OUTER RING ROAD TRAFFIC ANALYSIS AND PREDICTION

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ABSTRACT: Traffic congestion is becoming a serious problem in Hyderabad like any other city in India. Therefore, there is pressing and growing need to measure congestion levels in a consistent manner and it is needed to improve the road facilities in order to connect different areas with no loss of time. A multi-disciplinary approach is needed in understanding the problem and providing solutions. Hyderabad is the fifth largest city of India with a total extent of 1868 sq.km. A huge amount of traffic moves daily and in order to divert the highway traffic bypassing through the city and to reduce the travel time and to connect all the places around the city without connecting to inner ring road, an outer ring road is essential. The backbone of any successful traffic management system for a metropolis is reliable, accurate and real time data. Traffic flowing, travel time and traffic increments are the three most important factors considered in TMS for analysing and predicting the traffic and controlling congestions. It is observed that major congestion problems are caused due to poor network of roads. This study presents manual counting of traffic flowing on ORR as well as at underpasses and the traffic is predicted for future years. The main aim of our project is to de-congest metropolitan area and inner ring road and to meet future demand. A comparative statistical analysis was performed on traffic predictions. Information about ITS is specified which helps in decongestion of traffic on ORR due to increased vehicular traffic. Moreover, our study conveys the importance of transportation engineering in our day to day life.

Keywords: Traffic Analysis, Travel Time, Traffic Prediction and Intelligent Transport System.

INTRODUCTION

Transport plays a significant role in the overall economic development. Transportation results into growth of infrastructure, industrialization and massive production. Advancement in the transport sector has resulted into comfort and convenience. Well-functioning transportation systems form the basis for economic prosperity and social wellbeing of societies.

Road network in India is one of the largest networks in the world. The country's road network consists of Expressways, National Highways, State Highways, Major District Roads, Other District Roads and Village Roads. Roads are the dominant mode of transportation in India.

They are an indispensable means of communication and has come a long way. It is today regarded as one of the most ideal and cost effective modes of transportation in India. The Indian Roadways play a crucial role in connecting the different parts of India. One of the most important advancement in transportation system is outer ring road, which helps in the development of the state or city.

The outer ring road is the rim of the cartwheel. While it is now also used by the traffic to bypass a town, its original purpose was to link the outer communities and promote development infill by acting as a distributor between radials, thus these ring roads are generally located within the lower density outer fringes of urban development, and they tend to be more circumferential than inner ring roads. Their quality of demand and completeness depend upon needs at specific locations. Outer ring roads are not heavily used by public transport, it is mainly to divert the heavy motor vehicles from the inner city traffic.

METHODOLOGY

TRAFFIC STUDIES

Traffic studies are carried out to analyse the traffic characteristics. It helps in geometric design and traffic control, which tends to a safe and efficient traffic movement. The traffic studies in collection of data is also known as traffic census. There are multiple methods for the collection of traffic data and traffic characteristics either manually or mechanically. The different types of traffic studies are:

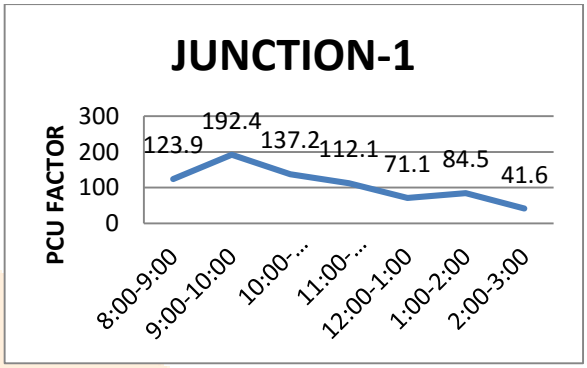
1. Traffic volume study
2. Speed study
3. Origin and destination study

4. Traffic flow characteristics study
5. Traffic capacity study
6. Parking study
7. Accident study

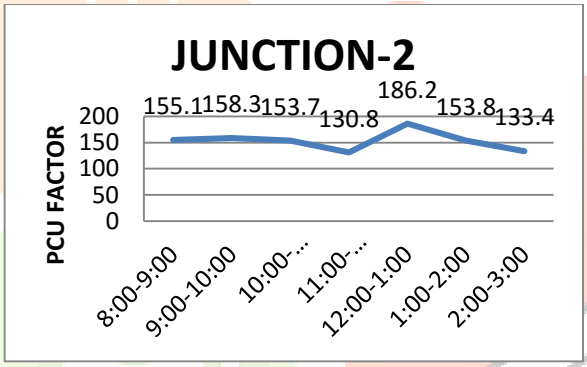
The traffic study in this case is done using “Traffic volume study”.

The case study includes the stretch Bongulur- Ghatkesar. The distance between the two junctions is 32.1km. The stretch consists of 16 vehicle under passes (VUP). But the survey was conducted in 6 vehicle under passes only. The data is collected and represented graphically as follows:

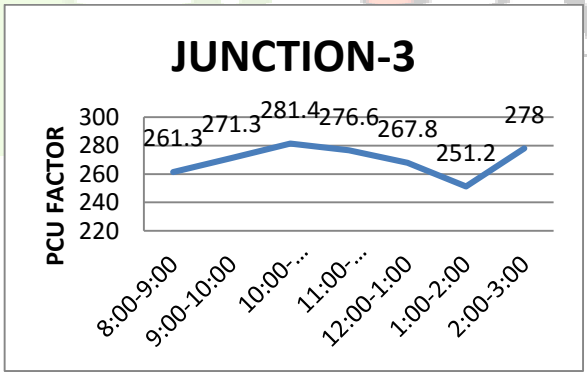
Graph 1:PCU vs. TIME



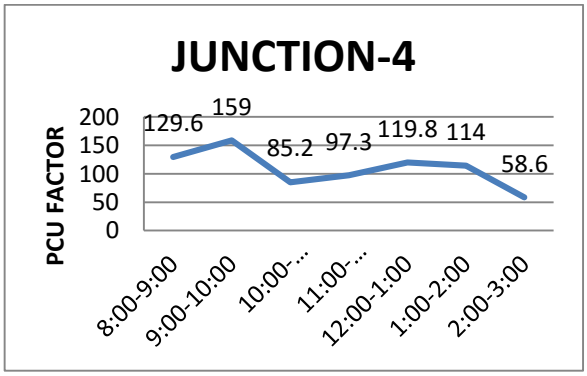
Graph 2: PCU vs. TIME



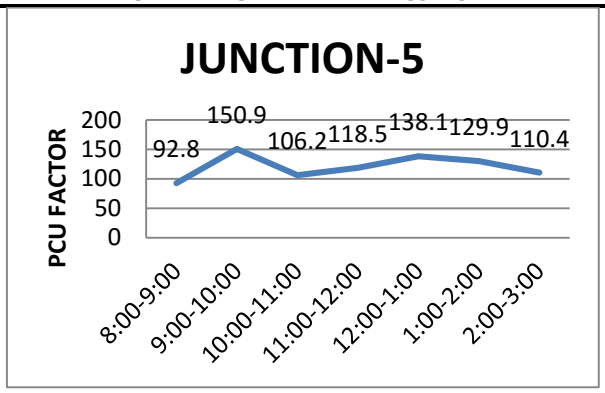
Graph 3: PCU vs. TIME



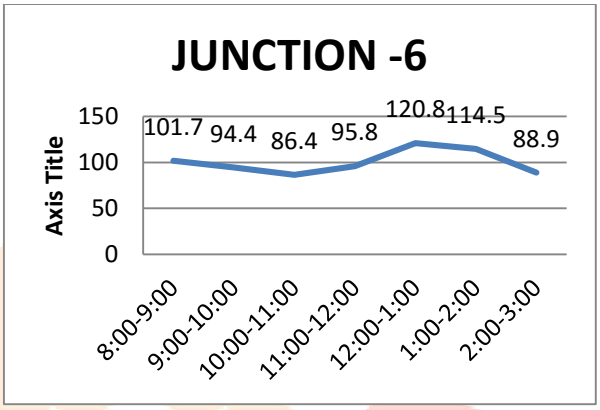
Graph 4: PCU vs. TIME



Graph 5:PCU vs. TIME



Graph 6:PCU vs. TIME



REGRESSION MODEL

In this model an additive functional form is assumed to exist between the factors which affect trip-generation and the number of trips generated.This model is very helpful in determining the number of trips generated in a zone when the parameters of the regression function are known. These parameters can be determined using estimation techniques likeOrdinary Least Squares or Maximum Likelihood Technique on empirically obtained data on variables.

The formula generated is as follows:

$$y= a+ b(x)$$

Where, y= dependent variable (vehicular registered data),
a= intercept,
b= slope of the line,
x= independent variable (GDP).

OUR CONCEPT

Taking vehicular registered data as dependent variable and GDP as independent variable, using regression technique in excel a relation between them is created, based on that equation vehicular registration for future year is calculated and an average growth rate per year is obtained. Based on that growth rate the traffic on ORR is predicted for future years.

The method, Elasticity based model using regression, is used in predicting the traffic which is based on the assumption that traffic volume is dependent on growth rate which in turn depends on the number of vehicular registrations. Based on this assumptions predictions are performed.

Regression analysis is a causal / econometric forecasting method. Some forecasting methods use the assumption that it is possible to identify the underlying factors that might influence the variable that is being forecast.

Regression analysis includes several classical assumptions. Regression analysis includes many techniques for modelling and analysing several variables when the focus is on the relationship between a dependent variable and one or more independent variables.

A large body of techniques for carrying out regression analysis has been developed. Familiar methods, such as linear regression and ordinary least squares regression, are parametric.

REGRESSION TECHNIQUE:

year	vehicles registered in hyddist	vehicles registered in rrdist	Total Registered Vehicles	GDP (USD BILLIONS)	
2011	1849087	1302186	3151273	74	
2012	2012816	1489806	3502622	79.476	
2013	2176560	1679030	3855590	85.357224	
2014	2340869	1881518	4222387	91.67365858	

2015	2520309	2095383	4615692	98.45750931	
	TOTAL VEHICULAR TRAFFIC ON ORR	TOTAL TRAFFIC IN OUR STRETCH			GROWTH RATE
2016	16212984	853248	5044875.13	105.743365	9.20%
2017	17542448.69	923214.336	5503176.52	113.568374	9.00%
2018	18980929.48	998917.9116	5995392.212	121.9724337	8.90%
2019	20537365.7	1080829.18	6524031.865	130.9983938	8.82%
2020	22221429.69	1169457.173	7091790.853	140.6922749	8.70%
2021	24043586.92	1265352.661	7701564.005	151.1035033	8.60%
2022	26015161.05	1369111.58	8356460.371	162.2851625	8.50%
2023	28148404.25	1481378.729	9059819.068	174.2942645	8.42%
2024	30456573.4	1602851.785	9815226.309	187.1920401	8.34%
2025	32954012.42	1734285.631	10626533.69	201.0442511	8.27%
2026	35656241.44	1876497.053	11497877.81	215.9215257	8.20%
2027	38580053.24	2030369.811	12433701.39	231.8997185	8.14%
2028	41743617.6	2196860.136	13438775.93	249.0602977	8.08%
2029	45166594.25	2377002.667	14518225.98	267.4907598	8.03%
2030	48870254.97	2571916.886	15677555.33	287.285076	7.99%
2031	52877615.88	2782814.07	16922675.05	308.5441716	7.94%
2032	57213580.38	3011004.824	18259933.63	331.3764403	7.90%
2033	61905093.97	3257907.22	19696149.35	355.8982969	7.87%
2034	66981311.68	3525055.612	21238645.04	382.2347708	7.83%
2035	72473779.24	3814110.172	22895285.4	410.5201439	7.80%
2036	78416629.14	4126867.206	24674517.15	440.8986345	7.77%
2037	84846792.73	4465270.317	26585412.04	473.5251335	7.74%
2038	91804229.73	4831422.483	28637713.17	508.5659934	7.72%
2039	99332176.57	5227599.126	30841884.57	546.1998769	7.70%
2040	107477415	5656262.255	33209164.66	586.6186678	7.68%
				AVG GROWTH	8.21%

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.999967178					
R Square	0.999934357					
Adjusted R Square	0.999901535					
Standard Error	4749.006444					
Observations	4					
ANOVA						
	df	*SS*	*MS*	*F*	*Significance F*	
Regression	1	6.87094E+11	6.87094E+11	30465.6675	3.28222E-05	
Residual	2	45106124.42	22553062.21			

Total	3	6.87139E+11				
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Lower 95.0%*
Intercept	-1148386.886	29871.8553	-38.44377508	0.000675939	-1276915.106	-1276915.106
74	58568.8002	335.5528861	174.5441706	3.28222E-05	57125.03265	57125.03265

RESULTS AND CONCLUSIONS

According to the survey done and data obtained, the predictions are performed by regression process. The vehicular traffic is predicted till the year 2040. The traffic may be **6.2** times greater than the present traffic. Since there is a huge increase in the number of vehicles, the present design may not be sufficient. To meet the future need some changes have to be implemented.

One of the best ways to decongest the road is to properly managing the traffic. This can be done by implementing new technologies in the toll management and variable message systems.

The study has given a lead to the scientific planning in the Cantonment from planning, management and engineering perspectives. In the planning front, the future urban longitudinal and transitional corridors are identified by defining the hierarchy of the road systems. The link prioritization, identification of potential junctions to be developed, recommendations on land use controls are some of the key outputs from the planning distance that have been achieved in the study. The management issues have been dealt in the road safety auditing of links and junctions in the study area. An engineering face lift is given by the junction designs and link designs. It is further recommended for regular road safety audits to propose any improvements catering to the demands. A better practice of transportation planning and related policy making as suggested in the study must be followed. Improvement of the mobility based on access and hierarchy is the objective that has been accomplished in the study. Managing transportation accessibility fromdifferent parts of the area is the key concept framed in the study. The planning and design proposed in the study will be supportive in the smooth transition of the sprawl to an urban fabric. The study advocates the idea that, when the capability of new construction of roads is limited, a thoroughly designed road systems that fills the sprawl space better and improves the accessibility within the area can provide a larger transportation capability to serve more people and a better economy.

HMDA has taken initiation to implement ITS on the outer ring road. Smart cards, variable message systems etc. They will be installed and implemented by the year 2017.hyderabad is the first city to implement ITS. The use of ITS improves the traffic flow and reduces the problems.

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