

FINAL
PRE FEASIBILITY REPORT
FOR
DEVELOPMENT OF MULTI LEVEL CAR PARKING FACILITIES
ON PPP FORMAT IN CITIES OF KARNATAKA
TO



INFRASTRUCTURE DEVELOPMENT DEPARTMENT

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SUBMITTED BY:

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I. Introduction

1.1. Background

Infrastructure Development Department (IDD), Government of Karnataka is the Infrastructure arm of the government of Karnataka (GoK) with the objective of facilitating / developing infrastructure projects across the Karnataka State.

The IDD on discussions with project advisors empanelled with the department, including **KSIIDC-IL&FS Project Development Company (KIPDC)** has identified a pipeline of infrastructure projects to be taken up across the State. For optimum utilization of the State Government's fund resources, the IDD has proposed to explore the development of the projects identified on Public Private Partnership (PPP) basis.

The IDD recognizes that depending upon the location and other location specific issues, projects at some locations may not be financially viable or attractive to developers for development on PPP basis. IDD also recognizes that certain projects may require Viability Gap Funding (VGF) or other State / Central support.

The IDD has proposed to carry out Pre-feasibility Studies for the set of projects identified for development across multiple locations within the State. While the objective of the Pre-feasibility Study would be to assess the broad project viability for development on PPP basis and to segregate the project that would require VGF or other State / Central support, the IDD has agreed in principle to mandate the project development of the viable projects identified to the advisory agency doing the project pre-feasibility on single source basis at "no cost basis" to IDD. A project success fees as agreeable to IDD would however be permitted to be charged and recovered from the selected developer for the project.

The project development for projects requiring VGF would be bid out based on Ministry guidelines. The advisory agency that carried out the project pre-feasibility study would be eligible to participate in such bids.

Vide **letter No. ID/89/ITS/2008[Part-I] dated 18th March, 2009**, the IDD has mandated KIPDC to undertake the Pre-feasibility study for "**Development of Multi Level Car Parking Facilities on PPP format for Major cities in Karnataka**"

1.2. IDD's Objective

IDD's objective towards preparation of the Project Pre-feasibility is:

- To explore the possibilities of development of the projects identified on Public Private Partnership (PPP) basis
- To assess the preliminary project viability for development on PPP basis and to segregate the project that would require VGF or other State / Central support
- To identify the project stakeholders including the project sponsoring department and advice them on taking up the projects
- To explore project viability for implementation in multiple cities on a replicable model
- Mandate the viable projects to the respective project advisors for project development
- Development & time bound implementation of all projects of the government with private sector investment
- Development, operations and maintenance of the projects in a planned manner with modern amenities and requisite supporting infrastructure by reputed developers without utilizing Government resources of manpower, funds, etc
- To structure a viable and bankable project amenable for PPP and explore project funding through Private Sector Developer
- To expedite project implementation by leveraging private sector efficiency

1.3. Role of KSIIDC-IL&FS Project Development Company (KIPDC)

The Role of KIPDC while carrying out the Pre-feasibility Studies has been to:

- Conduct project pre-feasibility study for development of the proposed project on PPP at the identified locations and include the project concept, need for the project at the location, preliminary market / demand assessment, broad financial feasibility / viability, implementation framework, recommendation of nodal agency for the project at individual locations, role of nodal agency & IDD and way-ahead.
- The Pre-feasibility essentially focuses on the viability of the project on PPP with / without State / Central Govt. support, segregation of projects / locations requiring VGF support and project development approach for projects proposed to be taken up for project development by KIPDC.

- The Pre-feasibility study has been carried out with location analysis and assessment of viability for development at multiple locations across the State.

1.4. Approach & Methodology

Activities required to be carried out by KIPDC would include:

- Development of project concept
- Desk study for location(s) analysis, review of statistic / data already available
- Interact with the head of respective Department / Deputy Commissioner
- Co-ordination for correspondence by KSIIDC / IDD with respective Deputy Commissioner's for additional information, shortlisting of locations, etc
- Preliminary project structuring and viability assessment
- Summarizing of the Pre-feasibility assessment in the form of a report alongwith recommendation to KIPDC / IDD
- Preparation of requisite presentations to IDD

As a part of the project documentation, KIPDC would submit the following to IDD:

- 1) Inception
- 2) Draft Pre-feasibility Report
- 3) Presentation on Draft Pre-feasibility Report
- 4) Final Pre-feasibility Report
- 5) Presentation on Final Pre-feasibility Report

II. Infrastructure in Karnataka

2.1 Overview

Karnataka has emerged as one of India's fastest growing states with respect to parameters of GDP and GDP per capita, in addition to being the most economically progressive states. The per capita income during 2007-2008 stood at US\$ 942. The state has been the forerunner in the IT/ITeS space owing to an appropriate ecosystem for knowledge-driven industries including proactive government, sector-friendly policies and a large pool of skilled manpower, with Bengaluru being amongst the five largest technology hubs in the world.

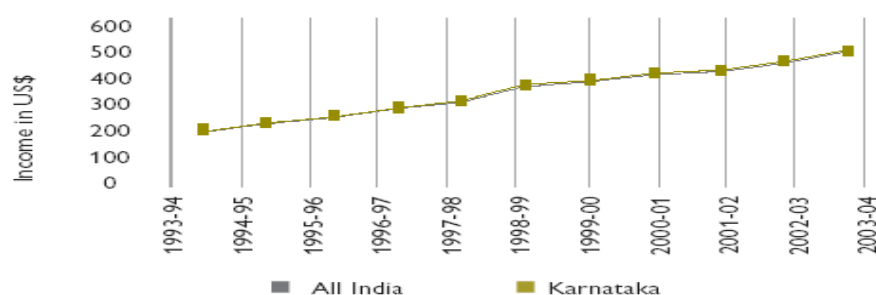
Located in the southern part of India, Karnataka has a population of 52.85 million (as per 2001 Census), making it India's ninth most populated state.

Divided into 29 districts, it occupies an area of 191,791 sq km, accounting for about 5.83 per cent of India's geographical area. The state is bordered by the Arabian Sea to the west, Goa to the northwest, Maharashtra to the north, Andhra Pradesh to the east, Tamil Nadu to the southeast, and Kerala to the southwest. The administrative and financial capital of the state is Bengaluru, which together with Hubli-Dharwad, Mysore, Gulbarga, Belgaum and Mangalore, is among the large cities in the state in terms of population.



The total gross state domestic product (GSDP) of Karnataka in 2007-2008 was about Rs. 2152.82 billion (US\$ 51.25 billion) during which period the GSDP grew by seven per cent.

Per Capita Income in Current Prices



Bengaluru, Mysore and Mangalore are three major cities of Karnataka and home to over 40 per cent of the urban population in the state.

- **Bangalore** – largest urban metropolis of the state
- **Mysore** – emerging as an alternative destination to Bangalore in service and tourism sectors
- **Mangalore** with its ports presence of – ports, educational institutes, hospitals and banks it's fast emerging economy in services, logistics and manufacturing.

Cities	Average Annual Household Income (\$)	Average Annual Household Savings (\$.)	Households Electrified (%)	Internet Users (Nos.)	Households with Four Wheelers
Bengaluru	211	84	95	579,000	10%
Mysore	180	58	93	91,000	9%
Mangalore	180	50	91	95,000	6%

Source: City Skyline Date, E&Y Analysis

The government of Karnataka is promoting the growth of SEZs, with several sector-specific SEZs, e.g., for pharmaceuticals and biotech, food processing and agro- based industries and processing clusters, besides a textile SEZ at Hassan and coastal SEZ at Mangalore. Karnataka is among the top five industrialised states in the country. It was the first to introduce a State Industrial Policy in 1982-1983, offering subsidy of up to US\$ 0.2 million for setting up of an effluent treatment plant in any area.

Karnataka also leads the nation in biotechnology. It is home to India's largest bio cluster, with 158 of the country's 320 biotechnology firms being based here. Karnataka has a headcount of over 6,800 scientists involved in biotech research. The state also accounts for 75% of India's floriculture, an upcoming industry which supplies flowers and ornamental plants worldwide.

Seven of India's leading banks, Canara Bank, Syndicate Bank, Corporation Bank, Vijaya Bank, Karnataka Bank, Vysya Bank and the State Bank of Mysore originated in this State. The coastal districts of Udupi and Dakshina Kannada have a branch for every 500 persons - the best distribution of banks in India. As of March 2002, Karnataka had 4767 branches of different banks with each branch serving 11,000 persons, which is lower than the national average of 16,000.

Karnataka is the manufacturing hub for some of the largest public sector industries in India, including Hindustan Aeronautics Limited, National Aerospace Laboratories, Bharat Heavy Electricals Limited, Indian Telephone

Industries, Bharat Earth Movers Limited and Hindustan Machine Tools, which are based in Bangalore. Many of India's premier science and technology research centers, such as Indian Space Research Organization, Central Power Research Institute, Bharat Electronics Limited and the Central Food Technological Research Institute, are also headquartered in Karnataka. Mangalore Refinery and Petrochemicals Limited is an oil refinery located in Mangalore.

Providing world class infrastructure in the State is one of the next initiatives of the Government of Karnataka in order to keep its pace with the growing Cities in the State.

2.2 Transport Infrastructure in the State

Karnataka has 3,843 km of national highways (NH), 28,311 km of state highways (SH) and 19,801 km of district roads. The state is well connected to six neighbouring states and other parts of India through 14 NHs, which account for six per cent of total NH network in India. The district centres are connected to each other with 114 SHs. The total road network of NH, SH and district roads is about 52,000 km.



The Civil Aviation Sector has seen tremendous growth with international air passenger traffic growth of 50% and domestic air passenger growth at 44%

during 2006-07. As regards cargo traffic, the State airports handled 1.66 lakh ton of freight during 2006-07, a 19% increase over the previous year. Karnataka has airports at Bangalore and Mangalore, Hubli, Belgaum, Hampi and Bellary with key international operations from Bangalore and Mangalore airports. Airports at Mysore, Gulbarga, Bijapur, Hassan and Shimoga are under implementation.

New Bangalore International Airport developed under a Public Private Partnership framework at Devanahalli, in the outskirts of Bangalore started operations in May 2008.

Karnataka has a railway network with a total length of approximately 3,089 kilometres (1,919 mi). Until the creation of the South Western Zone headquartered at Hubli in 2003, the railway network in the state was in the Southern and Western railway zones. Several parts of the state now come under the South Western Zone, with the remainder under the Southern Railways. Coastal Karnataka is covered under the Konkan railway network which was considered India's biggest railway project of the century. Bangalore is extensively connected with inter-state destinations. However, intra-state rail connectivity, especially on the key lines for passenger and freight movements, needs to be augmented.

The Karnataka State has a maritime coastline of 155 nautical mile (300 kilometers) and has only one Major Port at Mangalore i.e. New Mangalore Port and studded with 10 minor ports of the State are Karwar, Belekeri, Tadri, Honnavar, Bhatkala, Kundapur, Hangarkatta, Malpe, Padubidri and Old Mangalore. Out of 10 ports Karwar is the only all weather port while the other nine are the reverine anchorage lighter age ports. All these ports have handled a total carago of 6573 thousand tonnes in 2006-07.

The New Mangalore port was incorporated as the ninth major port in India on May 4, 1974. This port handled 32.04 million tonnes of traffic in the fiscal year 2006-07 with 17.92 million tonnes of imports and 14.12 million tonnes of exports. The port also handled 1015 vessels including 18 cruise vessels during the year 2006-07.

2.3 Initiatives in Urban Infrastructure

The growth of urban population in India has been extremely rapid. While the total population in India has grown by about 3.5 times in the last century, its urban population has increased almost 9 times over the same period. The increase in the number of million plus cities has particularly been striking. The number has increased from 1 in 1901 to over 50 by the end of Century. The

urban population of India is project to be 538 million by 2021, i.e. about 37% of the Country's total population.

Karnataka too faces the challenge to sustain high growth while also improving its Human Development. The four strategic development challenges facing Karnataka are:

- to remain one of India's fastest growing states.
- to move from an average to a high-performing state as measured by the Human Development Index
- to maintain rapid agricultural growth, while reducing the risks faced by the rural community
- to enable north-east Karnataka to catch up with the rest of the state.

Average annual growth rates of Income and Per Capita Income in real terms for all India and major states of India

State	Annual Average Growth Rates (%) during 1999-00 to 2006-07		Per Capita income at Current prices 2006-07 (Rs)	Rank
	Income	Per Capita Income		
Andhra Pradesh	10.9	9.7	29582	8
Assam	9.0	7.4	20166	12
Bihar	10.1	8.0	9702	15
Gujarat	12.5	10.5	37532	4
Haryana	13.7	11.3	49038	1
Karnataka	10.0	8.6	30847	7
Kerala	9.4	8.3	33609	5
Madhya Pradesh	6.5	4.6	16578	13
Maharashtra	10.6	8.8	41331	2
Orissa	11.2	9.9	20240	11
Punjab	8.7	6.9	40566	3
Rajasthan	8.7	6.5	20492	10
Tamil Nadu	8.8	7.9	32733	6
Uttar Pradesh	8.3	6.1	14649	14
West Bengal	10.3	9.0	28753	9
All India	11.2	9.4	29642	

Source : 1. Karnataka : Directorate of Economics and Statistics, Government of Karnataka

2. All India and other States: Central Statistical Organisation, Government of India

Having recognised that with Karnataka having ranked 7th in the Country for growth rates for Income and Per Capita Income, the expectations for infrastructure by its population especially that of urban population would be equally higher, the State aims at providing world class urban infrastructure to its population. The same is identified as one of the key drivers to the uniform growth of the State and its cities in a sustainable manner. Hence, the Government of Karnataka has been taking several initiatives to keep itself at

pace with the growing cities and their infrastructure needs with its focus primarily on providing:

- Primary Education
- Health Awareness Programme
- Drinking water
- Roads & Street Light
- Under Ground Drainage and Sanitation
- Solid Waste Management

With the above objectives, the State Government has also initiated several schemes / programs with the objective of creating quality infrastructure including the projects like,

Under Karnataka Urban Infrastructure Development Finance Corporation (KUIDFC):

- Completed
 - ADB assisted Karnataka Urban Infrastructure Development Project (KUIDP)
 - Centrally sponsored Mega City Scheme
- Ongoing
 - ADB assisted Karnataka Urban Development and Coastal Environmental Management Project (KUDCEMP)
 - World Bank assisted Karnataka Urban Water Supply Improvement Project(KUWASIP)
- Proposed
 - ADB assisted North Karnataka Urban Sector Investment Programme (NKUSIP)
 - World Bank assisted Karnataka Municipal Reforms Project (KMRP)

Other Projects

- Greater Bangalore Water and Sanitation Project (GBWASP)

The State Government has also been effectively seeking the assistance under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) for the developments of its JNNURM classified cities.

While there is a lot done, the need for doing a lot more in providing basic urban infrastructure needs has been noted by the Government of Karnataka. Considering the same, the State Budget 2009-2010 has identified the

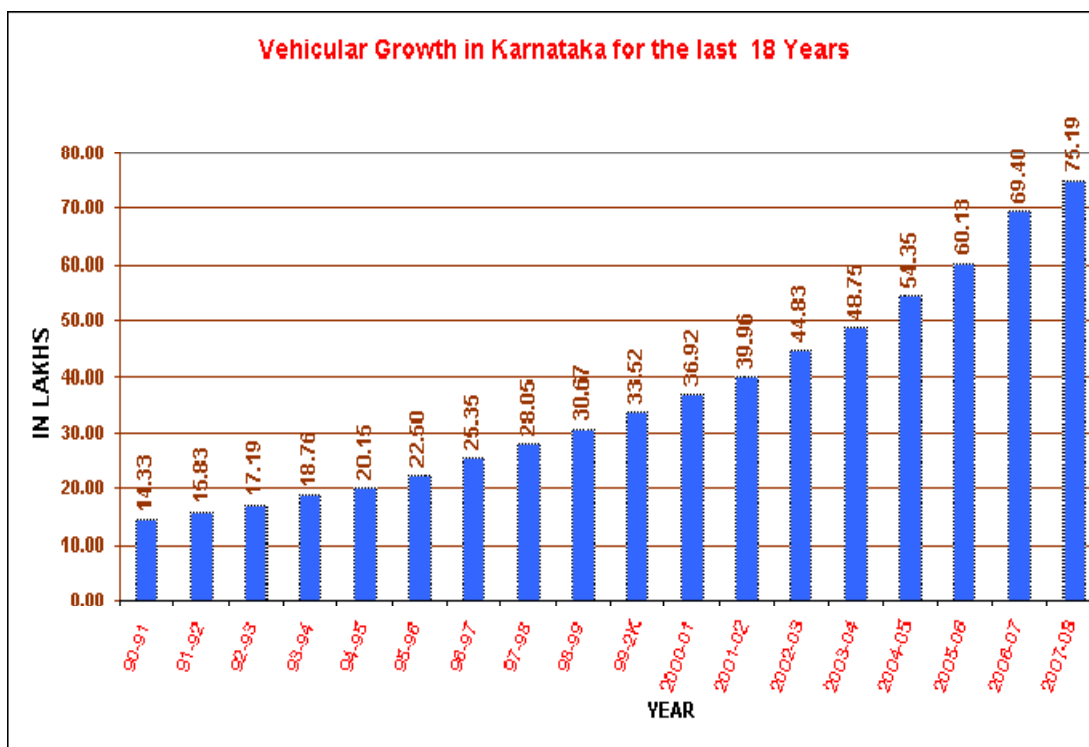
development of Urban Infrastructure as the one of the Priority Sectors and has earmarked Rs. 7,367 Crores (approx.) for the development of the same including that for Bangalore City.

Keeping in mind its objective to remain as one of India's fastest growing States, the State Government also looks forward in providing other world class ancillary infrastructure and services viz: parks, urban recreational and entertainment facilities, community centers, parking plazas, markets, pedestrian tracks, foot over bridges, etc that would help developing all its cities in a sustainable manner.

2.4 Traffic & Congestion Scenario in growing Cities

Most cities are characterized by high densities, intensely mixed land use patterns, short trip distances and high share of walking and non motorized transport. The spatial spread of most cities has been changing and comprise of the old core areas (usually congested) and the land use mixed. Most cities also have the central core and more than one Central business District (CBD).

The cities of Karnataka are no different in their pattern of spread. With the rising number of vehicular population alongwith the city's growth and rise in per capita income, high volumes of vehicular traffic and congestion is presently the focus for attention in most tier –II cities.



In a city like Bangalore, the growing number of immigrants and the pressure on transportation systems, travelling 10 kms within the city could just take more than 90mins.

The key causes of traffic congestion in cities are as below:

- **Increasing private vehicles & rickshaws**
- **Parking**
- Jaywalking/Cattle & Stray dogs
- Vehicle Breakdown
- Accidents
- Potholes/ Under Construction activities & repairs
- Lack of Driving Discipline

Car sales, close to 8 lakh units a year, are growing at an average rate of 10 per cent while two-wheeler sales at 5 million are expected to grow 14-15 per cent. In order to accommodate the large volume of vehicles, cities and towns must develop their infrastructure - roads, flyovers, car parks and other facilities. Otherwise their arteries are most likely to get clogged.

With limited scope for road widening, providing signal free and smooth flowing traffic especially in CBD areas is a concern that most cities in Karnataka desire to address. A consequence to the inflation in the traffic scenario, number of vehicles in cities & unplanned urbanization has led to congestion. Hence, a decongestion programme backed by a systematic development plan in basic infrastructure is required.

Number of motor vehicles under different categories 2005-2006 to 2008-09

Item	2005-06	2006-07	2007-08	(000s)
				2008-09 (31-10-08)
1. Motorcycles	4512.91	4972.75	5269.31	5703.51
2. Motorcars	635.21	731.27	774.07	874.21
3. Jeeps	41.99	45.16	45.34	46.12
4. Auto rickshaws	213.72	242.69	248.93	268.21
5. Omnibuses	54.81	66.19	68.38	75.89
6. Motor cabs	39.29	49.68	57.65	61.38
7. KSRTC buses	30.22	34.08	36.47	19.70
8. Private buses	9.80	8.22	7.35	8.18
9. Goods carriages	219.20	247.29	254.12	286.78
10. Tractor	166.69	195.78	209.66	221.25
11. Trailers	167.62	185.80	200.15	208.02
12. Others	128.91	160.80	164.00	251.90
Total	6220.37	6939.71	7335.43	8025.15

Source: Motor Vehicles Department

One of the solutions to decongest roads and solve parking problems may be a multi-level car parking system to maximise car parking capacity by utilising vertical space, rather than expand horizontally.

III. The Project Concept

3.1 Background

Karnataka is one of India's most rapidly urbanizing states; its capital city of Bangalore is known as the Silicon Valley of India. Enormous growth in business opportunities, as well as rising urban populations and incomes has led to strong demand for better infrastructure and services.

In tune with India's progress, the state of Karnataka has played an important role in various spheres. The per capita income of Karnataka has more than doubled in the last 50 years. In the post-1991 era, Bangalore has emerged as the "Destination City" for fresh investments, gaining the reputation of being the "Silicon Valley of India." At present, there is cause for optimism due to the favorable industrial climate of Karnataka and its human resources. Karnataka contributes a significant portion to India's export of coffee, silk, electronic hardware, computer software, and readymade garments. The state is also a major producer of spices, flowers, fruits and vegetables. Recently, Karnataka has successfully attracted investment in the biotechnology industry.

The state houses several industries like information technology, electronics, biotechnology, aerospace, apparel, automobiles, mining, and cement. The state has been a major receiver of foreign direct investment (FDI) of Rs.7,575.71 crore which is 7.45 percent of India's FDI. This is clear from the fact that the state houses many of the *fortune* 500 companies. The state is currently witnessing a boom in the construction sector, which is an indicator of the economic dynamism of the state. Karnataka's capital, Bangalore, has emerged as the leading global hub of technological innovations in the world, especially in IT-related fields.

Currently, the industrial sector of the state is in great boom. The major industrial sectors are registering high growth as a result of the economic reforms. For example, Indian automobile industry had a growth of 16.49 percent during 2005-06 and the Karnataka government decided to give more priority to this industry with all financial support. The electronics industry in the state has also witnessed an increase in the net sales by 15.7 percent and PAT by 30.42 percent in 2005-06. Karnataka, which is considered to be an IT hub of India and Asia, has seen a growth of 36 percent in 2005-06 in total IT/ITES

exports from India. Engineering and steel industries have also had a good growth contributing a major share to the national gross domestic product. All these developments in the industrial sector have proved to be favorable for the economic growth of the state.

Increasing population places heavy demands on urban infrastructure and services in the state. Despite these problems, Karnataka has the potential to lead the country in the information and biotechnology sectors. Karnataka has some inherent advantages to grow in the information technology field, like the availability of a large pool of skilled human resource, which was made possible by the presence of a large number of engineering and other educational institutes, single-window clearance system, and good climate. In recent times, in the light of the adverse reports on the infrastructure situation in the state, the Government of Karnataka has been giving top priority to infrastructure projects. Rather than depending solely on Bangalore for information technology development, the state has been developing new hubs/centres like **Mysore, Belgaum, Hubli-Dharwad, and Mangalore.**

This proactive approach of the State has in effect opened up new corridors for growth and development - thus offering investors many more options. Some of the stated development and initiatives from the Karnataka Government that are envisaged to increase the concentration of population in Tier 2 cities of the state:

- The 'Karnataka Vision 2025' states: To enable balanced development of the state and a more equitable distribution of economic activities, creation of world-class infrastructure (power, water, sanitation/waste disposal, highway access, local roads, rail & air access) is essential at multiple urban locations. The government should invest in such infrastructure at "Tier-2 cities" such as Mysore, Mangalore, Hubli-Dharwad, Belgaum, Bellary, Raichur, and Gulbarga.
- To give a thrust to the new government's policy of developing tier II and tier-III cities as magnets for technology companies, the IT industry is asking for a special investment of Rs 500 crore each in Mysore and the port city of Mangalore in three years.
- The Karnataka Government has urged IT companies to shift to other Tier II cities in Karnataka like Mysore, Mangalore, Hubli and Gulbarga. Some of the companies like Infosys, Wipro, Mphasis have all set up units in Mysore,

Mangalore, but the focus need to also shift to other cities like Hubli, Hassan, Gulbarga to see an overall development throughout the Tier II cities of the state.

- The Karnataka state government initiated the idea for a high speed passenger corridor that'll connect Bangalore-Hubli in 2 hours, Bangalore-Mysore in 40 minutes. This will perhaps give stimulus to Hubli and Mysore, by increasing connectivity, so that they can develop as economic centers and act as meaningful alternatives to Bangalore.

The central government has an aspiring industrial corridor plan & under the Delhi- Chennai industrial corridor. The main aim of this corridor is the overall industrial development and ease in logistics. 100 acres at Halga on the NH 4 has been reserved for Agri Food processing. 70 acres already allotted for a Textile park in Waghvade on the Belgaum – Khanapur road.

These Industrial corridors would observe immense growth in population and infrastructure in the coming years.

- An Integrated IT-BT-Health city is envisaged for the twin cities of Hubli-Dharwad to be set up under a public-private partnership. For the northern cities of Belgaum and Gulbarga, it wants 'electronic cities' which will help generate large-scale local employment for business process outsourcing companies.

The major cities of Karnataka are undoubtedly one of the fastest growing cities in Asia and also one of the most sought after cities in India by people, companies, multinationals and tourists. The massive growth that the cities have witnessed in the last decade is a clear indication of these cities being developed to be at par with the most modern cities in the India. The population of urban cities in Karnataka has grown enormously; foremost being Bangalore city.

Mysore, Mangalore, Hubli, Dharwad, Belgaum, Gulbarga and Bellary have been identified to be the next emerging and fast developing cities other than Bangalore in Karnataka.

3.2 Need for Multi Level Parking Facilities

The existing road network in Bangalore can accommodate only 10 lakh vehicles whereas there were 31 lakh vehicles in the city as on December 2007. While

there is limited scope to widen the roads, around two lakh new vehicles hit the road annually in the city.

With several other initiatives of the State Government for uniform development of the tier II cities of Karnataka, the Urban Local Bodies (ULBs) have also been gearing themselves to keep pace with the rapid growth of the cities and provide sufficient urban infrastructure in time. While the priorities of these ULBs is to provide basic infrastructure viz: Water & Sanitation, Roads, etc., the local bodies aspire to parallel develop other urban facilities.

Taking cognizance of the limited resources and the utilization of the State's budgetary provisions towards priority works, the ULBs often fall short of resources for providing other requisite infrastructure.

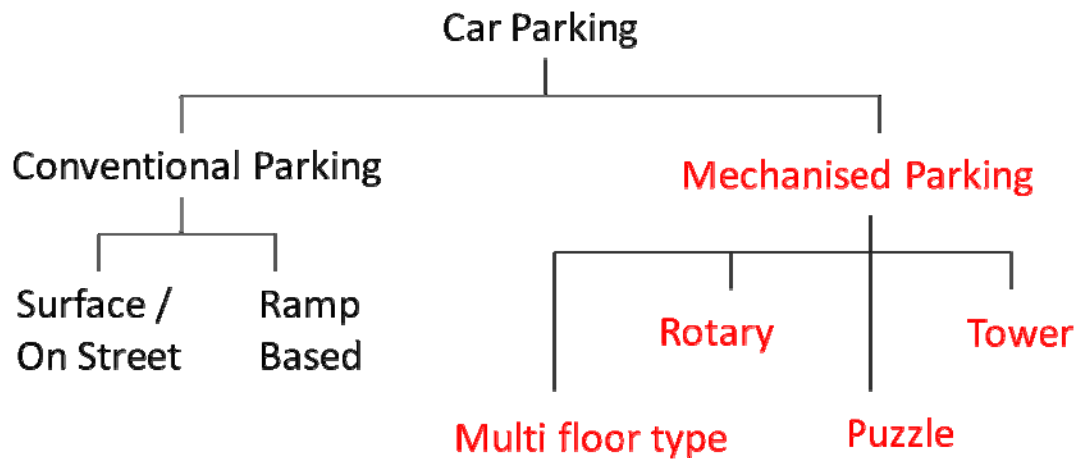
As mentioned earlier, with the growth in trade and commerce in the region, the number of vehicles has grown sharply. The above mentioned cities attracts substantial amount of cars and two wheelers. The absolute number of vehicles in Karnataka has increased from 3.06 lakhs in 1951 to 80.25 million in 2009. The vehicle population has been steadily increasing with the pace picking up significantly since the Eighties. Increase in vehicle population in the face of the limited road space used by a large variety of motorized and non-motorized traffic has heightened the need and urgency for a well-thought-out policy on the issue of road safety and congestion.

Though there are parking lots available in these cities, the capacity of the parking lot is not sufficient to cater to the present demand and at the same time the location of the parking lot is questionable. In the absence of adequate parking facilities, the vehicles are parked on the side of the street leading to a major bottleneck in the smooth flow of traffic. In addition, high population density, **large number of pavement hawkers, sidewalk encroachments, heterogeneous nature of traffic and commercial area development along all the major roads** have compounded the problem of congestion on the main as well as internal roads of these cities. Since there is no planned parking space available within these cities, currently, the ULB and the city traffic police allow parking of passenger vehicles on the side of the road thereby eating away a sizeable portion of motorable road.

The precious time of citizens is wasted due to traffic jams and if this problem is not solved at this stage, and then it would become a serious and complicated problem in future. Multi-level parking lots at strategic places and a rational parking fee are inevitable for solving the problem of finding parking space for the growing number of vehicles.

3.3 Solution for Parking Crises

The Equivalent Car Space (ECS) that can be accommodated at the parking site would vary with the technology used. There are two basic technologies available for multilevel parking, which are briefed in the following paragraphs



3.3.1 Conventional Multilevel:

Conventional multilevel parking system can be underground, above ground or both under and above ground structure. The above ground structures are usually Open-deck parking structures, which typically have at least two sides that are minimum 50 percent, open to the outside. The open parking structure is preferable to enclosed structures for above ground, as it does not require mechanical ventilation and specialized fire protection systems.



The design for conventional multilevel parking include

- entry and exit ramps and/or car lifts
- aisle/circulation space between vehicles
- car park area

3.3.2 Automated Multilevel:

As against cars being driven (on ramps) or carried (in car lifts) to different levels in conventional multi-level parking, cars are driven at only one level for parking or retrieval. Cars are parked in steel pallets and a target pallet comes up or down to the driveway level at the press of a button, for parking or retrieval. Technologies used for automated parking systems are of the following five types:



➤ Puzzle type or Modular



This system can have more than two levels of parking. It's design has a structure that enables use of all parking entrances and exits on ground level. The parking pallet moves left, right, upward, and downward and has always a minimum of one empty slot for

movement. Car parker can have multiple levels above, pit style below, or a combination of both.

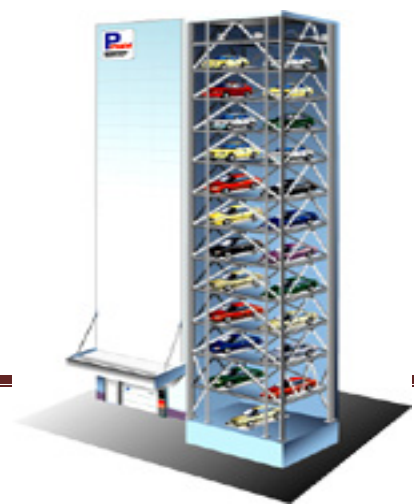
Cost: Rs. 2.5 lakhs/ECS

Advantages:

- Operation is simple, no need for parking attendant.
- Fast retrieval time, generally within two minutes
- Extremely safe and reliable with safety sensors and optional automatic gates.

➤ Elevator type or Tower

The elevator type often called the Parking Tower, is designed to automatically move the vehicles on a pallet vertically on the elevator, it then transfers it horizontally left or right for storage. Very fast retrieval



time is accomplished in less than two minutes. This system is suitable for medium or large scale buildings. It can also be used as a stand alone tower for a parking garage business. Since it is controlled by an integrated computer system, the overall operation can be viewed with one screen and its operation is very user friendly.

Cost: Rs. 2.75 lakhs/ECS

Advantages:

- Minimal land use. An area of 25'x22' can park up to 72 vehicles.
- Low noise and vibration. Elevators never touch guide rails, use of urethane rollers minimize noise when transferring pallets from elevator to storage area.
- Entry and exit is very quick and convenient. We incorporate a built in turntable on the elevator and retrieval time is less than two minutes.
- Completely equipped with multiple sensors and triple safety devices. A self malfunction diagnostic control provides you with an excellent level of safety.
- Has the capability of holding cue memory when multiple patrons come to retrieve there vehicles during rush hours.

➤ **Multi floor parking type**



The Multi-Parking system has been designed to automatically move the vehicles by lift which then transfers it to a waiting cart on one of the multi- levels. The carts then travel horizontally and place the vehicle in its appropriate slot. This system is suitable for middle and large-scale buildings as well as independent public parking garage.

The multi-parker can accommodate as little as 20 vehicles to several thousand units. It is therefore suitable for large scale projects. It can move more than 2 vehicles at the same time for maximum efficiency.

Cost: Rs. 3.5 lakhs/ECS

Advantages:

- Because each elevator and cart is operated independently on each level, entry and exit is quick. Retrieval time of a vehicle is less than two minutes.
- Low noise and vibration. Elevators never touch guide rails, use of urethane rollers minimize noise when transferring pallets from elevator to carts and then to parking slot.
- Entry and exit is very quick and convenient. We incorporate a built in turntable on each elevator.
- Completely equipped with multiple sensors and triple safety devices. A self malfunction diagnostic control provides you with an excellent level of safety and reliability
- Has the capability of holding cue memory when multiple patrons come to retrieve their vehicles during rush hours..

➤ **Multi floor parking type-circulation**

After entering the vehicle in the parking garage, the parking system is designed to move the vehicles vertically with elevators on each end. The garage consists of several levels where the vehicles are moved horizontally which rotate the pallets in conjunction with the elevators.. The multi floor circulation type is suitable for small and mid-sized buildings because of its high space efficiency.



Cost: Rs. 3.75 lakhs/ECS

Advantages:

- With eight times the space efficiency of a ramped garage, this system can use the narrow basement spaces to its maximum capacity.
- Up to six levels can be equipped with this new technology.
- With the adoption of the high speed lifting mechanism, the elevating speed has become very quick, thereby significantly shortening the time required for entering and leaving.

- With the upper entrance design, it is convenient because the built-in turntable allows for easy entry and exit.

➤ Rotary type

The perfect solution to park the maximum number of cars in the least amount of space. The design enables you to park either 7,8,10, or 12 vehicles in the space of only 2. There is no need for a parking attendant, just insert the key and press your parking space number and the pallet will rotate either clockwise or counter clockwise. It will automatically sense which way to rotate by space number.

Cost: Rs. 1.75 lakhs/ECS

Advantages:



- Up to 12 vehicles can be accommodated within the space normally taken up by two vehicles.
 - It is not applicable by the regulations of building coverage.
 - There is no need for an attendant because of its simple one-touch operation method.
 - Senses where vehicle is closer and rotates bi-directionally for fast retrieval time.
- Extremely safe and reliable. Impossible for vehicles to fall with endless chain and pallet drop prevention system.

3.3.3 Advantages of Automated Multi Level Car Parking System

- accommodates maximum cars in minimum space
- Reduces parking and retrieval time. Saves time spend in searching for empty parking slots and time spend is searching the parked car. Retrieval on average is 2 to 3 minutes
- Cost effective in terms of maintenance over the conventional parking systems.

- Provides improved security, safety for the cars. Cars parked are free from theft and damages that can be caused while parking and retrieving.
- Drivers collect their cars from secure waiting areas; thus they do not have to walk through a car park alone and are less vulnerable
- Environment friendly. As the car engines are shut during the automatic parking process there is no pollution.
- State of the art modular design makes the system look very attractive.

3.3.4 Technical specifications for proposed development:

Technology is available in two types i.e., Hydraulic and electro mechanical systems. The suitable options in automated multi level car parking can be chosen based on the site conditions, budgetary constraints, traffic scenario, capacity, etc

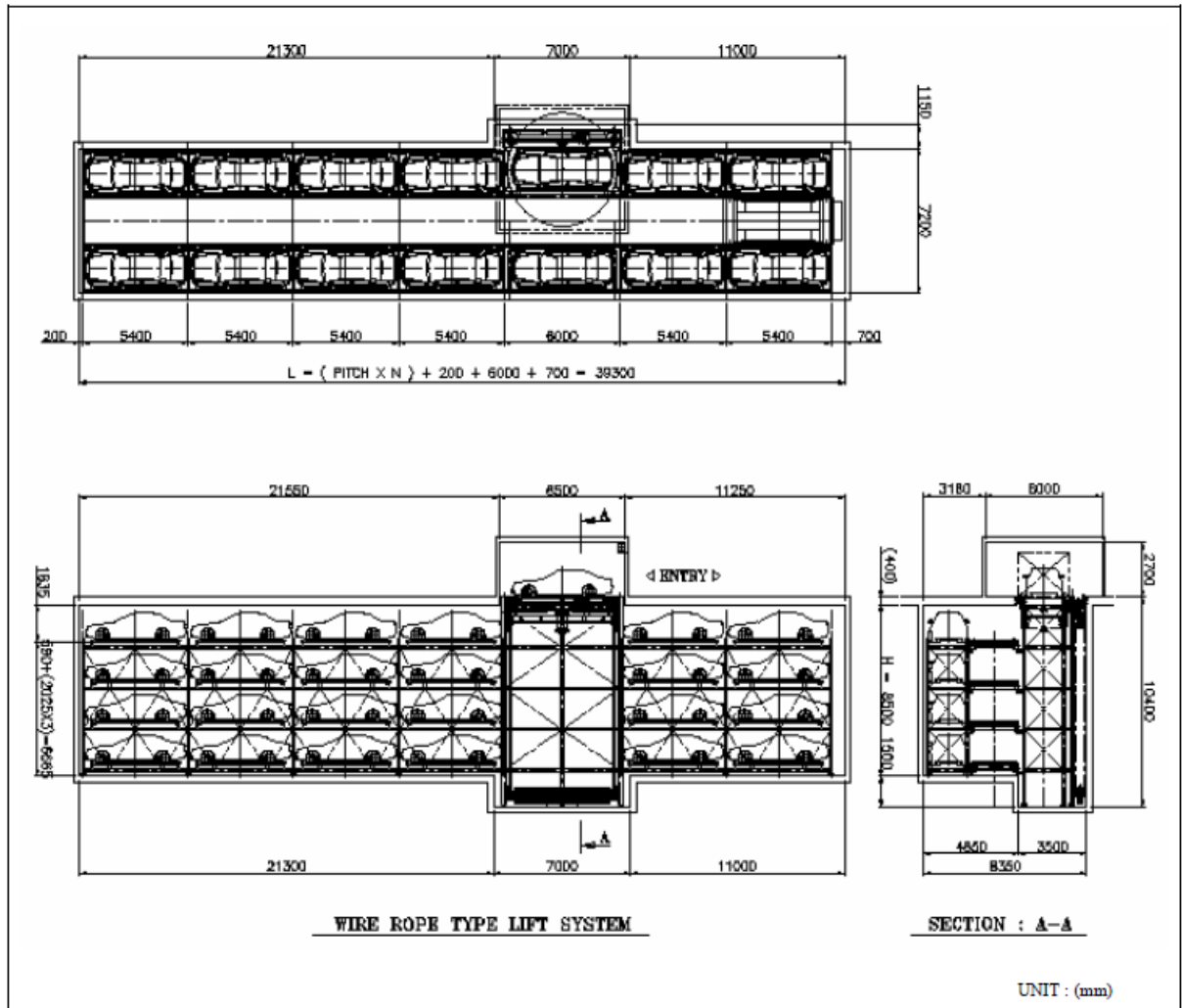
3.3.4.1 Lift Type

Hydraulic type

A hydraulic cylinder is used to operate this type of lift. Due to the limited length of the cylinder, however, the hydraulic type of lift is limited in terms of height. It is generally appropriate for the parking systems with less than four levels. The hydraulic type of lift requires less pit area and no balance weight, and features a quiet and stable operation.

Wire rope type

The wire rope type of lift provides fast operations and features an extended elevation height that is taller than that of the hydraulic type. It is suitable for parking systems with more than four levels. However, this system requires more pit area than the hydraulic type since the balance weight should be secured.



Legend

Mark	Explanation	Reference
L	Interior wall dimension	
Pitch	Pallet interval	Please consult regarding the dimensions of large vehicles, since they differ from standard specifications
N	Number of pallet rows	
H	Minimum height for parking system installation	Height from the bottom end of the beam or slab to the top of the floor

Features

This system can be installed in more than two locations by adding lifts. The sizes and formula in the above drawing are drawn based on the storage capacity. They should be used in the architectural design for reference.

3.3.4.2 Level Parking System

The level parking system is commonly used for medium to large buildings due to its superior space efficiency. It is designed to supplement multi-level parking spaces with vertical and horizontal directions to facilitate the entry and exit of cars.

The pallet loaded with the car moves up and down using the vertical circulation rail of the lift. It can also move laterally by pitch-shifting. It can be installed in various ways considering site conditions. The different models and types are classified as follows:

According to the entry location

ALU Type: Utilizes the underground space of the building; the parking spaces are located below the entry level. The entry module is located either at the left or at the right end of the top of the system. A lift is installed both at the left and right sides.

ALUM Type: The parking spaces located below the entry level are similar to the top drive-in type; however, the entry module is located at the intermediate section instead of the left and right ends of the system. A lift is installed at the intermediate section as well as the left and right ends of the system

ALL Type: Parking spaces are located above the entry level. The entry module is located either at the left or at the right end of the system. A lift is installed both at the left and right end of the system.

ALUD Type: The entry level is located at the top level of the parking room.

ALLD Type: The entry level is located at the bottom level of the parking room.

System Specifications

System control	Operation	Touch screen
	Motor control	Invertor control
Safety	Entry module lead-in lamp and interior guide lamp, guide mirror	

device	Entry module car position sensor			
	Fall protection fence			
	Overrun protection system			
	Emergency stop system			
	Chain breakage detector			
	Monitoring system for safe operation			
Vertical moving	Motor	11kw~15kw DC Brake		
Lift part	Speed	20~25M/min		
Horizontal moving	Motor	3.7kw~5.5 kw DC Brake		
Traveling part	Speed	20M/min		
Turntable	Motor	1.5kw x 4p	Speed	2.5 r.p.m /min
Electric source	AC 3Ø 415V 50Hz			

Allowable Car Specifications

The sizes of cars in this technical sheet are classified into S, M1, M2, and L, as follows:

Car	Size	Car Size (mm)		Application
Sedan, Station wagon	S	Length	5,100	Standard
		Width	1,900(Mirror 2,100)	
		Height	1,550	
		Weight	1,900Kg	

Sedan, Station wagon	M1	Length	5,100	Optional
		Width	1,900(Mirror 2,100)	
		Height	1,650	
		Weight	1,900Kg	
Sedan, Station wagon	M2	Length	5,250	Optional
		Width	1,900 (Mirror 2,100)	
		Height	1,650	
		Weight	2,300Kg	
4WD Jeep, Sedan, Station wagon	L	Length	5,100	Optional
		Width	1,900 (Mirror 2,100)	
		Height	2,000	

Handling

Card (Optional for Multi, Elevator, Level, and Stacker Parking)

Drive in: Driver card check, door opens - Enter to the entry module - get off the car - push drive-in button of the operating panel

Drive out: Driver card check - push drive-out button on the operating panel - door opens - get in the car and drive-in process completed

Touch Screen (Standard for Multi, Elevator, Level, and Stacker Parking)

Drive in: Enter to the entry module - get off the car - input car number on the control panel

- Push drive-in button

Drive out: Input car number on the control panel - push drive-out button - door opens
- get in the car and drive in process completed

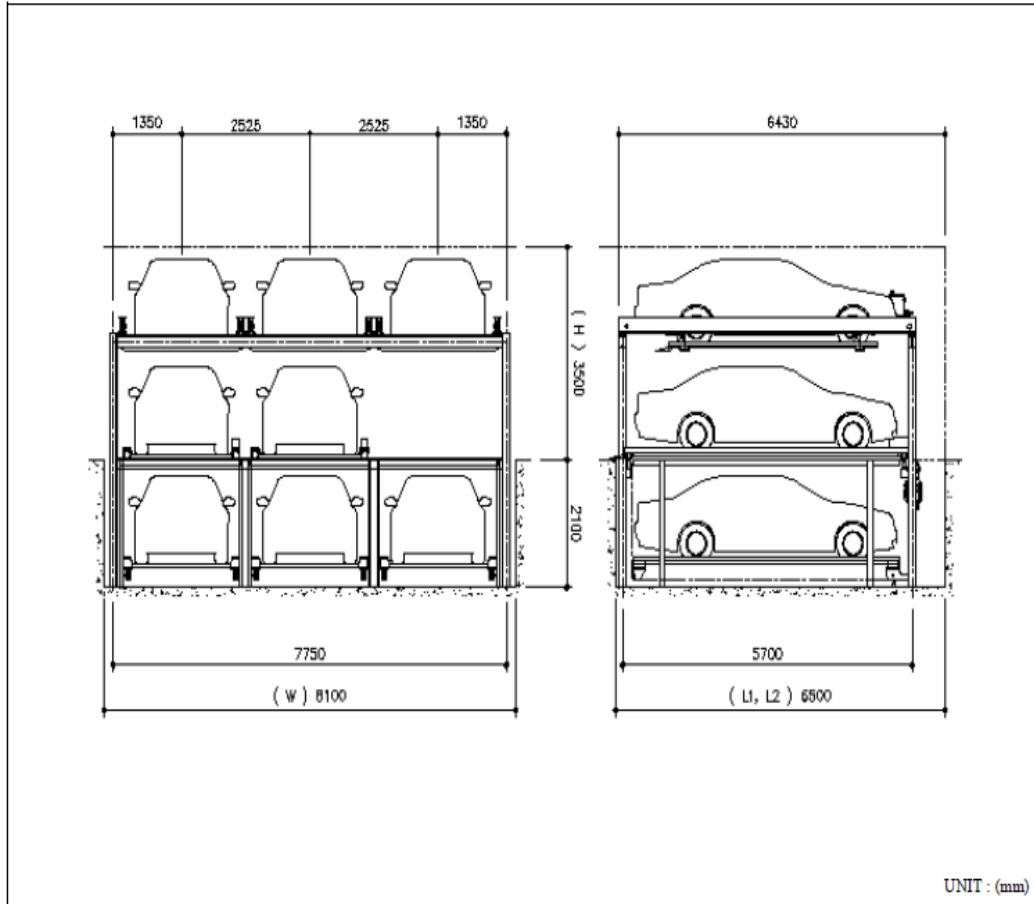
Ten key (Standard for puzzle parking, pit parking, 2-step parking, and car lift type)

In-out: Car in-out is performed through one or two simple operations using the up/down button or the pallet number input button.

Legend

Mark	Explanation	Mark	Explanation
H1	Minimum height for parking	H2	Minimum height for entry module
N	Number of pallet rows	A	Height measured from the bottom end of the pallet to the floor level (655mm)
P1	Pallet row pitch (2250mm)	B1	Height measured from bottom end of the ceiling to the bottom end of the pallet Car (M1) size = 1700mm
P2	Pallet row pitch (2400mm)	B2	Height measured from the bottom end of ceiling to bottom end of pallet Car (L) size = 2173mm
G	Internal distance of the wall from lift center (1800mm)	C	Distance between lift axles
F	Level	Pn	Number of turn rails
S1	1 section chain pitch (RS120 x 50Link = 1905mm)	D	Driving axle Sprocket P.C.D (Ø 231.48)
S2	1 section chain pitch (RS120 x 60Link = 2286mm)	X	Ceiling Slab thickness
L	Internal length	W	Internal width

3.3.4.3 Puzzle Parking System



P.N: This system requires one additional column when more than three rows are added in the transverse direction

Dimensions

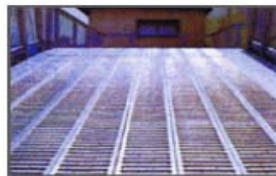
Model	Type		Descriptions						Single Set		Double Set
	Number of rows in the lateral direction		3	4	5	6	7	8	Height (H)	Length(L1)	Length(L2)
	Minimum width(W)		8,100	10,775	13,300	15,825	18,500	21,025			
PIT/	2F	Capacity/Single	8	11	14	17	20	23	3,500		

Single Layer		Capacity/Double	16	22	28	34	40	46		6,500	12,500
	3F	Capacity/Single	10	14	18	22	26	30			
		Capacity/Double	20	28	36	44	52	60	5,300		
	4F	Capacity/Single	12	17	22	27	32	37			
		Capacity/Double	24	34	44	54	64	74	7,100		

Safety and Fire Protection Features



Access Ramp
Main Road: 5.5M Street: 3.5M



Anti-Skid Plate



Traffic Mirror
(installed at the curved section)



Fluorescent Light – 1st level
Mercury Light – 2nd level



Fire Fighting Device



Wheel Stopper



Drainage



Emergency Stairs



Fall Protection Fence

IV. Multi Level Car Parking Facilities on PPP

4.1 Multi Level Car Parking (MLCPs)

A Multi-Level Vehicle Parking System ensures not only safety to the vehicles parked within it, but also ensures creating a Total Pollution Free Environment. It provides a clean, environmentally friendly operation and assures high safety and security for passengers, vehicle and contents. A Modern Multi Level Parking System offers minimum movement of parts and noise. It provides effective maintenance with aircraft type efficiency and reliability at easy and cost-efficient operation. Full exploitation of land usage upto 90% is ensured compared to 67% in other comparable systems and other advantages such as,

- ✓ Makes best use of available space above and below ground. With less environmental impact it reduces opportunities for theft and burglary.
- ✓ Automated Parking is a method of automatically parking and retrieving cars typically using a computerized system of shuttles, lifts, and carriers. Advantages are,
 - The hassle of searching for an empty spot would be eliminated.
 - Designed to decrease the risk of car theft, vandalism, and physical assault.
 - Eliminate the issue of fender benders and car door dents.
 - Drivers can retrieve their vehicles from a secure waiting area and are less likely to risk their personal safety.
 - Ideal for individuals with limited mobility or special needs.
- ✓ Automated Parking allow for flexible usage of land space, which means that the footprint can be reduced to one-third of the land required by conventional car parking solutions.
- ✓ It requires little power lighting and can be built where a typical conventional car park would not fit. Cost-effective on a number of fronts, automated parking also offers significantly improved service to the customer, the automated parking is reliable technology is manufactured to high tolerances and has few moving parts making maintenance costs low.
- ✓ It is economically beneficial to the environment. It would reduce the problem of pollution because the vehicles are not driven through the system, meaning there are fewer emissions. Automated Parking would

drastically reduce noise and disruptions. The ground space saved would enable more space devoted for greening the cities and allow automated parkade systems to be unseen.

A Modern Multi-Level Parking System has a Unique Operation:

- Driver is free to leave, after parking car on a tray at entrance lobby.
- Lift elevates tray to proper floor automatically to waiting carrier.
- Carrier raises tray for conveyance over cars already parked on that storey.
- Carrier moves horizontally to place car tray in vacant space allotted by the system.
- Carrier lowers tray mounted car into parking space
- Car is returned to lobby by reversing procedure
- At lobby tray takes 180 degree turn
- Car faces exit gate, driver takes the car out on to road

4.2 PPP in Infrastructure Projects

The Governments encourage the implementation of Infrastructure Projects through a Public Private Partnership (PPP) model. The PPP approach allows an ideal combination of public interest with private sector efficiency and sensitivity to market requirements. Private Sector tends to be responsive to market requirements and with a motivation to optimize returns brings in efficiency and accountability. For Operation, Maintenance and Management, Private Sector efficiency can also be tapped through awarding Management contracts, Service contracts and other such arrangements.

In a PPP, while the private sector shall be responsible for financing, executing and operating the facility, Government shall facilitate the development by providing timely clearances and approvals. The Government shall define minimum development obligations for the private sector, yet leave adequate flexibility for the developer to build the project in response to market demand and hence optimize collective returns.

In order to optimise on the utilization of Government Funds for priority projects, timely implementation of Infrastructure Projects and to offload the operational and market risks, the Government has been promoting the involvement of the private sector on Public Private Partnership (PPP) format in the infrastructure projects. The following are a few advantages of involvement of the private sector in Infrastructure Projects:

- Development & time bound implementation of all priority projects of the government with private sector investment
- Development, operations and maintenance of the projects in a planned manner with modern amenities and requisite supporting infrastructure by reputed developers without utilizing Government resources of manpower, funds, etc
- Focused project development and time bound implementation
- Optimization of commercial benefits to the Government, which could be utilized for funding other unviable projects
- Project funding through Private Sector Developer

4.3 Multi Level Car Parking (MLCPs) on PPP

With a large wish list of projects and limited resources for implementation of projects, several State Governments have been developing projects on PPP. With several developers now having developed their skills in developing, operating and managing urban infrastructure projects, most ULBs have been exploring the possibilities for development of their projects on PPP.

Commercial viability being the key to the success of any PPP project, Multi level car parking system are viable in the urban sector with the following as main streams of Revenue:

- Parking fee from the vehicles using the proposed parking facilities
- Lease rental from the commercial space in the proposed multilevel parking facility
- User charges for other miscellaneous services like valet parking, car maintenance, helmet repository, night parking for buses etc (as and when may be considered necessary/feasible)
- Revenue from advertising (on parking fee tickets, interior walls, parking spaces and subway etc)

The Project will be implemented on a PPP model by selecting a developer through a transparent open bidding process who would be responsible for the design, development, finance, construction, marketing, sub-lease and maintenance of the common area and facilities of the property.

The site is proposed to be leased out for a pre-agreed number of years to the successful bidder by Government for an agreed upfront lease premium, an annual license fee and /or on any other feasible option

4.4 Key Revenue Streams for MLCPs on PPP

Revenue generation would mainly be from parking fees, advertisement rights and renting of commercial space like kiosks, ATMs, Telephone Booths, etc. A demand assessment for each proposed location would however confirm the viability.

4.4.1 Demand for Parking fees

As a sheltered space with safety to the vehicles is provided for parking in MLCPs compared to the surface parking without safety, an enhanced parking charges can be levied as per the service provided.

4.4.2 Demand Assessment For Commercial Space

Most of identified MLCP locations would fall on the major arteries of the city having commercial development in surrounding areas. The proposed MLCP locations can be explored for creation of spaces for urban needs as well as commercial benefit to make the project more attractive. The commercial spaces could be in terms of kiosks, ATMs, Telephone Booths, Retail outlets, etc.

4.4.3 Demand Assessment For Advertisement Space

Advertisement industry has its spread in every aspect of merchandizing. Because of the cosmopolitan trends and global identity, there is immense market for advertisement in major cities and district headquarters. The prime commercial areas of the city are considered as high revenue potential areas while the residential localities/ old city area are considered as low revenue generating areas of the city. Because of the growing advertisement market the street furniture like Bus Shelters, Pay & Use Toilets, MLCPs, FOBs etc. are also used for the advertisement purpose.

4.5 Factors for selection of Cities

As an initiative resolve the congestion due to increase in traffic and improving parking facilities across the State, the Infrastructure Development Department has conceived the development of MLCP's across congested areas and CBD's of cities in Karnataka.

Parking fees is the key to the success of implementation of MLCP's on PPP basis. Revenues collected from parking fees, commercial spaces, etc from the facility make the implementation, operations and management of the project an attractive proposition to the private sector.

MLCP's are proposed to be implemented on PPP basis across most major cities in Karnataka, including **Bangalore, Mysore, Mangalore, Hubli, Dharwad, Belgaum, Gulbarga and Bellary**. The viability of the project in terms of potential for revenue from Parking fees, lease rentals for commercial spaces and advertisements at the respective cities is being assessed as a part of this Pre-feasibility study.

4.6 Pre-requisites for identification of locations

While the demand for parking in a particular city would establish the commercial viability for implementation of MLCPs in the city, the selection of locations for development of MLCPs would be the next critical task. The following parameters would need to be essentially taken into consideration while identifying the individual locations within a City:

- The need for the MLCP at the location/demand for parking
- Land availability with ULB's

The following table indicated the Key Parameters to be considered while evaluating locations for MLCPs.

Key parameters for evaluation of location	
1	Intensity/pattern of development
2	Approx. no of accumulation of vehicles and duration of stay (peak hour and non peak hour study)
3	Existing parking system/fee structure
4	Assess demand for commercial space and advertisement

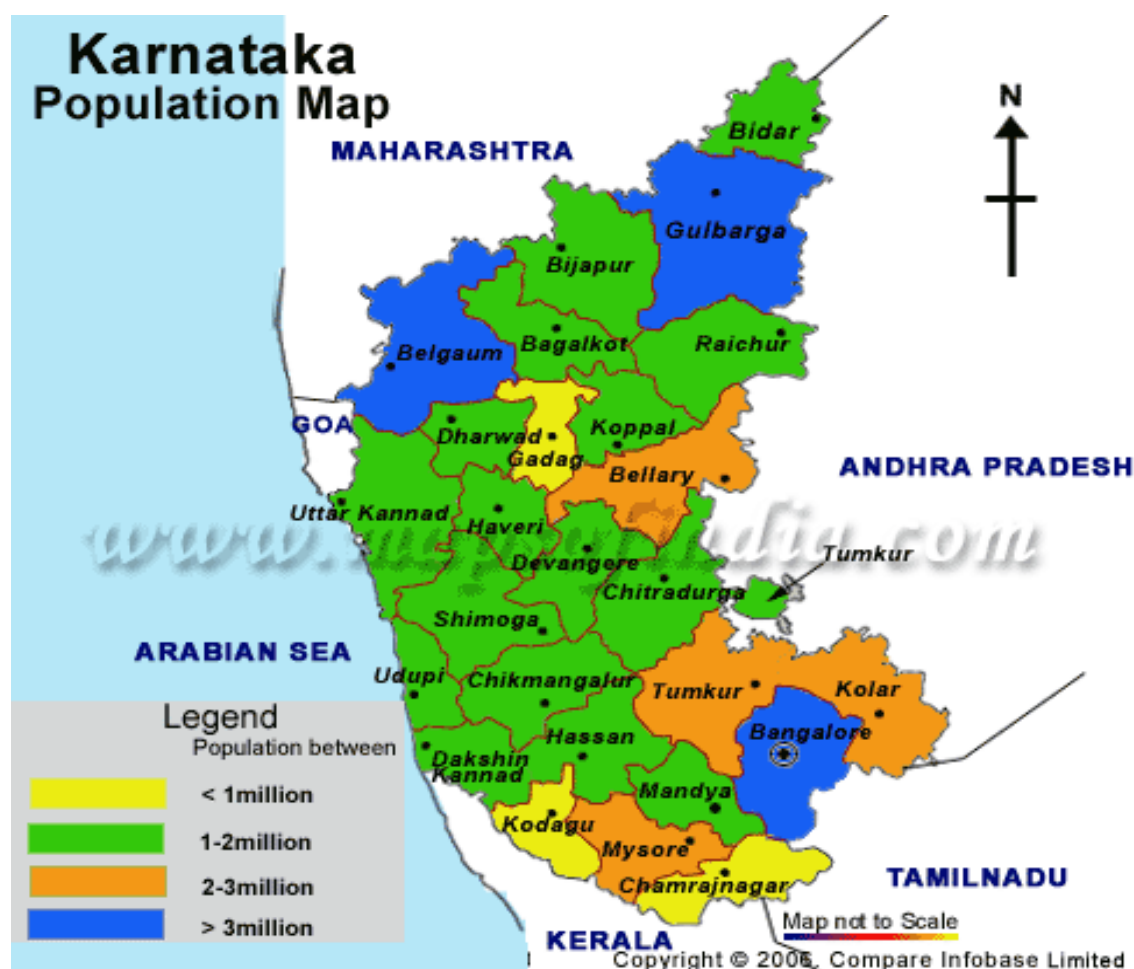
V. Cities Identified

5.1 Background

MLCP's are proposed to be implemented on PPP basis across most major cities in Karnataka, including **Bangalore, Mysore, Mangalore, Hubli, Dharwad, Belgaum, Gulbarga and Bellary**. The viability of the project in terms of potential for revenue from Advertisements at the respective cities is being assessed as a part of this Pre-feasibility study.

5.2 Basis of City Selection

As per the census of 2001, the industrially progressive state of Karnataka, encompasses a total population of 52,733,958. The state of Karnataka ranks ninth in the population chart of our country.



The following states the Population as from the 2001 Census of India and percentage increase in population for the major districts of Karnataka

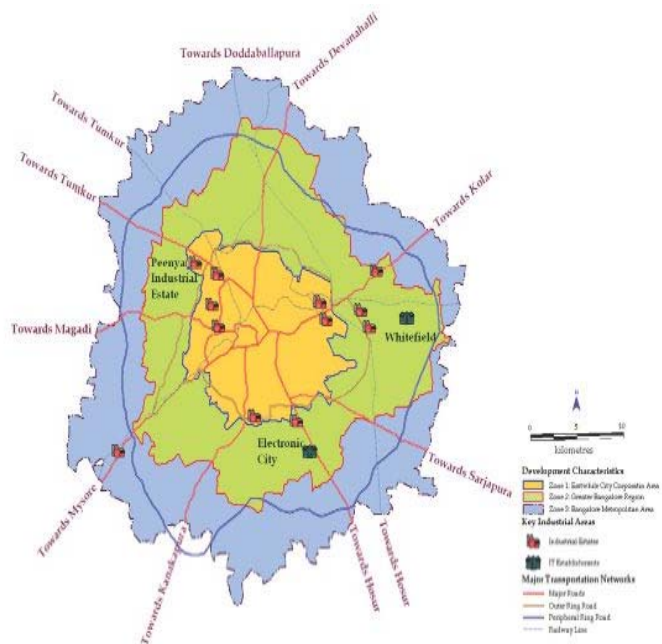
Sr. No.	District	Population	% Increase in Population
1	Bangalore district	6,523,110	34.80%
2	Bangalore Rural district	1,877,416	12.21%
3	Belgaum district	4,207,264	17.40%
4	Dharwad district	1,603,794	16.65%
5	Gulbarga district	3,124,858	21.02%
6	Mysore district	2,624,911	15.04%
7	Dakshina Kannada district	1,896,403	14.51%

Accordingly, MLCP's are proposed across most major cities in Karnataka, including **Bangalore, Mysore, Mangalore, Hubli, Dharwad and Belgaum**. These cities have been the fastest growing in terms of various aspects including population and demands better infrastructure. The city profiling for specific city would help in understanding the Infrastructure status and the developments proposed throughout the city. The profiling would help in assessing the viability of the project in terms of potential for revenue from parking fees, lease rentals from commercial spaces and advertisements as a part of this Pre-feasibility study.

5.3 BANGALORE

5.3.1 An Overview

Bangalore is undoubtedly one of the fastest growing cities in Asia and also one of the most sought after cities in India by people, companies, multinationals and tourists. The massive growth that the city has witnessed in the last decade is a clear indication of this city being developed to be at par with the most modern cities in the world. The population of Bangalore



has grown enormously on account of migration of people from all corners of India, neighbouring countries and from countries in the West. Bangalore is home to numerous high-tech knowledge hubs evident from the establishment of premier centres like Indian Institute of Science (IISc), National Institute of Advanced Studies (NIAS), Tata Institute for Fundamental Research (TIFR), Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), Indian Space Research Organisation (ISRO), National Aerospace Laboratories (NAL), Defence Research and Development Organisation (DRDO), Indian Institute of Management (IIM), Institute for Social and Economic Change (ISEC), Indian Institute of Information Technology (IIIT) and several professional engineering and medical colleges at undergraduate and graduate levels. In tune with recent trends, Bangalore now has numerous malls and multiplexes that are swarmed during weekends. With an active night life and Bangaloreans penchant for fast-food, a large number of restaurants, pubs and 'eat-outs' throng the city.

Road network Characteristics

Bangalore is endowed with a radial pattern of road network converging in the core area of the city. The total road network of the city is about 4000 km of which arterial/sub-arterial roads account for about 350 km. The road network in the central parts of the city has developed organically over the last few centuries and has inadequate right-of way. There is also a ring road (Outer Ring

Road of about 62 km) which cuts across the various radial roads. An intermediate ring road has been constructed in fragments e.g. at south-east between Koramangala and Airport Road. The National Highways which pass through Bangalore include:

⊙NH – 4 connecting to Pune and Chennai

⊙NH – 7 connecting to Varanasi and Capecamorin

⊙NH – 209 connecting Dindigul / Pollachi

The following are the State Highways in Bangalore:

⊙SH – 17 connecting Mysore & Gundlupet

⊙SH – 17E connecting T G Halli

⊙SH – 19 connecting Hindupur via Yelahanka and Doddaballapur

⊙SH – 86 connecting Mysore via Kanakapura

Mostly the road network is underdeveloped in terms of size, structure, continuity and connectivity. Nearly 82% of the total existing road network of 1763 km (taken for travel demand modeling purposes) is with 2-lane carriageway as shown in the Table below. Length of roads with carriageway of 4 lanes and above is only 290 km. Thus most of the roads have inadequate carriageway widths to cater to growing traffic at an acceptable level of service. Most of the roads in the city are also used for onstreet parking facility which even reduces the effective carriageway width available for traffic. Most of the major roads in Bangalore have V/C ratios > 1.0 indicating high congestion, low speeds and high delays. The intersections are also spaced quite closely which further increases the problem of traffic. Many of the intersections in core area are with 5 legs. This adds to traffic delays.

Distributions of Roads with Carriageway Widths in Bangalore

Type of Road	Length (Km)	%
Two Lane Undivided One Way	62.3	3.53

Two Lane Undivided Two Way	1379.2	78.21
Three Lane	31.6	1.79
Four Lane Undivided One Way	10.3	0.59
Four Lane Undivided Two Way	49.7	2.82
Four Lane Divided Two Way	198.5	11.25
Six Lane Divided	1.78	31.4
Six Lane Undivided One Way	0.5	0.03
Total	1763.5	100.00

Source: COTP - KUIDFC Report

The available right-of-way of major roads is generally inadequate to allow for their major widening as given in Table below.

Carriageway Widths of the Roads

Road ROW (m)	Length of Major Roads (%)
Less than 20	40.7
20-30	40.0
More than 30	19.3
Total	100.0

Source: COTP - KUIDFC Report

Bangalore city is estimated to have vehicle population of about 2.6 million while the current city population is about 7 million. The vehicle to person ratio is far higher than any other city in India. This has led to increased congestion in road networks across the city and frequent traffic jams. Manning signalling at traffic islands have also become unmanageable with the amount of traffic

plying across junctions. A lot of concern has been expressed over the years on the congestion issue with government launching several schemes to improve its traffic (Building several Roads, Flyovers etc) but unfortunately the scenario still remains the same.

Now with the implementation of the Metro rail project by BMRCL, the metro stations will have large influence zones with high demand for commuter's parking space. Development of efficient parking facility at Metro Stations and other congested locations as well is required to improve the inter-modal connectivity.

5.3.2 Bangalore City Traffic Scenario

Bangalore today is obviously one of the most sought after cities in the country what with the rapid growth in the IT industry and the rise in the number of job opportunities in the city. With the rising population in the city there is also a corresponding increase in the number of vehicles in the city and a huge increase in the demand on land.

Along with the population the city has also seen great improvements in its roads, highways and other Bangalore Infrastructure. Several flyovers have come into existence in the last few years easing the traffic and making travel easier. What adds to the traffic pressure in Bangalore in particular is that there is very little scope for expansion of roads and the need to use existing roads for smooth movement of vehicles is even more pronounced. It thus becomes mandatory for the administration to ensure better parking & pedestrian facilities. While there is still a lot to be done with regards to the tedious traffic and safety of the pedestrians.

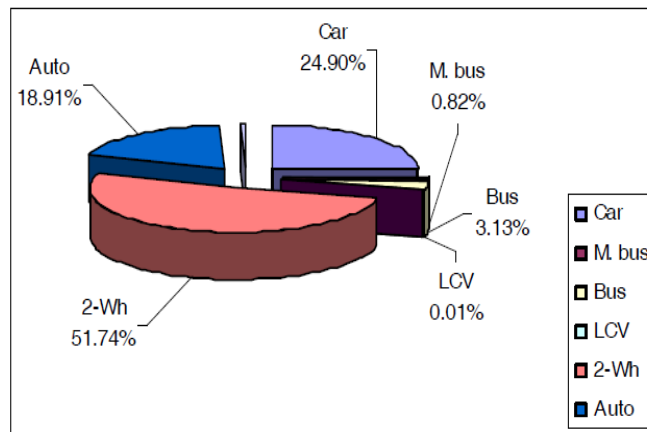
Rapid population growth because of IT and other associated industries in Bangalore led to an increase in the vehicular population to about 1.5 million, with an annual growth rate of 7-10%.

With the increase in population and the expansion of the city, the problem of connectivity of the populace has arisen. Quite obviously personalized modes of transport have grown at a tremendous rate and two wheelers along with the cars almost comprise 90% of the total registered vehicular population in the city. Two wheelers constitute more than 70% of the total volume, while cars comprise 15%, autos 4% and the remaining 8% includes other vehicles such as buses, vans and tempos.

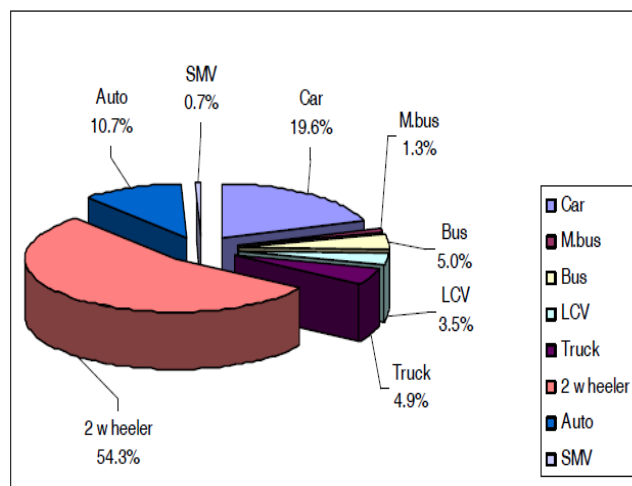
5.3.3 Traffic Surveys:

Traffic surveys form an integral part of the study to assess the present day traffic situation, which in turn helps in evolving the short, medium and long term strategies to ameliorate the traffic problems of the city.

Traffic volume count at mid-block locations give a clear picture about the density of traffic volume along different stretches of roads within the study area, which helps in assessing the V/C ratio of the road stretches. This in turn helps in assessing the current strategies to be adopted to ease the prevailing congestion as also in evolving future long term strategies. 24 mid-blocks were identified for carrying out the volume count survey covering some of the major and important roads of the city.



At M G Road (Mid Block)



At ROB on Chord Road near Mysore Road Intersection (Screen line)

Sl. No.	Road Name	Total Traffic Volume (12 Hour count)		Peak Hour	
		Vehicles	PCUs	AM	PM
1.	Chord Road near Toll gate	67015	76556	9 - 10	5 - 6
2.	Magadi Road near Prasanna Theatre	14596	14724	9 - 10	6 - 7
3.	R.V. Road near Vijaya College (South End Circle)	56770	60236	9 - 10	7 - 8
4.	Hosur Road (NH-7) near Wipro- CSB Junction	62514	66116	9 - 10	6 - 7
5.	Airport Road near Kemp Fort	30146	29589	9 - 10	6 - 7
6.	Rajajinagar Link Road near Sujatha Theatre	127741	146209	10 - 11	5 - 6
7.	Sampige Road near Sampige Theatre	57547	68045	11 - 12 Noon	6 - 7
8.	M.G. Road near Trinity Circle (Big Kids Kemp)	99404	109114	9.45 - 10.45	6 - 7
9.	Richmond Road / Gen. Timmaiah Road near Masjid (Richmond Circle)	59866	69452	10 - 11	6 - 7
10.	Residency Road / F.M. Cariappa Road near St. Joseph's College (Richmond Circle)	38510	45024	10 - 11	5 - 6
11.	K.G. Road near Cauvery Bhavan	69896	100455	10.15 - 11.15	6 - 7
12.	Mahakavi Kuvempu Road near Varalakshmi Nursing Home	36684	43720	10 - 11	6 - 7
13.	Outer Ring Road near Kamakya	37467	38026	9 - 10	5.15 - 6.15
15.	Bannerghatta Road near Mantri Apartments	55529	59087	9 - 10	6 - 7
16.	Mysore Road near KIMCO	33097	36667	9 - 10	5 - 6
17.	J.C.Road near BMP Parking Lot (Bharat Theatre Jn.)	99821	106048	10 - 11	6 - 7
18.	Lal Bagh Road near Urvashi Theatre	52944	58226	11 - 12 Noon	5 - 6
19.	K. R. Road near National High School	49536	56291	10.15 - 11.15	5 - 6
20.	Old Madras Road / Swami Vivekananda Road near NGEF	68781	70039	9 - 10	6 - 7
21.	Sankey Road (T.Chowdaiah Road) near NTI	179067	182047	9 - 10	5.15 - 6.15
22.	Sankey Road (T.Chowdaiah Road) after Cauvery Theatre	183194	185057	9 - 10	5 - 6
23.	Bellary Road (Ramana Maharshi Road) near Mekhri Intersection Underpass	95424	100973	9 - 10	5 - 6
24.	Dr. Raj Kumar Road near Navarang Theatre	81116	97489	10 - 11	5 - 6

Source: COTP - KUIDFC Report

5.3.4 Impact of growth on Traffic

All or most of the roads are operating above their capacity and the volume: capacity ranges from 1:2, 1:3 and 1:5

Sl. No.	Name of Road	V/C ratio
1.	Nrupatunga Road	3.62
2.	District Office Road	2.51
3.	K.G. Road	2.51
4.	Labagh Road	2.67
5.	Puttanna Chetty Road	2.45
6.	Richmond Road	2.26
7.	M.G. Road	2.26
8.	Chord Road	2.51
9.	Tumkur Road	2.62
10.	Sankey Road	1.52

- Travel speed has dropped to 15 kmph during the peak hours
- Insufficient or no parking spaces for vehicles
- Public transport vehicles vying for road space with private modes

Based on the above volume capacity (V/C) ratio, the Level of Service (LOS) is worked out which gives a qualitative measure of traffic, where as capacity analysis gives a quantitative measure of a facility. Capacity and level of service varies with the type of facility, prevailing traffic and road conditions etc. When capacity gives a quantitative measure of traffic, level of service or LOS tries to give a qualitative measure.

It divides the quality of traffic into six levels ranging from level A to level F. Level A represents the best quality of traffic where the driver has the freedom to drive with free flow speed and level F represents the worst quality of traffic.

Table: LOS for basic freeway segment

LOS	K (Veh/KM/Lane)	FFS (KM/hr)	v/c
A	0-7	120	0.35
B	7-11	120	0.55
C	11-16	114	0.77
D	16-22	99	0.92

E	22-28	85	1.0
F	>28	<85	>1.0

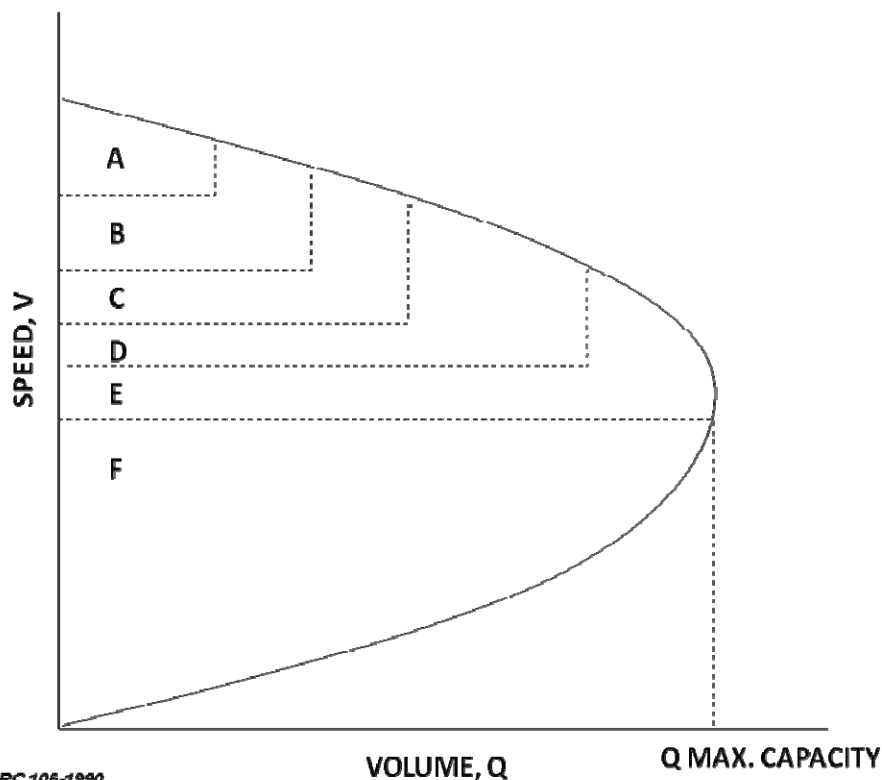
Source: Intro to Highway Engineering – Krishna Rao

Table: LOS for an intersection

LOS	Control delay sec/veh(signalised)	Delay sec/veh(unsignalised)
A	≤ 10	≤ 10
B	10-20	10-15
C	20-35	15-25
D	35-55	25-35
E	55-80	35-50
F	>80	>50

Source: Intro to Highway Engineering – Krishna Rao

Figure below shows the various levels of service in the form of indicative volume-flow relationship for urban conditions.



Source: IRC 106-1990

Speed Volume Curve showing Level of Service

Source:IRC 106-1990

Table: LOS for Bangalore main roads

Sl. No.	Name of Road	V/C ratio	LOS
1.	Nrupatunga Road	3.62	F
2.	District Office Road	2.51	F
3.	K.G. Road	2.51	F
4.	Lalbagh Road	2.67	F
5.	Puttanna Chetty Road	2.45	F
6.	Richmond Road	2.26	F
7.	M.G. Road	2.26	F
8.	Chord Road	2.51	F
9.	Tumkur Road	2.62	F
10.	Sankey Road	1.52	F

As per the table above, most of the Bangalore roads come under 'F' categorization, i.e. Represents zone of forced flow or breakdown flow. This condition occurs when the amount of traffic approaching a point exceeds the amount which can pass it. Queues form behind such locations. Operations within the queue are characterized by stop-and-go waves, which are extremely unstable. Vehicles may progress at a reasonable speed for several hundred metres and may then be required to stop in a cyclic fashion. Due to high volumes, break-down occurs, and long queues and delays result. The average travel speeds are between 25 per cent and 33 per cent of free flow speed.

Future Traffic Scenerio

- Vehicle population will cross 2 million by 2005
- Consequent increase in congestion levels / accidents
- Road network not likely to expand much
- Average speeds within the city likely to fall
- Increased parking problem
- Increase in pollution

5.3.5 Lack of parking facilities in the City

Bangalore has a decreasing mode share of public transportation and increase in private automobiles. Poor parking facilities and narrow, congested roads are easily the biggest problems of Bangalore. Roads are made narrower by two-wheelers parked along them. So a barely 20-ft-wide road becomes a 10-ft road where both vehicles move and pedestrians walk.

The transportation share is nearly 20% of the Bangalore's landuse which simulates international practice, still the congestion sustains in the city.

As per the estimates Bangalore loses out nearly 208 million Rs per day due to congestion. The root cause for congestion can be known from the fact that the 88% of total vehicles constitute only two wheelers and four wheelers, which contribute only 39% of total Trips.

Parking is assuming critical dimensions in Bangalore. Demand for parking is increasing with increasing vehicles and on-street parking is almost exhausted in the city centre. Parking surveys done at some important locations like bus terminals and commercial areas have indicated large parking demand. Most parking requirements are of short duration upto two hours. Some of the roads like J C Road, Sampige Road, M G road, Brigade Road, Commercial Street, CMH Road, Jayanagar 4th Block, Shivajinagar and K G Circle attract huge volume of vehicles especially during peak hours, weekends and holidays. Sufficient provision has been made for parking at KSRTC Bus Terminal and Railway Station. Parking lots have been constructed on J C Road and K G Road. However, the demand for parking is so heavy that the parking lots have not been able to cater to the increased demand.

List of few surveyed locations to devise the parking duration of vehicles at peak hours are as below:

Sl. No.	Road Name	Peak Accumulation		Avg. duration In Hrs	
		Cars	Two wheelers	Cars	Two wheelers
1.	Jayanagar 4th Block- nr. Arya Bhavan	48	301	1.562	1.785
2.	Sampige Road / Margosa Road (Malleshwaram Circle upto 18th Cross)	63	299	1.681	1.825
3.	M.G. Road (Brigade rd to Mayo Hall)	155	45	1.710	1.843
4.	(Brigade Rd to Kumble circle)	84	331	1.738	2.287
5.	Commercial Street	39	7	1.544	4.000
6.	Gandhi Bazaar Road	88	350	1.840	1.711
7.	J.C. Road	97	391	2.441	1.763
8.	KSRTC Bus Stand	-	482	-	2.998
9.	City Railway Station	121 +23	339	2.120	1.718
	City Railway Station- second entry	48 +26	260	2.033	2.008
10.	Banashankari Temple	8	22	1.836	1.924
11.	Banashankari BDA Complex	58 +5	327	1.661	1.969
12.	Rajajinagar RTO Complex	34 +13	66	0.838	2.575
13.	Koramangala BDA Complex	44	329	1.443	1.982
14.	CMH Road	98 +3*	335+21@	1.984	1.595
15.	Russel Market	226 +4*	236+47@	1.759	2.033

* Auto rickshaws @ Cycles

Source: CTPP - KUIDFC Report

List of identified locations for MLCPs in the city:

S. No	Location	Type
1	M G Road	AMP
2	Near Kamraj Road	AMP
3	Gandhi Nagar	AMP
4	Jayanagar Shopping Complex	CMP
5	Koramangala near Raheja Tower	CMP
6	Rajajinagar BDA Complex	CMP
7	Banashankari BDA Complex	CMP
8	Gandhi Bazaar	CMP
9	Malleshwaram	AMP
10	Fire Station, Residency Road	AMP
11	Dhobi Ghat, Cunningham Road	AMP
12	SP Office, Miller Road, Cunningham Road crossing	AMP

13	Near Sagar & States	AMP
14	Kanteerava Stadium	AMP
15	City Market	AMP
16	Bakshi Gardens	AMP
17	KSRTC Bus Depot	AMP

Where the availability of land is limited and the land values very high, automatic mechanical parking (AMP) has been suggested. In the outer areas, conventional multistory parking (CMP) has been proposed.

Similarly at all the termini of Metro, Mono rail/LRT, BRT, CRS and their major stations outside the Core Ring Road should be provided with adequate park and ride facilities are to be provided.

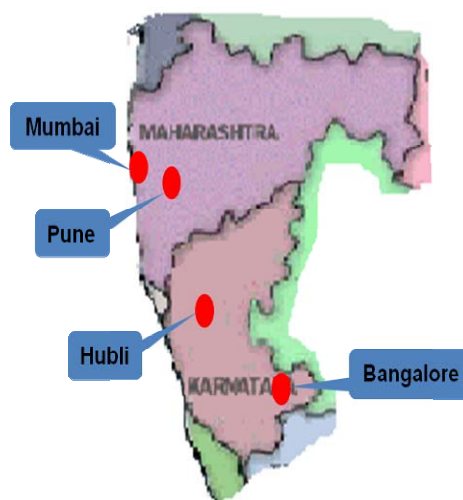
A comprehensive parking survey needs to be taken covering the entire city and parking plan prepared indicating on-street and off-street parking locations. A suitable parking policy needs to be devise for the city.

5.4 HUBLI-DHARWAD

5.4.1 An Overview

Hubli-Dharwad is the second-largest conurbation in Karnataka after the State capital - Bangalore. Dharwad is a quiet, pleasant, and fast growing city in the northern part of Karnataka, which together with Hubli, 22 kilometers apart, forms a twin city, about 400 km from Bangalore.

While Dharwad is the administrative headquarters of Dharwad District and an important education centre, Hubli is primarily a commercial and industrial centre. It is believed that owing to this diversity and geographical proximity, the State government amalgamated the two cities. The Hubli Municipal Corporation (HDMC) was constituted in the year 1962 by combining the two cities. The twin cities have a population of nearly 8 Lakh (Census 2001) and it covers an area of 202.28 sq kms, with development concentrated in 72.78 sq kms including 45 revenue villages¹ and large number of extensions spread in all the directions. The State Government promotes the industrialisation of the region leveraging its strategic location, good connectivity with metropolitan centres (like Mumbai, Pune and Bangalore), availability of water and forest resources, and labour.



Hubli-Dharwad Fact Sheet	
Latitude & Longitude	15° 21' 0" N and 75° 10' 0" E
Average rainfall	812 mm per annum
Temperature	Maximum of 39°C and a Minimum of 16°C.
Height from sea level	2,580 feet
Combined Population (including rural)	1,604,253 (Census 2001)
Population of Hubli-Dharwad	7,86,195
Languages spoken	Kannada, Hindi, English and Marathi.
Literacy Rate	71.61% (Census 2001)
Total Villages Included	45
Total number of households	2,97,494
Number of families below poverty line	47,160

Source: HDMC and other government agencies

With the tremendous success of the IT/ITES industry in Bangalore, the State government started promoting Mysore, Mangalore and Hubli as favorable IT destinations. Mysore and Mangalore, over the last few years, have emerged as alternative destinations (to Bangalore) for the IT industry in the State. Now, the Karnataka IT Department is focusing on Hubli and Dharwad to this effect. The literacy rate in Hubli is estimated to be 81% (2006 estimate) as compared to the national average of 61%. A large pool of this literate population constitutes educated youth with technical expertise, who would meet the growing demands of skilled manpower in these industries.

Dharwad is the seat of learning with Karnataka University and Agricultural University. There are large number of Arts, Science, Commerce and Law Colleges in the city. Karnataka Medical College, S.D.M. College of Dental Sciences and Engineering and technical institutions are crowning additions to the educational facilities in the city. Due to these educational and industrial facilities, the city attracts considerable floating population.

The city has an advantageous location being surrounded by a number of important historical and mythological places within a radius of about 200 kms. There are important tourist and historical places such as Ghataprabha, Gokak Falls, Soundati Yellamma Temple, Kittur, Badami, Pattadkal, Aihole, Kudalasangam, Bijapur, Bagewadi, Basavakallyan on northern side, on the western and southern sides there are Dandeli, Port-town of Karwar, Gokarn Magod falls, Ulavi, Banavasi, Jog-falls, Shimoga and Bhadravathi, Laxmeshwar and Tungabhadra Dam and on eastern side Hampi, Lakkundi and Mantralaya.

5.4.2 Economy – Hubli- Dharwad

Hubli is an important hub for agricultural and horticultural activity. Cotton, food grains, groundnuts and chillies are major crops cultivated here. Basaveshwar Agriculture Market Yard is amongst the largest agriculture markets in Asia. The Cotton Market of Hubli is also one among the five biggest markets in India. With the establishment of Bhoruka textile mill, NGEF and KMF, the city gathered momentum in industrial development. In order to promote industrialisation, the Karnataka State government has approached companies, such as Infosys, Mahindra & Mahindra to run Special Economic Zones (SEZs) in Hubli. Further, plans are also on for setting up five dedicated industrial clusters to promote industrial development in the State. Overall on

summarizing the above we can say that, though presently the economy is primarily of an agrarian nature but the pivotal focus is now on the development of IT/ITES industry.

There are eight industrial areas including the Growth Centres spread on 3,294 acres of developed land in the district. Some of the notified industrial areas in the city are Gokul Industrial Estate, Tarihal, and Rayapur. In the small scale sector, the main products manufactured are agro, engineering and machine tools, chemical and pharmaceutical. Notable is the production of industrial valves, designed to meet the needs of the chemical and petrochemicals industries. Hubli accounts for nearly 40% of the country's requirement.

Public sector establishment includes the Railway Workshop and Diesel Loco Shed in collaboration with General Motors of USA. Other large industries include TELCO, KEC, KSRTC, NGEF, Kirloskar Warner and Swassey, BDK. The Karnataka Material Testing and Research Centre is the first of its kind research centre that was established at the Gokul Industrial Estate in Hubli, and it caters to the testing needs of North Karnataka. The tests undertaken here include chemical analysis, water / soil testing, physical testing, instrument calibration, etc.

The economy is primarily of an agrarian nature but the pivotal focus is now on the development of IT/ITES industry. There are eight industrial areas including the Growth Centres spread on 3,294 acres of developed land in the district. Some of the notified industrial areas in the city are Gokul Industrial Estate, Tarihal, and Rayapur.

The STPI-Hubli (Software Technology Parks of India – an organization under the Dept of IT, Government of India) has been operational from May 2001, to provide the data communication and incubation services to IT/ITES industry and also to promote the industry. The IT Park Hubli that is situated in the heart of the City is promoted by the Government of Karnataka IT Department and Karnataka State Electronics Development Corporation Limited (KEONICS).

5.4.3 Hubli Dharwad Municipal Corporation (HDMC)

The Hubli Dharwad Municipal Corporation (HDMC) was constituted in the year 1962 by combining the two cities. The twin cities have a population of nearly 1.1 million and it covers an area of 202.28 sq kms, with development concentrated in 72.78 sqkms including 45 revenue villages and large number of

extensions spread in all the directions. The State Government promotes the industrialisation of the region leveraging its strategic location, good connectivity with metropolitan centres (like Mumbai, Pune and Bangalore), availability of water and forest resources, and labour.

There is an excellent inter-city transportation facility between Hubli and Dharwad, as NWKRTC and Bendre Nagara Sarige (a consortium of private bus-owners) jointly cater to the large number of commuters between Hubli and Dharwad. Bus services from the twin-cities are available to most of the parts of Karnataka and neighbouring states. Private bus operators also render their services for overnight travel between Hubli and Bangalore, Mangalore, Pune, Mumbai.

Overall Road Network – Hubli-Dharwad (700 km network)	
Hubli Dharwad twin city distance	22 km
The length of the roads HDMC jurisdiction	630 km
The density of the road in the town	3.29 km per sq m
Per capita road length	0.8 km
The Average width of the road	9.5 m in the town
HDMC road	595 km
National Highway	30 km
PWD roads	40 km

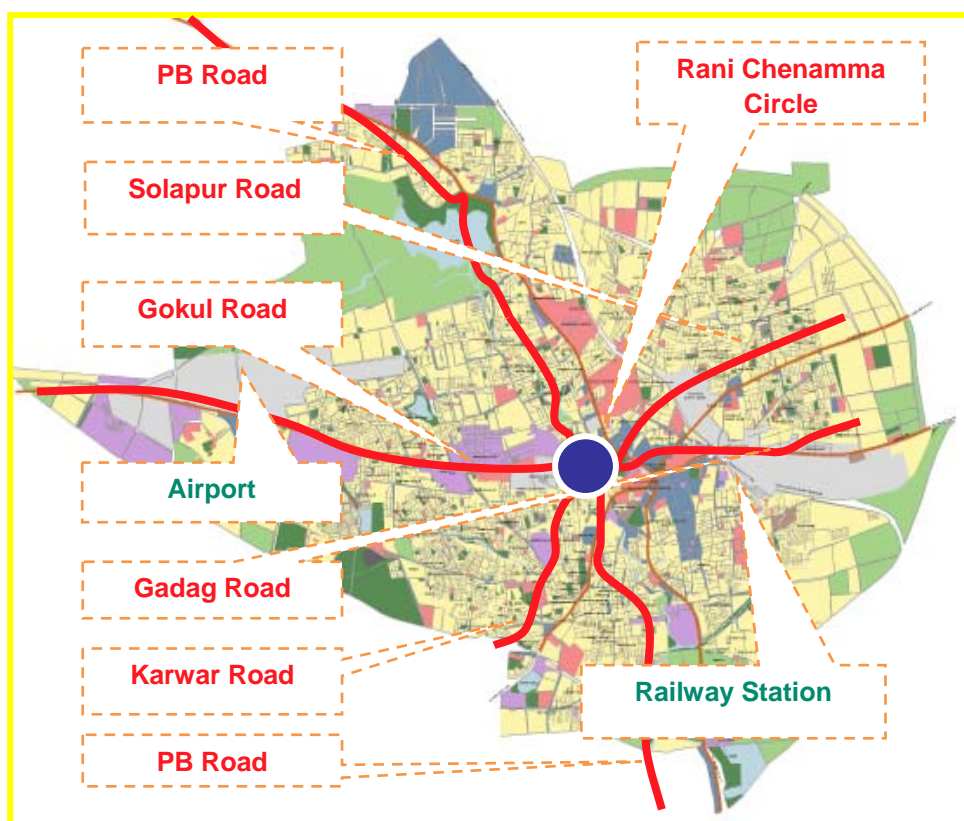
Source: HDMC Research

5.4.4 Traffic Intensive Areas In Hubli-Dharwad

Dharwad: Old P.B. Road, Azad Road, Subhash Road, Corporation Road, Regal Circle, Cosmos Club road, Sangam Theatre road, Vijaya Road

North Hubli: VIP Road, IB Road, New Cotton Market road, P.B. Road, Neeligin, Court Road, Byahatti Plot Road, Swimming Pool Road, New Cotton Market Road, Lamington Road, Old PB Road, Karwar Road.

South Hubli: Station Road, Koppikar Road, Javali Sal, Maratha Galli, Coen Road, J.C. Nagar Road.

Major Roads and Prominent Locations in Hubli:**Traffic Volume on Major Roads in the city**

- Very High PCU values are observed on major roads of the city.
- P.B. Road is the major corridor in Hubli. Commercial activities are concentrated around this corridor.
- P.B. Road is the busiest stretch. High PCU values are prevalent at stretches between Vidya Vihar to Bammapur Junction
- Lot of truck traffic from Karwar Road joins P.B. Road. The traffic volume at various stretches is given below:

Stretch on P.B. Road	PCU per day (16Hr)	Peak Hour PCU
Unkal –Vidya Vihar	25,144	2,345
Vidya Vihar – Chenamma	34,341	2,942
Chenamma – Bammapur	39,927	4,932
Bammapur – Gabbur Jn	25,895	3,035
At Gabbur Jn	13,156	1,790

Source: Traffic Management - KUIDFC Report

5.4.5 Lack of parking facilities in the City

The city has a high of traffic from other nearby cities such as Karwar, Goa, Sholapur etc making it a congested cross over city. The pedestrians need a better infrastructure to ensure safety at all times while crossing the busy roads of Hubli Dharwad.

As mentioned earlier, with the growth in trade and commerce in the city, the number of vehicles has grown sharply. The city attracts substantial amount of cars and two wheelers. Currently the parking system is decentralized and is predominantly on surface parking lots, the capacity of the parking lot is not sufficient to cater to the present demand.

5.4.6 Parking Survey: as per Traffic Management Plan (KUIDFC Report)

Parking Survey was conducted to develop parking management plans to satisfy parking demand by provision of parking spaces or curbing the demand in absence of space by parking controls to ensure smooth flow of traffic. Parking survey was conducted for 12 hours on major roads in CBD. Dajibanpeth and Broadway have the highest parking demand of 5871 and 5192 vehicles per day respectively. The composition of 2-wheelers is the highest on all the roads. The demand for 2-wheeler parking on Dajibanpeth Road (from Lamington Road to Myadar Galli) is 3032 per day and 881 in peak hour.

The peak hour parking demand on major roads in CBD is given in table below:

LINK	Road Name	Total Parking Demand (12 Hour)	Daily Peak Demand (No)
Link 1	Anchatgeri Road		
	Lamington Road to Kamaripeth	2667	1191
	Kamaripeth to Hirepeth	2447	1607
	Hirepeth to Bankapur Chowk	2812	1981
Link 2	Dajibanpeth Road		
	Lamington Road to Myadar Galli	5871	1710
	Myadar Galli to Algandagi Oni	5036	1592
	Algandagi Oni to P. B. Road	3522	1439
Link 3	Station Road		
	Station Road to Coen Road	3256	985
	Coen Road to Shahbazar Road (CBT)	3500	1382
Link 4	Koppikar & Broadway Road		
	Koppikkar Road to Broadway	3277	1678
	Broadway to Durgadbail	5192	2246
Link 5	Hirepeth Road		
	P.B. Road to Javalisal Road	3190	964
	Shahbazar Road	2386	995
Link 6	Maratha Galli		
	Koppikkar Road to Station Road	1983	597
Link 7	Radhakrishna Galli	2549	1416

Source: Primary Survey, 2003

Composition of Vehicles on Major Roads in CBD

SN	Road Name	Composition (%)					
		2 W	Car	Autos	Buses	Tempo	Cycles/Hand Carts
1	Anchatgeri Road	49	5	7	0	4	32.3
2	Dajibanpeth Road	52	4	11	0	0	33
3	Station Road	60	4	4	0	1	31
4	Koppikkar & Broadway Road	51	11	4	0	1	33
5	Hirepeth Road	53	3	6	0	0	38.3
6	Maratha Galli	58	3	1.6	0	0	37.5
7	Radhakrishna Galli	52	7.7	9.5	0	5.6	25.0
	Average	53	5	6	0	2	33

Source: Primary Survey, 2003

Spot Area Level Parking

Spot parking survey was conducted at few locations where private taxi and bus parking is observed. Also capacity of the two pay & park locations were also noted during the survey.

Taxi Stand Parking

SN	Location	Capacity (Numbers)
1	At Chenamma Circle	100
2	At Hosur Circle	20
3	At Solapur Road	30

Source: Primary Survey, 2003

: Private Bus Stand

SN	Location	Capacity (Numbers)
1	Solapur Road	15
2	Neeligin Road	5-6

Source: Primary Survey, 2003

: Pay Park of 2 wheelers:

SN	Location	Capacity (Numbers)
1	At Intercity Bus Stand	200
2	At Durgadbail (CBD)	50

Source: Primary Survey, 2003

Observations

- Parking surveys clearly show that maximum demand for parking is for two wheelers, which comprises of 53% of total vehicles in the CBD.
- Koppikkar Road has the highest demand for car parking (11%)

The growing parking demand for 2-wheelers can be met by providing multiplex parking lots

- There is also considerable parking demand for cycles and hand carts which is 33% of the total vehicles

Locations identified for development of MLCPs:

- 1) Koppikkar Road
- 2) Station Road

5.5 BELGAUM

5.5.1 Overview

Belgaum (also known as Belagavi) is the headquarters city of Belgaum district and is one of the oldest urban centers of Karnataka, lying at a distance of around 502 km from Bangalore and around 500 km from Mumbai.

Belgaum is an important trade, administrative and education hub of North Western Karnataka. The city has training centers of the Indian Armed Forces and an air base of the Indian Air Force. The city houses a number of industries, including hydro engines, turbines & pressure oils and Indian Aluminium Company (INDAL).

Belgaum is also been known as an Educational Hub with a set up of several professional colleges.

5.5.2 Belgaum - Economic Base

As stated earlier, Belgaum is a multi-functional city with business (trade and commerce), skilled jobs (industries) and administration as the principal sources of employment. Economic base of the city comprises of the following four core sub-sectors:

- Agriculture & agrarian goods trading;
- Wholesale commodity trading-vegetable, fish, wood;
- Heavy manufacturing industries like INDAL, hydraulics, pressure oils; and
- Centre of automotive engineering esp. crank shaft machining.

The city is an important location for vegetable trading, fish, wood & mining resource trading in North Karnataka. Trade flourishes in the city as many areas of the city are dedicated to certain kinds of trade. For example, almost all automobile-related trade and manufacture happens in the Fort Road area of the city. The Raviwarpeth area is known as the wholesale market which sells commodities like grains, tea, etc.

From the early 1970s, Belgaum began developing as an important centre for the manufacture of heavy machine tools, including the manufacture of high pressure oil hydraulics. Rich deposits of bauxite are found in Belgaum district, and have led to the creation of the INDAL for production of aluminium.

Additionally, uranium deposits have recently been found in Deshnur, a small village near Belgaum. The city is also a strong industrial hub for machine shops catering to automotive manufacturing especially in crank-shaft machining. Belgaum has friendly environment for foundry and casting businesses. The geographical location of the city is an advantage since it is situated strategically between Bangalore and Mumbai/Pune to support the major automotive and aerospace companies.

5.5.3 Belgaum Administrative Setup

The city conurbation area is planned and regulated by the Belgaum Urban Development Authority (BUDA). The Belgaum Municipal Corporation (BMC) is the city administrator, which comprises 58 wards under its jurisdiction with an urban population of about 506,480 (Census 2001). The administrative jurisdiction of BMC encompasses an area of about 83.93 sq. km including many urban villages. Significant proportion of the city area forms part of the Cantonment Board Jurisdiction i.e. Defence area. Following table presents the fact sheet of the Belgaum City

Fact Sheet for Belgaum City

City	Belgaum
Administrative Status	District Headquarters
Area	Belgaum Municipal Corporation (BMC): 83.93 sq. km Belgaum Urban Development Authority (BUDA): NA Belgaum Cantonment Board: NA
Population	506,480 (as per 2001 Census) 604,763 (Estimated Population - 2008)
City Administrator	Belgaum Municipal Corporation
City Functions	Trade & Commerce, Industries, Tourism, Medical & Education Centre, Agriculture and Mining
Geographic Location	Latitude: 15° 87' North Longitude: 74° 5' East Altitude: 751 m above the Mean Sea Level Located in between Bangalore & Mumbai National

	Highway – 4
Connectivity and Linkages	The city is well connected with other parts of the district and state by road and rail. NH-4, NH-4A & SH-20 passes through it connecting the city with Bangalore, Mumbai, Hubli -Dharwad & Panjim.
Temperature	Temperature: Maximum 36°C, Minimum 20°C Rainfall: 125 mm of annual average rainfall
Languages	Regional language: Kannada and Marathi English & Hindi are widely understood
Nearest Airport & Approx. Distance	Sambra (20 km)

5.5.4 Key Infrastructure And Development Initiatives

The GoK has initiated proactive measures to augment and expand the physical infrastructure of the city by developing major infrastructure projects to catalyze economic development of the city. Belgaum would soon get a more advanced airport, a new power station, an international standard exhibition centre amongst many other facilities. Micro level infrastructure projects for better water & electric supply has also been undertaken. Following are some of the major infrastructure development initiatives in the city:

- **Recent Industrial Incentives:** To develop specific sectors, the GoK has setup and IT Incubation Centre at Gogte Institute of Technology, Belgaum and a Science and Technology Entrepreneurs Park at KLE's Engineering College. Karnataka Industrial Area Development Board (KIADB) has setup 8 industrial areas and Karnataka State Industrial Investment Development Corporation (KSIIDC) has setup 5 industrial estates which are fully developed. There is an exclusive auto park to house all auto related industries. The oldest agency in co-operative sector i.e. Belgaum Manufacturer's Co-operative Industrial Estate at Belgaum has developed another 250 acres and provided best quality infrastructure at competitive rates.
- **Communication:** 713 post offices, 189 telephone exchanges, mobile connectivity services by BSNL, Airtel, Hutch, Spice, Reliance and Tata Indicom form the communication hub at Belgaum. Broadband Internet connectivity rules the roost by over 12000 internet installations providing

global connectivity. BSNL has undertaken the augmentation of Wi-fi, optical fibre & cellular connectivity in the entire city for better internet & mobile coverage in the city in the near future.

- Power: Belgaum has 87 sub stations with a capacity to receive and disseminate 1625 MW of power. Belgaum is bestowed with TATA Power Limited with 81.3 MV of power generation. A new 110 KVA power station at Udyambag is to be set up at a cost of about INR 185 million.
- Augmentation of Infrastructure for Water Supply in the City: District administration have planned to increase water supplying capacity of Hidkal Reservoir from 12 MGD to 18 MGD supported by another project of Rakaskop Reservoir from 6 MGD to 12 MGD. The City Municipal Corporation has planned 24 X 7 water supply scheme for the city.
- Belgaum Airport: The land acquisition of about 370 acres is underway as per the Government Order in October 2006, for the airport expansion. The Airport Authority of India has been given the charge of upgrading the runway, terminal and the taxi apron way.
- Upgradation of Infrastructure Facilities at Foundry: The Government of India (GoI) has very recently approved the Upgradation of Infrastructure facilities at Foundry Cluster, Belgaum under Industrial Infrastructure Upgradation Scheme (IIUS) at a tentative cost of INR 247.80 million. The following works will be covered under this Upgradation scheme.
 - Upgradation of infrastructure covering roads, water, water tank, sump tank, pump house
 - Communications covering telephone, internet, fax, Xerox, computers, LCD, Genset etc.
 - CETP - building reclamation plant, green sand, chemical bonded (5 tons /hr.), material handling equipment, common quality testing laboratory, building, furniture, equipments
- Redevelopment of Tourism Properties under PPP Scheme: The Department of Tourism / Karnataka State Tourism Development Corporation has mandated i-deck to provide assistance in selecting a private developer for renovation, operations and management of tourism properties at various locations in Karnataka. The overall project cost is pegged at INR 90 million with a fixed amount of money

allocated for all historical/tourist monuments in the City of Belgaum. Apart from this, about INR 1.0 million was allocated in 2005-2007 from the budget to form new gardens & Lake Front Development of the Kotekere Tank.

- Proposals for Special Economic Zones (SEZs) and Industrial Parks:
There are many proposals for SEZs development and for setting up specific product industrial parks in and around the Belgaum city. About 169.8 acres of land identified adjacent the VTU college in south Belgaum for an IT Park. Close by 69.8 acres land has been earmarked for a proposed Apparel park. Apart from this a proposal has been tabled for two more SEZs for engineering and sugar industries. About 300 acres identified in Hukkeri Taluk for this purpose. Engineering services major Quest is collaborating with business partners to establish a 300-acre SEZ in Belgaum to build an ecosystem of aerospace supply chain. The SEZ, which has been granted in-principle clearance by the Board of Approvals, will be housing suppliers in a single area and carry out precision machining. It is expected to employ about 10,000 people. Quest's present facility in Bangalore, set up in collaboration with Canadian major Magellan, will also move into the SEZ as a 200,000 sq. ft. plant. Lately there have been repeated proposals to set up food processing, textile & floriculture parks in the north as industrial parks in collaboration with the KIADB.
- Major residential developments are taking place in the far north, east and the south. The northern as well as the southern areas are experiencing growth due to the commercial and institutional developments on the NH-4 (north) and NH-4A (Khanapur Road in the south). The eastern areas like Ramterth Nagar, Kanbargi, Mahantesh Nagar, Rukmini Nagar, Patil Nagar, Sree Nagar, Shivteertha Colony, Gandhi Nagar etc. have developed mainly in the last 3 years and constitute the most sought after residential areas of the city. This development can be attributed to their proximity to the CBD and the developing stretch of NH-4 in the north as well as the proximity to the SH-20 that leads to the airport.

5.5.5 PARKING OCCUPANCY SURVEY: as per Traffic Management Plan (KUIDFC Report)

Parking surveys were carried out where intense parking was observed during the reconnaissance survey and also the stretches identified during the other traffic surveys.

The roads were:

- Entire Khade Bazar
- Ganpat Galli
- Maruti Galli
- Ramdev Galli
- Kakatives
- Old P.B.Road

The peak demand in the CBD area was 628 vehicles on Kakatives and outside CBD area 885 vehicles on Old P.B.Road. However, there are different space standards for different type of vehicles. Therefore, when peak demand is converted into the space occupied by different vehicles give a different picture for the demand for space. Peak parking demand by space-wise within the CBD area was 1477 sq.m on Ganpat Galli and outside CBD area was 8,711 sq.m on Old P.B.Road.

However, from the results it is clear that there is high demand for 2Wheelers/Bicycles, which comprises of 87% total vehicles on Ganpat Galli, 94% of total vehicle on Ramdev Galli, 98% of total vehicles on Maruti Galli, 98.5% of total vehicles on Khade Bazar and 98% of total vehicles on Kakatives.

Heavy parking by cars/trucks/LCVs was observed on Old P.B.Road, which comprises of 65% of the total area occupied by vehicles.

Summary of Parking Survey Results

Name of the Road	No.of Vehicles Parked	Area Occupied in Sq.m	Peak Hour
Ganpat Galli	473	1477	18:00 to 19:00
Ramdev Galli	268	684	14:00 to 15:00
Maruti Galli	509	1031	12:00 to 13:00
Khade Bazar 1	355	922	19:00 to 20:00
Khade Bazar 2	523	1029	19:00 to 20:00
Khade Bazar 3	386	780	16:00 to 17:00
Kakatives	628	1155	20:00 to 21:00
Old P.B.Road	885	8711	9:00 to 10:00
College Road	208	911	11:00 to 12:00
Civil Hospital Road	60	226	6:00 to 7:00
Club Road	194	839	11:00 to 12:00

Locations identified for development of MLCPs:

- 1) Ram dev galli - 0.5 acres of land available with Belgaum City Corporation
- 2) Khade Bazaar (subject to availability of BCC land)
- 3) Near GSS college (subject to availability of BCC land)
- 4) Ganpat Galli
- 5) Maruti Galli
- 6) Old P.B.Road

5.6 MANGALORE

5.6.1 An Overview

Mangalore, originally called Mangalooru, is the fourth largest city and chief port city of Karnataka State. The city is located along the Malabar Coast on the backwaters of the Netravati and Gurupur Rivers and is the administrative headquarters of the Dakshina Kannada (South Canara) district. Mangalore is an administrative, commercial, educational and industrial center and is known for its beaches and temples. It has a long tradition of business & entrepreneurship and ranks second in the state after Bangalore in terms of growth and potential for development. The following map presents the location map for the city.

Map Showing the District Map of Dakshina Kannada and Its Location



Three National Highways (NH) pass through Mangalore connecting the city to the rest of the country. NH-17, which runs from Panvel, Maharashtra to Changanur Junction, near Edapally in Kerala, passes through Mangalore giving it excellent North-South connectivity. NH-48 runs eastward from Mangalore to the state capital, Bangalore. NH-13 runs northeast from Mangalore to Sholapur. A state highway (SH-88) connects Mangalore to the city of Mysore passing through the hill city of Madikeri.

5.6.2 Economic Base - Mangalore

The establishments of many industries particularly from 1950, existence of port & port related activities, bulk export of timber, coffee & cashew nuts, trade & commerce, entry of IT & ITES companies have made the city an important center of employment in Karnataka. Economic base of the city comprises of the

following five core sub-sectors:

- Agriculture;
- Port related Activities;
- Manufacturing Industries;
- Information Technology; and
- Trade & Commerce.

Mangalore is a multi-functional city with business (trade and commerce), skilled jobs (industries) and administration as the principal sources of employment. The tertiary or service sector has increased over the recent years with a significant proportion of new jobs across a whole range of activities. Of late, this sector has emerged as the single largest employer and will continue to grow as the dominant sector in the future considering the developmental initiatives planned in the city. The sector contributed to more than 98 percent (in absolute figures - 226,180) of the total city's workforce in 2001 due to the development of IT development, trade & commercial, financial & banking sectors, and industries, which are being identified as future growth engines.

Workers participation rate (42.6%) of the city is higher compared to some of the major cities in the state. The spending pattern indicates an annual expenditure between INR 48,000 to INR 75,000 for majority of the households (51%).

Mangalore is one of the first Tier II cities in Karnataka to attract investments in information technology (IT) sector. Major information technology and outsourcing companies have started locating their operations in Mangalore. IT major Infosys was one of the first to move in and establish a large presence. Several other major companies have their presence in Mangalore and more companies such as TCS, Wipro, KEL and Infosys are planning to expand their workforce in Mangalore.

5.6.3 Administrative Setup

Mangalore City Municipal Council was upgraded into Mangalore City Corporation (MCC) on 3rd July 1980 and has witnessed expansion of the administrative jurisdiction twice, firstly during the year 1996-97 by including Surathkal Town Municipal Council, Katipalla Notified Area, and Panamboor, Baikampady Kulai & Hosabettu villages and secondly during April 2002 by including Bajal, Kannuru, Kudupu and Thiruvail Panchayats. Present

administrative jurisdiction of the MCC extends over an area of about 132.45 sq. km comprising 60 administrative wards.

Mangalore Urban Development Authority (MUDA) is the planning authority responsible for planning and regulating the development of the Mangalore urban. The administrative jurisdiction of MUDA comprises the MCC area and other surrounding revenue villages. Following table presents the fact sheet of Mangalore City.

Fact Sheet for Mangalore City

City	Mangalore
Administrative Status	District Headquarters for Dakshina Kannada (South Canara) District
Area	Mangalore Municipal Corporation (MCC): 132.45 sq. km
Population	539,387 (as per 2001 Census) 584,580 (Estimated Population - 2007)
City Administrator	City Municipal Corporation (MCC)
City Functions	Administrative Activities, Trade & Commerce, Agricultural Processing and Port-related Activities
Geographic Location	Latitude: 12° 52' North Longitude: 74° 49' East Altitude: 5 m above the Mean Sea Level Located at a distance of approximately 363 km from Bangalore and 673 km from Mumbai.
Connectivity and Linkages	The city is well connected by road, rail, air and sea. Three national highways pass through the city (NH-17, NH-48 & NH-13). A state highway (SH-88) connects Mangalore to the city of Mysore passing through the hill city of Madikeri. Mangalore is directly connected through broad gauge railway network to the major cities like Mumbai, Delhi and Goa via the Konkan Railway to Chennai, Calicut, Cochin and Trivandrum via the Southern Railway and to Bangalore,

	Mysore & Hassan via the Mangalore-Hassan Rail Line of South Western Railway. The city has daily direct flights to Bangalore, Mumbai, Goa, Calicut, Cochin and Trivandrum and a few international flights to the Middle East. Mangalore is the only major port in Karnataka, situated midway between the major ports of Marmagoa and Cochin.
Climate	General: Hot and humid climatic conditions. Summer : Maximum 37°C, Minimum 20°C Winter: Maximum 30°C , Minimum 17°C Rainfall : June to September: 400 centimeters
Languages	Regional language is Tulu, Kannada and Konkani. English & Hindi are widely understood
Nearest Airport and Approximate Distance	Bajpe - 20 km

5.6.4 Key Infrastructure And Development Initiatives

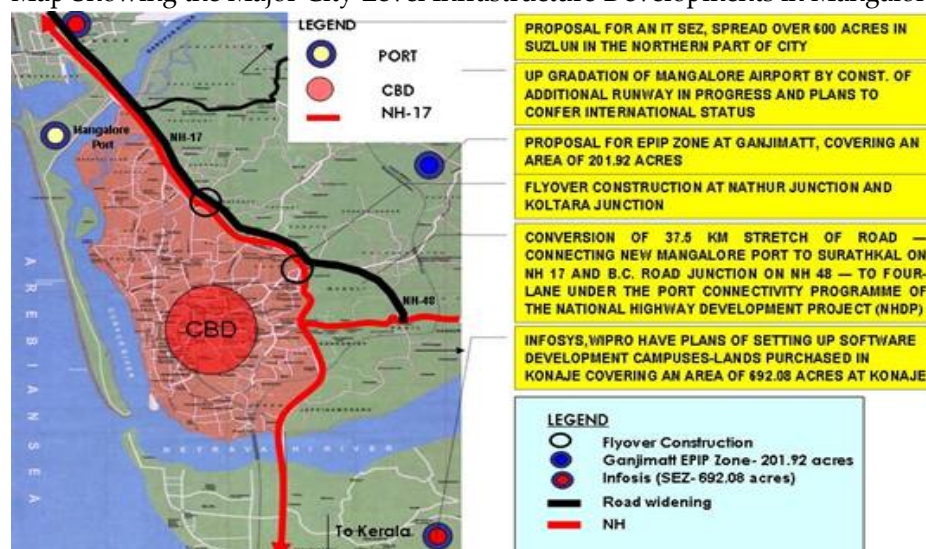
- Mangalore Special Economic Zone: The proposed Mangalore Special Economic Zone (MSEZ) is planned adjacent to the existing MRPL refinery complex on north & eastern sides in an area covering about 3,985 acres of land. ONGC-MRPL, the anchor promoter is already operating a refinery in the adjacent area with established infrastructure. The SEZ is proposed adjacent to an already established industrial belt. This SEZ is being developed under PPP format with 49% stake holding with MRPL & Karnataka Industrial Area Development Board (KIADB) and the rest 51% stake with private developers. Master Plan for this mega project is being prepared at present.
- IT Special Economic Zone: The KIADB has issued notifications for the acquisition of around 600 acres of land in the northern part of Mangalore for the purpose of setting up of IT-ITES SEZ. Also, Infosys and Wipro have plans of setting up software development campuses-lands purchased in Konaje covering an area of 692.08 acres.
- Export Promotion Industrial Park Zone: The State-level single window clearance committee has totally approved the investment proposals of eight

companies at the Export Promotion Industrial Park (EPIP) at Ganjimath covering an area of 201.92 acres with a total investment of INR 3.00 billion. This includes the establishment of both Information Technology & business process outsourcing (BPO) unit.

- Port Connectivity And Road Projects: Apart from above key infrastructure development initiatives, about 37.5 km stretch of road connecting New Mangalore Port to Suratkal on NH-17 and BC Road Junction on NH-48 is being upgraded to four-lane under the Port Connectivity Program of the National Highway Development Project (NHDP). As part of this project, the National Highways Authority of India (NHAI) is constructing seven flyovers. Three flyovers are expected to be completed during the year 2008 while the others are being built at Surathkal, Kulur, Kuntikana and Nanthoor.
- Airport Up-Gradation: There is a proposal to upgrade the airport to international status with a new terminal building and approach road to facilitate handling larger passenger traffic volume.
- KUDCEMP: It is noteworthy that Mangalore is one of the 10 coastal cities/towns taken up for infrastructure development, under the Karnataka Urban Development and Coastal Environmental Management Project (KUDCEMP). This project is being executed by the Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC) of Government of Karnataka with financial assistance from the Asian Development Bank.

The following map presents major city level infrastructure developments.

Map Showing the Major City Level Infrastructure Developments in Mangalore



VI. Project Financials

6.1 General

The preliminary financial analysis for a standardised MLCP has been carried out based on the assumptions arrived from preliminary market assessment carried out at the identified Cities.

The Financial Viability of the Project is assessed with respect to the key parameters such as Project IRR and Equity Internal Rate of Returns (IRR). The Equity IRR for the selected cities vary drastically as certain cities growth rates are much lower as compared to developed cities like Bangalore, Mangalore etc.

The viability analysis includes the identification of revenue and expenditure streams. Revenues will be from parking fees, commercial activities and advertisement, while the expenditure would be primarily on account of Capital and O&M costs.

Caveat: The following set of assumptions has been adopted for the purpose of financial analysis and assessing the broad viability of the project. The assessment would vary for specific locations.

6.2 Space Standards for Car Parking

Standard norms considered for car parking space is shown below,

Sl. No	Type of Parking	Area in Sq. Ft per ECS
1	Open	235
2	Ground Floor Covered	290
3	Basement	325
4	Multi level with ramps	310
5	Multi level with lifts	165
6	Semi automated	235

Source: Implementation of Parking Policy - EPCA Report

6.3 Cost & O&M Assumptions

Following set of assumptions are considered for the Financial Assessment of the MLCP that includes general assumptions, area assumptions and specifications.

6.3.1 Preliminary Cost Estimation

The preliminary cost estimates are based on the preliminary market surveys carried out for the identified Cities. The landed project cost is estimated considering the cost involved in Construction, Project Development Fees, Interest during construction, Cost of Approvals & Sanctions and Pre-operative cost & contingencies etc. Following Tables shows the breakup of the Cost for a standard design of MLCP

Cost	% of the Project Cost
Total Construction Cost	25
Overhead Costs (Percentage of Construction Costs)	3
Equipment Cost for automated parking	68
Interest during Construction (Capitalized)	3
Total Project Cost	100
<i>Particulars</i>	<i>Rupees in Lakhs</i>
Total Construction Cost	1,232.79
Overhead Costs (Percentage of Construction Costs)	147.94
Equipment Cost for automated parking	3,378.00
Total Development Cost	4,758.73
Interest during Construction (Capitalized)	158.51
Total Project Cost	4,917.24

Table: Cost per ECS

Sl. No	Type of Parking	Cost per ECS (in lakhs)
1	Conventional Multi level car parks	6
2	Automated Multilevel car parks	7

6.3.2 O&M Assumptions

Operation & maintenance cost is taken as 20% of the revenue

6.4 Revenue Streams

The MLCPs are proposed to be structured on Development and Management Rights Model with parking fees, advertisement and commercial rental rights. Revenue from parking fees shall be major revenue stream for the operator to recover the investment.

The parking fees & advertisement rates for selected few cities in Karnataka were studied to understand and assess their viability for a MLCP. The table below states the proposed fees for car parks & rates per square feet of advertisement at some of the high traffic congested roads in each city. These roads have also been identified as critical locations that are in urgent need for MLCPs.

Car parking fees at various cities in Karnataka

City	Location	Automated car parking(Rs/car)	Conventional car parking(Rs/car)
BANGALORE	Cars < 2 Hrs	35	30
	Cars 2-5 Hrs	70	60
	Cars >5 Hrs	120	100
MANGALORE	Cars < 2 Hrs	30	20

	Cars 2-5 Hrs	60	40
	Cars >5 Hrs	80	60
HUBLI	Cars < 2 Hrs	30	20
	Cars 2-5 Hrs	60	40
	Cars >5 Hrs	80	60
DHARWAD	Cars < 2 Hrs	30	20
	Cars 2-5 Hrs	60	40
	Cars >5 Hrs	80	60
BELGAUM	Cars < 2 Hrs	30	20
	Cars 2-5 Hrs	60	40
	Cars >5 Hrs	80	60
MYSORE	Cars < 2 Hrs	30	20
	Cars 2-5 Hrs	60	40
	Cars >5 Hrs	80	60

Advertising rates at various cities in Karnataka

<i>City</i>	<i>Location</i>	<i>Size (In Sq Ft)</i>	<i>Rate Per Month</i>	<i>Rate Per Sq Ft</i>
BANGALORE	Hosur road	600	150,000	200
	Bannergatta	600	120,000	180
	City railway station	600	108,000	150
	Sharjapur road	600	120,000	180

MANGALORE	Kankanady circle	800	17,600	22
	Hampankatta road	600	13,200	22
	Bunts hostel circle	600	13,200	22
	Falnir road	600	13,200	22
	City hospital road	600	13,200	22
	Kadri park	840	18,480	22
HUBLI	Lamington road	750	15,000	20
	Station road	400	8,000	20
	Chennama circle	400	8,000	20
	Gokul road	600	12,000	20
DHARWAD	Cosmos club road	400	6,800	17
	Corporation road	400	6,000	15
	Jubilee circle	400	6,000	15
BELGAUM	College road	600	12,000	20
	Central bus station road	600	12,000	20
	Kohlapur circle	600	12,000	20
	Station road	600	12,000	20
MYSORE	Suburb bus station road	300	6,600	22
	Ontikoppal	200	5,000	25
	Dhanwanthri road	200	4,400	22

	Railway station road	200	5,600	28
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6.5 Key Financial Indicators

A Period of 30 Years is found suitable to expect good returns for a continued period from a MLCP. A block financial Assessment for development of MLCP on PPP format has been carried as in Annexure-I.

Following table shows the financial indicators for 30 years of authorization period, 50:50 debt-equity structure for Mechanized MLCP.

Key Financial Indicators

<i>Sr. No.</i>	<i>City</i>	<i>Indicators</i>	
	Bangalore	Project IRR	24.00%
		Equity IRR	21.00%
		DSCR (Avg.)	1.64
1.	Mangalore	Project IRR	21.00 %
		Equity IRR	17.0 %
		DSCR (Avg.)	1.35
2.	Hubli	Post-tax Project IRR	21.00 %
		Equity IRR	17.0 %
		DSCR (Avg.)	1.35
3.	Dharwad	Post-tax Project IRR	21.00 %
		Equity IRR	17.0 %
		DSCR (Avg.)	1.35
4.	Belgaum	Post-tax Project IRR	21.00 %

		Equity IRR	17.0 %
		DSCR (Avg.)	1.35
5.	Mysore	Post-tax Project IRR	21.00 %
		Equity IRR	17.0 %
		DSCR (Avg.)	1.35

The equity IRR and the Project IRR represent the projects financial viability on PPP format.

6.6 Commercial Viability as Per Location

Viability of the project is based on the parking fees and other revenues like commercial activities, advertisement, etc and depends on the development and city infrastructure around the proposed area. City specific IRR have been derived considering the prevailing parking rates and advertisement rates at various locations in the selected cities.

The table below shows the ranking of the cities as per commercial viability of constructing & operating a MLCP:

Ranking of cities based on commercial viability

<i>Ranking</i>	<i>City</i>
1.	Bangalore
2.	Mangalore
3.	Mysore
4.	Belgaum
5.	Hubli
6.	Dharwad

VII. Operating Framework

7.1 Implementation Structure

The locations identified for development of MLCPs in individual cities would need to be assessed for their technical & financial viability. In the proposed PPP structure for implementation, the roles to be performed by the respective parties i.e. the ULBs and Selected Developers have been identified as below:

7.1.1 Role of ULBs:

The role of the ULBs would include:

- a. Identification of locations
- b. Co-ordination with and seeking requisite clearances
- c. Standardization of parking fee structure and performance standards
- d. Providing collection of parking fees and advertisement rights to developers

7.1.2 Role of Developer:

The role of the Developer would include but not limited to :

- a. Design, finance, construct, operate, maintain and manage the facilities including supporting ancillary infrastructure
- b. Meet the requirements laid down by the Competent Authority

7.2 Standards and Specification

The facilities will include but not limited to the followings.

- a. Mechanised Parking Facility
- b. Adequate Car Lifts
- c. Toll Plaza/ Booths adequately computerized
- d. Commercial space as permissible under the bye-laws

The design criteria like loading standards, permissible stresses and quality standards, to be followed for the preparation of design and drawings will be as per the latest standards, codes and recommendations of the Indian Bureau of Standards. The design shall not only satisfy the functional requirements but also consider the service condition and provision is to be made for future expansion.

The following specifications and standards cover only some of the minimum requirements for the development. The developer would be required to design, finance, construct, maintain and operate the proposed Multilevel Parking

strictly conforming to the relevant Indian Standards, the best Industry practices and internationally acceptable norms.

7.2.1 Design Basis

All equipment should be derated for an ambient temperature of 45°C for indoor and 50°C for outdoor. Maximum relative humidity to be considered is 90% or as specified. Continuity of power supply is the first consideration. The design shall be such as to provide facilities to simplify inspection, testing, maintenance, cleaning, and general repairs at site.

Special care to be taken to make the enclosed equipment proof against entry of rats, lizards and other creeping reptiles, which may create electrical, short-circuit. All ventilation opening shall have suitable screen protection. All equipment shall be complete with approved safety devices wherever a potential hazard to personnel exists and with provision for safe access of personnel to and around equipment for operational and maintenance functions. Design shall include all reasonable precautions and provisions for the safety of operating and maintenance personnel.

7.2.2 Multi-level Parking

Multilevel Parking with a required capacity and additional parking space to accommodate the parking requirements for permissible commercial space as per the building bye-laws

Multi Level Parking facility should be fully mechanized and the use of standards and specifications for use of material, construction technology and operations shall adhere to the national and international set of specifications and the best practices in the industry.

All basic necessity like drinking water, toilets, DG sets, Fire fighting facility, security should be provided

Retrieval Time : Not more than 3 minutes

The Multi-level Parking would be required to be planned in accordance with the Development Control Regulations applicable on the site in respective cities.

7.2.3 Specifications for Multi-level Parking

The design should be considering the standards for Mechanized Multi-level with lift. A minimum number of 3 car lifts each for entry and exit with at least one lift each for entry and exit as stand by

A modern state of the art toll collection system such as Mechanized Parking Ticket Issuing Machine shall be designed for computation and collection of toll. The toll shall be collected from the vehicles at the exit point. A mechanized barrier gate shall be designed and synchronized with the toll collection system for regulating entry/exit of vehicles into and out of the parking area. The Ticketing Station or access system shall be located outside the Entry and Exit Areas on the right side of the inbound traffic.

The entry/exit point shall be located away from the traffic junctions and exit locations. The entry/exit of vehicles shall be provided so that it does not hinder pedestrian movements and shall under no circumstances be from Walkways. The minimum clear width of Entry Area shall be designed according to the respective needs and leaving adequate space to the left and right of the car for passengers to leave/enter the car. Adequate area for queuing of the inbound and out bound vehicles shall be provided.

The Entry areas shall be equipped with sensors to ensure the right positioning of the vehicle to be transported as well as determine the presence of oversized vehicles, protruding mirrors or racks, which exceed the size limitations of the system.

Motion detectors and CCTV cameras or similar devices shall be installed inside the Entry and Exit Areas to ensure that no person or animals are inside the Entry and Exit Areas or the vehicle when the machine starts moving. Cameras shall be installed to record digital photos of the physical condition of the car entering and exiting the premises. The images are also helpful to locate cars for drivers with a lost ticket and to validate damage claims. All Entry and Exit Areas must comply with disability requirements.

7.2.4 Toll Plaza

‘Closed’ system of toll collection shall be required to be adopted for the Project. Toll collection is proposed to be fully automatic/semi-Multi-level tolling system comprising registering of vehicle classification, ticket issuing, data processing etc. The multiple numbers of toll lanes shall be provided so that no more than 3 vehicles per lane queue up during the peak hours. The design for toll plaza shall conform to the standards. The toll plaza/booths layout shall be prepared by Developer and approved from the Development Authority.

7.2.5 Civil and Structural Requirements

The building shall be designed in accordance with the latest Indian Standard Codes and shall be designed to resist wind and seismic forces RCC Structures

shall be designed as per IS 456 : 2000. Steel Structures shall be designed in accordance with the provision of IS 800-1984. Structural steel shall conform to IS 2062. Tubular section shall conform to IS 4923

Architectural design norms as per NBC (National Building Code – 2005)
Structural Design norms as per NBC and BIS (Bureau of Indian Standards)

7.2.6 Services and Facilities

A fully mechanized Multi-level parking lot at shall be designed for a minimum capacity of parking as defined above.

Adequate underground water storage shall be provided to cater for one day requirement of domestic flushing requirements. An additional separate underground storage shall be provided exclusively for firefighting purposes. The design and detailing for the provision of plumbing and sanitary facilities for the parking complex shall be done in accordance with National Building Code & Hand Book of Water Supply & Drainage

Adequate public convenience and drinking water facility should be provided for the support staff as well as the drivers. Drainage facilities shall be constructed and designed in such a manner that there is no stagnation of water in the Project Site. The internal drainage system shall be connected to main common drain at an appropriate location in accordance with the existing network Worker/ employee amenities shall be provided in accordance with Good Industry Practice

Safety barriers, at appropriate locations, shall be provided to effectively manage pedestrian and vehicular traffic.

Illuminated signage in accordance with National Building Code (NBC)/ Indian Road Congress (IRC) Norms shall be provided at suitable locations within the Parking Facility.

7.2.7 Fire Fighting Facilities

The developer shall provide the required fire fighting equipment and facilities conforming to relevant standards and the applicable rules and regulations. Fire safety measures as recommended in applicable codes (Indian as well as international) listed in Point 3 shall be implemented. Specifically, the fire fighting system shall be adequate to control petroleum fires. Construct the Parking Facilities' structure with non-combustible material without a specified

fire resistance. In addition, those portions of the facility used for the transport and / or storage shall have a finish of non-absorbent, non-combustible material. Specifically, the fire fighting system shall be adequate to control petroleum fires. Provisions shall be made in a Mechanized Parking Facility that leakage of gasoline tanks or other flammable fluids are collected during transportation and storage of the vehicle.

Where the Mechanized Parking Facility is located below a building, a 2-hour fire resistance rated separation shall be provided between the Mechanized Parking Facility and the adjacent space use.

As the nature of a Mechanized Parking Facility provides the means to transport a vehicle without human interference, provisions shall be provided to detect a vehicle on fire and to transport it to a fire extinguishing cell at a space on ground floor, easily accessible for fire-fighters.

7.2.8 Light and ventilation

Proper ventilation should be provided for all parking floors. A mechanical ventilation must be provided to permit a minimum of 15 air- changes per hour for normal ventilation and 30 air changes per hour in case of fire or distress call. Adequate lighting system in parking facility area will have to be provided to achieve a minimum lux level of 70 for ramps, parking and pedestrian movement area and a minimum lux level of 100 for stairways, toilets, entrance and exit areas of parking.

The Entry Areas for Parking shall be provided with auxiliary emergency lighting system such that in the event of failure in general power supply the auxiliary emergency lighting system is activated immediately.

Power back-up adequate for 100% of the designed power load of the Parking Facility (except Walkways) and Toilet Area shall be provided. The generator shall be equipped to have a switch-over mechanism so as to be activated automatically in the event of power failure. The generator shall be installed in a separate sound-proof enclosure.

7.2.9 Automation and Process Control

The automation system shall be suitable for acquiring data / information from various systems / sub-systems and process them to execute the functions as required for the operations.

The level of automation shall satisfy the requirements of the promised specification for the Parking system like human interface, ticketing, tracking of the car, choice of least time critical path for parking, retrieval and metering etc. A computer CPU with appropriate software will act through the PLC. The software will be based on the state-of-the art operating system and will be time tested for the type of parking installed.

The required UPS (Uninterrupted Power Supply) will be provided. The equipment and component parts shall conform to the relevant standards by Bureau of Indian Standards wherever available. They shall further conform to the latest Indian

7.3 Maintenance and Performance Standard

7.3.1 General

During the period of operation, the Developer would be required to maintain all the Facilities in accordance with performance standards and maintenance requirements, as mentioned below:

- Perform maintenance on a routine and periodic basis. Identify potential problems early within the context of the planned maintenance system so that corrective action may be planned and completed in a timely manner.
- Establish a maintenance list for planned operation and maintenance. Follow an orderly program so that maximum operational efficiency is attained.

7.3.2 Diagnostics

The Parking Facility may have an installed and real time, on-line connection to the manufacturer/ technical operator which allows for resolution of most errors remotely with a short response time in reaction to any trouble alarms generated by the system.

The Parking Facility shall be capable of reporting alarms in different classes according to their severity for the System functionality. Preferably, a hotline support line shall be implemented to enable a remote system support.

7.3.3 Maintenance / Operator

Adequate steps shall be taken for regular maintenance of the equipments in order to avoid System interruptions as much as possible and to remedy such interruptions in a reasonable time.

Under all circumstances without any exception, trained personnel must be available round the clock at short notice. A contract with manufacturer shall be entered into to provide a trained technician for the prevention and remedy of interruptions during the all hours of operation of the Parking Facility. Explicit provisions relating to training and know-how transfer, including sharing of manuals and procedures would have to be reflected in the agreement that may be entered into with the manufacturer.

The system shall be required to be designed such, that maintenance personnel has access to all Parking Facility, machinery and electrical and electronic components in a safe manner.

The Developer shall perform routine and periodic maintenance activities for the project infrastructure viz, civil, mechanical and electrical works and equipment, furniture for meeting the specified performance standards

VIII. Keys to Success

8.1 Key Stakeholders

The key stakeholders identified for the development of Multi Level Car Parking Facilities in developing Cities of Karnataka are:

- **Project Sponsor** - Concerned Municipal Authority
- **Nodal Department** - Urban Development Department / Directorate of Municipal Administration
- **Facilitating Department** - Infrastructure Development Department
- City Town Planning Department
- Traffic Police Department
- State Electricity Board
- Other agency as deemed necessary

For the successful implementation of the projects, the Infrastructure Development Department alongwith the Project Advisors and the Urban Development Department would require to convene a joint meeting of the heads of the ULBs where the project concept and structure is discussed and taken up for implementation.

The project sponsor alongwith the Project Advisors will be required to take the lead in co-ordinating with the individual agencies involved for identification of locations and for seeking the requisite clearances

8.2 Essential issues to be addressed

The following have been identified to be key issues for the success in developing of a MLCP and effective utilization of the same

- Stringent provisions by way of fine and other penal actions need to be provided for violation of parking rules in the cities to ensure parking of vehicles in the designated MLCPs
- A graded parking fee structure should be evolved as a measure of parking demand management
- Joint inspections of locations and reviews with key stakeholders

8.3 Role of Project Sponsor

The ULB shall be responsible to give right to use land free of encumbrance to the Developer for developing the Project components. The land required for creating the Project Facilities would be required to be given on Development and Management Rights to the Developer over the Authorization Period in terms of the Authorization Agreement supported by Development and Management Agreement (DMA).

The ULB will also require to facilitate availability of infrastructural support/ services and ensure effective coordination between all government departments to provide timely approval and clearances. Government support/ facilitation would be required in the following:

- Ensuring availability of requisite land & infrastructural support/ services, viz. power supply, improving existing road,
- Providing all clearances and approvals for execution of MLCPs, installing supportive facilities and other commercial components for development and operation.

8.4 Clearances and Sanctions

The following clearances and sanctions for the proposed project from various agencies would be required

- Concerned Municipal Authority
- Traffic Police Department
- State Electricity Board
- Water Supply & Sewerage Board
- Urban Development Authority
- Other agency as deemed necessary

8.5 Risk Allocation and Mitigation

Appropriate risk mitigation structures would have to be evolved for the Project. Various risks associated with the Project and broad mitigation structure is explained below:

8.5.1 Design and Development Risk:

This can arise due to faulty specifications. This risk is being looked at being mitigated by the designs being finalized and standardized by the ULBs based on the city's profile.

8.5.2 Construction Risk:

This can lead to delays in completion. Effective clauses in the Authorisation Agreement and ensuring timely clearances and handing over of sites are some ways of mitigating this risk.

8.5.3 Demand Risk:

These risks arise from the project if there is no established demand for the Project. However in this case, a Pre-feasibility has been carried out to assess the viability of the project based on the demand for the revenue generating components for the project.

8.5.4 Commercial Risk/ Revenue Risk:

These risks arise from existing and future competition, effectiveness in utilizing space and management of facilities. With the involvement of Private Sector in marketing, O&M and management and attractive incentives structures linked with Project success, risk would be transferred to the Developer.

8.5.5 Political Risk:

These can be mitigated by effective legal documentation and insurance.

8.5.6 Environmental Risk:

Considering the size of the project and the design parameters essentially being considered the project to be environment friendly to the extent possible, this risk is not envisaged.

IX. Success Stories

9.1 Case Studies

Project summary sheets of the Multi level Car Parking Projects which are successfully implemented on PPP format across India are provided below.

9.1.1 Sector 17 – Chandigarh

Parameters	Details
Developer	SPML
Client	Mun. Corporation Chandigarh
Capacity (ECS)	1200
Height	G+3 + 2 basement
Technology / Type	Combination (Manual, semi-Automatic)
Land area	6996 sqm
Approx Cost	3.50 lac / ECS (2007)
Parking Charges	Upto 2 Hour - Rs 10 For 2 to 5 Hour - Rs 15 For > 5 Hour - Rs 20 Monthly - Rs 500
Occupancy	Under implementation
Commercial Facility	9% of floor area + Advertising inside premises)
Implementation Str.	BOT
Concession Period	9 yrs 11 months

9.1.2 Rowdon Street – Kolkata

Parameters	Details
Developer	Simpark
Client	Kolkata Municipal Corporation
Capacity (ECS)	221
Height	G+2
Technology / Type	Combination (G.F. – Manual, 1 st & 2 nd Floor Automatic)
Land area	2000 sqm (225 X 9 m)
Approx Cost	3.60 lac / ECS (2001)
Parking Charges	Upto 1 Hour - Rs 15 For 1 to 4 Hour - Rs 50 For 4 to 8 Hour - Rs 75 Monthly - Rs 1,500
Occupancy	75%
Commercial Facility	Nil (No Advertising potential)
Implementation Str.	BOT
Concession Period	20 yrs (from 2001)

9.1.3 New Market – Kolkata

Parameters	Details
Developer	Simpark
Client	Kolkate Municipal Corporation
Capacity (ECS)	280
Height	1 floor (2nd Basement)
Technology / Type	Fully Automatic
Land area	4,320 sq m (180 X 24 m)
Approx Cost	10 lac / ECS
Parking Charges	Upto 4 Hour - Rs 10 / hr For 4 to 8 Hour - Rs 55 Monthly - Rs 1,500
Occupancy	80%
Commercial Facility	1 st Basement (3800 sqm)
Implementation Str.	BOT
Concession Period	20 yrs (from 2007)
O&M	15 min daily

9.1.4 Sambhaji Park – Pune

Parameters	Details
Capacity (ECS)	80
Developer	Ram Ratan Group
Height	40 mts
Technology	Automatic (Tower Parking)
Land area	250 sqm
Approx Cost	28 Crs.
Parking Charges	Normal (10 Rs for two hrs and 50 for whole day)
Occupancy	50% (no parking regulation has not been enforced)
Commercial Facility	None (only advertisement rights)
Implementation Str.	BOT
Concession Period	5 yrs

X. Way Ahead

10.1 Proposal

KIPDC proposes to take up the Project Development for development of Multi Level Car Parking Facilities (MLCPs) on PPP format including identification of locations in close co-ordination with IDD and the respective City administrations.

KIPDC proposes to provide advisory services for the implementation of MLCPs in the cities identified as an innovative urban infrastructure development program of the Government of Karnataka.

10.2 Project development approach by KIPDC

Project development comprises of end-to-end responsibility commencing from project conceptualisation, identification of locations for setting up of Multi Level Car Parking Facilities (MLCPs) alongwith stakeholders (ULB, Traffic Police, Town Planning Dept, etc), technical and financial viability assessment, project packaging, risk analysis and legal review, concession agreements, assisting the ULB till the identification and selection of the most suitable private sector developer for the MLCPs.

KIPDC shall undertake the project structuring and bid process management for selecting the most suitable developer to finance, design, construct, operate and maintain the subject project for around 30 years and with a view to facilitating PPP format. Bid process management shall be taken up in a speedy, competitive and transparent manner.

The ULB shall provide the selected private sector developer with development rights and permissible advertisement rights to recover its investments. Subsequent to the completion of the concession period, the asset would be returned back to the ULB by the developer.

Another essential requirement of successful project development would be to create awareness amongst likely developers through proactive marketing strategy. Project development cycle is expected to be around 4-6 months.

10.2.1 Scope of Project Development

In order to successfully implement the project, certain essential requirements as listed hereunder are enumerated:

- a. **Location Identification:** Identification of suitable project locations in coordination with ULB, Traffic Police, Town Planning Department, or any other agency as deemed necessary by the ULB. The basis for location of a MLCP shall be the parking demand assessment surveys of the vehicles and vehicular volumes at a given location and availability of land for development of the MLCP. Project location identification also includes proximity of related synergies that may be factored while project development and structuring.
- b. **Project Development & Benchmarking Bid Values:** KIPDC would provide its professional expertise to undertake project development including project feasibility and structuring exercise in order to develop the most suitable PPP model and exploring the viability options. Based on the viability of the proposed package, KIPDC would arrive at the benchmarking of Bid Values for each of the packages for optimum returns to the ULBs.
- c. **Procurement of Developer:** Undertaking in a speedy manner, competitive and transparent bid process management in order to select the most suitable private sector partner for this project. Private Sector Developers for the packages shall be selected through transparent bidding based on highest premium to ULB. KIPDC shall draft the concession agreement to be entered into by the ULB with the Private Sector Developer and facilitate in signing of the same

10.3 Implementation Plan

KIPDC proposes to take up the Project Development for the development of MLCPs in Cities of Karnataka in the following Phases:

10.3.1 Phase-I

In the Phase-I, it is proposed to identify critical locations each in the top 5 cities of Karnataka and take up the project development and procurement process for selection of private sector developer for the same.

10.3.2 Phase-II

In the Phase-II, it is proposed to take up the project development for the following:

- Next set of locations in the top 5 cities of Karnataka
- MLCPs in other cities of Karnataka

10.4 Role of Infrastructure Development Department

- Approval of Pre-feasibility Study carried out and recommendations to the Urban Development Department, Directorate of Municipal Administration and the ULB's for implementation of the MLCPs with KIPDC as project development advisor.
- Take up the implementation of the MLCPs in the Cities identified as an urban infrastructure development Program
- Act as facilitating arm to the Urban Development Department, Directorate of Municipal Administration and the ULB's.
- Convene joint meetings of the stakeholders for facilitating the ULBs in taking up the implementation, setting development time frames.
- Assist the ULBs in meetings with other departments, viz: Traffic Police, etc

10.5 Role of Urban Development Department & Directorate of Municipal Administration

- Take up the implementation of the MLCPs in the Cities identified as an urban infrastructure development Program with the assistance of IDD and KIPDC
- Issue necessary directives to the ULBs for taking up of the program for their respective cities with KIPDC as project development advisor
- Set project implementation timeframes and hold joint meetings of the ULBs for review of progress
- Seek the necessary expertise from IDD and KIPDC for successful implementation of the program

10.6 Role Of Urban Local Bodies

- Mandate the Project Development for development of MLCPs in the City on PPP format to KIPDC
- Take up the implementation of the MLCPs with the assistance of IDD and KIPDC
- Identify specific locations within the city for implementation of the MLCPs
- Seek necessary clearances from other stakeholders.

I. Annexure-I

Typical Viability Assessment – Automated type MLCP

Particulars	Area	Unit
Plot Area	43,460	sq. ft.
Permissible Floor Area Ratio	3.25	Ratio
Total area for surface parking	10,865	sq. ft.
Total area for ground and 3 level above ground parking	141,245	sq. ft.
Basement Parking (2 levels)	65,190	sq. ft.

Project Stream - Commercial Complex			Y1H1	Y1H2	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y15	Y20	Y30
Capital Account																
Construction Phasing			50%	50%												
Receipts																
Equity Component			50.0%	1,369.57	1,461.58	-										
Debt Component			50.0%	1,369.57	1,461.58	-										
Expenditure																
Land Development Cost	0	In Lakhs	-													
Cost of Surface parking	46	INR per Sq. ft	2.52	2.52	-											
Cost of Construction - ground and 3 level above ground	750	INR per Sq. ft	529.67	529.67	-											
Cost of Construction - Basement Parking	1000	INR per Sq. ft	325.95	325.95	-											
Escalation in Construction Cost	7%															
Cost Reduction if Any	0%															
Total Construction Cost		In Lakhs	858.14	858.14	-											
Overhead Costs (Percentage of Construction Costs)	12%		102.98	102.98	-											
Equipment Cost for automated parking	3,378.00	In Lakhs	1,689.00	1,689.00	-											
Total Development Cost			2,650.12	2,650.12	-											
Recommended (Tentative) Land Reserve Premium	-	In Lakhs	-	-	-											
Interest during Construction (Capitalized)		In Lakhs	89.02	273.05	-											
Total Project Cost	5,662.31	In Lakhs	2,739.14	2,923.17	-											
Revenue Account																
Absorption Rate of Leasable Area			0%	0%	70%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Receipts																
Revenue from Parking Charges			-	-	1,329.55	1,994.33	2,094.04	2,198.75	2,308.68	2,424.12	2,545.32	2,672.59	2,806.22	3,581.53	4,571.04	7,445.74
Revenues from advertisement	1%		-	-	13.30	19.94	20.94	21.99	23.09	24.24	25.45	26.73	28.06	35.82	45.71	74.46
Less: Revenue Loss due to Non-Occupancy	0%		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Net Revenue Receipts			-	-	1,343	2,014	2,115	2,221	2,332	2,448	2,571	2,699	2,834	3,617	4,617	7,520
Expenditure																
Lease Rents per sq ft.	25	INR per Sq. ft per			25	25	25	26	26	26	28	28	28	30	34	39
Transaction Charges	2%	In Lakhs	-	-	27	40	42	44	47	49	51	54	57	72	92	150
Lease rents payable		In Lakhs	-	-	456	652	652	684	684	684	719	719	719	792	874	1,011
Operations & Maintenance Cost	20% of revenue		-	-	266	399	419	440	462	485	509	535	561	716	914	1,489
Interest during Operation		In Lakhs	-	-	347.60	306.71	265.81	224.92	184.03	143.13	102.24	61.34	20.45	-	-	-
Total Revenue Expenditure		In Lakhs	-	-	1,097	1,398	1,379	1,394	1,377	1,361	1,381	1,369	1,357	1,581	1,880	2,651
Depreciation (Machinery & Equipment)	10.34%	In Lakhs	-	-	349.29	349.29	349.29	349.29	349.29	349.29	349.29	349.29	245.92	-	-	-
Depreciation (Building)	3.34%	In Lakhs	-	-	189.12	189.12	189.12	189.12	189.12	189.12	189.12	189.12	189.12	189.12	189.12	-
Depreciation		In Lakhs	-	-	538.41	538.41	538.41	538.41	538.41	538.41	538.41	538.41	435.04	189.12	189.12	-
Taxable Income (PBT)		In Lakhs	-	-	(292)	78	198	289	416	549	651	792	1,042	1,847	2,547	4,869
Deduct: Corporate Tax (incl. Surcharge and Education Cess)	33.99%	In Lakhs	-	-	-	-	-	93	142	186	221	269	354	628	866	1,655
Net Profit (PAT)		In Lakhs	-	-	(292)	78	198	196	275	362	430	523	688	1,219	1,682	3,214
Deduct: Dividend Distribution Tax (DDT)	17%	In Lakhs	-	-	21	52	63	62	69	77	82	90	95	120	159	4,066

Net Cash Accruals			In Lakhs	-	-	225	564	674	672	744	824	886	971	1,028	1,289	1,712	(852)
Capital Structuring / Funding																	
Equity	50.0%	2,831.15	In Lakhs	1,369.57	1,461.58	-											
Debt	50.0%	2,831.15	In Lakhs	1,369.57	1,461.58	-											
Debt Schedule																	
Opening Balance			In Lakhs	-	1,369.57	2,831.15	2,516.58	2,202.01	1,887.44	1,572.86	1,258.29	943.72	629.15	314.57			
Loan Receipts			In Lakhs	1,369.57	1,461.58	-	-	-	-	-	-	-	-	-			
Loan Repayment			In Lakhs	-	-	314.57	314.57	314.57	314.57	314.57	314.57	314.57	314.57	314.57			
Closing Balance			In Lakhs	1,369.57	2,831.15	2,516.58	2,202.01	1,887.44	1,572.86	1,258.29	943.72	629.15	314.57	-			
Interest																	
Total Interest on the Debt Component	13%		In Lakhs	89.02	273.05	347.60	306.71	265.81	224.92	184.03	143.13	102.24	61.34	20.45	-	-	-
Interest during Construction			In Lakhs	89.02	273.05	-	-	-	-	-	-	-	-	-	-	-	-
Interest during Operation			In Lakhs	-	-	347.60	306.71	265.81	224.92	184.03	143.13	102.24	61.34	20.45	-	-	-
Corporate Tax Calculation																	
Loss brought Forward			In Lakhs	-	-	-	(292)	(214)	(16)	-	-	-	-	-	-	-	-
Net Profit/Loss for Tax Calculation			In Lakhs	-	-	(292)	(214)	(16)	272	416	549	651	792	1,042	1,847	2,547	4,869
Deduct: Corporate Tax (incl. Surcharge and Education Cess)			In Lakhs	-	-	-	-	-	93	142	186	221	269	354	628	866	1,655
Net Profit (PAT)																	
Dividend Distribution Tax Calculation																	
Dividend Payout	50%		In Lakhs	-	-	123.07	308.26	368.08	367.29	406.66	450.25	484.04	530.72	561.48	704.22	935.36	1,607.12
Non-Taxed Dividend Carried Forward			In Lakhs	-	-	123.07	431.33	799.41	1,166.70	1,573.36	2,023.61	2,507.66	3,038.37	3,599.85	6,734.42	10,938.17	22,309.24
Dividend Distribution Tax (DDT)	17%		In Lakhs	-	-	20.92	52.40	62.57	62.44	69.13	76.54	82.29	90.22	95.45	119.72	159.01	4,065.78
SUMMARY CASH FLOWS AND KEY FINANCIAL INDICATORS																	
Cash Profit (Net Cash Accruals - Loan Repayment)			In Lakhs	-	-	(89.35)	249.54	359.02	357.57	429.61	509.38	571.23	656.64	712.94	1,288.73	1,711.70	(851.53)
Project Cash Flows (including Tentative Land Premium) on EBITDA			In Lakhs	(2,739.14)	(2,923.17)	593.75	923.22	1,001.98	1,052.08	1,138.90	1,230.07	1,291.58	1,392.09	1,497.63	2,036.30	2,736.60	4,869.33
Project Cash Flows (including Tentative Land Premium) on EBITDA						(5,662.31)	1,516.97	1,001.98	1,052.08	1,138.90	1,230.07	1,291.58	1,392.09	1,497.63	2,036.30	2,736.60	4,869.33
Project Cash Flows (including Tentative Land Premium) - post tax			In Lakhs	(2,739.14)	(2,923.17)	246.15	616.51	736.16	734.58	813.32	900.50	968.09	1,061.43	1,122.96	1,408.45	1,870.71	3,214.25
Equity Cash Flows (including Tentative Land Premium) of the Project			In Lakhs	(1,369.57)	(1,461.58)	(89.35)	249.54	359.02	357.57	429.61	509.38	571.23	656.64	712.94	1,288.73	1,711.70	(851.53)
Equity Cash Flows (including Tentative Land Premium) of the Project						(2,831.15)	160.19	359.02	357.57	429.61	509.38	571.23	656.64	712.94	1,288.73	1,711.70	(851.53)
Total Cumulative Equity (including Tentative Land Premium)			In Lakhs	1,369.57	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15	2,831.15
Average Return on Equity						-100.00%	-51.63%	-3.16%	8.81%	12.68%	12.63%	15.17%	17.99%	20.18%	23.19%	25.18%	45.52%
Total Investments / Cost			In Lakhs	2,739.14	2,923.17	-	-	-	-	-	-	-	-	-	-	-	-
Total Benefits			In Lakhs	-	-	594	923	1,002	1,052	1,139	1,230	1,292	1,392	1,498	2,036	2,737	4,869
Interest Service Ratio						3.86	6.57	7.96	9.87	12.67	17.11	25.15	44.00	138.61	-	-	-
Debt Service Ratio						0.72	1.79	2.14	2.14	2.37	2.62	2.82	3.09	3.27	-	-	-
Debt Service Coverage Ratio						0.34	0.91	1.16	1.25	1.49	1.80	2.13	2.58	3.07	-	-	-
Project Breakeven Period			In Lakhs	(2,739.14)	(5,662.31)	(5,416.16)	(4,799.65)	(4,063.49)	(3,328.90)	(2,515.58)	(1,615.09)	(647.00)	414.43	1,537.39	7,806.53	16,214.03	38,956.17

DETERMINATION OF PREMIUM LAND RESERVE PRICE

Equity (Developer's) IRR	Percent	21%
Project Internal Rate of Return (IRR) - EB	Percent	24%
Land Premium per Unit Area	INR per sq. ft.	-
Total Land Premium for the Project Comp	INR lakhs	-
NPV	INR lakhs	6,965.94

Typical Viability Assessment – Conventional type MLCP

Particulars	Area	Unit
Plot Area	43,460	sq. ft.
Permissible Floor Area Ratio	3.25	Ratio
Total area for surface parking	10,865	sq. ft.
Total area for ground and 3 level above ground parking	141,245	sq. ft.
Basement Parking (2 levels)	65,190	sq. ft.

Project Stream - Commercial Complex				Y1H1	Y1H2	Y2H1	Y2H2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y15	Y20	Y25	Y30	
Capital Account																				
Construction Phasing				40%	40%	20%														
Receipts																				
Equity Component				50.0%	398.60	425.38	607.02													
Debt Component				50.0%	398.60	425.38	607.02													
Expenditure																				
Land Development Cost	0	In Lakhs		-																
Cost of Surface parking	46	INR per Sq. ft		2.02	2.02	1.01														
Cost of Construction - ground and 3 level above ground	743	INR per Sq. ft		420.06	420.06	210.03														
Cost of Construction - Basement Parking	1022	INR per Sq. ft		266.58	266.58	133.29														
Escalation in Construction Cost	7%																			
Cost Reduction if Any	0%																			
Total Construction Cost		In Lakhs		688.66	688.66	368.43														
Overhead Costs (Percentage of Construction Costs)	12%			82.64	82.64	44.21														
Equipment Cost				-	-	660.00														
Total Development Cost				771.29	771.29	1,072.64														
Recommended (Tentative) Land Reserve Premium	-	In Lakhs		-	-	-														
Interest during Construction (Capitalized)		In Lakhs		25.91	79.47	141.41														
Total Project Cost	2,862.01	In Lakhs		797.20	850.76	1,214.05														
Revenue Account																				
Absorption Rate of Leasable Area				0%	0%	70%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Receipts																				
Revenue from Parking Charges				-	-	346.39	519.58	1,091.13	1,145.68	1,202.97	1,263.11	1,326.27	1,392.58	1,462.21	1,535.32	1,959.50	2,500.88	3,191.83	4,073.67	
Revenues from advertisement	1%			-	-	3.46	5.20	10.91	11.46	12.03	12.63	13.26	13.93	14.62	15.35	19.60	25.01	31.92	40.74	
Less: Revenue Loss due to Non-Occupancy	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Net Revenue Receipts				-	-	350	525	1,102	1,157	1,215	1,276	1,340	1,407	1,477	1,551	1,979	2,526	3,224	4,114	
Expenditure																				
Lease Rents per sq ft.	25	INR per Sq. ft	In Lakhs			25	25	25	26	26	26	28	28	28	29	30	34	37	39	
Transaction Charges	2%		In Lakhs	-	-	7	10	22	23	24	26	27	28	30	31	40	51	64	82	
Lease rents payable			In Lakhs			228	326	652	684	684	684	719	719	719	755	792	874	963	1,011	
Operations & Maintenance	5%	annual increase				29	29	61	64	67	71	74	78	82	86	110	140	179	229	
Interest during Operation			In Lakhs	-	-	-	170.53	155.03	134.36	113.69	93.02	72.35	51.68	31.01	-	-	-	-	-	
Total Revenue Expenditure			In Lakhs	-	-	264	536	890	906	890	874	892	877	861	872	942	1,064	1,207	1,322	
Depreciation	3.34%		In Lakhs	-	-	47.80	47.80	95.59	95.59	95.59	95.59	95.59	95.59	95.59	95.59	95.59	95.59	95.59	95.59	
Taxable Income (PBT)			In Lakhs	-	-	38	(59)	116	155	229	306	352	434	520	583	942	1,366	1,921	2,792	
Deduct: Corporate Tax (incl. Surcharge and Education Cess)	33.99%		In Lakhs	-	-	13	-	19	53	78	104	120	148	177	198	320	464	653	949	
Net Profit (PAT)			In Lakhs	-	-	25	(59)	97	103	151	202	232	287	343	385	622	902	1,268	1,843	
Deduct: Dividend Distribution Tax (DDT)	17%		In Lakhs	-	-	6	-	16	17	21	25	28	32	37	41	61	85	116	2,230	
Net Cash Accruals			In Lakhs	-	-	67	(11)	176	181	226	272	300	350	402	440	656	912	1,248	(387)	



Capital Structuring / Funding																					
Equity	50.0%	1,431.01	In Lakhs	398.60	425.38	607.02															
Debt	50.0%	1,431.01	In Lakhs	398.60	425.38	607.02															
Debt Schedule																					
Opening Balance			In Lakhs	-	398.60	823.98	1,351.51	1,272.01	1,113.01	954.00	795.00	636.00	477.00	318.00							
Loan Receipts			In Lakhs	398.60	425.38	607.02	-	-	-	-	-	-	-	-							
Loan Repayment			In Lakhs	-	-	79.50	79.50	159.00	159.00	159.00	159.00	159.00	159.00	159.00							
Closing Balance			In Lakhs	398.60	823.98	1,351.51	1,272.01	1,113.01	954.00	795.00	636.00	477.00	318.00	159.00							
Interest																					
Total Interest on the Debt Component	13%		In Lakhs	25.91	79.47	141.41	170.53	155.03	134.36	113.69	93.02	72.35	51.68	31.01	-	-	-	-			
Interest during Construction			In Lakhs	25.91	79.47	141.41	-	-	-	-	-	-	-	-	-	-	-	-			
Interest during Operation			In Lakhs	-	-	-	170.53	155.03	134.36	113.69	93.02	72.35	51.68	31.01	-	-	-	-			
Corporate Tax Calculation																					
Loss brought Forward			In Lakhs	-	-	-	-	(59)	-	-	-	-	-	-	-	-	-	-			
Net Profit/Loss for Tax Calculation			In Lakhs	-	-	38	(59)	57	155	229	306	352	434	520	583	942	1,366	1,921	2,792		
Deduct: Corporate Tax (incl. Surcharge and Education Cess)			In Lakhs	-	-	13	-	19	53	78	104	120	148	177	198	320	464	653	949		
Net Profit (PAT)																					
Dividend Distribution Tax Calculation																					
Dividend Payout	50%		In Lakhs	-	-	36.36	(5.67)	96.22	99.05	123.52	148.88	163.87	191.13	219.41	240.31	358.58	498.61	681.98	921.60		
Non-Taxed Dividend Carried Forward			In Lakhs	-	-	36.36	30.69	126.91	225.96	349.48	498.36	662.24	853.37	1,072.77	1,313.09	2,856.70	5,041.00	8,079.26	12,196.90		
Dividend Distribution Tax (DDT)	17%		In Lakhs	-	-	6.18	-	16.36	16.84	21.00	25.31	27.86	32.49	37.30	40.85	60.96	84.76	115.94	2,230.14		
SUMMARY CASH FLOWS AND KEY FINANCIAL INDICATORS																					
Cash Profit (Net Cash Accruals - Loan Repayment)			In Lakhs	-	-	(12.97)	(90.84)	17.09	22.26	67.05	113.45	140.88	190.77	242.52	439.77	656.20	912.45	1,248.03	(386.95)		
Project Cash Flows (including Tentative Land Premium) on EBIDTA			In Lakhs	(797.20)	(850.76)	(1,128.50)	159.19	366.89	385.24	438.72	494.88	519.63	581.54	646.56	678.89	1,037.21	1,461.48	2,017.08	2,792.30		
Project Cash Flows (including Tentative Land Premium) on EBIDTA						(1,647.96)	(969.31)	366.89	385.24	438.72	494.88	519.63	581.54	646.56	678.89	1,037.21	1,461.48	2,017.08	2,792.30		
Project Cash Flows (including Tentative Land Premium) - post tax			In Lakhs	(797.20)	(850.76)	(1,141.33)	(11.34)	192.44	198.10	247.05	297.76	327.74	382.26	438.82	480.62	717.16	997.21	1,363.96	1,843.20		
Equity Cash Flows (including Tentative Land Premium) of the Project			In Lakhs	(398.60)	(425.38)	(619.99)	(90.84)	17.09	22.26	67.05	113.45	140.88	190.77	242.52	439.77	656.20	912.45	1,248.03	(386.95)		
Equity Cash Flows (including Tentative Land Premium) of the Project						(823.98)	(710.83)	17.09	22.26	67.05	113.45	140.88	190.77	242.52	439.77	656.20	912.45	1,248.03	(386.95)		
Total Cumulative Equity (including Tentative Land Premium)			In Lakhs	398.60	823.98	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	1,431.01	
Average Return on Equity						-100.00%	-51.63%	-43.33%	-6.35%	1.19%	1.56%	4.69%	7.93%	9.85%	13.33%	16.95%	30.73%	45.86%	63.76%	87.21%	-27.04%
Total Investments / Cost			In Lakhs	797.20	850.76	1,214.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total Benefits			In Lakhs	-	-	86	159	367	385	439	495	520	582	647	679	1,037	1,461	2,017	2,792		
Interest Service Ratio						-	-	3.08	7.11	8.61	10.69	13.72	18.52	27.22	47.63	-	-	-	-		
Debt Service Ratio						-	-	0.84	(0.14)	1.11	1.14	1.42	1.71	1.89	2.20	2.53	-	-	-		
Debt Service Coverage Ratio						-	-	0.84	(0.05)	0.56	0.62	0.83	1.08	1.30	1.66	2.11	-	-	-		
Project Breakeven Period			In Lakhs	(797.20)	(1,647.96)	(2,789.30)	(2,800.64)	(2,608.19)	(2,410.10)	(2,163.05)	(1,865.28)	(1,537.54)	(1,155.28)	(716.47)	(235.84)	2,851.39	7,219.98	13,296.50	21,531.78		

DETERMINATION OF PREMIUM LAND RESERVE PRICE

Equity (Developer's) IRR	Percent	17%
Project Internal Rate of Return (IRR) - EBIDTA	Percent	20%
Land Premium per Unit Area	INR per sq. ft.	-
Total Land Premium for the Project Comp	INR lakhs	-
NPV	INR lakhs	2,694.93

