFETY AUDIT FOR SELECTED ROAD LINKS IN ARVALLI**

<sup>1</sup>Nilay G. Prajapati, <sup>2</sup>Prof. Kalpeshsinh J. Solanki

<sup>1</sup>B.E Civil Semester 8, Tatva Institute of Technological Studies, Modasa.

<sup>2</sup>Assi.Prof., B.E Civil, M.E Transportation Engineering, Tatva Institute of Technological Studies, Modasa

### **Abstract**

*In Most regions of the world, the epidemic of road traffic fatalities is on the upsurge with over 1.2 million people die every year due to road crashes and about 50 million suffer nonfatal injuries. According to Ministry of Road Transport & Highways (MORT&H) India, the analysis of road accident data 2016 reveals that about 1,374 accidents and 413 deaths take place every day on Indian roads which further translates into 55 accidents and 17 deaths on an average every hour in our country. The goal of this study is to understand roadway accident causes in selected route and reducing the frequency and severity of crashes on selected roadways. To achieve such a goal, traffic accident data, roadway geometric data, traffic volume data, surface condition data for the selected linking road are collected and analyzed. Develop models for accident rates and priority index. Determine Present Serviceability Index. It also aims to reduce fatal accidents and serious injury and to develop road accident model for selected road links.*

**Key words:** Priority Index, Present Serviceability Index, Road safety, Accident rate model

### **Problem statement**

In the road accidents the cost due to death, injury or property damage is much higher which directly affects the national economy. In Indian context 03% of GDP approximately affected due to road accidents. Accident analysis should be given priority for any road or existing road scheme to reduce the cost of maintenance and to reduce the accident cost. Fatal accidents are not only damage economically but affect more emotionally to humanity. Some time it may happen due to any lack of road design or drivers disability, which reasonably modifiable for any condition to reduce loss of property damage and fatal, serious, or minor accident of the road. Road safety shall be given first priority at planning, design, construction, operation and maintenance i. e. at all stage.

In the roads alignment of road (i. e. horizontal curves, vertical curves), geometry of road (i. e. width, camber, stopping site distance, over taking sight distance, super elevation), surface condition of road (i. e. roughness, no. of patches, potholes, crack, rut, etc.), markings, signs, medians, island, weather effects and surrounding environment play vital role for accident occurrence. Very few studies have been conducted to develop the relationship between numbers of accidents with above mentioned parameters. Therefore, this study is aimed to develop a detailed report for the selected stretches of selected road link of Arvalli District. From the collected accident data and Functional evaluation a model can be developed to predict the probability of accident occurrences and developed road network in selected area.

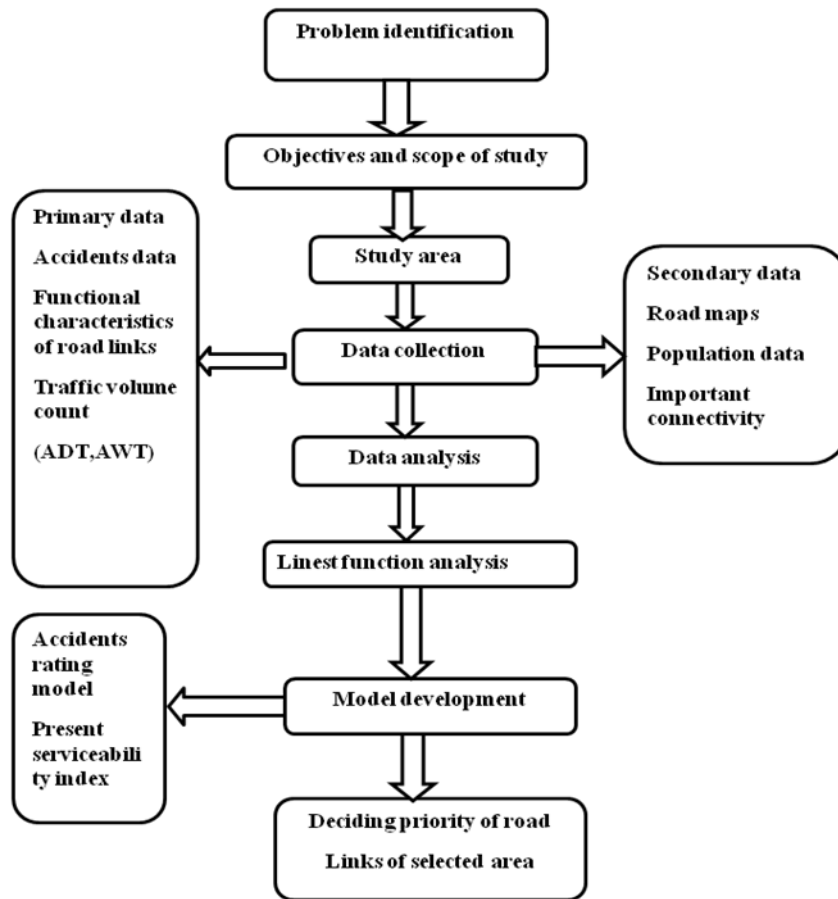
### **Objectives**

- To collect information of existing condition and past accidents data of selected road links.
- To develop a model/relationship for identification of safety influencing parameters in minimizing likelihood accident rate on selected section of urban road network.
- To develop a model for deciding priority for maintenance.

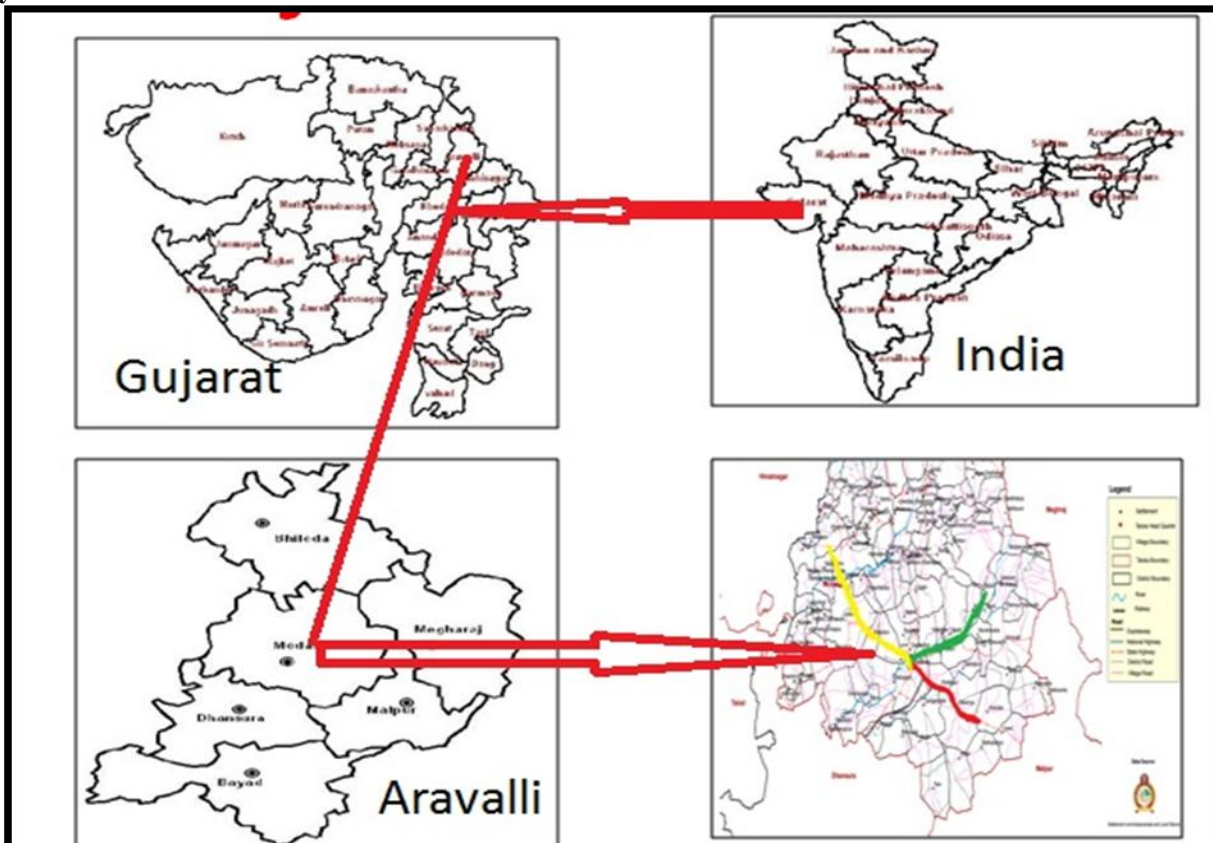
### **Scope of study**

- This study is limited to selected rural road links of Modasa Taluka.
- With the suggested measures, if they will be implemented then
  - Accident rate may reduce,
  - Fatality of accidents may be reduced,
  - Road accident injuries may be reduced,
  - Rate of loss of property may be reduced.

### **Methodology**



Study Area



Selected Road links as study area

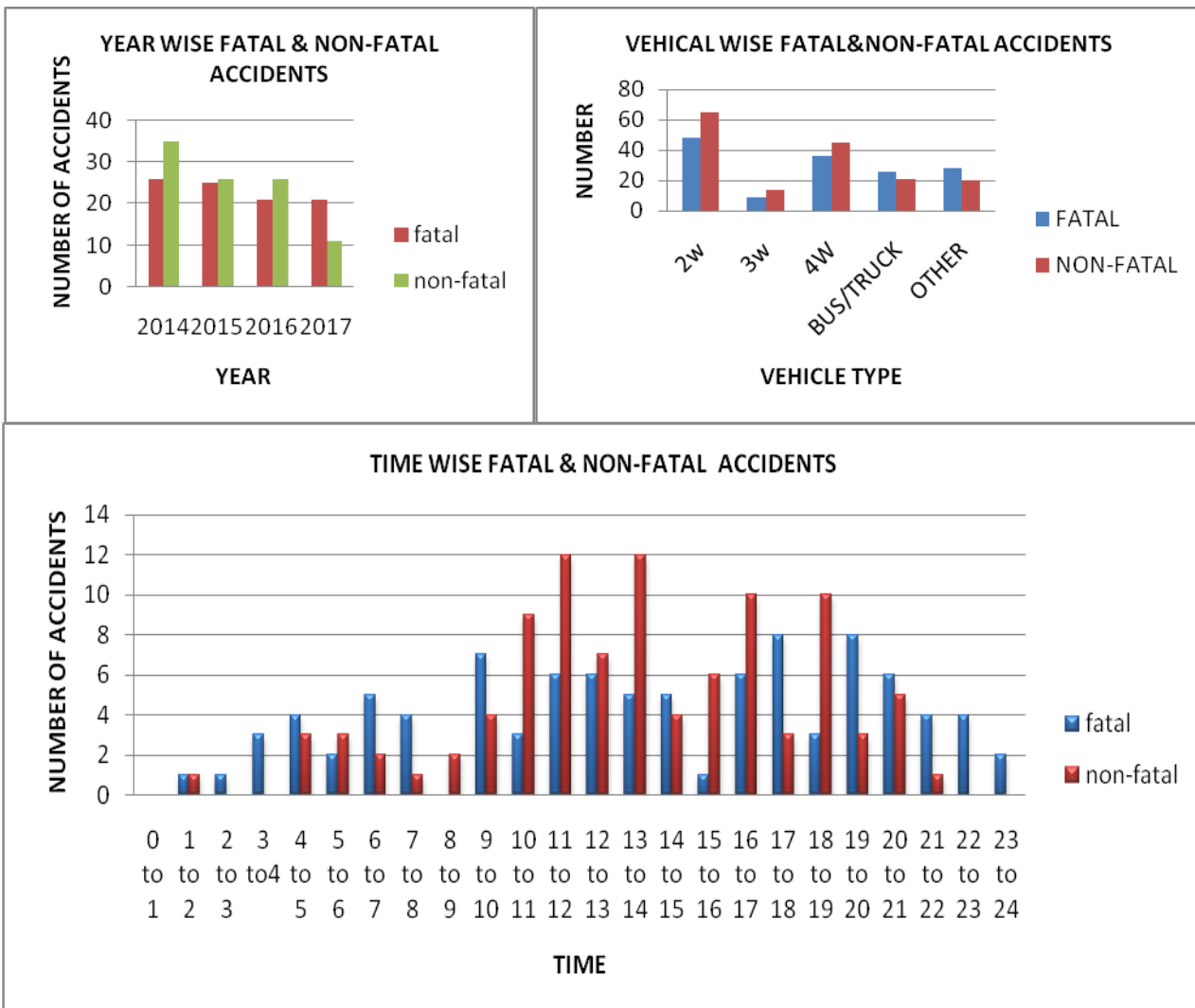
Following rural road links are selected for the proposed study

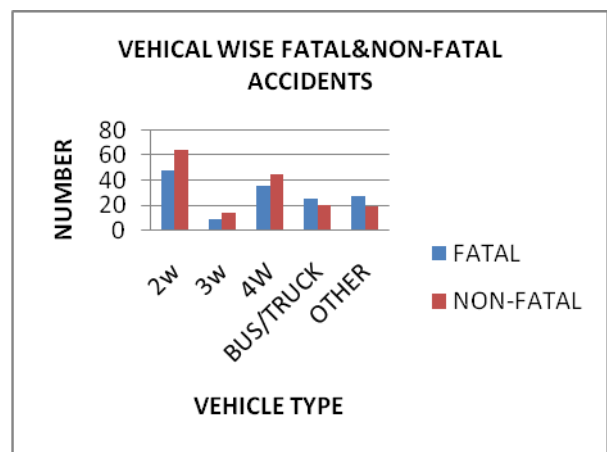
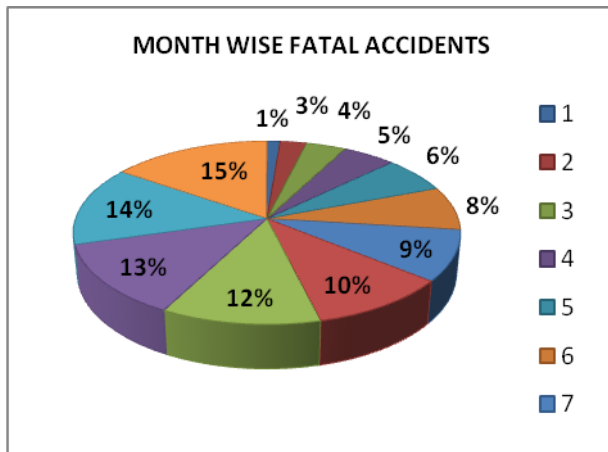
Modasa to Rajendranagar (23.9 Km), Modasa to Malpur (21.8 Km.), Modasa to Meghraj: (24.2 Km).

**Data Collection and Data analysis**

➤ **Accidents Detail**

Year	Fatal Accidents	Non-fatal Accidents	Total Accidents
2014	21	31	52
2015	26	35	61
2016	25	26	51
2017	21	26	47
2018	21	11	32

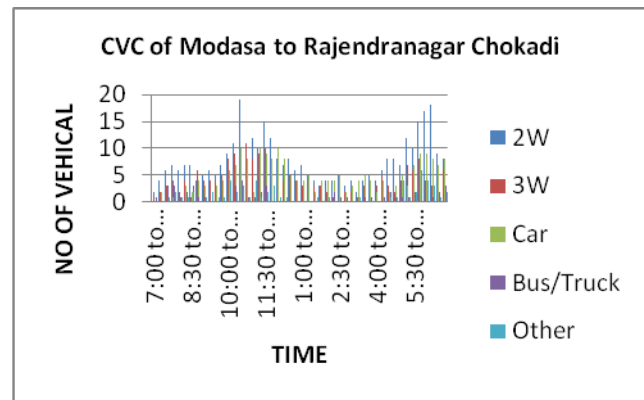
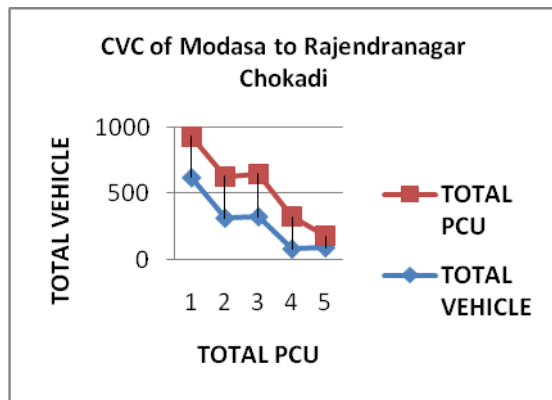




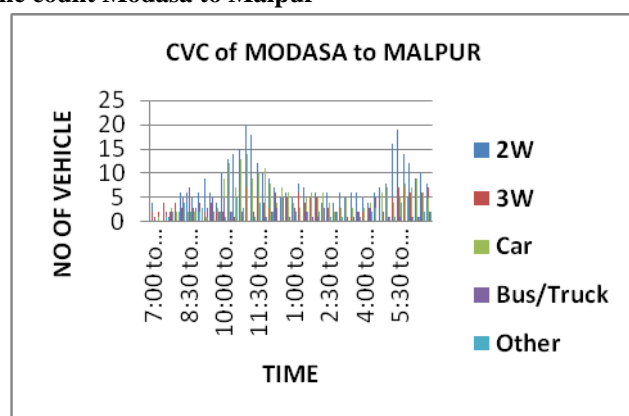
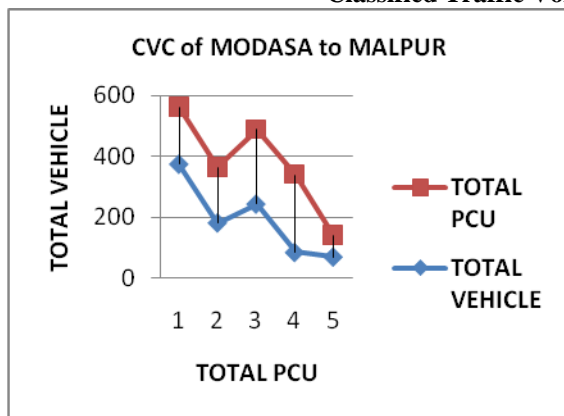
**Classified Traffic Volume Count**

**Classified Traffic Volume count Modasa to Rajendranagar Chokadi**

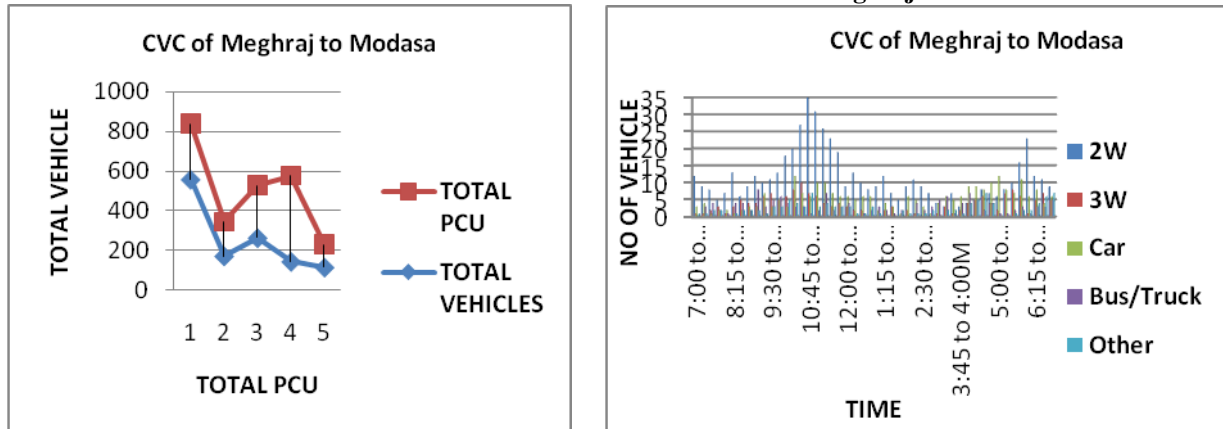
	2w	3w	4w	bus/truck	other
<b>TOTAL VEHICLE</b>	620	315	325	82	91
<b>PCU</b>	0.5	1	1	3	1
<b>TOTAL PCU</b>	310	315	325	246	91



**Classified Traffic Volume count Modasa to Malpur**



Classified Traffic Volume count Modasa to Meghraj



Functional Inventory of Selected Road Links  
 Modasa to Rajendranagar Chokadi

Section no.	No. of Acci.	RF	CV/KM	J	C	P	AW	Q ADT	R	AVG.PSI
1	0.19	13.58	49.61	3	1.25	28.35	7.5	956	0.625	3.01
2	0.21	12.86	21.23	2	0.45	52.45	7.3	428	0.54	
3	0.16	12.94	35.80	1	0.58	13.05	8.5	840	0.765	
4	0.15	12.21	43.57	3	2.30	31.19	7.6	862	0.91	
5	0.11	12.33	20.00	2	3.02	17.64	7.9	816	0.68	
6	0.23	13.33	27.00	2	0.75	32.5	8.5	876	0.838	
7	0.17	13.30	25.00	4	1.39	46.86	8.4	450	0.535	
8	0.12	13.19	23.68	2	3.23	27.38	8.5	793	0.837	
9	0.15	13.21	31.58	1	1.59	12.37	7.6	512	0.472	
10	0.22	12.79	26.48	2	0.80	33.85	7.8	653	0.444	
11	0.21	12.97	33.33	5	2.15	48.85	7.7	588	0.51	
12	0.15	13.12	28.16	2	3.01	27.59	8.5	359	0.41	
13	0.19	13.43	24.39	2	1.88	23.26	8.1	651	0.57	
14	0.25	13.23	21.29	3	1.45	38.25	7	870	0.325	
15	0.21	13.17	37.54	2	0.50	22.21	7	436	0.49	
16	0.18	13.29	33.00	2	0.78	16.46	7.5	510	0.281	

Where,

RF- Rise and Fall

CV- Degree of curvature

J- No. of Junction

Accident Rate Model of Modasa to Rajendranagar Chokadi

C- Crack area

R-Rut depth

PSI- Present Serviceability Index(@AASHTO 1993)

P-Pot holes Area

AW- Average Width

$$AR = 0.1356 + 0.12421 RF + 1.01214 CV + 0.87875 J + 0.0125436 AW$$

$$+ 1.245Q_{ADT}$$

$$R^2 = 0.81$$

Modasa To Malpur

Section no.	No. of Acci.	RF	CV/KM	J	C	P	AW	Q ADT	R	AVG.PSI
1	1.14	10.97	49.55	2	0.35	109	15	1349	0.945	3.29
2	0.29	10.93	19.33	4	0.63	80	14.5	1235	0.56	
3	0.29	11.12	15.32	3	2.36	75.11	16.2	1254	0.86	
4	0.44	15.00	29.56	1	3.13	69.9	15.5	1220	0.91	
5	0.14	10.78	21.33	2	2.24	53.9	16.1	1452	0.68	
6	0.71	10.47	25.22	3	1.01	67.6	16.2	1120	0.838	
7	1.20	22.00	35.65	2	2.50	50.56	13.2	1120	0.535	
8	0.29	10.78	24.65	1	1.56	57.98	15.9	1140	0.837	
9	0.67	12.00	30.25	0	2.90	46.76	16	1230	0.442	
10	0.56	10.88	26.10	1	3.50	56.9	15.7	1352	0.444	
11	1.10	10.60	19.58	2	1.64	61.59	15.7	1220	0.57	

Accident Rate Model Modasa to Malpur

$$AR = 3.381861 + 0.15668 RF + 0.851232 J + 1.352648 AW$$

$$R^2 = 0.72$$

Modasa To Meghraj

Section no.	No. of Acci.	RF	CV/KM	J	C	P	AW	Q ADT	R	AVG.PSI
1	0.14	16.35	35.89	3	0.81	19.55	7	805.96	0.711	2.67
2	0.14	10.00	20.07	3	1.00	57.86	8.5	485.84	0.766	
3	0.14	11.00	17.00	4	1.54	55.94	7.5	597.4	0.632	
4	0.00	12.00	33.32	5	0.88	33.03	7.7	224.58	0.734	
5	0.29	16.11	26.33	2	1.43	35.77	7.6	338.07	0.65	
6	0.14	16.11	40.35	1	0.92	46.93	7.8	332.54	0.609	
7	0.43	13.00	39.79	1	2.288	31.04	8.5	490.06	0.452	
8	1.00	15.02	22.00	1	2.81	56.33	8	116.33	0.281	
9	0.26	25.00	34.12	3	1.89	16.87	8	97.22	0.346	
10	1.90	63.00	22.10	2	1.46	43.83	8	151.56	0.425	
11	0.35	21.00	19.19	6	0.68	39.62	8.2	185.27	0.487	
12	0.70	15.33	24.89	1	1.68	26.48	7.5	75.35	0.354	

Accident Rate Model Modasa to Meghraj

$$AR = -2.32151 + 1.35432 CV + 0.20012 J + 1.012423 AW + 0.23241 Q_{ADT}$$

$$R^2 = 0.67$$



Road side observation (Modasa to Rajendranagar crossing)



Trimming of Road Side Vegetation

Along the Project Corridor (Examples at CH 5.910 Km)

Recommendation: Vegetation should be cut/trimmed on a regular basis so that it will not hamper the smooth traffic flow of the roads and affected visibility. Regular trimming require.

Road side observation (Modasa to Malpur road)



Figure 5.6: CH-1423.25m. Pot holes, no curvature markings



Figure 5.7: CH- 1750.0 m Edge braking

Potholes,

curvature marking

Recommendation:

Periodic Maintenance is required

No

Edge Braking

Recommendation:

Regular trimming require.

Road side observation (Modasa to Megraj Road)



Unauthorised opening.

(Examples At CH. 8.2 km)

Recommendation: Opening should be closed to prevent accident.

Conclusion

Conclusions derived from the accident data analysis and functional surveys carried out for the selected Road Links. Modasa to Rajendranagar road link give good linear relationship for the accident rate.

• Modasa to Malpur:-

From the above equation, it is observed that no. of junctions (J), Width of road (W), Rise and fall of the road (RF) are significant parameters for causing the accidents

• Modasa to Rajendranagar:-

From the above equation, it is observed that Rise and fall of the road (RF) and Traffic volume (ADT), Avg. Width are significant parameters for causing the accidents.

• Modasa to Meghraj:-

From the above equation, it is observed that Rise and fall of the road (RF), Width of road (W), Degree of Curvature no. of junctions (J), are significant parameters for causing the accidents.

From the road side observation for RSA the common deficiencies are found as follows:

- Improper road markings.
- Periodic trimming of vegetation, trees are necessary for sufficient clear vision on the road.
- Marking and speed hump with stop signs are not provided on the junctions, which may be the main causes for the accident occurrence near the junctions.
- Improvement in the gradients are necessary to minimise the accident occurrences, as the regression equations of accident rates reflect the significant effect of rise fall for the causing more accidents. Proper sign boards, lighting, flashing amber signals shall be provided on the rising/ falling gradients.
- Data analysis shows that overall average PSI of all selected road links are between 2.6 to 3.3 From Present Serviceability Index rate using pavement condition@ AASHTO (1993) it realize that all road links are good and all links are need to an improvement or maintenance. Maintenance Priority Ranking is given to Modasa to Meghraj Road.

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