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EVALUATION OF TRAFFIC CONGESTION USING COMPARATIVE LAND USE PATTERN-A CASE STUDY OF SURAT CITY

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Abstract - *Transportation and land use are two sides of same coin. Land use and transportation are inextricably linked. Land use involves building and roads, which affect traffic flow and transportation demand through distribution trip. Thus the relation between land use and transportation is very complex.*

The present work is to understand the impact of land use in traffic planning in Surat and different three road cross section. Compare the different road's land use and movements of vehicles of Surat to understand the land use effect on traffic congestion and flow. At the end of the work we find out land use impact on movement of traffic.

***Key Words*: Land use, Transportation, Distribtion trip, Traffic congestion, Flow**

1. INTRODUCTION

Urbanization has been one of the dominant contemporary processes as a growing share of the global population lives in cities. Transportation in urban areas is highly complex because of the modes involved, the multitude of origins and destinations, the amount and variety of traffic. Traditionally, the focus of urban transportation has been on passengers as cities were viewed as locations of utmost human interactions with intricate traffic patterns linked to commuting, commercial transactions and leisure/cultural activities. Land use refers to the pattern of land usage in an area; including the location, type and design of infrastructure such as roads and building which affects the transportation demand and traffic flow through unauthorized vehicle parking on the road and many more activities which direct and indirectly affect the vehicle flow. Land use planning (LUP) is one of the important tools available to the city planners attain sustained growth of a city.

2. LITERETURE REVIEW

The land use in which a particular piece of property or district is permitted to be used; typical usage includes residential, commercial, industrial, institutional, and agricultural.

Land use patterns affect accessibility, people's ability to reach desired services and activities, which affects mobility, the amount and type of travel activity. Different land use patterns have different accessibility features.

2.1 TRAFFIC VOLUME STUDY

Traffic Volume is the number of vehicles crossing a section of road per unit time at any select period. Traffic volume is used as a quantity measure of flow; the commonly used unit is vehicle per day and vehicles per hour.

A complete traffic volume study may include the classified volume study by recording the volume of various type and classes of traffic, the distribution by direction and turning movements and distribution by direction and turning movement and the distribution on different lanes per unit time.

3. CLASSIFIED VOLUME COUNT SURVEY:

Manual Classified volume count survey is carried out by counting vehicles at starting and end points on the survey route Anand mahal road and Citylight road.

The morning peak hour is 10:00 a.m. to 12:00 p.m. and evening peak hour is 6:00 p.m. to 8:00 p.m.

3.1 LANDUSE CALCULATION:

Land use calculated for identifying the relation between traffic and land-use, almost all type of land-use covered in study by selecting two roads in different T. P. schemes.

Transportation is the function of land use. As the land use change the transportation also change. Here, the purpose of land use is used to compare with the observed PCU count for the calculation of traffic congestion. For the land use calculation 100 meter lines are drawn from centre line of the particular road and area covered under that is taken for calculation.

Land-use calculated in cad tools software by using existing TPS autocad maps. The land use of existing developed T. P. Scheme's of particular roads are calculated by firstly taking approx. 100m distance from the centre line of the road and then taking both side of road. This whole process repeated for all two survey roads.

The different type of land use taken in study which are observed and identified and the land use covered are road use, residential, commercial, institutional, industrial, recreational and open undeveloped land. The land-use calculation for all two roads calculated below by the use of AutoCAD software by analysis of data.

5.2 LANDUSE DATA:

❖ ANAND MAHAL ROAD:

Table-1: Area wise land use for anand mahal road

LAND USE TYPE	AREA	PERCENTAGE (%)	COLOUR
Commercial	82762.18	19	
Residential	130557.61	29	
Residential + Commercial	69435.52	16	
Public/Semi. Public	28105.66	6	
Open space	20942.52	5	
Educational Institution	6274.55	1	
Industrial	-	0.00	
Recreation	-	0.00	
Road/Transportation	109188.64	24	
Total Area	447266.68	100	

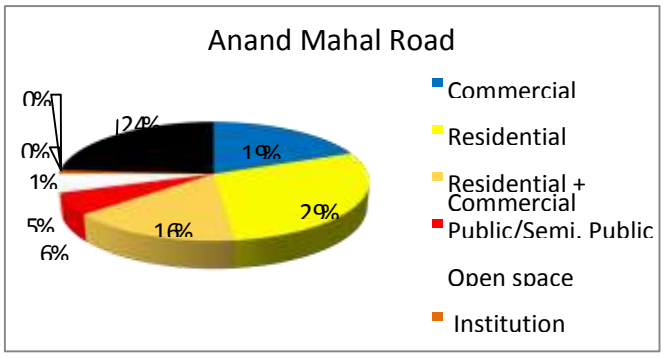

Chart -1: area wise land use for Anand mahal road

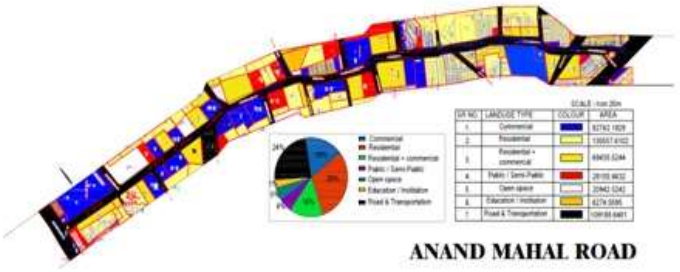

Fig -1: Map of Anand mahal road

❖ CITYLIGHT ROAD:

Table-2: Area wise land use for Citylight road

LAND USE TYPE	AREA	PERCENTAGE (%)	COLOUR
Commercial	30989.63	7	
Residential	170618.8	40	
Residential + Commercial	40039.42	9	
Public/Semi. Public	31972.68	8	
Open space	15148.48	4	
Educational Institution	20630.63	9	
Industrial	-	-	
Recreation	-	-	
Road/Transportation	114309.7	27	
Total Area	423709.34	100	

Fig -2: Map of Citylight road

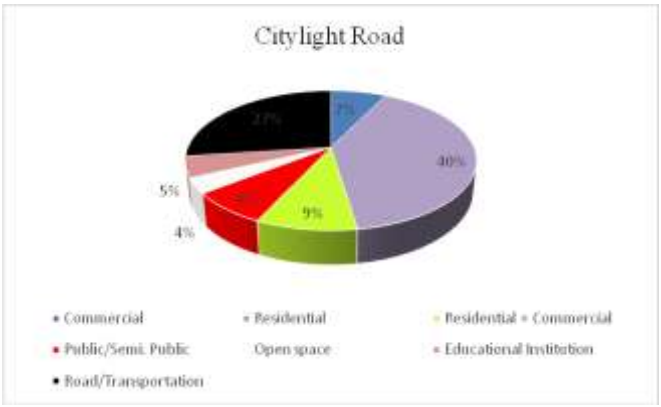

Chart -2: area wise land use for Citylight road

The above charts shows the percentage of the different land use pattern in the survey route.

3.2 DEVELOPMENT OF PCU PREDICTOR MODEL

Regression Based PCU predictor model for TPS 24 Mt. roads in Linear regression analysis by using SPSS software.

Hence, the model is formulated in standard regression form ($Y_{ij} = \beta + \beta_i X_i + \ldots + \beta_j X_j \pm e$) as below:

Y= 50.673 (R) + 10.693 (RC) + 2.806 (C) – 0.913 (In) – 14.589 (Ot) – 3.653 (RW) + 1920.291

Where,
Total area is covering a land width of 100m from center line of road on either side (i.e. 200 Mt wide belt)

R = Residential Landuse in Percentage of total area
RC = Residential+CommercialLanduse in Percentage of total area
C= Commercial Landuse in Percentage of total area
In= Institutional Landuse in Percentage of total area
Ot=Other (Indusrtial, open spaces, recreational) Landuse in Percentage of total area
RW = Road area in percentage for 24 Mt. wide road

3. CONCLUSIONS

The town planner can use this model at draft T. P. Scheme level when road network is 24 Mt. wide and surrounding land use type is known.

1) The different land-use area on a particular road can be calculated considering a 100 Mt. long and wide belt from the center of the road intersection.

2) Then input the value of area of different land use type (in percentage of total area of 100m long and wide road) in equation;

3) Then input the value of road width which is 24 Mt.;

4) After inputting all right side values, the average PCU value (here **Y** in equation) will be generated through model.

5) The PCU provision on particular road will be different as per its land use type.

6) The traffic characteristics of PCU on particular road of 24 Mt. wide will be got through this equation. Then compare this PCU counts (value of Y) with IRC standards

(referring to IRC:86-1893) generated from model's output.

7) From this model find the level of congestion.

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