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IDENTIFICATION OF VEHICULAR GROWTH AND ITS MANAGEMENT ON NH-202 IN RANGA REDDY DISTRICT

Khaja Ahemed[1] ,V.Ranjith kumar[2] ,Eshrak[3]

[1]*Research Scholar (M.Tech, T.E), Malla Reddy Engineering College,(Autonomous) Kompally*
[2] *Assistant professor, Malla Reddy Engineering College,(Autonomous) Kompally*
[3]*Assistant professor, Malla Reddy Engineering College,(Autonomous) Kompally*

Abstract *— In this paper, a brief practical review is presented on the statistical evidence showing the existing pavement and traffic conditions for extra widening and conversion of lanes and to identify the traffic growth statistics at particular stretches for management of the roads according to the vehicular growths and its management for the essential of future traffic estimation Hence Detailed traffic surveys have been carried out to assess the baseline traffic characteristics on the project road and other major corridors like NH-202, SH-3, SH-17 and SH-9, which come under project influence area. All the data are characterized by a high degree of goods and Passenger vehicular traffic and the analysis of traffic survey data was done for the Identification of Vehicular Growth and Its Management on NH-202 in Ranga Reddy District*

Keywords*—Identification, traffic growth, ranga reddy, NH-202, vehicular growth.*

I. INTRODUCTION

National Highway 202 (NH 202) is a National Highway in India that links Hyderabad in Telangana and Bhopalpatnam in Chhattisgarh. The road till Warangal was already a state highway. It was extended and upgraded to a NH as the shortest route to connect Chhattisgarh to an important city. In Hyderabad city, the highway passes through Golnaka, Amberpet, Ramanthapur, Uppal Kalan and Ghatkesar areas along the northern banks of River Musi. The highway passes through Ghatkesar, Bhongir, Aleru, Jangaon, Raghunathpalle, Station Ghanpur, Warangal, Atmakur, Mallampalli, Mulug, Eturu Nagaram, Chandrupatla and Bhadrakali. It is arbitrarily calculated about 280 kilometers, in which the stretch in Telangana is about 244 kilometers and in Chhattisgarh 36 kilometers. The highway joins National Highway 16 (India) at Bhopalpatnam, but there is no bridge across River Godavari at Nagaram village so travellers have to go all the way to Bhadrachalam to get into Chhattisgarh. The highway joins National Highway 7 (India) at Hyderabad.

Roads are meant to facilitate mobility - the movement of people and goods. However, most roads are developed for vehicles rather than for pedestrians and non-motorized vehicles. Roads should be treated as shared space for all and developed in the same manner. Pedestrian sidewalks and bicycle lanes need to be developed along with roads. But, such cases happen very rarely. Car owners, private and business, are a minority in developing countries, but have concentrated political power, because of which our roads are more vehicle-friendly. Cities in developing countries are ugly because they are built and are still being built solely for the powerful minorities and their cars.

Transport is the basis of mobility and without mobility, national as well as international, trade cannot happen. Economy can never develop without trade.

Our study uses an idealized traffic network model to directly compare the efficiency of one-way and two-way street networks. It finds that two-way streets may serve traffic more efficiently, especially when trips within the network are short.

II. NEED FOR PRESENT STUDY

Initial investigation of the study is to evaluate the rating of the pavement condition and to determine functional and structural conditions of a highway section either for purposes of routine monitoring or planned corrective action. Functional condition is primarily concerned with the ride quality or surface texture of a highway section. Structural condition is concerned with the structural capacity of the pavement as measured by deflection, layer thickness, and material properties. At the network level, routine evaluations can be used to develop performance models and prioritize maintenance or rehabilitation efforts and funding. At the project level, evaluations are more focused on establishing the root causes of existing distress in order to determine the best rehabilitation strategies. Due to increase in traffic volume of the existing single lane of Golnaka to Warangal road as to be widened from the section as shown in the figure 1.1

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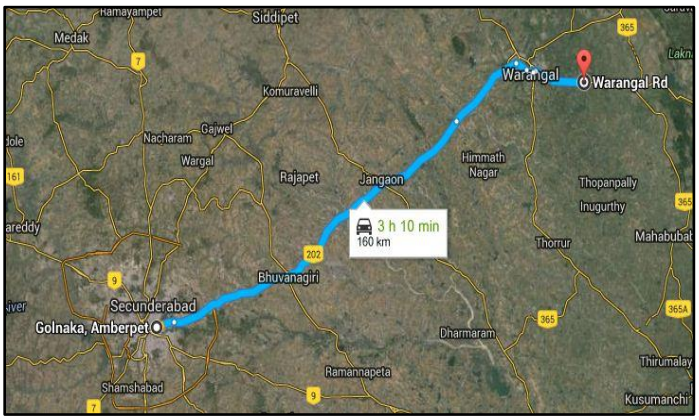

Figure-2.1 Satellite Map of National Highway in Ranga reddy district.

III. OBJECTIVE AND SCOPE OF THE STUDY

- To determine the vehicular growth in the present corridor.
- To determine the Existing pavement history for extra widening and conversion of single lane to double lane.
- To determine equivalent single axle loads (ESAL) and the average ten heaviest wheel loads daily.
- To determine for material selection and reuse of existing pavement materials.

IV. LITERATURE REVIEW

The current literature on urban street network design stresses that two-way streets create higher levels of economic activity. For example, two-way streets are better for local businesses that depend heavily on pass-by traffic. Additionally, traffic signal timing on two-way streets forces vehicles to stop more frequently than on one-way streets, giving drivers more exposure to local businesses.

Two-way streets have also been found to be safer than one-way streets, for several reasons. Although intersections of two-way streets have more conflicting maneuvers, one-way streets correlate with decreased levels of driver attention. One-way streets also allow higher travel speeds since signal timing results in less frequent stops for vehicles. Pedestrians also prefer crossing two-way streets since drivers tend to travel more slowly on them and vehicular conflicts are more predictable.

We prefer two-way street networks to one-way street networks because they are less confusing. Visitors driving in a two-way grid network can easily approach their destination from any direction. A one-way network may prevent drivers from approaching their destination from the most logical direction. This uncertainty can intimidate drivers and, in some cases, make them hesitant to return. Likewise, two-way streets make locating the transit stop for a return trip from downtown easier—in almost all cases, the bus stop is simply located across the street. On one-way networks, however, the stop for the return trip is usually on another street, which may confuse visitors and cause them to get lost.

V. METHODOLOGY

5.1 Traffic studies and forecast

An accurate estimate of the traffic that is likely to use the Project Road is very important as it forms the basic input in planning. Design Operation and financing. A Through Knowledge of the travel characteristics of the traffic likely use the Project Road as well as outer major roads in the influence areal of' the study corridor is therefore. Essential for future traffic estimation Hence Detailed traffic surveys have been carried out to assess the baseline traffic characteristics on the project road and other major corridors like NH-202, SH-3, SH-17 and SH-9, which come under project influence area.

5.2 Traffic Surveys

In order to identify traffic survey locations on the project affected roads as well as on the likely completing roads as detailed reconnaissance has been carried out for finalizing the locations.

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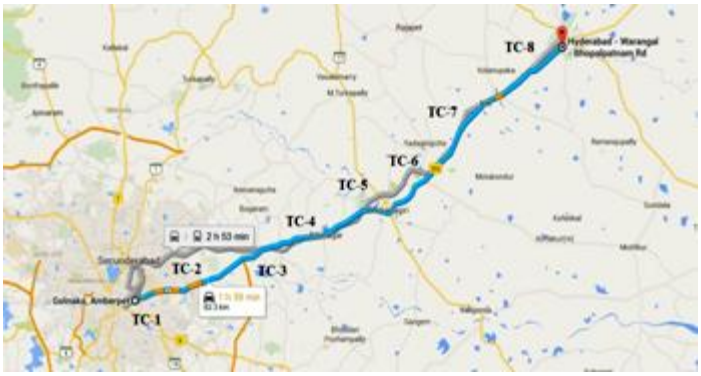
The traffic volume survey locations have been divided accordingly and termed as TC1, TC2, TC3, TC4, TC5, TC6, TC7, and TC8. A map showing the stretch with Traffic Surveys location is enclosed as shown in fig 1.
Traffic Volume count stations were selected in such a manner that all-possible movement would be captured on the Project stretch. To capture the Traffic and Travel characteristics of predominant category of vehicles, Origin and destination surveys were conducted. For the opinion sake, willingness to pay survey was also conducted. A schedule of all such surveys conducted is listed and presented in table 1 as shown below.



5.3 Schedule of traffic surveys

Type of survey	Location	Duration of survey
Classified traffic volume count	1. Golnaka	24 hours for 7 days at each location
	2. Ghatkesar	
	3. Bibinagar	
	4. Yadagirigutta	
	5. Aler	
	6. Janagon	
	7. Chagal	
	8. Kazipet	
OD commodity and willingness to pay survey	9. Uppal	24 hours for 1 day at each location
	10. Ghatkesar	
	11. Aler	
	12. Janagon	
	13. Kazipet	

Objectives of Traffic Survey

The primary objectives of these traffic studies are to:

- Determine the characteristics of traffic movement;
- Identification of Zone of influence for the project stretch and the extent of influence based on OD survey;
- Determine the travel pattern as well as type and weight of commodities carried by goods vehicles;
- Capacity assessment and recommendation for 8 lane based on demand forecast and geometric design of intersections;
- Determination of vehicle damage factor as an aid to pavement design;
- Cost benefit and sensitivity analysis;
- Environmental impact assessment.

Analysis of traffic survey data

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Traffic data analysis have been carried out as per the stipulation of TOR, to provide the basic input for highway design junction design pavement design environmental impact assessment and investment appraisal.

Classified Traffic volume counts

The analysis has been carried out *for each location to derive*

- Average Daily Traffic (ADT) for fast and slow moving vehicles.
- Average Daily Variation
- Average Hourly Variation
- ADT composition (modal split)
- Annual average daily traffic (AADT) after seasonal correction.
- Traffic composition pattern for passenger. Goods and non- motorized vehicles.
- Classified Hourly Average traffic for every count station.

Seasonal Variation Factors

Monthly sales data of diesel and pattern for five consecutive years from different petrol pumps were collected on all major cross roads and seasonal factors were calculated. The values of seasonal factors which have been adopted for the present analysis are presents in Table 2

SINo	Month	Golnaka	Ghatkesar	Bibinagar	Yadagirigutta	Aler	Janagon	Chagal
1	Jan	1.067	1.106	8.85	0.97	.98	1.03	0.922
2	Feb	.992	1.019	1.05	1.02	0.77	1.01	1.078
3	Mar	1.030	1.007	1.07	0.09	0.81	0.99	1.241
4	Apr	1.065	0.964	1.05	0.99	1.09	1.00	0.987
5	May	1.00	0.841	1.23	0.99	1.09	0.97	1.049
6	Jun	0.952	0.945	1.14	1.07	1.13	1.06	0.998
7	Jul	0.980	0.975	1.09	1.08	1.08	1.02	0.975
8	Aug	1.00	1.056	0.99	1.06	0.92	1.01	0.978
9	Sept	1.042	1.104	0.90	0.94	0.91	1.02	0.930
10	Oct	0.957	1.082	0.88	0.99	0.95	0.96	0851
11	Nov	0.959	0.993	0.82	0.93	0.94	0.93	0.922
12	Dec	0.956	0.987	0.92	1.01	1.07	0.99	1.068

Table**: Seasonal Variation Factors on Major Roads**

The average annual daily traffic at the study location is obtained by multiplying the average daily- traffic with the seasonal correction factor. The traffic surveys have been conducted during the month of March 2013. The seasonal variation actors for the month of March 2013 have been established as given in Table 2. The AADT of vehicles for the year 2013 at the twelve locations are shown in table 3.

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Origin Destination Survey and Analysis

Origin - Destination surly were conducted at five locations. Namely at Uppal, Ghatkesar, Aler, Janagon and Kazipet Origin - Destination Survey were carried out to estimate the percentage of internal traffic, external traffic. Well-formatted questionnaire was framed containing information regarding origin. Destination, distance, purpose. Willingness to pay and various details. Separate queries were made for passenger vehicles and goods vehicles. The 0-D matrix estimates describing the travel pattern of both goods and passengers vehicles observed at all OD survey locations. The entire stretch is divided in to 8 legs such as leg 1 is in between Golnaka and Uppal, Legs 2 is in between Uppal to Ghatkesar, Leg 3 is in between Ghatkesar and Bibinagar, Leg 4 is in between Yadagirigutta and Aler, Leg 5 is in between Janagon and kazipet, Leg 6 is in between Kazipet and Hanamkonda, Leg 7 is in between Hanamkonda and Warangal Road.

In this study this study in order to estimate the travel demand on the project road the shortest path method considered to analyze the traffic data the traffic on a specific leg is arrived by considering influence of OD survey at all twelve locations for example if the traffic generated at Hyderabad (O-D I) and destined to Bibinagar (O-D 4) then the traffic is assigned on Leg 1. Leg 2 and Leg 3. Similarly when the traffic is generated at MGBS (O-D 1) and destined to Uppal (O-D 3) then the traffic assigned to Leg 1 and Leg 2. Same method is adopted for all legs by considering the shortest distance the O-D pairs. So that we will get the cumulative traffic all each leg horn all O-D location. After arriving the cumulative traffic on each leg the traffic considered for projections and MSA calculation Leg wise.

Willingness to pay survey

In the OD survey the drivers of both goods vehicles and passenger vehicles were questioned about the amount of toll and willingness to pay on provision of an improved road facility.

In case of Goods Vehicles, nearly 69% were willing to pay more than or equal to Rs. 201 while nearly 250% were willing to pay less than of Rs. 20. In case of Passenger Vehicles, nearly 50% were willing to pay more than or equal to Rs. 20, while nearly 47% were willing to pay less than of Rs. 20. Details of toll rate survey of goods and passenger vehicles are indicated in table 6.

Table 6: Willingness to pay Toll by Vehicle Type (All OD Survey Location)

Willingness to pay							
Goods vehicles in %							
Vehicle type	**Rs.5**	**Rs.10**	**Rs.20**	**Rs.50**	**Rs>50**	**No response**	**total**
2A truck	10	12	52	11	7	8	100
3A truck	0	20	63	9	3	5	100
MA truck	0	0	66	30	4	0	100
LCV	0	60	30	0	0	10	100
Passenger vehicles in %							
Vehicle type	**Rs.5**	**Rs.10**	**Rs.20**	**Rs.50**	**Rs>50**	**No response**	**total**
Car (old)	6	45	38	6	1	4	100
Car (new)	2	41	44	9	2	2	100

Axel Load Survey Analyses

The survey data have been verified: computerized and rechecked. Before the load spectrum analysis, the modal split of commercial vehicles and the percentage sample obtained in load measurements are assessed with necessary data processing.

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From the recorded data, the commodity wise movement of the goods has been analysis. The data with respect to the axle loads as obtained are grouped with 1 tone class interval for each axle of a vehicle are the frequency distribution of axle loads for all types of vehicles has been obtained along with gross vehicle Weight (GVW) for each category of Vehicle. Car (New) The Vehicle Damage Factor (VDF) is an index characterizing the traffic loading for a highway and is defined as a multiplier for converting the number of Commercial vehicles of different axle loads to Standard Axle Loads (SAL). Equivalency factor (EF) is normally worked out by using the fourth power rule derived by AASHTO. However, TRRL has suggested a factor of 1.5 for developing countries. In the present study however, the Fourth Power Rule given by CRRI has been adopted. With the help of Equivalency factors and frequency distribution of axle loads Equivalent Axle Loads (EAL) are computed.

VDF= Total EAL/Number of Vehicles Weighed.

Axle load surveys were not conducted in the present stage. The VDF values were derived from the previous report, where in the axle load surveys were conducted at Ghatkesar, Bibinagar, Aler, and Kazipet The following VDF factors have been assumed in the present report these values will be verified after conduction the axel load surveys on the project corridor

location	2A truck	3A truck	MA truck	LCV	Buses
Ghatkesar	3.21	2.41	2.5	0.23	0.50
Bibinagar	2.66	3.17	4.92	0.36	0.30
Aler	3.90	2.42	7.60	0.40	0.44
Kazipet	1.50	2.60	2.65	0.14	0.41
average	2.82	2.65	4.44	0.28	0.41

Estimation of Growth Rates

- To arrive at a realistic and rational assessment of Growth Factor, effort was made to collect the various secondary data and statistical information. More secondary data and recent trend of road transportation within the influential area could have led to more realistic and rational assessment.
- The Growth Factor derived from past traffic data on the stretch supplemented by registration trend and the statistical parameters would have been the ideal method. However, due to irregular, erratic and insufficient past traffic data Available, the derivation of Elasticity and Growth Factors was based on Registration of Vehicles and the Economic Parameters.
- The Growth trend has been derived for the following categories of vehicles: PV =Passenger Vehicles (Car, Jeep, Taxi, Van, etc) T =Trucks (Mini, 2 axle and Multi axle) B =Bus, Mini Bus
- The following steps have been adopted to derive the Elasticity and Growth Factors,
- Growth rate of registration vehicles of zone of influence (A.P and India) is found out.
- Growth rates of NSDPIGSDP, GDP, per Capita Income (at 1993-94 Constant prices) and population are obtained.
- For PV and bus, number of registered vehicles has been regressed with Population of Andhra Pradesh State.
- For trucks, number of registered trucks has been regressed with GSDP of the state for Intra -State movement and GDP for Inter-State movement.
- Mean value of Average growth rate of registered vehicles and the growth Rate obtained by Regression Analysis for all categories were found out both at State level and at National level (For trucks only).
- For PV and Bus, the mean growth rate of registered vehicular growth rate and growth rate from regression analysis is adopted.

Final growth rate were obtained for horizon years by considering the projected economic trend of the State. Table 7 shows the growth rates, which are adopted in finding the future traffic demand estimates.

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Table 8: Projection Growth Rates for Different Category of Vehicles

Year	City	Buses	Tucks AP	Trucks national
Up to 2010	12%	3%	7%	7%
2011-2015	12%	2%	7%	7%
2016-2020	12%	2%	6%	6%
2021-2025	12%	2%	6%	6%
2026-2030	11%	2%	5%	5%
2031-2035	10%	2%	5%	5%
2036-2040	10%	2%	4%	4%
Average	10.93%	2.07%	5.50%	5.50%

With the growth rate shown in table 7, the present and projected traffic volumes on the project road for 30 years are presented in table

Present and projected volumes along with project corridor

Leg	2006	2011	2016	2021	2026	2031	2036
Leg1	34931	49267	69489	98010	138236	194973	274997
Leg 2	35450	50000	70522	99466	140290	197870	279083
Leg 3	34672	48903	68974	97283	137211	193528	272958
Leg 4	52136	73534	103715	146284	206324	291006	410445
Leg 5	57655	81319	114695	161769	228165	321811	453893
Leg 6	58305	82235	115988	163593	230737	325439	459011
Leg 7	38276	53986	76143	107395	151474	213644	301331
Leg 8	58761	82879	116895	164872	232541	327984	462601
Leg 9	64463	90921	128238	180871	255107	359811	507490
Leg 10	37924	53489	75443	106408	150081	211679	298560
Leg 11	32589	45965	64830	91439	128968	181901	256559
Leg 12	31861	44895	63263	89145	125617	177009	249427

Capacity Calculation for the Traffic Homogeneous Sections

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Traffic homogenous section	Year of attaining volume of nearly 40000 PCU	Corresponding traffic volume	Year of attaining volume of nearly 96000PCU	Corresponding traffic volume
Leg1	2008	40459	2021	96126
Leg 2	2008	41269	2021	97636
Leg 3	2008	41274	2021	96126
Leg 4	2008	58603	2015	95301
Leg 5	2008	64251	2014	98535
Leg 6	2008	65667	2014	98311
Leg 7	2008	40939	2021	96491
Leg 8	2006	61378	2014	96008
Leg 9	2006	66305	2013	99016
Leg10	2007	41738	2022	99108
Leg11	2009	41252	2024	97727
Leg12	2009	40009	2025	95820

CONCLUSIONS

- Despite good performance of the road transport sector it is best with slow technological development, low energy efficiency, pollution and slow movement of freight and passenger traffic. The step-up in freight and passenger road traffic during the past years as to done with the alternate growth paths provides an opportunity for technological up gradation, capacity augmentation and replacement of over aged rolling stock.
- Greater the share of commodity-producing sectors like agriculture and manufacturing, higher is the demand for transport.
- Composition of vehicle population in India in the year 2011, the latest year for which the data is available, reveals preponderance of two-wheelers with a share of more than 71 per cent in total vehicle population, followed by cars with 22 per cent and other vehicles (a heterogeneous category which includes 3 wheelers, trailers, tractors etc.) with 9.4 per cent
- However, the share of buses and trucks in the vehicle population at 1 per cent and 5 per cent respectively is much lower compared to other areas.
- With a rising income and inadequate urban public transport system, in particular, the personalized mode of transport is likely to grow in importance in the coming years.
- Overloading has detrimental effect on service life of the pavement and results in increased maintenance It also results in higher road user cost, besides increase in pollution level. It is also a potential hazard not only from safety consideration but may lead to accidents.
- The amount of damage caused due to overloading to the road infrastructure and the life expectancy of the road far outweighs any short term again.

RECOMMENDATIONS

- Road design and traffic management along with specifications need to be reviewed to follow the best practices in the world
- Promote road design/layout which has a beneficial impact on the road users. A case in point is segregation of motorized and Non Motorised Transport traffic as in Bangladesh
- Strengthen bus mode by: making subsidized loans or alternatively Providing concession. Interlink regional & District Transport Authorities through computer network.
- Innovative approaches for separating pedestrians from road traffic should be developed. Public should be made aware of benefits of Non Motorised Transport, viz, bicycling and walking.

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- Increase in permissible axle load and GVWs should be discouraged Discourage modification in design (tyre size, no. of springs etc.) to suit overloading by incorporating essential features in Registration Certificate.
- Install weigh in motion (WIM) at select points on National Highways, Inter State Check Posts, industrial areas etc on a selective basis installation.
- Train students in technological institutions on all aspects of road safety and review enforcement of traffic rules and regulations Establish Regional Centres of Excellence in various aspects of road safety

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