

A LITERATURE SURVEY ON TRAFFIC AND TRANSPORTATION PLAN FOR RAIPUR URBAN AGGLOMERATION

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Abstract

The geographic area within the jurisdiction of Raipur Municipal Corporation (RMC) and Raipur Urban Planning area limit is the Study Area for the current Study. Planning area of town compassing the special area of new capital town is also considered for its traffic interaction with Raipur Existing traffic and potential pockets / growth centres like Durg. Bhilai. Rajnandgaon, Charoda, Kumhari, Bhatapara, Dhamtari and Rajim etc having economic/regional linkage with Raipur Urban Agglomeration will also take into consideration for their traffic interaction with Raipur in this study These town special Area are emerging as fast-growing agglomerations. Urban Transport Strategy can play an important role in tackling urban problems, traffic congestion constraints and business efficiency which degrades the quality of life. Urban Transport projects can reduce journey times and their unpredictability yielding large savings of travel time and vehicle operating costs and thus release city's economic and social potential. Urban transport problems of RUA have been analysed in the context of area-wide issues and transport strategy evolved. Special attention has been paid to aesthetics aspects so that the proposed system gels well with the environment. In order to prepare the long-term traffic and short term traffic and transportation Plan the following policy measures are required to be taken based on which the mobility plan will be finalized.

Keywords: *Traffic, Transportation, Agglomeration, Raipur.*

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1. Introduction

Raipur the present capital city of the State of Chhattisgarh is a fast developing industrial, commercial and administrative centre .Raipur is one of the largest growing urban settlements in Chhattisgarh. The present population of Raipur is about Raipur is the 45th largest city agglomeration in India according to the 2011 census. Traditionally, the city of Raipur has been described as "an agricultural-processing and saw-milling town". The city is located centrally in the state of Chhattisgarh, and now serves as a regional hub for trade and commerce for a variety of

local agricultural and forest products. There are several small scale industries, which include oil milling, soap manufacturing and electrical welding. The traditional face of the city is changing, and the city of Raipur and its neighbourhood are now becoming an important regional commercial and industrial destination for the coal, power, steel and aluminium industries. Raipur traditionally has been a centre of trade and commerce catering to the needs of Chhattisgarh, Orissa, a part of Jharkhand and Andhra Pradesh. The products of these industries have wide application in various sectors of the Indian Economy.

The City is a major contributor in the economy of the Chhattisgarh with its commercial and industrial potential well established in agricultural and forest products oil milling, soap manufacturing, coal, power, steel and aluminium etc sectors, the City is poised for further growth. The industries in coal, power, steel and aluminium etc. have a spill-over effect in the entire Raipur Urban Agglomeration Region and therefore, a string of commercial and industrial development is taking place in the fringes of development area. It is also worthwhile to mention here that the Raipur Development Area has undergone major changes in the land use pattern due to rapid industrialisation

The development of comprehensive traffic and transportation system will enhance connectivity, as well as, pattern of future physical and economic growth. Efficient public transport is one of the areas, which has been lacking far behind in the city. There is a huge potential to identify and develop a safe, reliable and comfortable public transport system together with improvement of urban road and terminal infrastructure in the short, medium and long-term perspective. potential public transport corridors with sizeable demand will require a capacity mass.

2. Need of the Study

The current population of Raipur City is about **1,010,433**. Large-scale urbanization and rapid growth of vehicles population has laid sever stress on the existing urban transport system in Raipur city. With the sharing of limited right of way by a variety of modes and other utility services, the problems have become unmanageable resulting in traffic congestion, accidents, and inadequate parking area and environment deterioration. The demand of commuters on certain high dense corridors might not be met by existing bus transportation system. The nature of trips that the people have to make is also quite varied and they use private means of transport for most of these trips given the convenience of accessibility.

The presence of prestigious commercial and industrial nature of the City protracts a continuous traffic scene on the ensure road system The usage of private modes is growing unabated mainly due to inadequate public transport facilities. The augmentation in the capacity of urban transport infrastructure has become necessary. The City must keep pace with the growth in various sectors. The increasing trend of private mode is causing congestion, reduced mobility and rising pollution level.

The traffic problems are bound to grow in magnitude unless advanced actions are taken now. Therefore, it is essential to have Short Term and Long-term Traffic & Transportation Plan in place to ensure planned development of transport infrastructure to meet the expected transport demand in horizon year.

With a view of developing effective and efficient urban transport system. So, it has rightly stepped forward to plan for the preparation and study "**Long term Traffic and Short term Traffic & Transportation Plan for Raipur Urban Agglomeration**".

3. Literature Review

A comprehensive database has been prepared in order to appreciate and assess the traffic characteristics in the study area i.e., Raipur planning area. The database has been prepared by using the secondary data such as demographic characteristics, road network characteristics, accident data, registered vehicles etc. available with various agencies as well as primary traffic and travel surveys carried out as part of the assignment.

The primary traffic surveys carried out as part of the study include road network inventory, classified traffic volume counts at mid-block / screen line points, turning movements at junctions, speed and delay survey, parking patrol survey and pedestrian counts. The traffic surveys i.e. roadside origin-destination surveys at outer cordon points and bus / rail / airport terminals have also been undertaken.

The traffic and travel survey locations were discussed and agreed with RMC and the survey methodology and proforma as presented in the Inception Report have been followed.

The traffic and travel surveys have been carried out with the help of trained enumerators. The database has been compiled and analysed by using the software packages developed by the consultants in the available / standard transport planning formats.

3.1 Review of Earlier Studies

Relevant studies carried out in the past in Raipur, were collected from RMC and studied in detail. Relevant information useful for the present study has been extracted and will be used for the preparation of long term traffic and short term traffic & transportation plan. Following reports have been collected and are briefly discussed as follows:

3.1.1 Draft Feasibility Report – Short Term Traffic and Transportation Improvement Plans for Raipur Urban Area, Urban Administration and Development, Craphpts Consultants (India) Private Limited., March 2002.

The study area of this study was Raipur city. The focus of the study has been on optimisation of existing facilities (being essentially a short term study) with low cost traffic engineering and management measures without any land acquisition. The study included development of comprehensive database through detailed traffic and travel surveys including household surveys for a sample 2% household population in Raipur Municipal Corporation area.

A total of about 9.41 lakh daily trips were estimated when the city had the population of about 6.69 lakh in year 2001. The weighted average trip length for Intra city travel (including intra zonal trips) works out to be 2.01 kms. 81% of those interviewed were ready to incur additional expenses for an improved public transport system.

About 44% of trips daily were conducted together by bicycles, cycle rickshaws in 2001. The total share of about 25% was by motor cycles / scooters.

The peak hour traffic varied from 9,351 pcu to 20,851 pcu on the main intersections in Raipur city. The peak hour traffic varied from 1,914 pcu to 5,144 pcu on the midblock sections in the city. It was observed that during the course of a day, 45,059 passenger vehicles and 41,492 goods vehicles entered / exited the city along the six major intercity roads. Buses constituted nearly 16% of total passenger vehicles. On the other hand trucks constituted nearly 57% of total intercity goods traffic.

Recommendations to this report were to i) provide proper connectivity of the primary network must be ensured through completion of missing links (the Ring Road in particular). ii) Segregate inters city traffic from total city traffic to the extent possible. This could be achieved in two stages namely, through time restrictions for entry and then, through development of peripheral terminals, transport nagars etc.

3.2 Secondary Data

3.2.1 Vehicular Growth

With the rapid growth of urban population, there is an ever-increasing demand on the city's infrastructure to serve the population. The rapid motorization rates have further complicated issues and compete with the public transport systems in the cities, as mode choices for commuting. The trips per household have increased over the years, with increasing per capita incomes and increase in vehicle ownership. Considering the improving socio-economic level in the Indian cities and inadequate mass transport system, personalized motor vehicles have been growing @ 6-18 per cent per annum in different cities. In most of the cities, scooters/motor cycles comprise of the more than 70 per cent of the total motor vehicles.

Table 1. Registered vehicles in Raipur (Source: RTO, Raipur)

Year	Vehicle Type										
	2 W	3 W	Car	Jeep	Maxi cab, Motor cab	LCV, Bus	Heavy, Vehicle	Tractor	Trailer	Others	Total
1997-98	12155	202	796	53	882	385	1264	1477	1341	41	18596
1998-99	29327	391	1776	173	1281	645	1845	2940	2683	85	41146
1999-00	43157	590	3013	206	1588	888	2534	3827	3475	107	59385
2000-01	58098	770	4276	302	1984	1119	3234	4459	4032	125	78399
2001-02	78244	1021	5710	344	2886	1521	4344	5304	4761	156	104291
2002-03	100043	1342	7434	409	3525	1896	6309	6101	5464	236	132759
2003-04	127103	1657	10146	447	4232	2563	8375	7327	6544	368	168762
2004-05	161293	2144	13195	461	4859	3576	11203	8928	7864	544	214067
2005-06	197194	2686	16293	478	5602	4495	14058	10699	9470	675	261650
2006-07	238083	3432	20022	489	6229	5801	17487	12603	10807	1010	315963
2007-08	281672	4159	24614	492	7253	7624	22431	14783	12267	1617	376001
2008-09	338962	4725	29768	511	8250	9388	26181	17184	13853	2358	451180
2009-10	393819	5356	36165	527	9228	11238	29020	19772	15316	3003	523444
2010-11	456858	6415	44202	534	10089	13102	30996	22336	16778	3395	604705
2011-12	517773	7593	52722	536	11391	15207	33533	25137	17948	3901	685741

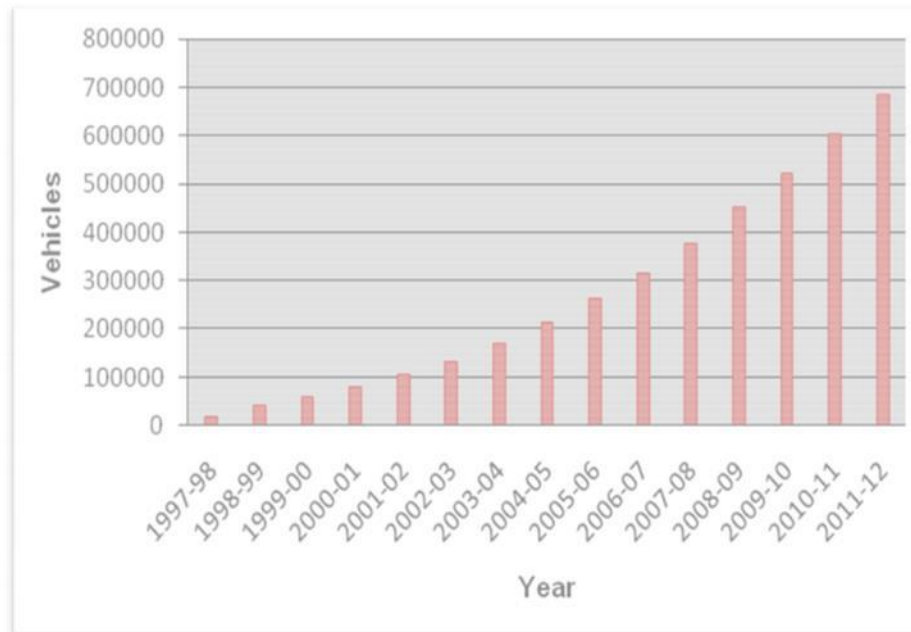


Figure 1. Growth of registered vehicles

The registered vehicles in Raipur have increased significantly over the years. The number has climbed from 0.19 to 6.86 lakh in last fourteen years (Table 1 and Figure 1). This high density and rapid growth of vehicles have worsened the transport situation to a significant extent. The growth has been phenomenal registering a growth of 15% p.a. in last 3 years (2008-09 to 2011-12). The share of two wheelers is highest (about 76%). It is significant to note that about 8% of the vehicles now in Raipur are cars and jeeps. About 23 thousand cars have been added in the city in last 3 years. The sharp increase of two-wheelers and cars could be attributed to the improved economic status of people and deficient public transport supply. The phenomenal increase of cars - demand more road space, has resulted in dense concentration of traffic on roads. This trend in context to the congested urban road system and the cost these impose on users demands a careful consideration. Mode wise growth and composition of registered vehicle is shown in Table 2.

Table 2. Growth and composition of registered vehicles in Raipur

Mode wise Registered Vehicles	Total Vehicles 2008-2009	Total Vehicles 2011-12	Mode wise Share - Year 2011-12	Growth Rate (p.a.) % (2008-09 to 2011-12)
Two Wheeler	338962	517773	75.5	15.2
Three Wheeler	4725	7593	1.1	17.1
Car	29768	52722	7.7	21.0
Jeep	511	536	0.1	1.6
Mini Bus, Omni bus, Maxi cab, Motor cab	8250	11391	1.7	11.4
LCV, Bus	9388	15207	2.2	17.4
Heavy Vehicle	26181	33533	4.9	8.6
Tractor	17184	25137	3.7	13.5
Trailer	13853	17948	2.6	9.0
Others	2358	3901	0.6	18.3
Total	451180	685741	100.0	15.0

3.2.2 Road Accident Characteristics

The increasing road accident on major roads in Raipur is a cause of concern. Considering the urban expanse, population growth and increase trends of vehicles on the city roads; the safety of the commuters is equally vital.

There are many reasons for the growth in the number of accidents in Raipur. Accidents are caused not merely due to the increase in population and rise in vehicle ownership. They are also caused due to the causal approach of road users in observing driving rules, adhering to safety precautions and regulations. Rush and negligent driving have proved to be a frequent cause of serious and fatal accidents. Similarly, poor road geometry and inadequate street lighting also increase the incidence of accidents on urban roads. One of major causes of pedestrian safety is endangered by extended trading activities of shops and commercial activity on footpaths and sidewalks. This compels pedestrians to clog the road space, hence give a chance to accidents.

An insight into the trends and type of accidents observed in the Raipur district indicates total 2222 road accidents have taken place in Raipur district (Table 3 and Figure 2) in year 2012. Involvement of trucks, cars and two-wheelers is more in road accidents.

Table 3. Road accidents by type district Raipur (Source: Traffic Police Department, Raipur)

Year	Total Accidents	Serious/Minor Injuries	Persons Killed In Fatal Accidents
2001	946	601	88
2002	956	605	111
2003	1772	1635	356
2004	2070	2173	375
2005	2059	1873	364
2006	2349	2123	441
2007	2395	2050	476
2008	2648	2685	508
2009	2750	2604	505
2010	2638	2436	509
2011	2774	2310	494
2012	2222	1558	362

Last 9 year accident data has been tabulated according to the classification of roads (NH, SH, ODR) shown in Table 4.

Table 4. Category wise accidents in district Raipur (Source: Traffic Police Department, Raipur)

Year	Particulars	Classification Of Road		
		NH	SH	OR
2003	No. of Accidents	924	240	608
	Person Killed	193	53	110
	Person Injured	809	277	549
2004	No. of Accidents	1016	361	693
	Person Killed	190	73	112
	Person Injured	939	420	814
2005	No. of Accidents	943	457	659
	Person Killed	179	78	107
	Person Injured	808	463	602
2006	No. of Accidents	1085	526	740
	Person Killed	196	98	147
	Person Injured	934	552	637

2007	No. of Accidents	1074	575	746
	Person Killed	240	96	140
	Person Injured	861	556	633
2008	No. of Accidents	1027	720	901
	Person Killed	207	151	150
	Person Injured	957	830	898
2009	No. of Accidents	1008	793	949
	Person Killed	193	157	155
	Person Injured	866	791	946
2010	No. of Accidents	952	685	1001
	Person Killed	230	125	154
	Person Injured	843	694	899
2011	No. of Accidents	848	602	1324
	Person Killed	191	145	158
	Person Injured	-	-	-

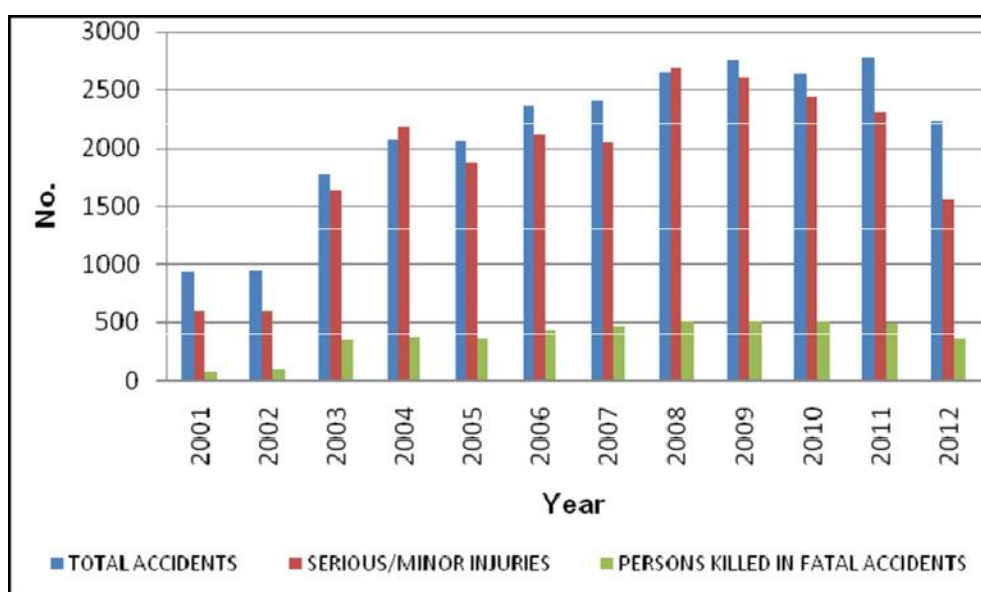


Figure 2. Road accident statistics in Raipur district

3.2.3 Existing Public and Inter Mediate Public Transport System

3.2.3.1 Existing Public Transport System

Public transport plays a crucial role in the commuter transportation in any city. It offers economies of scale with minimized road congestion and low per capita road usage. Cheaper and affordable public transport systems world over have proved to promote mobility – move people more efficiently and safely with increased opportunities for education, employment, social development etc.

At present the public transport services are rather limited and bus is the only mass transport system in the Raipur. The Raipur Nagar Nigam Transport Limited (RNNTL) operates the city bus services consisting of mainly normal buses, few low floor buses and mini buses. The fleet size of about 100 buses by December 2013 is a noticeable feature of poor supply public transport. The present supply of buses per lakh populations works out to only nine buses, which cannot be compared with any standards. The benchmark for assessing the supply of buses

should be about 60 to 70 buses per lac. population for city like size of Raipur. RNTTL operates city buses with eleven routes in different zones in the city. Shared auto and cycle rickshaws supplement these transportation services. With the growth of population, the number of commuters has increased many folds. However the transport system has been unable to cope up with increased demand.

The present intra city bus fleet in Raipur city is not matching with the present population. The major modes of transport in Raipur are 2-wheeler, auto and cycle rickshaw. This is the cause of acute traffic congestion and environmental pollution in the city. This indicates that there is a need for upgrading the public transport system considerably for short- and medium-term perspective.

IPT modes have been popularized and play a vital role in city passenger transport movement. The IPT system comprising of auto-rickshaw, taxi, and cycle rickshaw are the backbone of passenger movement in the city. With their limitations and drawbacks, they continue to keep the city mobile and active. The IPT operation is reasonably self-regulated and looked after by operators' unions. There has been a gradual increase in the number of IPT vehicles every year.

Most of the people use auto rickshaws or cycle rickshaws depend on the distance of travel for the transportation. As the city's rapid growth these autos and rickshaws are also increasing rapidly.

3.2.3.2 Existing Bus Route Structure

The route structure in Raipur has been designed by RNTTL based on major boarding / alighting demand locations. Each route is embedded in a schedule and there were 11 routes covered by 100 buses. The allocation of buses as per routes is meagre. The existing route structure is presented in Table 5.

Table 5. City route structure bus in Raipur (Source: Raipur Nagar Nigam Transport Limited)

S. No.	Route		Length (Km)	No. Of Buses	Detail Route
	From	To			
1	Railway Station	Mantralaya	25	47	Railway station- Fafadih Chowk- Mekahara Chowk- Ghadi Chowk-Bhagath Singh ChowkTelibanda- VIP Chowk- City Mall- Agriculture College- Labhandih-Jora- Mantralaya
2	Railway Station	Mantralaya	37	4	Railway station- Fafadih Chowk-Devendra nagar- Mekahara Chowk-Ghadi Chowk-Moti Baag-Mahila Thana-Kali Badi-Siddharth Chowk-Pachpedi Naka-R. K. Hospital-MMIFroot Market-Devpuri-Dumartarai- Mana CampMukthangan-Uparwara- Nawagaon- RakhiMantralaya
3	Railway Station	Tatibandh	11	16	Railway Station- Fafadih Chowk- Devendra nagar- Mekahara Chowk- Shastri ChowkJistambh Chowk- Sharadha Chowk- Taty Para Chowk- Azad Chowk- Amapara ChowkVivekanand Ashram- Rajkumar College-Engineering College- RSSU Gate- Mohba BazarTatibandh
4	Railway Station	Saddu	12	3	Railway station- Fafadih Chowk- Moudha Para-Jay Stambh- Shastri Chowk-Mekahara ChowkPandri Bus Stand-Pandri Cloth Market- Mandi Gate-Avanthi bai Chowk-Mova-Saddu

5	Railway Station	Mukthangan	21	5	Railway station- Fafadih Chowk-Devendra nagar- Mekahara Chowk-Ghadi Chowk-Moti Baag-Mahila Thana-Kali Badi-Siddharth Chowk-Pachpedi Naka-R. K. Hospital-MMI-
6	Railway Station	Navagaon	20	8	Railway station- Fafadih Chowk- Mekahara Chowk- Ghadi Chowk-Bhagath Singh ChowkTelibanda- VIP Chowk- City Mall- Agriculture College- Labhandih- Jora- Mandir HasaudNavagaon
7	Railway Station	Airport	18	7	Railway station- Fafadih Chowk-Devendra nagar- Mekahara Chowk-Ghadi Chowk-Moti Baag-Mahila Thana-Kali Badi-Siddharth Chowk-Pachpedi Naka-R. K. Hospital-MMI Froot Market-Devpuri-Dumartarai- Mana Camp Mana Basti-Airport
8	Railway Station	Arnleshwar	13	4	Railway station- Fafadih Chowk- Mekahara Chowk- Ghadi Chowk-Moti Bag Chowk- Lakhe School- Shyam Theatre- Purani Basti- Lakhe Nagar Chowk- Sundar Nagar- Raipura Chowk Arnleshwar
9	Railway Station	Kabir Nagar	15	2	Railway Station- Fafadih Chowk- Devendra nagar- Mekahara Chowk- Shastri Chowk Jistambh Chowk- Sharadha Chowk- Taty Para Chowk- Azad Chowk- Amapara Chowk Vivekanand Ashram- Rajkumar College-Engineering College- RSSU Gate- Mohba Bazar Tatibandh- Kabir Nagar
10	Railway Station	Sejbahar	11	3	Ghadi Chowk-Muzeum-Fire Brigade Chowk Madhusudhan Chowk-Kalibadi Chowk Tikrapara Chowk- Santhosi Nagar Chowk Seibahar
11	Railway Station	Choti Line	6	1	Railway station- Fafadih Chowk- Mekahara Chowk- Ghadi Chowk-Bhagath Singh ChowkTelibanda- Choti Line
Total				100	

4. Conclusion

- Study of existing traffic and travel characteristics and projection of transport demand upto long-term plan period - design and development of road intersections, exclusive pedestrians and cycle tracks.
- Study of existing and proposed land use plans/master-plans, by local governments. Study the available report/plans on traffic and transport situation and related matters and collection of relevant data from various offices.
- Carry out primary surveys relating to traffic volume counts at midblock and Intersections, origin destination survey, speed and delay study for selected, important corridors and public transport survey.
- Collection of primary road inventory data and identification of primary network. Detailed survey for paid and free parking space with suggestion for private and public transport system.
- Analysis and interpretation of collected data to elicit the traffic and travel characteristics of the study area.

- Development four-stage transport demand model, Calibrate and validate the transport demand model and proposed land use plans.
- Project the transport demands up to the end of long-term plan period based on the calibrated models and proposed land use plans.
- Indicate the problems with priority areas and priority junctions, and carry traffic estimates/projects on major travel corridors.
- Identify the transport corridors on the basis of transport demand.
- Alternative transport strategies short medium- and long-term strengthening transport infrastructure.
- Suggest Policy framework and Institutional Frame work.

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