

## TRANSPORTATION

### 9.1 EXISTING TRANSPORTATION NETWORK

#### 9.1.1 Road Network

##### 9.1.1.1 Road Network in Sangli

Sangli is well connected to all the urban centers in the region by good road network. The major traffic contributor corridors leading to Sangli are Kolhapur state highway in south, Peth/ Islampur state highway in northwest, which connects to National Highway 4 at Peth, Budhgaon state highway in north, Sangli-Miraj urban expressway on east. Apart from these state highways there are roads, which connect Dhamani, Karnal, Padmale, Samdoli, Haripur etc. The physical inventory of inter urban road network given in Table 9.1 and also shown in enclosed map on 'Transportation network'.

**Table 9.1. Inventory of Sangli Inter urban Roads**

S.No	Road	Right of Way m	From	To	Description
1	Kolhapur State highway	36.5	ST stand	Ankli	2 lane carriage way
2	Sangli - Miraj Urban Expressway	45.7	Sangli	Wanleswadi (Miraj)	4 lane divided carriage way
3	Budhgaon State highway	24.38-30.48	Sangli	Budhgaon	2 lane carriage way
4	Peth State highway	30.48	Sangli	Islampur	2 lane carriage way

The physical inventory of intra urban road network given in Table 9.2

**Table 9.2 Inventory of Sangli Intra Urban Roads (Major traffic corridors)**

S.No	Road	Road way width m	From	To	Landmarks
1	Kameti Road	15.24	Shivaji Chowk	Fort road	Collect rate Office
2	Nagoba Road	13.41-15.24	Risala road junction	Press	
3	S.T. Stand Road	18.28	Shivaji market chowk	Ambedkar chowk	
4	Sant Maharaja Road	15.24	Ambedkar statue chowk	Shivaji statue chowk	
5	Ankali Road	6.7-16.7	Ambedkar Chowk	Maruti mandir chowk	Park, Residential
6	Maruti Mandir Road	15.24	Maruti Mandir Chowk	Ganpati peth road	
7	Vakhar Peth + High School Road	18.28	Patel Chowk	Budhgaon road	Sangli High School
8	Madhavraj Road	18.68	Rajwada Chowk	Bhaurao Patil chowk	
9	Panchmukhi Road	10	Nagobar Raod	Ram mandir chowk	
10	Dr. B.R.Ambedkar Road	20	Dr. Ambedkar Chowk	Dr. Bhaurao Patil Chowk	Civil Hospital
11	100 ft Road	30.4	Kolhapur highway	Vishrambag	Parallel to Ambedkar road
12	New Toll bridge road	30.4	Sangli wadi	Madhav nagar road	Part of Ring Road

The physical inventory of major intersections is given in Table 9.3.

**Table 9.3 Major Intersection in Sangli**

S.No	Intersection			
	Name	Type	Approach Roads	
1	College Corner	4 Legged	Ganapati Peth, Shivaji Nagar, Timber Market, Madhavnagar, Budhgaon	
2	Ambarai Garden Chowk	4 Legged	Station Chowk, Ganpati Peth, Madhavnagar Road, Timber Market	
3	Mahavir Nagar	3 Legged	Vakhar Bhag Road, High School Road, Transport Area	
4	Patel Chowk	4 Legged	Peth Road, Ganapati Peth, Karnal Road, High School Road	
5	Tilak chowk	4 Legged	Pune Road, Ganapati Peth, Sangli, Gaon Bhag	
6	Corporation Road	3 Legged	Police Station, ST Stand Road, Islampur Road	
7	Mahavir Nagar	4 Legged	Kolhapur Rd, Pune Traffic Rd, Rajwada Rd (Miraj), Inner City Road	
8	Maruti Chowk	5 Legged	Stand Rd, Gaon bhag Rd, Datta Maruti Rd, Inner City Rd	
9	Shastri Chowk	4 Legged	Kolhapur road, Haripur Road, Maruti chowk, Ambedkar Chowk	
10	Jhulelal Chowk	4 Legged	Ambedkar Road, 100 ft road, ST Stand Road, Kolhapur Road	
11	Dr. P.R.Patil Chowk	4 Legged	Ambedkar Road, Hirabag Water Works Road, 100 ft Road	
12	Nehru Chowk	4 Legged	Nal bag Chowk, Nagoba Rd, Police Quarters	
13	Congress Bhavan Chowk	4 Legged	Collector Office, Shivajji Stadium, Shivaji nagar (Budhgaon), Vishrambhag	
14	Collector Bungalow Chowk	3 Legged	Nehru Chowk (Sangli City), Budhgaon, Miraj Rd.	
15	Rajwada Chowk	4 Legged	Sangli, Nagoba Rd, Vakhar Rd, Mahavir Nagar, Miraj Highway	

S.No	Intersection			
	Name	Type	Approach Roads	
16	Police Station Chowk	4 Legged	Fort Rd, Peth Traffic, Patel Chowk, Miraj	
17	Ram mandir chowk	4 Legged	Ram mandir, 100 ft rd, Ambedkar Road, Miraj Road	
18	Bhaurao Patil Chowk	3 Legged	Sangli Miraj Road, 100 Ft. Road, Ambedkar Road	
19	Dhamani Road	4 Legged	Kali Khan Rd., Sangli Rd, Miraj Rd, Ambedkar Rd	
20	Mahavir Bridge	4 Legged	Neminath Nagar Rd, Govt. Colony Rd, M.S.E.B. Road	
21	Market chowk	3 legged	Timber Market, Kupwad MIDC, Sangli Market Yard Rd.	

#### 9.1.1.2 Traffic Movement

The present day external-to-external traffic movement is moving through the intra urban roads. There by the inner city roads are congested. To reduce the congestion, diversion of commercial traffic through alternative routes or bypass the traffic is one of the efficient measures.

The major congested areas in the city are around Harbot road, Nagoba road, Saint Kotnis road, ST stand road, Maker lane, Maruti Mandir road, Shivaji chowk road, Ganapati peth road, Vakhar peth road, Tilak chowk road, Patel chowk, Congress Bhavan chowk, High School road, Old Station road, Ambedkar road, Sangli-Miraj road and Vasanta dada Market yard, transport Nagar.

#### 9.1.1.3 Road network in Miraj

Miraj connected with good highway road network such as Sangli-Miraj Express Highway on west, Miraj-Pandharpur State Highway on north, Miraj-Ankli state Highway on west, Miraj-Bijapur state highway (inter state road) on south and Miraj-Arjunwad state highways. The physical inventory of inter urban road network of Miraj given in Table 9.4

Also roads leading towards Kupwad MIDC, Malegaon, Dhamani, Takali, Arag Bedag, Wednera, Takali, Vijapur are other main roads carrying significant traffic volume.

**Table 9.4 Major inter urban road network connected to Miraj**

S.No	Road	Right of Way in m	From	To	Description
1	Bijapur State highway	30.4	Miraj	Mhaisel naka	2 lane single carriage way
2	Arjunwadi state highway	18.28-30.48	Miraj	Arjun wadi	2 lane single carriage way
3	Pandharpur state highway	45.72	Gandhi Chowk	Octroi naka	2 lane single carriage way
4	Miraj - Ankli state highway	45.72	Miraj	Ankli	2 lane single carriage way
5	Sangli-Miraj highway	45.7	Gandhi Chowk	Wanleswadi	Width is not in uniform, 4 lane single carriageway

Although Miraj has the advantage of 'Chakkar' ring road for immediate dispersal of traffic with out entering in to the city. The Chakkar road in east is very narrow and with





number of curves, also development and traffic along this road is very less. The entire traffic moves on west Chakkar road. The development of east Chakkar road would reduce the congestion along west, near ST stand and at Mission hospital chowk (Busiest junction at Miraj). The inner road network in the city is like radial road system from the heart of the city at Lakshmi market. The roads are very narrow and with number of turnings, and the traffic level is also not high. Station road, Western part of Chakkar road, ST stand road, and Sangli Miraj road are busy with goods as well as passenger traffic. The inventory of major inner road network is given in Table 9.5.

**Table 9.5 Major Inner Urban Roads in Miraj**

S.No	Road	Road Width in m	From	To	Landmarks / Remarks
1	Chakkar Sadak (Inner Road)	8 to 24.39	Hindu Dharamshala	Station Road Junction near Amar Talkie to Nadivesh	ST stand, Mission Hospital
2	Dhor galli road	9.74	Station road	Nadives road	Narrow road
3	Nadi Ves Road	15.24	Shastri Chowk	Kisan chowk	Straight Road
4	Station Road	12.2	ST stand	Kisan chowk	Stadium junction, Miraj Darga.
5	Sangli Ves Road	12.2	Sangli, Stadium roads naka	Kisan chowk	Sanglives road, Budhwar peth road.
6	Kupwad Ves Road	15.24	Gandhi Chawk	Sinyah Road chowk	

Junctions around Lakshmi market, Stadium chowk, Gandhi chowk (Mission Hospital chowk), ST stand chowk, Pandarpur naka, Bijapur, Arjunwadi state highways meeting point with chakkar road are the high traffic density chowks. Inventory of major intersections is given in Table 9.6.

**Table 9.6 Major Intersections in Miraj**

S.No.	Intersection			
	Name	Type	Approach Roads	
1	Maida Factory Chawk	3 Legged	MIDC, Miraj, Sangli	
2	Vantmore Corner Chowk	3 Legged	Miraj, Station, Sangli Road.	
3	Shivaji Chawk	4 Legged	Pandharpur, Malegaon, Miraj Gaothan, Gandhi Chawk	
4	Pandharpur Naka	3 Legged	Sangli, Miraj, Pandharpur.	
5	Balgangadhar Chawk	4 Legged	Municipal Office, Brahman Purl Road, Chakkar Road.	
6	Kisan Chawk	4 Legged	Vijapur Road, Laxmi Market Road, Station Road.	
7	Shastri Chawk	4 Legged	Bijapur, Chakkar Sadak, Arjunwadi, Kolhapur	

S.No.	Intersection		
	Name	Type	Approach Roads
8	Mahatma Phule Chawk	3 Legged	Ankli, Chakkar Road and ST Stand.
9	Stand Chawk	4 Legged	Station Rd, Kisan Chowk road, Mission Hospital Road, Bijapur Road.
10	Irate Chawk	5 Legged	Pandharpur, Sangli, Stadium Road, ST Stand Road, Miraj Gaothan.

#### 9.1.1.4 Road network in Kupwad

Kupwad is the small town surrounded by various residential colonies like Mahalakshmi Nagar, sham nagar, Gandhi Nagar, Yashwant nagar and Industrial areas of Sangli, Kupwad & Miraj MIDC. The presence of industrial, goods traffic is predominant in the Kupwad area.

Kupwad is well connected by roads to other parts of Sangli district. The major roads connected to other parts are Kupwad-kanadwadi, Kupwad-Budhgaon and Kupwad-Kavlapur connecting Tasgaon State Highway in north, Kupwad-Sawli road connecting Pandharpur State Highway in east, Kupwad-Madhavnagar passing through Yashwanth Nagar in west, Kupwad-Madhavnagar road passes through Mahalakshmi Nagar, HUDCO area and crosses South central railway Pune-Miraj section in South-west direction, Kupwad-Vishrambag road passes through Mahalakshmi Nagar and Gandhi Nagar connecting Sangli-Miraj State highway in south and Kupwad-Miraj road passes through Kupwad and Miraj MIDC and meets at Sangli-Miraj State highway in south-east direction. The inventories of inter and intra urban road network in Kupwad given in Table 9.7.

**Table 9.7 Inventory of road network in Kupwad.**

S.No	Road name	Right of Way in m	From	To	Landmarks / Remarks
1	Kupwad-Sawli road	17	Kupwad	Sawli	It meets Pandharpur State Highway
2	Kupwad-Madhav nagar road	20	Kupwad	Madhav nagar	It meets Tasgaon state highway
3	Kupwad-Vishrambag road	22	Gandhi nagar	Vishrambag	It meets Sangli-Miraj State Highway
4	Kupwad-Madhav nagar road road	23	Kupwad MIDC	Madhav nagar road (Sangli)	Vasantadada Market Yard, Timber Depot.
5	Kupwad-Miraj MIDC road	17	Kupwad MIDC	Miraj	Miraj MIDC

The section from Vasanth Nagar (Kupwad side) to Gandhi colony junction (Ahilyadevi holker chowk) of Kupwad- Madhavnagar Road connecting Sangli is narrow and not in good condition.

Apart from the above there are number of small roads are linking to neighboring villages, residential localities and industrial area in the area. The inventory of major intersections is given in Table 9.8.

**Table 9.8 Major Intersections in Kupwad**

S.No	Intersection		Approach roads
	Name	Type	

1	Ahilyadevi Chowk	4 legged right angle	Kupwad MIDC, Sangli city, Gandhi colony, Sanjay nagar
2	Vishrambag	4 legged right angle	Kupwad MIDC, Sangli city, Vishrambag, Yashwanth nagar
3	Madhav nagar	3 legged Y shaped	Kupwad MIDC, Sangli city, Vishrambag, Madhavnagar
4	Menon Piston	3 Legged T shaped	Pandharpure Highway, Kupwad MIDC, Miraj MIDC

### 9.1.2 Railway

Miraj is the major railway junction on Mumbai – Bangalore railway line. It is the Four-lane railway junction with Broad gauge railway lines connecting Pune in the north, Kolhapur in the west and Belgaum in the south and Narrow gauge line connecting Miraj with Pandharpur. Miraj – Pune section passes through Sangli city separating Industrial area from the Sangli.

Direct trains are connected to various major cities viz. Mumbai, Pune, Kolhapur, Tirupati, Bangalore, Goa, New Delhi etc from Miraj and Sangli. Railway network in the area is depicted in the enclosed map on 'Transportation network'.

### 9.1.3 Bridges

Various bridges have been constructed in the study area to ease out the traffic and to improve connectivity on the railway lines and on the Krishna River, which flows along the West, and South of the study area.

There are four Rail Over Bridges (ROB) viz. on Madhav nagar road, on Miraj – Ankli road, at Vishrambag police station between Sangli and Kupwad MIDC and on Bijapur highway. The traffic also use the Level crossing on Sangli-Miraj section at Police head quarters for moving in and out of industrial area, which is located north of railway line.



Four major bridges are present on Krishna River; two bridges are on Islampur state highway. One of the bridges called Irwin bridge, is mainly used for passenger traffic (goods traffic avoid this bridge), as this directly connects to the "Sangli Gaothan". This area is the busy part of the Sangli city. Irwin Bridge also connect Sangli and Sangliwadi. To decongest this, another Bridge has been constructed by Public Works Department on Toll basis. This corridor forms part of the ring road proposed in the previous Development Plan.

One more bridge was constructed, on toll basis on Krishna River on Kolhapur Highway at Ankli( outside SMKMC area), parallel to old bridge. After crossing bridge the highway passes in two directions, one is towards Sangli city and the other leads towards Miraj. The traffic on these two bridges is one way.

## 9.2 TRAFFIC GENERATORS AND ATTRACTORS

The traffic generators and attractors in and around the study area affects the traffic characteristics of the study area. The major traffic attractors and generators are summarized below:

#### In Sangli

- Ganpathi peth road and Vakharbag area
  - Transport nagar
- Municipal Corporation has declared the area located between Sherinala and old Budhgaon road as Transport Nagar. But this area faces problems of lack of



facilities and maintenance. Also during floods in the Sherinala, the entire area is covered with floodwater.

- VasantaDada Patil Market Yard and Timber area
- Fruit Market
- ST stand
- Octroi office located near Old station
- Rajwada
- Sangli MIDC

#### In Miraj

- Lakshmi Market
- Central Warehousing Corporation
- Miraj Railway Yard
- ST stand
- Miraj MIDC
- Along Western Chakkar Road
- SamanyaWadi on Pandharpur Highway: There are godowns for storing and distribution of commodities

#### Others

- Kupwad MIDC
- Kupwad Gaothan
- Haripur
- Madhav nagar & Budhgaon

### **9.3 PARKING SPOTS**

In the overall growth of town over the years, parking has been accorded the least significance. Existing parking locations for various vehicles described below.

- Auto rickshaw parking. : According to the Information from Auto drivers association, Sangli there are 70 auto rickshaw-parking locations in Sangli city.
- Truck parking: Two parking areas have been identified. One is at old station chowk in Sangli. It has good access to the road network. Other is Transport nagar.

No parking area has been observed inside the Vasanta dada Market yard for trucks, but space is available in front of the go downs and on the roads. The roads inside are wide. Separate cart parking is available inside the market yard.

- Tempo or Four wheeler parking: Presently vehicles are parked at Jhulelal chowk and adjacent to Deluxe hotel near to ST stand in Sangli. This location is busy and congested. Recently parking has also commenced near Apta Police chowki,(near ESR).

In Miraj, Tempos parking are on one local street near to ST stand.

#### **9.3.1 Parking at Octroi Collection naka**

No designated parking space has been allocated at the octroi nakas on roads leading to SMKMC area. It has been observed that the trucks are parked on the road itself on the highways during collection of octroi. It obstructs the carriageway and prevents smooth flow of traffic. Also no controls like signals or speed breakers or signs were observed at these locations for the vehicles coming with free speeds. The secondary data on accident study indicates, all the octroi collection locations on the highways to be frequent accident spots.

## 9.4 TRANSPORT SURVEY ANALYSIS

The following conclusions inferred from the Transport Surveys conducted in October 2001(detailed out in the `Report on Summary Survey Findings') is summarized under the following categories.

### 9.4.1 Bypassable Traffic

By passable traffic in the study area can be considered in three ways of bypassing

- Entire study area as one homogeneous urban center as mentioned in TOR
- Sangli city
- Miraj city

29.8 % i.e. 2778 vehicles per day of commercial traffic and 20.3 % i.e.1299 vehicles per day of passenger traffic (i.e. cars, vans, jeeps, taxis only) is the traffic moving external to external of the study area.

12.37 % i.e. 3587 vehicles per day in base year and 8898 vehicles per day in projected year of total traffic and 23.5 % i.e. 6802 vehicles in base year per day and 16876 vehicles per day in projected year can be bypassed with out entering in Sangli and Miraj respectively.

### 9.4.2 Accident study

From the accident data, it was found that maximum number of accidents occurred on main arterials, which are inter urban roads. It's mainly due to as:

- driver chooses his free speeds as vehicle leaves the developed area, but capacity of that road not meeting the demand
- significant presence of Small Moving Vehicles like Bicycles and Carts in all roads,
- absence of controls such as signals, signs and speed breakers at intersections coming in between even though cross roads are less trafficked roads.

Eventhough Sangli-Miraj road is a divided four-lane carriageway it is a frequent accident location because of lack of median improvement and lack of control on illegal crossing of vehicles.

### 9.4.3 Congestion in the study area

The major congested parts of the study area, which have to immediately focussed for decongestion are Sangli Gaathan including ST stand area, Vakharpeth, Ganpath peth, Vasanta Dada Market Yard, Old Station area in Sangli and Chakkar road on west from ST stand to Mission Hospital Chowk in Miraj. This can be done by bypassing the outbound traffic which would eliminate its entry in to the city area. Decongestion can also be possible by reducing the frequency of city bus trips in the route and making it follow the parallel routes, re routing the non stop buses between major traffic centers like Sangli and Miraj to follow routes on alternate network.

### 9.4.4 Capacity of Arterials

Capacity of an urban road is the maximum hourly volume (vehicles per hour) at which vehicles can reasonably be expected to traverse a point or uniform section of a lane or roadway during a given time period under the prevailing roadway, traffic and control conditions.

Capacity standards are fixed normally in relation to the Level of Service (LOS) adopted for design. LOS is a qualitative measure describing operational conditions with in a traffic stream, and their perception by drivers/ passengers. Six levels of service are recognized commonly, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or break-down flow).

In case of urban roads, the design is based on peak hour traffic rather than average daily traffic (ADT) as in the case of rural roads and Level of Service C be adopted for design of urban roads. At this level, volume of traffic will be around 0.70 times the maximum capacity and this is taken as the "Design Service Volume" for the purpose of adopting design volumes. Capacity assessment of main arterial is depicted in Table 9.11 at the end of this section. It has been observed that some of the arterial roads



need immediate capacity enhancement while others too require increasing their capacity in the design period

## 9.5 TRAFFIC GROWTH ANALYSIS

Statistical and Economic information such as registration of vehicles, population, per capita income etc. for the district of Sangli and Kolhapur region given below have been used for traffic growth analysis.

### 1. Per Capita Income (PCI) is given in Table 9.10.

**Table 9.10 Per Capita Income at 1980 - 81prices (PCI in Rs.)**

Year	1980-81	1985-86	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
PCI	2435	2705	3483	3399	3849	4110	4274	4598	4853

Source: Maharashtra Key Data 1999-2000 - Kalnirnay

Table 9.11: Capacity Assessment of Major Arterials

Road	ADT (in PCU)		Peak Hourly Traffic (in PCU)		Peak Hour Factor		CAPACITY (pcu / hour)		Remarks / Comments
							With Level of Service 'C' DSV		
	FMV	FMV SMV	FMV	FMV SMV	FMV (%)	FMV SMV (%)	4 lane road with paved shoulders	2 lane road with earthen shoulders	
Sangli-Miraj road (Miraj to Wanleswadi)	21809	24612	1630	1879	7.47	7.63	2,369	955	Present traffic is more than its capacity at Level of Service 'C'.
Sangli-Miraj road (Sangli to Wanleswadi)	21809	24612	1630	1879	7.47	7.63	2,369	955	The capacity of road is more than the peak hour traffic
Peth State highway	10793	11380	764	772	7.08	6.78	2,555	1,075	The capacity of road is more than the peak hour traffic. But it seems traffic on the road exceed its capacity in the coming decade.
Budhgaon state highway	10279	12846	987	1346	9.60	10.48	1,726	696	Existing traffic on the road will reach its capacity in near future.
Kolhapur-Sangli State Highway	14214	14777	1169	1221	8.22	8.26	2,189	882	This road is in alarming stage mainly in peak hours and identified as major accident-prone zone. Exceeds its capacity.
Kolhapur-Miraj State Highway	6709	6491	619	650	9.23	10.01	1,806	728	The capacity of road is more than the peak hour traffic
Pandharpur State Highway	7716	8195	598	656	7.75	8.00	2,259	911	The capacity of road is more than the peak hour traffic
Bijapur State Highway	7927	9849	619	780	7.81	7.92	2,283	921	Present traffic is more than its capacity at Level of Service 'C'.

## 2. Population of SMKMC

This data will be used in the calculation of traffic growth rates and thereby to project the future traffic. This data is given in Table 9.12.

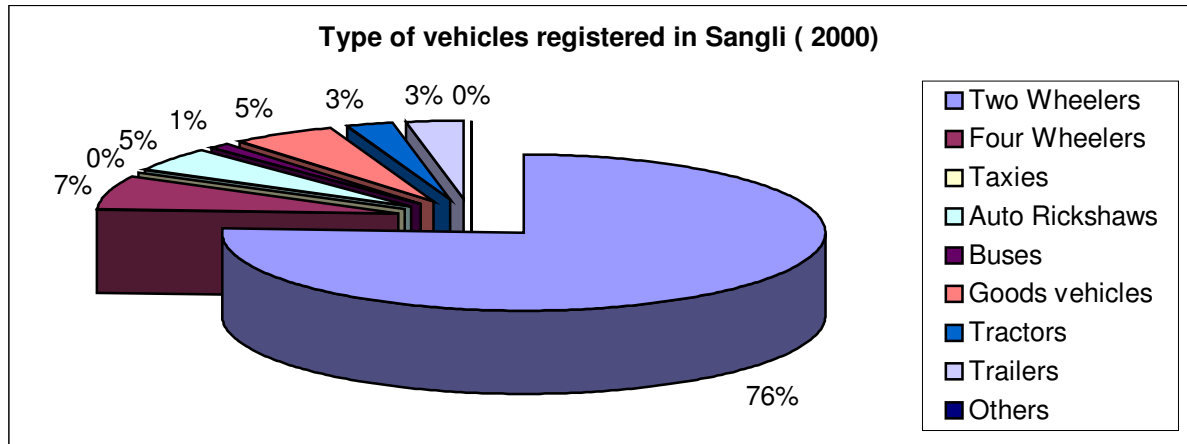
**Table 9.12 Population of SMKMC**

Area	1971	1981	1991	2001
Sangli and Sangliwadi	1,15,504	152,389	193,197	
Miraj	77606	105405	121593	
Kupwad	9351	11716	33313	
Wanleswadi	-	1539	3814	
SMKMC	202461	271099	351917	431104

Source: Census of India, Sangli DCH

## 3. Vehicle Registered in Sangli city, Kolhapur Region.

From this data, we know the past trends of growth in vehicles and can there by assess the future growths & forecast the projections. Vehicle registered in Sangli and in Kollhapur region is given in Table 9.13. and 9.14 respectively. Two wheelers dominate the vehicles constituting about 76% of the total registered vehicles in 2000.



**Table 9.13 Vehicle Registered in Sangli**

Year	Two Wheelers	Four Wheelers	Taxies	Auto Rickshaws	Buses	Goods vehicles	Tractors	Trailers	Others	Total
1998	43588	3612	118	3128	885	2815	1490	1465	70	57171
1999	45984	4005	122	3220	906	3358	1670	1770	53	61088
2000	52804	4869	132	3370	908	3715	1917	1982	58	69755

**Table 9.14 Motor Vehicles on Road (Kolhapur Region)**

District / Area	1980	1985	1990	1995	1996	1997	1998	1999	2000
Kolhapur	37489	68502	112811	173166	187752	203536	224354	244792	272878
Sangli	15557	35866	65334	105859	116092	126216	139257	153039	172218
Satara	11626	27457	60426	95649	105565	117805	130469	145136	164918

District / Area	1980	1985	1990	1995	1996	1997	1998	1999	2000
Kolhapur Region	64672	131825	238571	374674	409409	447557	494080	542967	610014

Source: Regional Transport Office.

To arrive at a realistic and rational assessment of growth rate, effort was made to collect the various secondary data and statistical information. Following steps have been adopted to derive the Growth rate.

- Growth rate of registered vehicle (A)
- Growth rates of Per capita Income (at 1980-81 prices), and Population are obtained.
- For Passenger Vehicles (PV) and Bus (B) number of vehicle on road in Sangli has been regressed with population of SMKMC and for Motorcycles number registered vehicles in Sangli has been regressed with Per Capita Income (PCI). To arrive at the respective elasticity and growth factor (R).
  - Growth of PV & Bus = function (Growth of Population)
  - Growth of MC = function (Growth of Per Capita Income)
- Mean of, the average growth rate of registered vehicle (A) and the growth rate derived by regression analysis (R) for all the categories except were found out.
- For PV, MC and Bus this mean growth is adopted.
- For Trucks average growth rate of registered vehicle (A) is adopted

The growth trend has been derived for 4 categories of vehicles, namely,

PV = Passenger Vehicles (cars, jeeps, taxi, van etc.)

B = Bus, Mini Bus

MC = Two / Three Wheelers

T = Trucks (Mini, 2 Axle, Multi Axle)

The growth rates calculated from the above approach are given in Table 6.5.1.

#### 9.5.1 Traffic Growth Rates from the analysis

Type of Vehicle	Cars, Jeeps, etc.	Truck	Motorcycle	Bus
Av.Growth Rate (%)	10.67	8.64	8.06	1.35

The calculated growth rates may also comparable with

- Average octroi collection growth of 13.32 % (pessimistic approach)
- Average growth rate of Total vehicles in Kolhapur region including districts of Sangli, Satara and Kolhapur is 10.88 %.

The analysis of Traffic Growth Rates indicates unusual high growth rates. Unusually high rates of change must be carefully considered since such a rate may not be sustained over a long period of time. Further past experience shows that the growth rates considered in various projects implemented in Metros such as Mumbai, Delhi etc., are found to stabilize over a period of time. Hence we have applied growth rates, as calculated from data, up to year 2006 for passenger vehicles, motor vehicles and trucks. For further duration a stabilized growth rate of 5 % is considered for passenger vehicles, motor vehicles and trucks. But for buses we have considered 2 % growth rate for the entire design period. Recommended traffic growth rates for the study area are given in Table 9.15.

**Table 9.15 Recommended Traffic Growth Rates**

Type of Vehicle	Up to 2006	2006 to 2021
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Cars, Jeeps, Taxis, Vans	10.50	5.00
Motor Cycle / Auto Rickshaw	8.00	5.00
Bus	2.00	2.00
Truck	8.5	5.00

## 9.6 TRAFFIC PROJECTIONS

For judicious investment planning in transportation, an accurate estimate of future demand for a reasonable period is essential. With a limited available past data, fluctuating economy, changes in policies and priorities, traffic forecasting could be tricky, subjective and approximate. Future pattern of change in population, vehicle ownership, per capita income etc., can be estimated with only a limited degree of accuracy. The projected future traffic in terms of Average Daily Traffic, Peak hour Traffic for various arterials in Number and in PCU is as calculated in Appendix 4. Projected Peak Hour Traffic of Fast Moving Vehicles for various arterials is given in Table 9.16.

**Table 9.16 Projected Peak Hour Traffic (Fast Moving Vehicles)**

Road Name	Base Year		2006		2021	
	No	PCU	No	PCU	No	PCU
Bijapur State Highway	535	612	794	876	1821	2009
Pandharpur State Highway	429	595	637	831	1461	1974
Kolhapur - Sangli State Highway	749	1149	1087	1595	2491	3655
Miraj - Ankli State Highway	353	611	507	844	1161	1936
Budhgaon State Highway	1093	984	1621	1424	3715	3263
Peth State Highway	440	760	644	1078	1476	2470
Sangli - Miraj Urban Expressway	1644	1580	2472	2338	5666	5358

From the above table, the projected peak hour traffic of fast moving vehicles alone in 2021 requires double the capacity than the existing capacity of the major arterials.

## 9.7 VEHICLE GROWTHS

Vehicle growth rates have estimated based on registered vehicles in Sangli, population of SMKMC area and per capita income of state. The growth rates derived and recommended for the design period are given in table 9.15.

## 9.8 PROPOSALS

Urban planning aims at providing coordinated traffic plan for inter-urban and intra-urban traffic and transportation movements and strengthening of existing physical linkages between settlements, for which a preconceived broad based traffic plan, which takes into account future growth in population, vehicle ownership, employment and transformation of economic and social conditions in the study area is necessary.

### 9.8.1 By passable Traffic

On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present average daily volume of fast moving traffic exclude two wheeler, auto rickshaws, buses and agricultural tractor trailer can be bypass the Study area, which is, on average, 4857 in number of vehicles and 8194 pcus would increase to 17042 in number of vehicles by 2021, bypass the Sangli, which is, on average, 2403 in number of vehicles and 4055 in pcus would increase to 8432 in number of vehicles by 2021 and bypass the Miraj, which is, on average, 4565 in number of vehicles and 7703 in pcus would increase to 16019 in number of vehicles by 2021.

In addition to the observations based on survey data and mentioned under Chapter Transportation Survey of Survey Report, following general considerations were also decided to make in recommending proposals for inclusion in the draft development plan.

- 1) The concentrated urban centers Sangli and Miraj and industrial area, which is north to Pune-Miraj railway line and SMKMC area as a homogeneous center considered separately for uniform growth and immediate dispersion of goods and passenger traffic.
- 2) The expected development mainly residential, administrative and educational between Sangli and Miraj along South of Sangli – Miraj urban Expressway in and around Wanleswadi, Walchand Engineering College, government colony, Vishrambag etc.
- 3) It was assumed that the road improvement proposals indicated in the sanctioned Development Plan, 1977 were implemented. The changes where needed has then been effectuated in light of the present analysis.

On the basis of above discussion, following policy recommendations / Plan proposals are put forth:

### 9.8.2 Concept for road cross sections

In the proposed Development plan, five categories of roads were proposed based on the existing developments and future planning made in the development plan study. The cross sections developed for roadway width of 45 m, 30 m, 24 m, 18 m and 12 m namely expressways, arterials roads, sub arterial roads, collector roads and local roads respectively. The typical cross sections for these categories of roads are shown in Drawings folder. Some of the important roads categorized are given in the following table.

Category	Road Name
Expressway	Sangli-Miraj road, Kolhapur-Bijapur road
Arterial roads	Peth road, Sangli-Kolhapur road, Ankli-Miraj road, Budhgaon road, Chakkar road in Miraj, Sangli-Kupwad Road, Miraj-Kupwad road, link connects Sangli-Mira road and Pandharpur road, Sangli ring road etc.
Sub arterial roads	As shown in Development plan
Collector roads	As shown in Development plan
Local streets	As shown in Development plan

#### 1. Sangli Ring Road (Missing Links)

An 18 m ring road was proposed to take off from Kolhapur-Sangli Road and to runs with a slight bend towards North through the Maharwada area and then along the eastern bank of Krishna River. The road crosses Sherinala and runs north wards through R.S.No.12, 20, 22 and 23 etc. of Sangli and meets the existing West-East Ring Road through R. S. No.12, 23, 24, 21, 95, 94, 91, 92, 133 etc. of Sangli of Road Way Width of 30.5 m.



The above West-East Ring Road through R. S. No.12, 23, 24, 21 etc. of Sangli crosses Krishna River over a Bridge of Krishna River on up streams of present Irwin Bridge as shown on the plans. This road is further extended westwards outside the Municipal limit of Sangli to join the Sangli-Satara State Highway as shown in dotted on the plan. This road connects the industrial areas of Sangli to out side directly without having to pass through the town. The above West-East Ring road through R. S. No.12, 23, 24, 21, 95, 94, 91, 92, 133 etc. of Sangli meets the old Budhgaon Road towards East.

It further follows alignment of old Budhgaon road and crosses the alignment of new Broad-Gauge Railway line. After crossing the alignment of new broad-gauge Railway, it takes an eastern turn and follows alignment of Kupwad Road along the northern boundary of Industrial Estate up to the municipal limit on East from where it takes a right angled turn towards south in S.No.190 of Sangli.

The road thereafter runs to South along the municipal limit. It gets slightly deviated from municipal limit towards West in S.No.308 of Sangli and runs to South through Site No.308 and 307 of Sangli to join existing 30.5 m North-South Ring Road which joins Sangli-Miraj State Highway.

Another section of ring road taking off from Kolhapur Sangli road runs towards east with slight curve and up to the South Eastern corner of the municipal limit near Vishrambag as shown on the Development Plan. This road is further proposed to be connected to the Sangli-Miraj State Highway by a short North-South 100' wide (30.5 m) road partly within the municipal limits and partly outside the municipal limit.

The ring road proposed along the periphery of the town will divert and carry fast moving Vehicular 'traffic'. The alignment of the Ring Road is old sanctioned West, North and North-East directions.

The above ring road proposal was made in the previous development plan proposal; some sections of the ring road were completed. Uncompleted sections of the above ring road proposal such as North South link parallel to Krishna river along the eastern bank of Krishna river, Old Budhgaon Road, North-South road along eastern municipal limits at Vishrambag connecting Sangli-Miraj Road with and ring road proposal, East-West road follows alignment of Kupwad Road along the northern boundary of Industrial Estate up to the municipal limit on East are shown in red lines on proposed development plan.

## **2. Sangli inner Ring Road: -**

The immediate dispersal of goods traffic in and out from Vasanta Dada Market Yard and Timber area with out entering in to the Sangli gaothan needs additional facility to the present.

It was proposed one inner ring road with the existing links by connecting 100ft road – Vishrambag road – Police staff quarters road crossing Sangli – Miraj road with intersection and Railway line with ROB – 100 ft road on north of Railway line – Sangli - Kupwad road – Railway Under Bridge on Railway line (RUB) – Madhavnagar road – New toll road. Some sections of the above links need up gradation, junction improvements etc. Roadway widths of the all the links are shown in the Development Proposal.

## **3. By pass Link between Sangli – Kolhapur Road and Sangli – Peth Road.**

On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present Average Daily volume of goods traffic of which is, 570 in number of vehicles and 864 in pcus would increase to 5317 in number of vehicles by 2021. This estimate not included the buses, 2 wheelers, slow moving traffic etc. The above situation would demand the by-passable links between Kolhapur-Sangli, Peth- Sangli and Tasgaon roads. The Regional traffic carried out by these roads when mixes with the traffic with in the Sangli town create serious problems. This proposal also made by regional Board. Hence it has been proposed to join these 3 highways by a State Highway Standard road (Right of way 30 to 45 m) by-passing roads starting from Sangli – Kolhapur Road, which further runs in North-West direction and further to Sangli-Peth road by a Bridge proposed on the River Krishna. The link existing between Sangli –

Peth Highway and joining Sangli – Tasgaon Road make advantage for Kolhapur-Tasgaon, Peth-Tasgaon traffic and vise a vise. The proposed road is shown in Development Plan.

#### **4. Rajwada Ring road or Committee Road**

It was estimated that the present average peak hour volume traffic passing in front of Rajwada, which is about 4300 PCUs. This present day traffic itself requires a 30 m wide road. As the already built up area limits the further widening of the existing road, alternate has been thought of, which is, widening of Risala Road, Nagoba Road, Sarwan Road and Police lines.

Risala Road, Nagoba Road, Sarwan Road and Police lines are short links running in continuation of one another. They form a parabolic curve with its apex in the southeastern direction. These roads envelope the old fort. The Committee Road takes off from the Mahatma Gandhi Road and runs towards South along the western boundary of the Municipal Office and then towards South up to Revani Road from where it takes a turn towards East up to its junction with Panchamukhi Maruti Road. This latter portion is known as 'Risala Road'. This road then again runs towards North meeting the Mahatma Gandhi Road, the intermediate portion being known as Nagoba road up to its junction with Miraj Road, Sarwan Road up to its junction with Nal Road and then as Police lines Road for the last portion. The existing width of the Committee Road varies from 9.00 m to 15.00 m. It is proposed to be widened to 15.00 m as shown on Development Plan.

Increase the width of the Road facing rural police barrack; Nakoba road to old station road includes dismantling, widening and providing all the road furnitures.

#### **5. Sangli – Kolhapur Road (ST stand to Octroi naka)**

On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present peak hour volume of fast moving traffic on this road, which is, on average, 1149 pcus would increase to 2035 pcus by 2011 and to 3315 pcus by 2021. The above number is only fast moving traffic. Carriageway of 4 traffic lanes therefore decided to be proposed in the coming decade 2011 to 2021 with cycle tracks, central median and separate service roads for local traffic etc. Since, however, the present link immediately widened to accommodate for slow moving traffic like cycles and carts.

#### **6. Sangli - Budhgaon Road (Paranjape Hospital to Sugar Kharkhana)**

On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present peak hour volume of fast moving traffic on this road, which is, on average, 984 pcus would increase to 1817 pcus by 2011 and to 2960 pcus by 2021. In addition to this traffic very significant amount of slow moving traffic also present. Carriageway of 4 traffic lanes therefore decided to be proposed in the coming decade 2011 to 2021 with cycle tracks, central median and separate service roads for local traffic etc. Since, however, the present link immediately widened to accommodate for slow moving traffic like cycles and carts. The proposed phased cross section of the road shown in the drawings folder.

#### **7. Miraj Ring Road**

Widening of Kolhapur Bijapur road to 45 m as per recommendation of Regional Planning Board and Pandharpur road and Bijapur road are linked by providing a 30 m wide road by the east of the gaathan as per the recommendations of Regional Planning Board. The above two proposals with the Chakkar road on west of Miraj form the ring road. This proposed road on east of Miraj town will divert and carry fast moving vehicular traffic between Kolhapur, Bijapur, Pandharpur and Vis a Vis.

## **8. Sangli – Miraj urban Expressway**

On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present peak hour volume of fast moving traffic on this road, which is, on average, 1580 pcus would increase to 3000 pcus by 2011 and to 5000 pcus by 2021. The above number not included the Slow moving traffic. Carriageway of 8 traffic lanes therefore decided to be proposed. Since, however, the present link also provided with cycle tracks, central median and separate service roads for local traffic, foot paths etc. It was observed that carriageway consisting of only 6 traffic lanes for vehicular traffic (three in each direction) could be provided and the remaining lanes of traffic should be accommodated in an alternative road links to be provided for relieving this link of contemplated high traffic and uniform growth of less developed area along this road are Wanleswadi area, east of Walchand engineering college, area west to Central Warehousing Corporation etc. The proposed road section for Sangli-Miraj urban expressway is shown in the drawings folder.

## **9. Parallel Links**

As remarked earlier, an alternative road links to the Sangli – Miraj urban Expressway was found to be necessary. Possibility of obtaining such links from the area to the South of Sangli – Miraj road through Government colony, south of Walchand Engineering College and Central Warehousing Corporation and north of Pune – Miraj line which passes through residential and Industrial areas with following multiple objectives; -

- a) At present the settlement and development taken place bi fold i.e. in Sangli and in Miraj. The development of alternative routes boost the development of less developed area, which is between Sangli and Miraj.
- b) It would also cause the uniform development of SMKMC as a whole in to one homogeneous urban center.
- c) It would also reduce the concentrated activities in Sangli and Miraj and replacement of settlements and administrative activities would takes place.

It was also decided, that the proposed links should be of State highway standard in right of way (24 m to 30 m). The southern link should run from Kolhapur road on Sangli side to Dairy Development end on Station road on Miraj side. The Northern link should run north of Pune – Miraj railway line from Budhgaon highway near Sugar karkhana on Sangli side to Chakkar road on north of Mission hospital chowk in Miraj. The two links which are parallel to Sangli Miraj expressway are as shown in the development plan.

1. Proposed one Parallel link to S-M road, which connect Sangli and Miraj, which are two growth centers in all aspects and Expected developments in south of S-M road with State highway standards.
2. It also recommended one more parallel connectivity link to Sangli – Miraj on north of Pune – Miraj railway line, which should passes through industrial areas of Miraj and Kupwad, which also with State highway standards.

The proper alignment of these links may be finalized at appropriate time.

The parallel links proposed above may influence the growth of whole SMKMC as one homogeneous urban center and will also form part of Ring Road to whole SMKMC area.

## **10. Other inter urban Roads**

Other interurban roads include Peth road (Irwin bridge to toll naka), Pandharpur road (Mission hospital chowk to Pandherpur octroi naka), Bijapur road (Chakkar Road chowk with Arjunwadi road to Bijapur Octroi naka) and Miraj Ankli road (ST stand to Ankli naka). On the basis of observations referred to under Chapter Transportation Survey of Survey Report, it was estimated that the present peak hour volume of fast moving traffic on these roads, on average, ranging 595 to 750 pcus would increase to 1078 to 1375 pcus by 2011 and to 1756 to 2240 pcus by 2021. Apart from fast moving vehicular traffic significance amount slow moving traffic is present on all the above roads. The present links to be provided with cycle tracks, Paved Shoulder and soft shoulder to accommodate for slow moving traffic.

The cross section for the above proposed roads is shown in drawings folder.

#### **11. Link joining Sangli – Miraj and Ankli – Miraj State Highway on eastern boundary of Sangli municipal limits**

It was proposed 24 m North – South link joining Sangli – Miraj and Ankli – Miraj State Highway along eastern boundary of Sangli Municipal limits. This will be an important road and will offer scope for future development and would be direct access to Industrial area, which is on north of railway line.

#### **12. Village Roads**

The regional road network as suggested in the regional and structural plan of Urban Complex have been incorporated in this area as road proposals of Development plan. Following village roads are proposed to widen to 15m wide so as to cater the needs of transportation of agricultural inputs and final produce from the agricultural areas to the main city.

1. Sangli – Dhamani Road
2. Sangli-Haripur Road
3. Kupwad – Dhamani Road
4. Extension to 100 ft East-West road towards West to cross the Kolhapur Road and to meet Haripur Road.
5. Sangli – Samdoli Road
6. Sangliwadi – Kasabe Digraj Road

#### **13. Link joining Sangli - Miraj and Ankli – Miraj State Highway parallel to western municipal limit of Miraj**

The Sangli road and Kolhapur road are also linked up by providing a north south state 24 m wide road running parallel to the western Municipal limit as per the recommendation of Regional Planning board. This will be an important road and will offer scope for future development.

#### **14. Link joining Sangli Miraj Road and Pandharpur Road**

Providing 30 m wide road link branching off from Sangli road in front of Richardson Leprosy Hospital and connecting Pandharpur road in between Medical college and guest House. This road would safeguard the residential area from the heavy traffic of M.I.D.C., which is coming. This link may also relieve the congestion at mission hospital chowk.

#### **9.8.3 Major Intersections**

From the inventory of the intersections, there was not observed a considerable problematic junction except Mission hospital chowk in Miraj. All the major intersections mentioned in Development plan are to be improved as per IRC standard norms at appropriate time. But by implementing the above DP proposals at all

the major junctions would be relieved from the traffic problems. No interchanges will be emphasized in the development plan proposals.

#### **Gandhi Chowk or Mission Hospital Chowk**

In view of the observed traffic flows in various important directions, it was decided that an elliptical Central Rotary with channelisers on three major arms and footpaths etc., as shown in the drawings folder should be provided at this junction. In addition, indiscriminate parking should be restricted to defined area.

#### **Congress Bhavan Chowk**

In view of the observed traffic flows in various important directions Traffic flow was observed mainly in two directions i.e. from Sangli and Miraj. But increasing flows may be expected from Kupwad due to various developments expected. At present no major up gradation of junction required, but 4-legged standard junction to be developed as plan shown in drawings folder.

### **9.8.4 Quantitative & Qualitative Improvements to road network**

As regards to the proposals concerning qualitative part of the road network, following recommendations are made: -

- a) General Condition, surfacing and street lighting (urban areas) – All deficiencies observed in existing road network, should be made up during current decade 2001 – 11.
  - i. 100 ft Road, From Kolhapur highway to Walchand Engineering College.
  - ii. 80 ft wide North – South road joining Sangli – miraj Road and an east – west road through S.No.242, 243, 244, 245, 248, 250, 255 etc.
  - iii. 80 ft wide North – South road connecting broad-gauge railway station and industrial area on the North.
  - iv. Part of Chakkar road, from ST Stand to Premnagar colony.
  - v. Bijapur road in Miraj, Mhaisel toll naka to Arjunwadi road chowk on chakkar road.
  - vi. Sangli - Kupwad road, from Railway Under Bridge on Pune – Miraj Railway line to Kupwad gaathan.
  - vii. Peth toll naka to Karnala road in between crossing new toll bridge.
  - viii. Link to Sangli – Miraj Road and Miraj – Miraj MIDC road in R.S.No.904 & 948.
- b) It was proposed to Provide Speed Breakers, Signs and Markings – All deficiencies observed at the following locations, which are frequent accident prone zones, should be made up during current two year 2001 – 02.
  - i. At all the octroi and toll nakas, which are located on major inter urban roads such as Budhgaon road, Peth road, Sangli - Kolhapur road, Miraj - Ankli road, Bijapur Road, Pandharpur road etc.
  - ii. Both approach (Sangli and Sangliwadi sides) ends of Irwin Bridge, Both approach ends of ROB on Miraj – Ankli road.
  - iii. It was proposed to provide Speed control measures such as Speed breakers and signs for the following cases. Typical plan and dimensions of speed breaker is shown in the drawings folder.
    - Case I. Meeting of Minor road to Major road of type NH / SH / Arterial / Semi Arterial. Speed breaker will be provided on full width of Minor road.

- Examples:
1. Exit from fruit market.
  2. All the minor road crossings on S - M road.
  3. New toll road meeting with Madhav nagar road.

c) Railway Bridges are proposed on the following roads, at the points mentioned against each: -

- |      |  |  |
|------|--|--|
| i.   | Sangli Ring Road                           | In S.No 314 on Pune-Sangli Railway line        |
| ii.  | Sangli – Old Kupwad Road                   | South boundary of Railway station in S.No. 262 |
| iii. | South parallel link to Sangli – Miraj road | Near Dairy Development in Miraj                |

d) Vakharpeth road to be widened to 4-lane road with all the road furniture including median, footpath, cycle tracks etc.

#### 9.8.5 Special measures at Octroi nakas

The following measures were proposed at octroi collection centers on the roads leading to SMKMC to avoid frequent accidents occurring at these points.

- i. A minimum of 300-m<sup>2</sup>-area parking to be provided at all the main Octroi collection centers on major roads for accommodating 10 vehicles at one instant.
- ii. The collection center should be located on left carriageway side of which vehicle direction is from external to internal (i.e. SMKMC).
- iii. Signs must be provided on both directions of Octroi naka which representing that driver coming near to octroi naka at a minimum distance before 200 m.

The nakas, which are identified for immediate qualitative measures, are on Sangli – Kolhapur road, Miraj – Ankli Road, Miraj – Bijapur road, Miraj – Pandharpur Road, Sangli - Peth road and Sangli – Budhgaon road.

#### 9.8.6 Traffic Management Measures

If the traffic movement patterns continue to be same for the DP period, some interchanges at important junctions in Sangli and as well as in Miraj would be required. But immediate widening of link roads on east of Rajwada and construction of part ring road proposal on eastern bank of Krishna river (which is parallel to Krishna River )connecting Kolhapur road and Budhgaon road to ease the North south flows across the Sangli gaothane, eliminating the need for provision of interchanges. The existing oneways on Sant Kotnis road and ST stand road to be continued till the development proposals mentioned under immediate 5-year phase are carried out. Also, till these proposals are implemented, the north south movement of commercial (heavy) vehicles ought to be discouraged by imposing restrictions as mentioned below in order to reduce some of congestion in the Gaothane to certain extent:

- i. No commercial (goods) movement will be allowed in to Sangli gaothan during peak hours such as 9.00 A.M to 2.00 P.M and 4.00 P.M to 8.30 P.M provided inner ring road fully upgraded to state highway standards with all the road furnitures such as median, shoulders, footpath etc and north south link on eastern bank of Krishna road as part of Sangli ring road.
  - a. At all the entries of commercial traffic in to Sangli gaothan, traffic police to be provided. The proposed traffic police posts are following.
    - Entry of Kolhapur road    Ambedkar chowk
    - On Madhav nagar road    Paranjape hospital
    - Sangli – Miraj road        (Near Vasanta Dada Market yard)



- b. Proper signs, markings at all the points incoming entry points should be provided depicting the prohibition and timings for entry of commercial vehicle,
- ii. In Miraj the traffic problem arises mainly at two places such as at ST stand and Gandhi chowk on Chakkar road. This might be relieved by immediate constructions of eastern chakkar road as proposed in the DP. Reduction in traffic flows from Pandharpur and Sangli directions may be expected by implement the arc links shown in DP between Sangli – Miraj road and Pandharpur road.
- iii. It was observed frequent accidents were caused due to lack of awareness in the people on the importance of the traffic control measures like signs, signals, markings etc. SMKMC in coordination with Traffic Police Deptt may carry public awareness programme on traffic rules and regulations.

#### 9.8.7 Parking Areas

At present there is no earmarked parking space in Sangli and in Miraj. The parking space is required especially in Sangli gaothane, as all the district administration located in Gaothane.

**Four Wheeler Parking (Auto Nagar):** The proposed parking for four-wheeler in Sangli is near Apta police chowk, at Bhav natya mandir and in front of Town Planning office adjacent to SMKMC building. The parking space at Apta police chowk may be mainly functional for four wheeler operators while that at Bhav natya mandir and SMKMC building would cater to meet the daily floating demand of two and four wheeler vehicles.

In Miraj separate area to be earmarked on eastern Chakkar road in R.S.No. 170. A minimum space of 1 ha is proposed for parking operations envisaged with dial a taxi / Vehicle facility.

Although more parking locations would be ideally required at all congregation points (such as weekly vegetable markets, Laxmi market etc) the very nature of their location being in the densely built up Gaothan areas leave no room for such provisions. However the possible solutions have been attempted here.

**Truck Parking (Transport nager):** It is proposed to develop the facilities at the Existing transport nager, which is on the bank of Sherinala. But this location faces problems of flooding and absence of amenities. The bridge on Sheri nalla in the entry road from new Toll road should be reviewed to improve the inflow/outflow and afflux characteristics. Also requisite amenities for the vehicle operators should be provided. Mainly commercial vehicle movement from Kolhapur and Pandharpur areas is observed here. The traffic from Budhgaon, Peth side and generate in timber market area and Vakharbaug area, can be catered by this existing transport nager.

Parking area facility is being proposed in the additional area being carved out for extension of fruit market on Kolhapur road. Nevertheless the parking space available at present in the market would be adequate for the normal traffic volume linked to the market operations.

Separate parking space will be earmarked in R.S.No.170 along the proposed eastern chakkar road in Miraj. This parking area will be common for trucks and four wheelers.

A minimum of each 2 ha space is to be earmarked for the proposed transport nager at each location.

#### 9.8.8 Additional Suggestions

- a. Municipal Octroi office located in municipal shopping complex at old station road is to be shifted to a location near Apta Police chowk, where the space available has already been earmarked for Octroi office. This would relieve the congestion imposed by the vehicles destined to Octroi office.
- b. A Central Bus Terminus (CBT) for SMKMC is proposed which will provide a centralized location for the SMKMC area as a whole. The location for Central Bus Terminus will be in Kupwad, located between Sangli and Miraj and north to Sangli-Miraj urban expressway.

### 9.8.9 Recommended Design Standards for the Design of Road Elements in Development of SMKMC

**Geometric design of urban roads:** For the geometric design standards of urban roads in plains like SMKMC area, the "IRC: 86-1983 Geometric design standards for urban roads in plains" should be followed. All the main elements of geometric design for urban roads are included in the text.

**Classification of roads:** For the purpose of geometric design, urban roads other than expressways are classified into four main categories. These are:

- 1) Arterial
- 2) Sub-arterial
- 3) Collector street
- 4) Local street

**Design speed and space standards:**

Classification	Design speed (km/hr)	Recommended land widths in metres
Arterial	80	50-60
Sub-arterial	60	30-40
Collector street	50	20-30
Local street	30	10-20

**Cross sectional elements:** The width and layout of urban road cross-sections depend on many factors, the chief amongst them being the classification of road, design speed, and the volume of traffic expected. Other considerations are requirements of parking lanes, bus-bays, loading-unloading bays, occurrence of access points, volume of pedestrians and cyclists, width of drains, location of sewer lines, electricity cables and other public utility services. Plate 1 of drawings folder shows some typical cross sections. Actual width of each element should be based on traffic volumes and other functional requirements explained in paras 6.2.1 through 6.2.11 in IRC: 86-1983.

**Clearances:** Clearances are required to be provided for overhanging loads and the tilting of vehicle towards obstruction by cross fall or super elevation of carriageway and for kerb shyness. Standards for lateral clearances for underpasses on urban roads are given in para 7 of IRC: 54-1974 "Lateral and Vertical Clearances at Underpasses for Vehicular Traffic". The same are recommended between edge of carriageway and obstruction on footpath, verge or central reserve. Where an obstruction is located on the inside of a bend, a greater clearance than that specified may be required to ensure that the sight distance is not less than the minimum.

**Underpass for Vehicles:** Minimum vertical clearance on urban roads should be 5.5 m.

**Provision of Cycle tracks:** Separate cycle tracks may be required when the peak hour cycle traffic is 400 or more on routes with traffic of 100 motor vehicles or more but not more than 200 per hour. When the number of motor vehicles using the route is more than 200 per hour, separate cycle tracks may be justified even if the cycle traffic is only 100 per hour. Standards for the design of cycle tracks for cyclists are given in "IRC: 11-1962 Recommended Practice for the Design and Layout of Cycle Tracks".

**Junction Design-General Considerations:** The need for good junction design is exemplified by the fact that well over half the fatal and serious road accidents in built-up areas occur at junctions. If the volume of crossing or turning traffic is small and the major road is lightly trafficked, simple junction designs will suffice, but on busier roads the achievement of the required route capacity and avoidance of excessive delays will call for the adoption of more complex designs with channelisation, gyratory systems, traffic signals, grade separation, or a combination of these features. The following standards of practices may be followed in the design of junctions for the study area.

- IRC: 65-1976 Recommended Practice for Traffic Rotaries
- IRC: 93-1985 Guidelines on Design and Installation of Road Traffic Signals
- IRC: 92-1985 Guidelines for the Design of Interchanges in Urban Areas

#### **Pavement Composition and Thickness:**

The flexible pavement designs given in the standard practice "IRC: 37-2000 Guidelines for the Design of Flexible Pavements" may be followed. The design of flexible pavements based on Design traffic in terms of cumulative number of standard axles and CBR value of Sub grade. For estimating design traffic the following information is needed.

- i. Initial traffic after construction in terms of number of cumulative vehicles per day (CPVD)
- ii. Traffic growth rate during the design life
- iii. Design life
- iv. Vehicle Damage Factor (VDF)
- v. Distribution of commercial traffic over the carriageway

For determining the CBR value the standard test procedure should be strictly adhere to. This is described in IS: 2720 (Part 16) " Methods of Test for Soils: Laboratory Determination of CBR".

Based on the observed soil characteristics, rainfall density and traffic characteristics suggesting the tentative minimum thickness and compositions of pavement layers for new constructions are given in the table. Before implementation the detailed design approach have to be followed as standard practice for design of flexible pavements.

**Table 9.17 Recommended pavement thickness for traffic range 1-150 msa**

Cumulative Traffic (msa)	Total Pavement Thickness (mm)	CBR 9 % & 10 %		Granular Base (mm)	Granular Sub base (mm)
		Bituminous Surfacing Wearing Course (mm)	Binder Course (mm)		
1	375	20 PC		225	150
2	425	20 PC	50 BM	225	150
3	450	20 PC	50 BM	250	150
5	475	25 SDBC	50 DBM	250	150
10	540	40 BC	50 DBM	250	150
20	565	40 BC	75 DBM	250	200
30	580	40 BC	90 DBM	250	200
50	600	40 BC	110 DBM	250	200
100	630	50 BC	130 DBM	250	200
150	650	50 BC	150 DBM	250	200

## 9.9 TO SUMMARIZE

### ▪ Existing Road Network

Sangli is well connected to all the urban centers in the region by good road network. The major traffic contributor corridors leading to Sangli are Kolhapur state highway in south, Peth/ Islampur state highway in northwest Budhgaon state highway in north, Sangli-Miraj urban expressway on east. Apart from these state highways there are roads, which connect Dhamani, Karnal, Padmale, Samdoli, Haripur etc.

Miraj is connected with good highway road network such as Sangli-Miraj Express Highway on west, Miraj-Pandharpur State Highway on north, Miraj-Ankli state Highway on west, Miraj-Bijapur state highway (inter state road) on south and Miraj-Arjunwad state highways. Also roads leading towards Kupwad MIDC, Malegaon, Dhamani, Takali, Arag Bedag, Wednera, Takali, Vijapur are other main roads carrying significant traffic volume.

Although Miraj has the advantage of 'Chakkar' ring road for immediate dispersal of traffic with out entering in to the city. The Chakkar road in east is very narrow and with number of curves, also development and traffic along this road is very less. The entire traffic moves on west Chakkar road. The development of east Chakker road would reduces the congestion along west, near ST stand and at Mission hospital chowk (Busiest junction at Miraj). The inner road network in the city is like radial road system from the heart of the city at Lakshmi market. The roads are very narrow and with number of turnings, and the traffic level is also not high. Station road, Western part of Chakkar road, ST stand road, and Sangli Miraj road are busy with goods as well as passenger traffic. Junctions around Lakshmi market, Stadium chowk, Gandhi chowk (Mission Hospital chowk), ST stand chowk, Pandarpur naka, Bijapur, Arjunwadi state highways meeting point with chakkar road are the high traffic density chowks.

Kupwad is well connected by roads to other parts of Sangli district. The major roads connected to other parts are Kupwad-kanadwadi, Kupwad-Budhgaon and Kupwad-Kavlapur connecting Tasgaon State Highway in north, Kupwad-Sawli road connecting Pandharpur State Highway in east, Kupwad-Madhavnagar passing through Yashwanth Nagar in west, Kupwad-Madhavnagar road passes through Mahalakshmi Nagar, HUDCO area and crosses South central railway Pune-Miraj section in South-west direction, Kupwad-Vishrambag road passes through Mahalakshmi Nagar and Gandhi Nagar connecting Sangli-Miraj State highway in south and Kupwad-Miraj road passes through Kupwad and Miraj MIDC and meets at Sangli-Miraj State highway in south-east direction.

### ▪ Railway

Miraj is the major railway junction on Mumbai – Bang lore railway line. It is a railway junction with Broad gauge railway lines connecting Pune in the north, Kolhapur in the west and Belgaum in the south and Narrow gauge line connecting Miraj with Pandharpur. Miraj – Pune section passes through Sangli city separating Industrial area from the Sangli.

Direct trains are connected to various major cities viz. Mumbai, Pune, Kolhapur, Tirupati, Bangalore, Goa, New Delhi etc from Miraj and Sangli.

### ▪ Bridges

Various bridges have been constructed in the study area to ease out the traffic and to improve connectivity on the railway lines and on the Krishna River, which flows along the West, and South of the study area.

There are four Rail Over Bridges (ROB) viz. on Madhav nagar road, on Miraj – Ankli road, at Vishrambag police station between Sangli and Kupwad MIDC and on Bijapur highway. The traffic also use the Level crossing on Sangli-Miraj section at Police head quarters for moving in and out of industrial area, which is located north of railway line.

There are four major bridges on River Krishna; of which two are on Islampur state highway.

#### • Traffic Generators And Attractors

The traffic generators and attractors in and around the study area affects the traffic characteristics of the study area. The major traffic attractors and generators are summarized below:

In Sangli	In Miraj	Others
<ul style="list-style-type: none"> <li>• Ganpathi peth road and Vakharbag area</li> <li>• Transport nagar</li> <li>• VasantaDada Patil Market Yard and Timber area</li> <li>• Fruit Market</li> <li>• ST stand</li> <li>• Octroi office located near Old station</li> <li>• Rajwada</li> <li>• Sangli MIDC</li> </ul>	<ul style="list-style-type: none"> <li>• Lakshmi Market</li> <li>• Central Warehousing Corporation</li> <li>• Miraj Railway Yard</li> <li>• ST stand</li> <li>• Miraj MIDC</li> <li>• Along Western Chakkar Road SamanyaWadi on Pandharpur Highway: There are godowns for storing and distribution of commodities</li> </ul>	<ul style="list-style-type: none"> <li>• Kupwad MIDC</li> <li>• Kupwad Gaothan</li> <li>• Haripur</li> <li>• Madhav nagar &amp; Budhgaon</li> </ul>

#### • Parking Spots

Existing parking locations for various vehicles described below.

- Auto rickshaw parking. : According to the Information from Auto drivers association, Sangli there are 70 auto rickshaw-parking locations in Sangli city.
- Truck parking: Two parking areas have been identified. One is at old station chowk in Sangli while the other is at Transport nagar.
- Tempo or Four wheeler parking: Presently vehicles are parked at Jhulelal chowk and adjacent to Deluxe hotel near to ST stand in Sangli. This location is busy and congested. Recently parking has also commenced near Apta Police chowki,( near ESR).

In Miraj, Tempo parking is on one local street near to ST stand.

- No designated parking space has been allocated at the octroi nakas on roads leading to SMKMC area, causing obstruction to traffic movement. The secondary data on accident study indicates, **all the octroi collection locations on the highways to be frequent accident spots.**

#### • Transport Survey Analysis

The following conclusions inferred from the Transport Surveys conducted in October 2001 are summarized under the following categories.

- **By passable Traffic**

29.8 % i.e. 2778 vehicles per day of commercial traffic and 20.3 % i.e. 1299 vehicles per day of passenger traffic (i.e. cars, vans, jeeps, taxis only) is the traffic moving external to external of the study area.

12.37 % i.e. 3587 vehicles per day in base year and 8898 vehicles per day in projected year of total traffic and 23.5 % i.e. 6802 vehicles in base year per day and 16876 vehicles per day in projected year can be bypassed with out entering in Sangli and Miraj respectively.

- **Accident study**

From the accident data, it was found that maximum number of accidents occurred on main arterials, which are inter urban roads. The main reasons for this being significant presence of Small Moving Vehicles like Bicycles and Carts in all roads, absence of controls such as signals, signs and speed breakers at intersections coming in between even though cross roads with less traffic and high speeds by the driver on leaving the developed parts of the city.

Eventhough Sangli-Miraj road is a divided four-lane carriageway it is a frequent accident location because of lack of median improvement and lack of control on illegal crossing of vehicles.

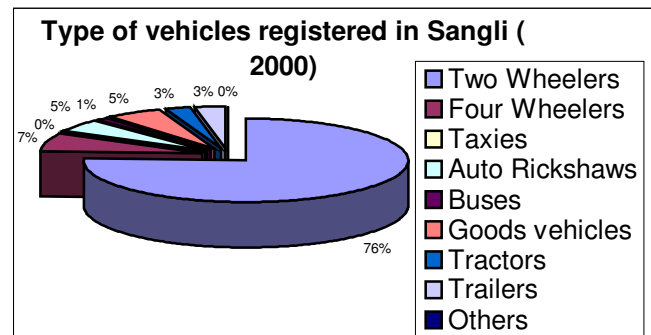
- **Congestion in the study area**

The major congested parts of the study area, which have to immediately focussed for decongestion are Sangli Gaothan including ST stand area, Vakharpeth, Ganpath peth, Vasanta Dada Market Yard, Old Station area in Sangli and Chakkar road on west from ST stand to Mission Hospital Chowk in Miraj. This can be done by bypassing the outbound traffic, which would eliminate its entry in to the city area. Decongestion can also be possible by reducing the frequency of city bus trips in the route and making it follow the parallel routes, re routing the non stop buses between major traffic centers like Sangli and Miraj to follow routes on alternate network.

- **Capacity of Arterials**

Capacity assessment of main arterial is depicted in Table on 'Capacity assessment of main arterials'. It has been observed that some of the arterial roads need immediate capacity enhancement while others too require increasing their capacity in the design period

An alternative road links to the Sangli – Miraj urban Expressway was found to be necessary. Possibility of obtaining such links from the area to the South of Sangli – Miraj road through government colony, south of Walchand Engineering College and Central Warehousing Corporation and north of Pune – Miraj lines is proposed.



- **Traffic Growth Analysis**

From data on **Vehicle Registered in Sangli city, Kolhapur Region**, it can be inferred that two wheelers dominate the vehicles constituting about 76% of the total registered vehicles in 2000.

Traffic Growth Rates from the analysis is depicted below

Type of Vehicle	Cars, Jeeps, etc.	Truck	Motorcycle	Bus
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Average Growth Rate (%)	10.67	8.64	8.06	1.35
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The calculated growth rates may also comparable with

Average octroi collection growth of 13.32 % (pessimistic approach)

Average growth rate of Total vehicles in Kolhapur region including districts of Sangli, Satara and Kolhapur is 10.88 %.

The analysis of Traffic Growth Rates indicates unusual high growth rates. Unusually high rates of change must be carefully considered since such a rate may not be sustained over a long period of time. Further past experience shows that the growth rates considered in various projects implemented in Metros such as Mumbai, Delhi etc., are found to stabilize over a period of time. Hence we have applied growth rates, as calculated from data, up to year 2006 for passenger vehicles, motor vehicles and trucks. For further duration a stabilized growth rate of 5 % is considered for passenger vehicles, motor vehicles and trucks. But for buses we have considered 2 % growth rate for the entire design period. Recommended traffic growth rates for the study area are given in Table 2.3.3

**Table 2.3.3 Recommended Traffic Growth Rates**

Type of Vehicle	Up to 2006	2006 to 2021
Cars, Jeeps, Taxis, Vans	10.50	5.00
Motor Cycle / Auto Rickshaw	8.00	5.00
Bus	2.00	2.00
Truck	8.5	5.00

- Traffic Projections**

The projected future traffic in terms of Average Daily Traffic, Peak hour Traffic for various arterials in Number and in PCU is calculated and Projected Peak Hour Traffic of Fast Moving Vehicles for various arterials is given in Table below.

**Table Projected Peak Hour Traffic (Fast Moving Vehicles)**

Road Name	Base Year		2006		2021	
	No	PCU	No	PCU	No	PCU
Bijapur State Highway	535	612	794	876	1821	2009
Pandharpur State Highway	429	595	637	831	1461	1974
Kolhapur - Sangli State Highway	749	1149	1087	1595	2491	3655
Miraj - Ankli State Highway	353	611	507	844	1161	1936
Budhgaon State Highway	1093	984	1621	1424	3715	3263
Peth State Highway	440	760	644	1078	1476	2470
Sangli - Miraj Urban Expressway	1644	1580	2472	2338	5666	5358

From the above table, the projected peak hour traffic of fast moving vehicles alone in 2021 requires double the capacity than the existing capacity of the major arterials.

- Vehicle Growths**

Vehicle growth rates have estimated based on registered vehicles in Sangli, population of SMKMC area and per capita income of state. The growth rates derived and recommended for the design period are given in the above table.

- **Summary of Proposals**

Five categories of roads are proposed with carriageway width of 45 m, 30 m, 24 m, 18 m and 12 m , namely expressways, arterials roads, sub arterial, collector roads and local roads respectively.



To reduce congestion in Sangli gaothan, various ring roads and bypass links are observed which are in the vicinity of the feasibility like road on eastern bank of Krishna River, Sangli ring road, inner road and Miraj chakkar road are proposed. Widening of link roads on east of Rajwada are proposed to decongest the road on west of Rajwada, which is already facing problems of shortfall of capacity. Presently, the roads such as Sangli-Miraj road, Sangli-Kolhapur road, Budhgaon road, Vakharbaug road, which are carrying traffic in excess of design capacities and are also accident-prone, are proposed to be upgraded.

All the major intersections mentioned in development plan are to be improved as per IRC standard norms. Moreover by implementing the DP proposals, all the major junctions would be relieved from the traffic problems. No interchanges are envisaged in the development plan proposals.

Accidents are observed at octroi nakas, junction of roads etc due to the lack of traffic signs and regulations and suitable measures are highlighted for this.

Parking areas are proposed near Apta Police Chowk, near Bhave Natya Mandir and on Kolhapur road near Vishnuanna Fruit Marker and on proposed eastern chakkar road in Miraj.

Central Bus Terminus is proposed in Kupwad, central to SMKMC area, in consonance with the proposals for Central administrative Complex and to reduce the existing congestion in S.T.terminals.

Recommended Design Standards for the Design of road Elements as per IRC is also incorporated at appropriate segment.