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Assess and Challenges of Vehicle Parking Scenario in the Central Core of Mysore City

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Abstract: ***Transportation is the engine of growth and the bedrock to the rapid development of every country or economy. In Mysore automobile has various impacts on people's lifestyle, on the other hands motor vehicles are cause to many problems in city like spaces for parking requirement and road traffic congestion. Lack of enough space in urban area has caused urban planners face challenges for vehicular problems management. While local government in Mysore has made efforts to solve vehicle parking problem in the old core of city, the absence of appropriate vehicle parking facilities has stroked up unexpected levels of parking demand. This paper highlights the parking problems in the central business district and proposes justified measures and strategies for meeting the traffic congestion challenges in central business district of Mysore city.***

Keywords: Central Core of City, Mysore city, Vehicle Parking, Vehicle Traffic Congestion.

I. INTRODUCTION

Problems of delays, congestions and inconsistencies in public transportation have forced people to prefer to drive to central core of city in their private vehicles. Vehicle parking is an essential component of the transportation system. This situation has increased the demand for parking spaces in the Central core of city. Parking supply space in central core of Mysore city has become one of serious problem especially during the rush hours. The number of vehicles in Mysore has been increasing day by day, so not only in central area of Mysore, even other areas also somewhat has faced to the challenge in parking management. Because of the rapid motorization, traffic congestion and car parking problems have been serious and require urgent solution. Searching for motor vehicles parking space in central part of city is one of main concern for drivers. Finding vacant parking space in main streets at central core of Mysore city is time-consuming and drivers who are searching for parking space drive their vehicles slowly, it is cause to reduce traffic speed movement especially during rush hours. Due to existence of imbalance in investment, in location oldest streets of city and commercial and economic activities, there is heavy congestion of vehicles and demand for parking space is dominant obviously. Although on- street parking would be helpful to have easiest accessibility, but this would reduce the capacity of roads and in such circumstances, on-street parking provokes traffic congestion.

II. BACKGROUND OF MYSORE

Mysore city (city of places) has a total population of 799,228 as per the census data of 2001 and 887,446 in 2011. The population has been increasing at a compounded annual rate of 2.5% in the last two decades. It is a headquarters of Mysore County, in Karnataka state of south west part of India. Mysore city lays 140 Kms from the State Headquarters, Bangalore city which is capital of Karnataka state. During the last two decades, Mysore city has grown rapidly in all directions and its area is around 128.42 km². according to the antiquity and historical background of Mysore (as a majestic and mysterious city is cultural capital), particularly in central core of city, it has a cultural tissue and the rapid increase in population inversely there is an increase in travel and usage of vehicles, bringing in a lot of vehicle traffic congestion in the Central Business District.

III. LAND USE PATTERN

The central area is hard core and oldest part of Mysore city. Also it is heritage district of city. The Heritage places structures are located strategically in the central Core of Mysore and its immediate environs. due to it is main commercial hub with many heritage and architecturally buildings like Mysore Palace, Town Hall and presence of attractive units like cinema theatres, shops, hotels, residences, retail and etc. not only from the city also from the region, daily there is about 300,000 visitors and tourists to the central area. Evolution growth of Mysore started from the Mysore Palace as the center of growth of central area of city.

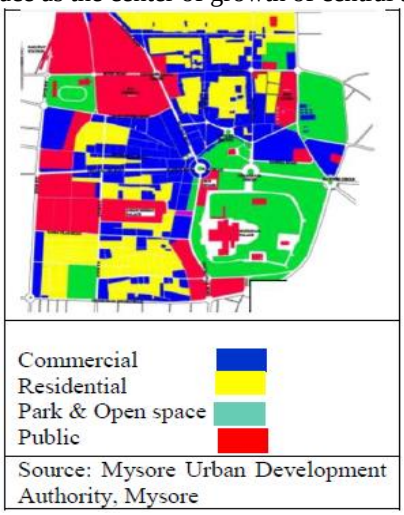

Fig 1. Land Use in the Core Area of Mysore City

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Table 1: Land Use in the Central Area of Mysore City 1976-2009

Land Use	1976		1986		1997		2009	
	Area in Hect.	%	Area in Hect.	%	Area in Hect.	%	Area in Hect.	%
Residential	80.70	28.64	74.25	26.36	62.10	22.04	72.34	24.11
Commercial	31.37	11.13	40.87	14.51	53.03	18.82	55.51	18.50
Industrial	4.39	1.55	6.79	2.41	6.60	2.34	0.28	0.09
Parks and Open Spaces	21.84	7.75	17.01	6.04	17.25	6.12	24.77	8.26
Public and Semi-Public	75.08	26.65	67.58	23.99	67.58	23.99	74.00	24.67
Traffic and Transportation	68.09	24.17	75.20	26.67	75.14	26.74	72.70	24.23
Water sheet	0.23	0.08					0.38	0.13
Total	281.7	100.0	281.7	100.0	281.70	100.0	300.0	100

Source: Mysore Urban Development Authority, Mysore

IV. NUMBER OF VEHICLES IN MYSORE

The total number of vehicles, which was about 6000 in 1970, increased to 1.45 lakhs in 1996 year. The number of vehicles registered in Mysore city up to 30.11.2006 is 3.55 lakhs of which 2.86 lakhs is 2-wheelers constituting 80.56 percentof the total vehicle population. The number of motor vehicles has increased by about 25 times in the Mysore city between 1970 and 1996. The road carrying capacity in older parts of the city however has remained the same while the quantum of traffic has increased significantly.

Table 2: Growth of Vehicles over the Period (1991-2011) in Mysore City

Vehicles (in thousands)	1991	2001	2011
4 wheeler	11300	26,100	51472
2 wheelers	128300	228,600	351074
Truck	3700	5100	7945
Bus/Minibus	1000	4800	6161
Auto	-	12,200	17155
Others	-	6900	9200
Total	144,300	282,600	440715

Source: Regional Traffic Office (RTO), Mysore City

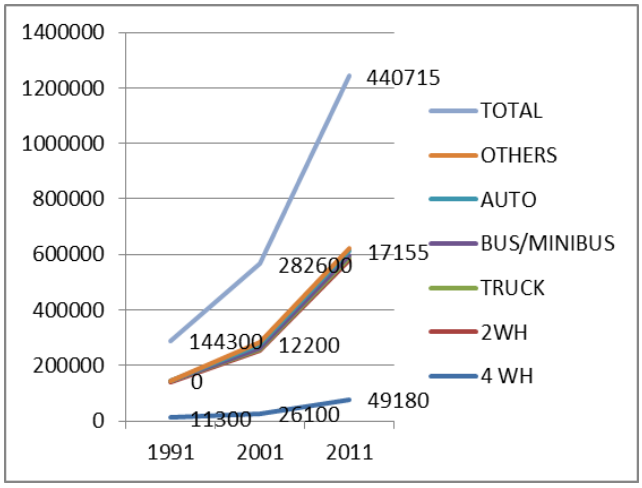

Figure 2: Growth of vehicles over the period (1991-2011)

The data shows that the registration of 4 wheelers has increased by 61 percent. During the period 2001-2011, while 2 wheeler increased by 43.6 percent, auto has increased by 32.78 percent. It is evident that increase of buses and trucks are 8 percent and 3 percent respectively, which is intangible. The total number of registered vehicles has increased sharply during 3 decades compare to growth of population number.

Based on the vehicle growth at 5.5 percent per annum during the last few years, the vehicle population is poised to grow over a period of time. Compounding the problem of congestion, due to the mixing up of different classes of vehicles, the journey speed gets considerably reduced. The conflict, confusion and irritation caused by mixed traffic also results in accidents. Comparison between population and vehicles growth rate:

Table 3: Comparison between Population and Vehicles Growth Rate over the Period (1991-2011) in Mysore City

Year	Total Population	Decadal Growth Rate of population	Total number of vehicles	Decadal Growth Rate of vehicles
1981	479.081		53,120	
1991	653,345	3.6%	144,300	17.1%
2001	799,228	2.2%	282,600	9.5%
2011	887,446	1.1%	440,715	5.5%

Source: Regional Traffic Office (RTO), Mysore City

According to the table 3.10, it is observed although there is a sharply increasing during 1981 -1991 in 17.1 percent in number of registered vehicles which follows by lesser decrease in 9.5 percent form 2001-2011 in Mysore city. As it is observed decadal growth rate of population is 3.6 percent, from 1981-1991 which much lesser compare to vehicle growth rate in same decade.

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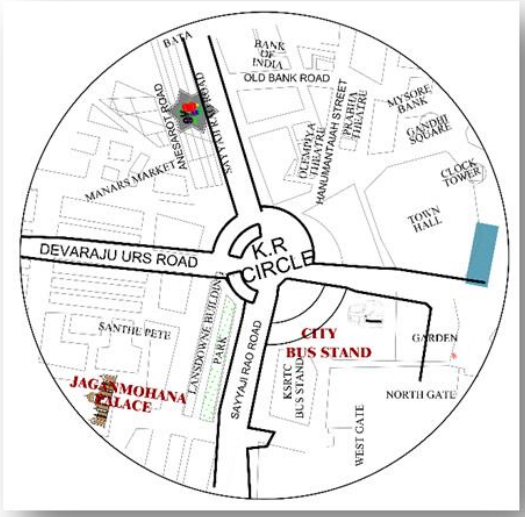
V. TRAFFIC CONDITION IN MAJOR INTERSECTIONS

Two major intersections in central core of Mysore are Harding Circle and KR Circle. Harding Circle is one of the important and old road junctions of Mysore heritage city and formed from six roads which carry moderate to heavy traffic. The existing signal is unable to control the traffic volume and the period of time is not sufficient because demand for crossing this circle has mismatch to that. This mismatch cause to delay and congestion in circle and in roads which connected to this circle. Out of the six road, four are one ways and two of them (Ooty Road and AV Road) are two ways. The existing layout is given in Figures.



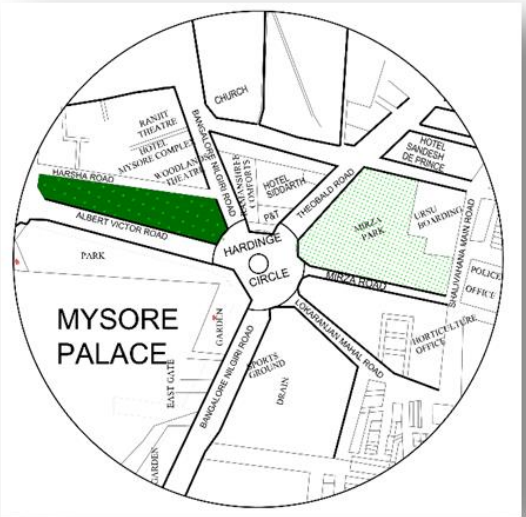


Figure 3: Harding circle layout & KR circle layout

In these two circles traffic conflict is evident heavily. Different types of traffic are there which cause to decrease the vehicles and traffic speed. Row also is not consistently. There is a lack of pedestrian's facilities at most of the major junctions that need to be looked into to avoid pedestrian vehicular conflicts at junction is another major issue which reduces carriageway capacity and leads to obstruction in movement of traffic.

VI. VEHICLE TRAFFIC VOLUME OF BUSIEST ROADS IN CORE OF CITY

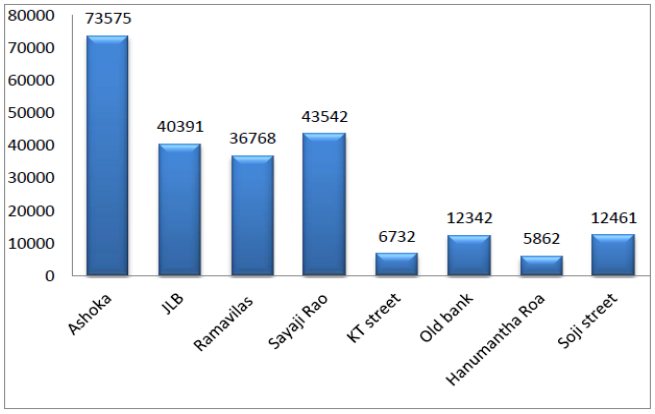


Figure 4. Traffic Volume in Busiest Roads

Ashoka road: The highest portion belongs to 2 wheelers especially in peak hours; the second highest category refers to cars. The lowest portion includes 3 wheelers and bus transfer.

JLB road: Additional of exiting traffic volume of 2 wheelers and 4 wheelers, transferring of buses is evident more than other roads which has described till now.

Ramavilas Road: The highest portion belongs to 2 wheelers and follows by cars. The lowest one refers to 3 wheeler and buses. In peak hours in the evening the highest massive of traffic volume is evident.

Sayaji Rao Road: The highest portion belongs to 2 wheelers and cars. The second highest portion belongs to 3 wheelers and number of buses and other modes of transportation is salient as this road is a most populated commercial roads which providing of segregated lane for pedestrian and vehicles and BRT is required severely.

K.T Street: As this street has lowest width between other roads which analyzed and is a commercial road just 3 modes of transportation are there which they are 2 wheelers, 3 wheelers and cars to their portion respectively.

Old Bank Street: The highest portion belongs to 2 wheelers and the lowest belongs to cars, after 2 wheelers the second highest refers to 3 wheelers.

Hanumantha Roa Street: In this road mostly 2 wheelers and 3 wheelers is evident rarely. As it is narrow road with commercial land use, is required to provide segregated lane for pedestrian and bicycle.

Soji Street: The highest portion belongs to 2 wheelers and 3 wheelers and number of cars which is evident in this road is less. Some roads which need accurate focus which are facing major traffic issues according to collected secondary document and observation and questionnaire paper are as follow:

Devaraj Urs Road is a 4 lane undivided road with mixed land use on both the sides and single way movement of traffic. There is on –street parking on both the sides of the road that reduces the usable carriageway to 2 lane only. Similarly, there is on-street parking on both the sides of Ashoka road that reduces the usable carriageway to only 2 lanes with two way movement of traffic.

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Dhanvantri road and SayyajiRao road also has on-street parking on one side and two side if the road respectively and hence carriage way is reduced to 2 lane undivided with two movement of traffic. Provision of wide footpath is there on all the roads, but either the surface is not pedestrian friendly or the footpath is encroached by hawkers and shopkeepers. Because of parking demand these roads were declared as one way roads. There is inadequate availability of right of way pertaining to primary roadway network at Ashoka road, SayajiRoa Road, Dhanvantri Road.

Purpose of trip

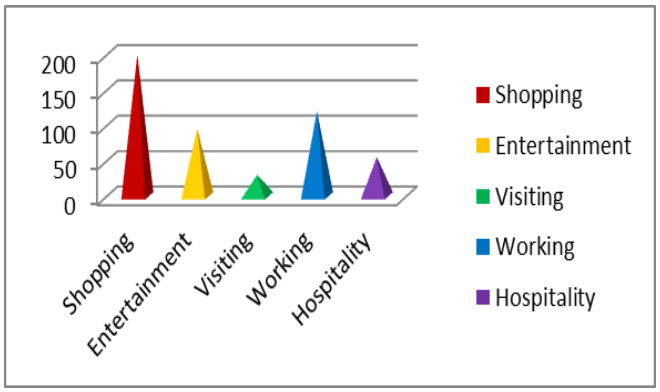

Figure 5: Purpose of trip

Figure 5 reveals about purpose of visit to CBD in Mysore city. It is observed that maximum number around 40 percent of the respondents come to CBD for shopping. The second highest number is belonging to working in 19 percent. The minimum number is belonging to visitor people.

Modes of Transport:

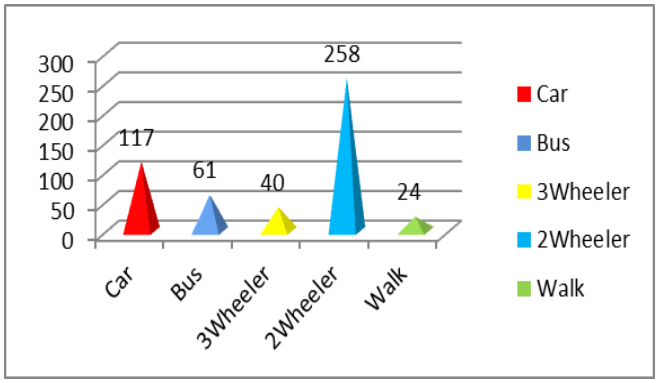

Figure 6: Modes of Transport

Figure 6 reveals about mode of transport. It is observed that the maximum number of respondents using their private 2 wheelers in 40 percent. The second highest number is belonging to using private cars in 23 percent. 13 percent of respondents are using bus which shows government has to encourage people to use public transport by providing more facility in public transport service.

VII. PARKING CHARACTERISTICS

Existing of parking space in urban area is one of the most urban criteria. Since by increasing the number of on-street parking, demand for parking space has increased sharply. In location near public transportation stand and commercial and economic activities, demand for parking space is dominant obviously. Some of the areas like sayaji Rao Road, DevrajUrs Road, Ramvilas Road and Dhanvantri Road attract huge volume of vehicles especially during peak hours. The parking lots in the city (both defined/undefined) have not been able to cater to the increased demand.

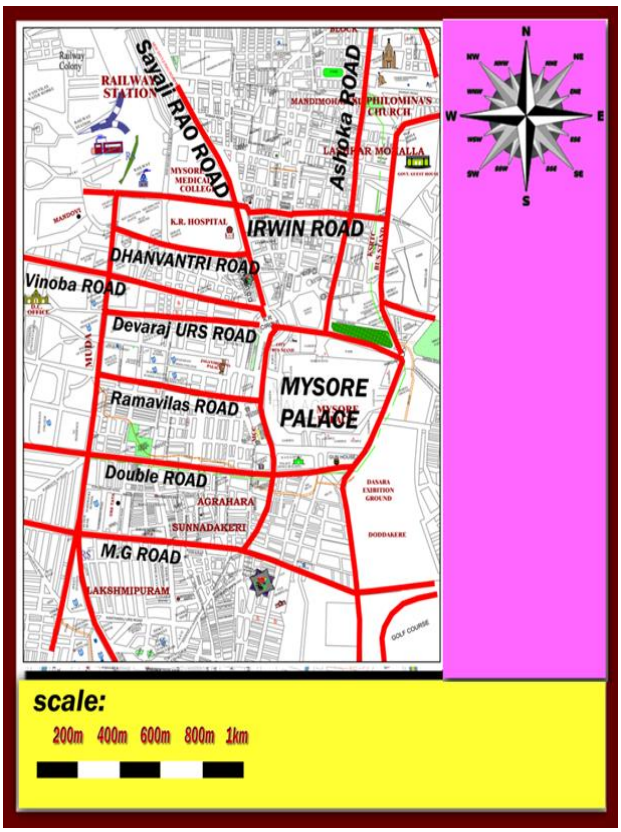

Figure 7: Parking Survey Locations

VIII. PARKING ACCUMULATION DURING PEAK HOURS

This is defined as the total number of vehicles parked in an area during the peak hours 10 AM to 11AM and 6 PM to 7 PM. The peak hour accumulation is given below in Table 4.

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Table 4: Parking Summary for Survey Locations

Road Name	Length of Parking Stretch (m)	No. of Parking Bays (ECS) Equivalent Car Space	Peak Accumulation				
			2W	Cars	Cycle	3W	Total
Sayaji Rao Road	300	461	600	80	141	6	827
Lane from Sayaji Rao Road Adjoining old clock tower	250	64	90		38		128
DevrajUrs Road	400	791	1,042	182	147	8	1,379
Narayan Shastri Road and Ramvilas Road	500	283	398	47	74		519
Dhanvantri Road	1,000	161	141	60	15	13	229
100 Feet Road	350	215	298	20	26	19	363
Chamraj Double Road	300	107	97	18	28	15	158
Ashoka Road		580	788	131	92	5	1,016

Source: Regional Traffic Office (RTO), Mysore City

The maximum number of parking is belonging to 2Wheeler. In Sayaji Rao road and Devaraj Urs Road the highest number of 2 wheelers is there. The minimum number of parking space refers to the 3 wheeler. The length of parking according to the number of vehicles is not appropriate which cause to poor urban landscape.

The Old Mysore Area, comprising of commercial areas such as Deveraj Urs Road, Ramvilas Road Dhanvantri Road carries a heavy traffic of pedestrians which are using their private vehicles. Non-existence of off street parking on this area result to on- street parking especially through CBD area. To improve upon this situation, proposing intensive parking spaces or multi-level car parking lots are needed which may give room to the existing and prospective parking demand and thus decongest streets of on street parking.

IX. PARKING ISSUES

In Mysore city there is traditional parking system only. It is typically expensive, unsafe, aesthetically unattractive and inefficient use of land. In Traditional parking systems, vehicles are parked in state of perpendicular or parallel. With respect to rising land prices and limited space especially in central business district of Mysore city, traditional parking system has become a far less attractive option with the invention of other parking system like multi-level car parking systems. According to high rise of population and demand for private vehicles, demand for parking also is increasing sharply. Currently negligible off-street parking spaces cause to on-street parking which encroached streets and reduced the width of carriage way.

Some of the major street in the Mysore city such as Sayyaji Roa Road, Devraj Urs Road, Ramvilas Road and Dhavantri Road attract huge volume of vehicles especially during peak hours. Existing on-street parking are not able to carry this much number of vehicles.

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In majority of commercial area the percentage of long term parking varies from 40 percent to 60 pecent which cause to low space for visitors to park over there area. These situations make confusion for visitor and reduce speed of vehicles which create further congestion.

X. PARKING MANAGEMENT MEASURES

By increasing vehicle growth demand for parking area also has increased. This conditions more dominant in CBD area because CBD area is more crowded and congested and parking infrastructure supply is absent and the road infrastructure is not wide enough to sustain on-street parking.

Long term parking especially in front of private owner shops varies from 40 percent to 60 percent which reduce the capacity of roads and remain little space for visitors. The central core has become congested due to the commercial areas around it, at Devaraja Urs market, Lansdowne Building etc. and there is an intermixing of daily traffic, commercial traffic and tourist traffic adding to the congestion. Moreover, there is no space around this area for organized parking and all the roads and street are occupied by on-street parked vehicles and Tonga's. The city bus stand is operating from just beside the palace, adding to the congestion. Providing multi-level car parking is required to carry these much as vehicles which aims to be developed at Town Hall, Palace. The parking structures must provide requirements as follow:

a) The parking must facilitate public transport.

b) The parking lots should improve off – street and removal on - street parking

c) Parking should support and facilitate cycles.

d) Parking must facilitate private vehicles such as 2 wheelers and four wheelers.

e) Parking should locate in different parts of city to facilitate non-motorized and motorized transport.

Strategies:

By considering to increasing motor vehicle ownership in urban area, the demand for vehicle parking especially in central part of city has become unavoidable. Due to the recognition of central core of Mysore as heritage zone and increasing land value in the city centre, the widening of the streets for contemplating vehicle parking spaces is a less choice of the local self-government. To address the parking problems, recommended strategies are as following:

1. Improve Public Transit Service and Encourage Transit Ridership:

- Improving urban bus services (feeder bus services, express bus services)
- Increase service - more routes, increased frequency, and longer operating hours
- Develop integration between different modes of public transport.
- Providing comfortable services, such as reduced crowding, providing appropriate seats and cleaner vehicles.
- Lower fares , and more convenient fare payment (such as electronic smart cards)
- Providing safety for travelers.
- Multimodal access guides that includes maps, schedules, contact numbers and other information on how to reach a particular destination by public transit for tourists to prevent ineffectual intercity trips.

2. Create integrated zone for public transportation within core of city.

3. Assess potential of city to develop different modes of transportation and increase public transportation share and in result reduce personal vehicle traffic congestion.

4. Parking Fee may be levied and both on-street and off-street parking. Long hours parking to be discouraged and heavy parking fee for long hour parking to be levied.

5. Constructing multi-level car parking (**MLCP**):

On-street parking and traffic congestion are mutually inclusive. The land use and vehicle traffic analysis after the suggestions made over the multilevel car parking in CBD is to be considered over the government lands beyond the suggested locations; making the MLCP to utilize suitable maximum capacity of carriage way and improve speed traffic movement. Multi-level car parking system can be underground, above ground or both under and above ground. Positioning and multilevel parking construction has important role in reduce traffic, savings fuel, reduce air pollution, Acceleration and ease in urban transportation.

XI. CONCLUSION

In this paper, a study was made for the existing parking scenario in central core of Mysore city, and the land use pattern, register number of vehicles, the service level of parking and automobile growth rate in city were reviewed. For which the proposals to solve parking problems in central core of Mysore city using modals were suggested in the different case studies, The most obvious working model for the context would be the multilevel car parking system as the plot area requirement for a multilevel car parking system is also less than a typical conventional car parking system.

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