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## Traffic Management Proposals for Udupi City

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**Abstract:** Udupi is amongst the most prominent places of pilgrimage in India and is famous for its Lord Krishna and many other deities. It is having population of 1.476 lacks in the year 2002, with floating population 100000 to 200000 per day. In view of growing importance of the Udupi city in the region of Central Business District (CBD), this is an urgent need for a comprehensive approach to tackle the short range and long-range traffic and transportation problems. To study the existing traffic and transportation system and prepare traffic management plan various traffic surveys have been carried out, and alternate proposal have been made. The proposals have been analysed for Level of Service (LOS) along the urban roads and LOS of turning traffic at junctions for next ten years. In present study an attempt is made to provide traffic management for CBD area.

**Keywords:** *Level of Service (LOS), Traffic Management, CBD*

### Introduction:

Udupi City is situated in Karnataka state. Udupi is the district and Taluk headquarters for udupi district and Udupi Taluk respectively. Udupi is amongst the most prominent places of pilgrimage in the Country and is famous for its Lord Krishna and many other deities. It is having population of 1.476 lacks in the year 2002<sup>[19]</sup>, with floating population 100000 to 200000 per day<sup>[15]</sup>. In view of growing importance of the Udupi city in the region of CBD, this is an urgent need for a comprehensive approach to tackle the short range and long-range traffic and transportation problems. To study the existing traffic and transportation system and prepare traffic management plan to provide solution to the present problems and to optimise the use of infrastructure in the city. At present the commercial activities in the city are haphazardly situated in CBD and hence the distributions of the shopping trips is not uniform and are concentrated towards one or more shopping regions and that is the main path for devotees of Lord Krishna Temple<sup>[14]</sup>. Since these locations are not planned in a scientific manner so the management skills are to be applied, in the present study an attempt is made to provide traffic management for CBD area.

The problems in the CBD area of the Udupi are:

- The turning radii are not available at all junctions.
- There are no channelisations to turning traffic at junctions.
- At the junctions the vehicles are experiencing delays.
- There are no provisions of pedestrian facilities.
- The traffic volume flowing towards temple legs are more.
- The flow of buses is more on main roads of CBD.
- The widths of roads are insufficient to cater the traffic flow.

### Objectives:

This study attempts to develop a traffic management for CBD area, to ensure better traffic circulation in terms of reduced delays, and to provide safety to devotees of Lord Krishna Temple. The objectives of the study are enlisted below.

- To Regularise Traffic and Speeds
- To reduce the traffic congestion on major roads
- To provide necessary junction improvements
- To provide pedestrian facilities at junctions
- To identify parking requirements

### Literature Review:

In review the past studies made on traffic management are studied, with a view to boost up the present study with past studies. The literature review includes.

- Traffic management plan for the central area of Trivandrum<sup>[16]</sup>.
- Traffic and Transportation Improvement Priorities for Road Corridors of Bangalore<sup>[1]</sup>.
- Traffic management Plan for Mysore City<sup>[5]</sup>.
- Comprehensive Traffic and Transportation Plan for Nagpur<sup>[4]</sup>.
- Transportation network for Madras metropolitan area<sup>[2]</sup>.

From the above studies it is seen that the traffic movement problems are more at central zone (CBD) compare to other zones, so it is decided to take up CBD area along with temple routes of Udupi city for present study.

### Delineation of the Study Area:

After collecting the land use, population and Socio-Economic data. It is necessary to define the area for which the traffic management studies are to be carried out. From land use data it is seen that at present commercial activities, Bus Stands and Temple are situated very near in an unplanned manner, in the CBD area. The schematic representation of CBD area is shown in Fig 1

### Field Studies:

To solve the above problems and achieve the objectives, various traffic surveys have

been carried out. Relevant data have also been collected from traffic police department and various other government departments.

### Data collection:

The following traffic surveys have been conducted,

- Identification of junctions needing improvements
- Turning volume counts at junctions
- Speed and Delay study
- Pedestrian volume counts
- Parking demand survey

### Secondary Data:

The following secondary data have also been collected

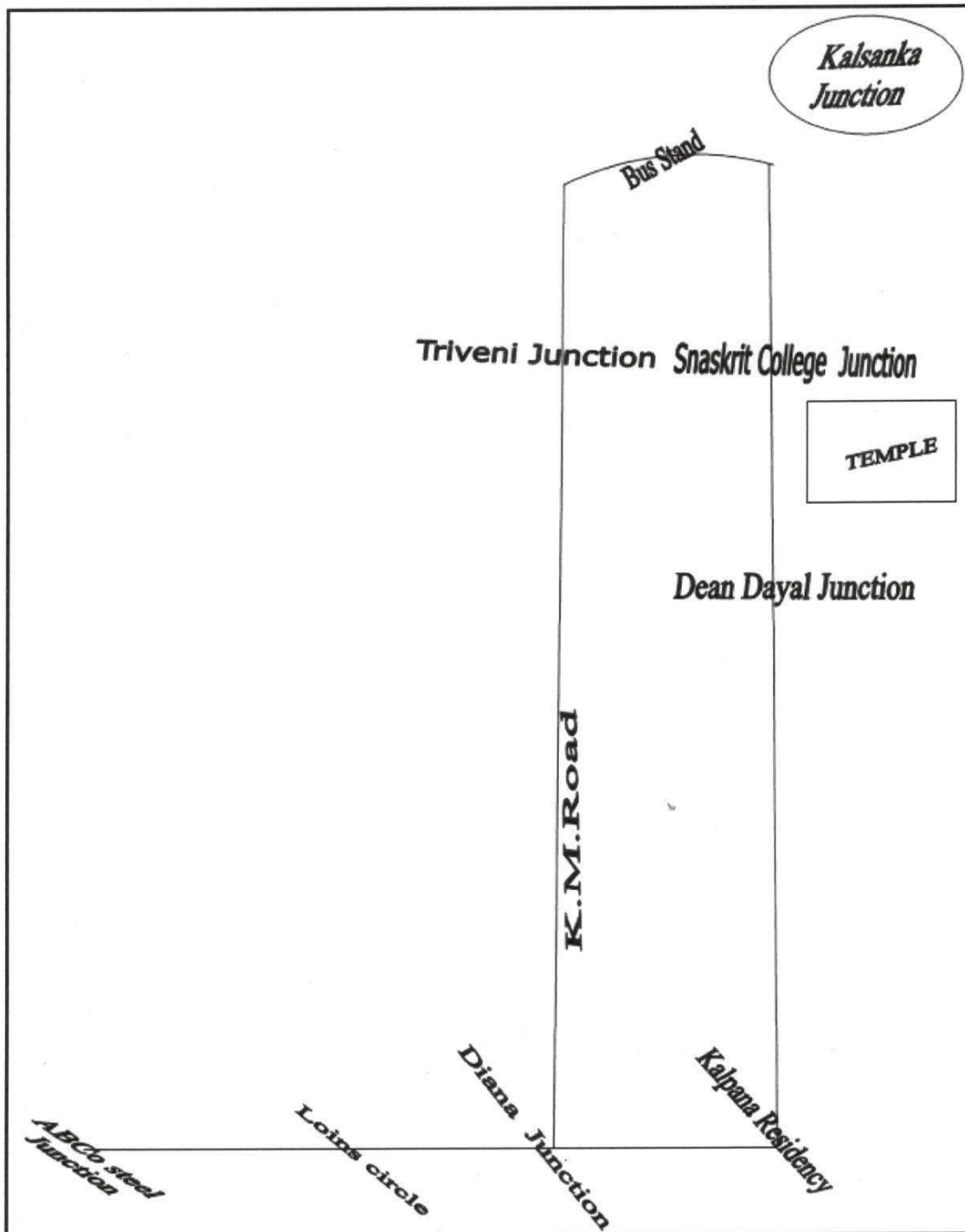
- Inception report<sup>[18]</sup>
- Land use data
- Accident data

Identification of junctions needing improvements

The study area is first surveyed to find the junctions having more traffic flow, more pedestrian conflicts for existing island features. By preliminary survey the following 4 junctions are selected for improvements.

- Diana junction
- Triveni junction
- Sanskrit college junction
- Kalsanka junction

The IRC recommendations have been used to improve this junction; the parking and pedestrian survey have been carried out in the CBD area. The improvements have been suggested as per IRC recommendations.



**Figure 1:** The Schematic Representation of Study Area

### Results and Discussions:

The various data collected from field are analysed to solve the traffic manoeuvre problems of CBD and to achieve the objectives.

Depending on the analysis three Traffic management proposals have been made, the different proposals made are as follows.

- Traffic Management Measures
- Shifting of Bus Stand near ABCo steel junction
- Shifting of Bus Stand near ABCo steel junction along with traffic management measures.

The above proposals are carefully studied and finally best proposal is selected, the analyses of different proposals are made with respect to existing Level of service (LOS) and improved LOS with each proposal. The existing and improved Los are tabulated from table no.1 to table no.6 as below. Also the existing road width and classified vehicle count is considered.

#### Traffic Management Measures:

Following traffic management measures are suggested to have streamline flow of traffic and to improve the LOS of road network. The K.M.Road from Diana Junction to Bus Stand, and Sanskrit College Road from Bus Stand to Road connecting Kalpana Residency road are to be made one way. There should be restriction of the buses flowing from Udupi leg and Kundapur leg at morning and evening peak at Kalsanka Junction. The vehicles coming from the Manipal leg at Kalsanka junction are diverted to temple through the road connecting the temple and mud road. At Kalsanka Junction vehicles moving to temple are diverted on mud road to avoid congestion and parking problem at temple. The vehicles moving to temple through Sri Ram Residency leg are to be diverted to temple through the Deen Dayal junction.

#### Shifting of Bus Stand near ABCo Steel Junction:

It is observed that the buses are moving through ABCo steel junction to Bus Stand from Kundapur and Manglore and returning

to the Kundapur and Manglore on the same route. So it is proposed to shift the Bus Stand from CBD area to near ABCo steel junction. Further the buses entering the CBD area junctions through the ABCo steel junction are listed as below From traffic volume counts in peak hour it is seen that at Diana junction the buses moving are 41.23% on Municipal office leg and 40.27% on National Highway leg. Triveni junction the buses moving are 49.12% on Bus Stand leg, 53.45% on Temple leg and 40.09% on Diana leg. Kalsanka junction the buses moving are 18.25% on Udupi leg, 28.15% on Kundapur leg. Sanskrit College junction the buses moving are 24.05% on Sri Ram Residency leg, 20.91% on Auto emporium leg, and 3.26% on Gokul leg.

#### Shifting of Bus Stand near ABCo steel Junction along with Traffic Management Measures:

Observing to Traffic Volume/Traffic Capacity (V/C ratio) of roads (refer table 1 and table 3), it is thought to implement both the proposals together to maximum streamline flow. The possible V/C ratio after implementing traffic Management Measures and shifting of Bus Stand near ABCo steel junction along with LOS are tabulated in table 2 and table 4.

#### Proposed road widening:

The above proposals have been analysed for LOS along the urban roads and LOS of turning traffic at junctions, they are tabulated as below. And it is found that the third alternative." Shifting of Bus Stand near ABCo steel junction along with traffic management measures" provides good LOS and the number of roads which are not providing  $LOS \leq C$  are four only compare to the other two proposals. The following roads are proposed for widening. The road from Bus Stand to Kalpana Residency is proposed to be made 4 lane divided. The Manipal leg road from Kalsanka junction is to be widened to 9.0M up to 1Km from Kalsanka junction and the Udupi leg is to be widened to 9.0M up to Janta hotel.

### Conclusions and Recommendations:

Traffic Management for CBD of Udupi city has been intended to include traffic and transportation problems of the city. Proposed Traffic Management Measures and proposals are to be implemented in short and long-term.

The following conclusions and recommendations may be made.

1. It is proposed to shift Bus Stands near ABCo steel junction and the K.M.Road from city Bus Stand Up to Diana Junction and Sanskrit College road from city Bus Stand Up to Kalpana Residency Road is to be made one way, so that the congestion of CBD area will be reduced.
2. There should be restriction of the buses flowing from Udupi leg and Kundapur leg at morning and evening peak at Kalsanka Junction. It is proposed to divert them on by pass road.
3. The vehicles moving to temple through Kalsanka junction are to be diverted to temple through the road connecting the temple and mud road.
4. The vehicles moving to temple from Manipal are to be diverted on mud road (1Km) before reaching at Kalsanka junction to avoid congestion and parking problems at temple leg.
5. The vehicles moving to temple through Sri Ram Residency leg at Sanskrit college are diverted to temple through the Deen Dayal junction.
6. The details pertaining to the pedestrians' path, modification to circle/junctions traffic control devices etc, have been worked out and these should be implemented in Short and Long terms.
7. Speed and Delay studies reveal that the Journey speed is 23.28Km/h, which is less than the posted speed (30Km/h). The traffic management measures listed above (1-6) will certainly increase the journey speed.
8. The road from Bus Stand to Kalpana Residency is proposed to be made 4 lane divided.
9. The Manipal leg road from Kalsanka junction is to be widened to 9.0M up to 1Km from Kalsanka junction and the

Udupi leg is to be widened to 9.0M up to Janta hotel.

10. Restrictions like one-way on K.M. road, Sanskrit college road, and restriction on flow of buses on Kundapur leg and Udupi leg at morning and evening peak at Kalsanka Junction are to be implemented gradually and at the earliest with strict enforcement. The turning movements are controlled by police person at the junctions. This will ensure that the congestion at intersection will be reduced; which will take care of desired LOS at six intersection legs which have  $Los > C$ , as per table 2.

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**Table 1:** Level of Service for Turning Movements of Existing Traffic Scenario

Junction Name	Turning Movement	level of service
Triveni	Temple-Bus Stand	F
	Temple-Diana	F
	Diana-Temple	E
Diana	Municipal office -N.H	F
	Municipal office -Kalpana Residency	B
	Kalpana Residency-Municipal office	F
Kalsanka	Kundapur-Udupi	F
	Kundapur-Temple	F
	Kundapur-Manipal	F
	Udupi-Temple	F
Sanskrit College	Sri Ram Residency-Gokul	F
	Sri Ram Residency-Auto emporium	F
	Sri Ram Residency-Temple	F
	Sri Ram Residency-Auto emporium	F
	Gokul -Temple	F

**Table 2:** Level of Service for Turning Traffic after applying the (third) Traffic Management Proposal

Junction Name	Turning Movement	Level of Service(LOS)
Triveni	Temple-Bus Stand	F
	Temple-Diana	—
	Diana-Temple	A
Diana	Municipal office -N.H	—
	Municipal office -Kalpana Residency	—
	Kalpana Residency-Municipal office	F
Kalsanka	Kundapur-Udupi	F
	Kundapur-Temple	F
	Kundapur-Manipal	A
	Udupi-Temple	F
Sanskrit College	Sri Ram Residency-Gokul	E
	Sri Ram Residency-Autoemporium	—
	Sri Ram Residency-Autoemporium	—
	Gokul -Temple	—

**Table 3:** V/C Ratio and LOS for existing Traffic Scenario

Junction Name	Name of the Leg	Capacity C	Peak Hour Traffic Volume in PCU V	V/C Ratio			Level of Service (LOS)
				2002	2007	2012	
Diana	Kalpana Residency Leg	1500	1495	0.997	>1	>1	E
	Municipal Office Leg	1850	2908	>1	>1	>1	F
	National Highway Leg	2250	3394	>1	>1	>1	F
Triveni	Bus Stand Leg	2300	2111	0.918	≥1	>1	E
	Temple Leg	2250	1519	0.675	0.903	>1	C
	Diana Leg	2350	1522	0.648	0.867	≥1	C
Kalsanka	Udupi Leg	1000	1978	>1	>1	>1	F
	Kundapur Leg	1000	984	0.984	>1	>1	E
	Manipal Leg	1350	2430	>1	>1	>1	F
	Temple Leg	650	2794	>1	>1	>1	F
Sanskrit College	Temple Leg	1000	2339	>1	>1	>1	F
	Sri Ram Residency Leg	1500	4204	>1	>1	>1	F
	Auto Emporium Leg	1350	4466	>1	>1	>1	F
	Gokul Leg	1350	2390	>1	>1	>1	F

**Table 4:** V/C ratio and LOS After Shifting The Bus Stands near ABCo, steel Junction and Applying Traffic Management

Junction Name	Name of the Leg	Capacity C	Peak Hour Traffic Volume in PCU V	V/C Ratio			Level of Service (LOS)
				2002	2007	2012	
Diana	Kalpana Residency Leg	3000	1853	0.618	0.826	≥1	B
	Municipal Office Leg	2250	1234	0.548	0.734	0.982	A
	National Highway Leg	3200	2027	0.633	0.848	≥1	B
Triveni	Bus Stand Leg	3200	841	0.263	0.352	0.47	A
	Temple Leg	1200	321	0.268	0.358	0.479	A
	Diana Leg	3600	853	0.237	0.317	0.424	A
Kalsanka	Udupi Leg	1200	1617	>1	>1	>1	F
	Kundapur Leg	1200	760	0.633	0.847	≥1	B
	Manipal Leg	1200	1228	>1	>1	>1	F
Sanskrit College	Temple Leg	900	659	0.732	0.98	≥1	B
	Sri Ram Residency Leg	1500	927	0.618	0.827	≥1	B
	Auto Emporium Leg	1500	2404	>1	>1	>1	F
	Gokul Leg	1200	1745	>1	>1	>1	F