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TRAFFIC AND ACCIDENTAL ANALYSIS ON MAJOR CORRIDOR , NAYAPURA OF KOTA CITY

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ABSTRACT

Today , according to the world health organization(WHO),motor vehicle crashes kill about 1.2 million people each year. That is set to rise 2 million by 2020 unless new safety measures are taken, making road traffic injuries the third largest cause of death and disability .This report reviews on the road accidental analysis in Kota city of Rajasthan, India

Keywords :Interchanges, manual method of analysis, Passenger car unit, stream flow, traffic volume

I. INTRODUCTION

"Safety in general may be defined as the freedom from the danger or risk in traffic system; this is defined as the consistency or stability of the system."The study of safety is dealt with interdisciplinary and integrated human approaches in which at its finest realization, every individual citizen is responsible. Engineers planners, physicians, psychologists, environmentalists and sociologists are people who devote part of their time in accident research. Most people are more conscious on other type of accidents than that due to transportation.

With an increasing trend of total motor vehicle registration yearly, a waste transportation system is pictured at hand traffic safety would be a major issue than several studies have been accounted for this and a monotones concept of the bottom line of the problem is still at stake – record-keeping, the most important aspect pertinent to accidents. Another problem is the under reporting of road accident data which is considered a phenomena both in developed and developing countries .

Road safety experts and researchers deal with large volume of quantitative information and collected statistics, in order to understand and estimate the social and economic cost of the accidendts and to be able to introduce safety plans in order to prevent or reduce occurrence of accidents . the road traffic and accidents statistics must be presented in such a way to make it easier to be both recognized and interpreted by a human opretor . there are many factors contributing to traffic accidents and they interect in complex ways. Even so , clarification of accident causes is indispensable in planning effective accident prevention measured. Onsite accident reports filled out by the police conventionally are used as the primary data for calarification of causes . these reports , which are filled out based on oral statements by the parties involed , tend to be vague and subjective, which makes it difficult to accurately understand the origin and development of each accident. Furthermore, because onsite accident reports record only accidents involving injury or death , these reports are few ,making the analysis of causes difficult .

Nearly 1.3 million people die every year on the world's roads and up to 50 million are injured .Traffic fatalities measured by the proxy of motor vehicle registrations and population ,increasing traffic volume leads to an increase in fatalities per capita. In India , the motor vehicle population is growing at a faster rate than the economic and population growth .The road network facing the problem of road accidents with the expansion in motorization .various studies already have been done to linking road traffic fatalities with vehicle ownership ,regional population and economic growth .this paper discusses the use of data of road accidents to evaluate the effectiveness of countermeasures and to compare the safety of many districts but primarily KOTA city of Rajasthan state's in different periods of time.

II.IRC GUIDELINES

2.1 CAPACITY OF TWO LANE HIGHWAY

2.1.1 The design service volume of two lane vehicular underpass/overpass

The vehicular underpass/overpass structures shall be provided at the intersection of the project highway with all roads carrying an average daily traffic of more than 15,000 PCUs,unless specified otherwise.The structure may be either an underpass or an overpass depending upon the nature of terrain,vertical profile of road,availability of adequate right of way etc.

2.1.2 Cattle and pedestrian underpass/overpass:

-in certain stretches, underpasses/overpasses for crossing of cattle and pedestrians shall be provided at locations indicated in schedule B of the concession agreement.

-the width of pedestrian/cattle crossing shall not be less than 5 metres.

-the pedestrian crossings shall have provision for movement of disabled persons.

NATURE OF TERRAIN	DESIGN SERVICE VOLUME IN PCUs PER DAY	
	without paved shoulder	with minimum 1.5 m paved shoulder
Plain	15000	18000
Rolling	11000	13000
Mountainous and steep	7000	9000

Table: Design service volume of two lane highway in PCUs per day

2.2 DESIGN STANDARDS

Design standards shall be as per IRC: SP: 41.salient features are given below-

I. Design speed : It shall be taken for various elements of the intersection shall be taken as 60% of the approach speed.

II. Design Traffic Volume : Its distribution shall be assessed at peak hours upto the operation period.

III. Design vehicle : refer IRC:3.

IV. Types and radius of curve of intersection: These shall be decided on the basis of traffic data and geometric design.

V. Visibility at intersection-sight distance considerations

VI. The number of lanes to be provided at the intersections shall be governed by the peak hour traffic volume in each direction of travel

2.3 INTERCHANGES

An interchange is a grade separated intersection with connecting roadways(ramps) for turning traffic between highway approaches. such an interchange will be necessary at all crossings of highway which is to be developed to completely access controlled standards. an interchange may also be justified at locations where traffic on cross roads is heavy and when an At- grade intersection fails to handle the heavy volume of turning, merging and diverging traffic leading to excessive delay and fatal and major accidents. cost effectiveness will decide whether to provide full interchange or grade separated intersections without ramps.

An interchange may be justified at the crossing of the project highway with another highway, and where the total traffic on all the arms of the intersection is in excess of 10,000 PCUs in peak hour.

The decision to provide interchanges at such locations shall be taken by the government and the requirement shall be clearly spelt out in schedule-B of the Concession Agreement, which shall also indicate specifications and traffic streams to be grade separated.

The detailed design and layout of the interchange shall confirm to broad parameters and requirements specified by the Government in schedule- B of the Concession Agreement. Based on detailed surveys and investigations the concessionaires shall develop appropriate detailed drawings and designs and submit to the Independent Engineer for review and comments, if any.

Width of sidewalks (meters)	Capacity of number of persons per hour	
	All in one direction	In both direction
1.50	1200	800
2.00	2400	1600
2.50	3600	2400
3.00	4800	3200

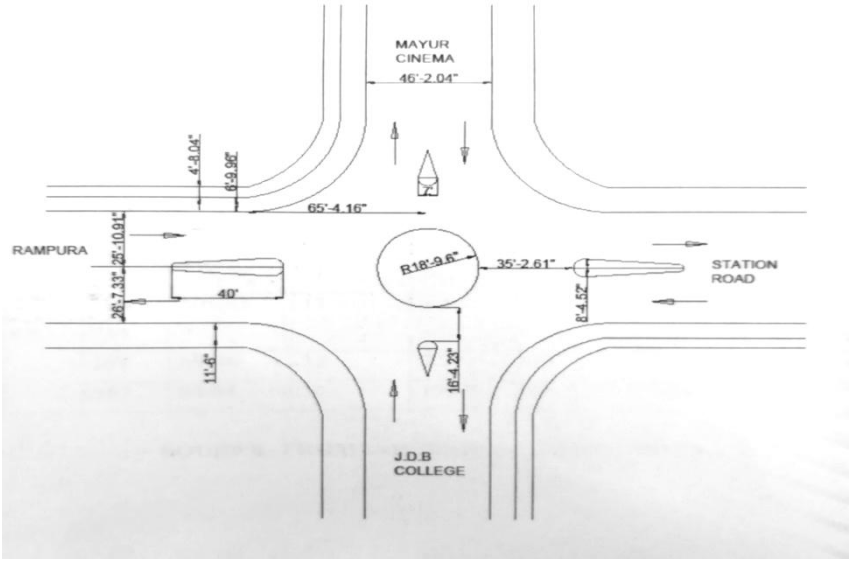
4.00	6000	4000

Table :Capacity of number of persons per hour

III. OBSERVATIONS

VEHICLES VOLUME FROM NAYAPURA CIRCLE

The circles at which the traffic volume is high or in other words are busy circles and are most prone for the accidents in KOTA city so NAYAPURA area was selected for analysis. At this area the data were collected by manual method of analysis and on the basis of this data we found out the PCU values of different categories of vehicles as given in tables.



IV. METHODOLOGY

The unrestricted mixing of various classes of vehicles along a road without their physical segregation creates various complex problems. Each class of vehicle in the traffic stream cannot be considered as equivalent to any other vehicle class as there is considerable difference in the vehicular and flow characteristics of each vehicle class. The vehicular characteristics refer to dimensions, power, speed, acceleration, braking and maneuverability of the vehicles.

4.1 PASSENGER CAR UNIT (PCU)

PCU IS a metric used in transportation engineering to access traffic flow rate on a highway.a passenger car unit is essentially the impact that a mode of transport as on traffic variables(such as headway, speed, density) compared to a single car. Highway capacity is measured in PCU per hour daily.

To estimate the PCU values is that it is directly proportional to the ratio of clearing speed of the vehicle and inversely proportional to the space occupancy ratio of vehicle with respect to the standard area of the vehicle, i.e. a car. The PCU of a vehicle type is taken as given by-

$PCU = (V_c/V_i)(A_c/A_i)$

Where, PCU_i = passenger car unit value of i^{th} type vehicle

Speed ratio of the car to the i^{th} type vehicle = V_c/V_i

Space ratio of the car to the i^{th} type vehicle = A_c/A_i

The PCU values for different categories of vehicles were calculated at different sections of highways. This shows the variations in PCU for different types of vehicles with lane width at different sections. The PCU factor is based on the mean speed values of different vehicle classes. To analyse these parts and determine speed-flow relationships accordingly in the present study.

4.2 FACTORS AFFECTING PCU VALUES

PCU values depends on the vehicle characteristics, stream characteristics, roadway characteristics, environmental characteristics, climatic conditions and control conditions.

4.3 PCU FACTORS FOR VEHICLES

TYPE OF VEHICLE	PCU FACTOR
Car	1.0
Bus	2.33
Van	1.58
Motorcycle	0.61
Small lorry	1.92
Big lorry	2.58

4.4 CALCULATION OF PCU PER HOUR OF NAYAPURA CIRCLE

A. FROM JDB COLLEGE TO NAYAPURA CIRCLE

TIME	PASSENGERS VEHICLES				GOODS VEHICLES			GRAND TOTAL
	BUS	CAR	TWO WHEELER	AUTOS	TRUCK	PICKUPS	TROLLIES	
8-9AM	25.63	64	172.08	244.9	12.9	28.8	0	548.31

9-10AM	23.3	72	247.05	243.32	28.38	48.0	0	662.05
10-11AM	32.62	97	319.03	273.34	15.48	49.92	0	787.39
11-12AM	34.95	113	351.97	347.6	0	21.1	0	868.64
12-1PM	37.28	89	289.14	330.22	10.32	48.0	0	803.96
1-2PM	44.27	92	274.5	325.48	2.58	51.84	0	790.67
2-3PM	51.26	117	345.26	383.94	5.16	55.68	3.84	962.14
3-4PM	55.92	133	300.73	437.66	5.16	40.32	1.92	974.71
4-5PM	41.94	120	279.38	374.46	7.74	48.0	0	871.52
5-6PM	27.92	96	319.64	254.4	2.58	53.76	0	754.3
6-7PM	18.64	169	351.36	423.44	5.16	69.12	1.92	1038.64
7-8PM	20.97	158	359.29	470.84	7.74	49.92	1.92	1068.68

DESIGN VALUE OF PCU PER HOUR = 1800

AS OBSERVED PCU/HR < DESIGN PCU/HR = SAFE

B. NAYAPURA CIRCLE TO RAILWAY STATION ROAD

TIME	PASSENGERS VEHICLES				GOODS VEHICLES			GRAND TOTAL
	BUS	CAR	TWO WHEELER	AUTOS	TRUCK	PICKUPS	TROLLIES	
8-9AM	11.56	77	130.54	233.84		23.04	7.68	438.75
9-10AM	6.99	36	179.34	202.24		19.2	1.92	445.69
10-11AM	20.97	72	245.22	314.42		21.12	00	673.73
11-12AM	4.66	59	320.86	265.44		36.48	1.92	688.36
12-1PM	9.32	29	320.86	265.44		34.56	00	659.15
1-2PM	11.65	31	262.3	257.54		36.48	00	598.97
2-3PM	13.98	27	296.46	287.56		32.64	00	657.64

3-4PM	9.32	39	218.99	311.26		28.82	00	646.39
4-5PM	16.31	82	289.75	327.06		40.32	00	755.44
5-6PM	9.32	43	351.56	360.24		36.48	5.76	806.36
6-7PM	11.65	62	624.52	381.24		34.56	3.84	717.81
7-8PM	6.99	53	289.75	303.06		32.64	00	685.44
8-9PM	4.66	71	258.03	289.14		24.96	1.92	649.71

DESIGN VALUE OF PCU PER HOUR = 1800

AS OBSERVED PCU/HR < DESIGN PCU/HR = SAFE

C. MAYUR CINEMA ROADTO NAYAPURA CIRCLE

TIME	PASSENGERS VEHICLES				GOODS VEHICLES			GRAND TOTAL
	BUS	CAR	TWO WHEELER	AUTOS	TRUCK	PICKUPS	TROLLIES	
8-9AM	34.95	80	292.8	208.56	10.32	76.8		703.4
9-10AM	30.29	86	317.2	301.78	2.58	86.4		824.25
10-11AM	25.63	102	268.4	221.2	7.74	76.8		701.77
11-12AM	32.64	105	91.5	158	5.16	57.6		449.9
12-1PM	27.96	110	152.5	205.4	2.58	48		546.44
1-2PM	23.30	70	158.6	221.2	0	30.72		503.82
2-3PM	11.65	66	134.2	283.8	7.74	38.4		541.79
3-4PM	16.31	50	128.1	189.6	0	96		480.1
4-5PM	34.95	110	137.25	165.9	0	97.92		546.02
5-6PM	37.28	105	183	173.8	0	101.76		600.84
6-7PM	25.63	120	244	268.6	0	115.2		773.63
7-8PM	30.29	170	256.2	252.8	0	115.2		824.49

8-9PM	34.95	180	262.3	284.4	0	134.4		896.04

DESIGN VALUE OF PCU PER HOUR = 750

AS OBSERVED PCU/HR > DESIGN PCU/HR = UNSAFE

V. CONCLUSION AND RECOMMENDATIONS

With increase in number of registered vehicles and population growth, traffic fatalities are increasing which becomes a point of concern for the people and their safety. This paper discusses the nayapura circle in kota city that is more prone to accidents and congestion leading damage to life and property. Data related to accidents and vehicles registration were collected from RTO office, showrooms in kota, hospitals and even traffic was monitored by the groups to whom different circles were allotted . traffic capacity of different circles was determined in the form of PCU/HR which was compared to the guidelines given in IRC codes. From there the circle whose PCU/HR exceeds the safe or design limit, the circles were considered UNSAFE and the recommendation were given. The following recommendations are there –

There should be divider between nayapura circle and mayur cinema road, encroachment should be removed, road condition should be improved, road width should be improved, no vehicle should be parked on road side, the pedestals that are being meant for public are being used by the vendors leading to congestions on road, heavy trucks movement over there is of great concern according to public.

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