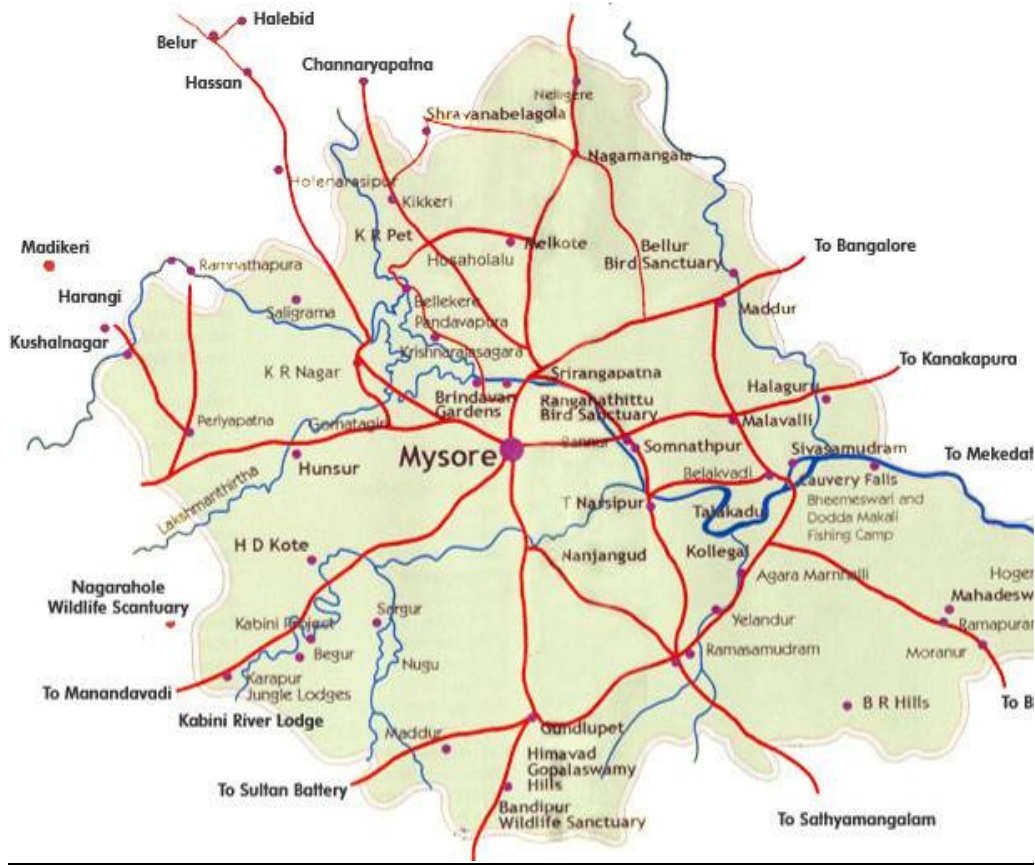




Chapter 1
Sector Background, Context & Project Rationale



Mysore is called the City of Palaces as it is home to a number of palaces like the Amba Vilas (Main Mysore Palace), Rajendra Vilas (the Summer Palace, situated on Chamundi hills), Jayalakshmi Vilas (now in the Mysore University premises) and Jaganmohan Palace. In addition to the above, the city also has a number of places of tourist attraction which include Chamundi Hills, Brindavan Gardens, Mysore Zoo, St. Philomena’s Church & Museum. Srirangapatna, Nanjangud, Bandipur, Ranganthittu, Melkote and B.R. Hills are some of the other tourist locations around Mysore with distances varying from 10 to 80 km from Mysore.

Landuse



The total area of Mysore city, which was 7569 hectares in 1995, has increased to 9221 hectares in



Chapter 1 Sector Background, Context & Project Rationale

2001, representing a growth rate of 22%. The total area is further expected to increase to 15669 hectares by 2011. The growth in recent years is skewed towards Southern Mysore i.e towards Nanjangud. MUDA/ private developers have developed new layouts in the area like, Vijayanagar and J.P. Nagar. Besides, the residential layouts the

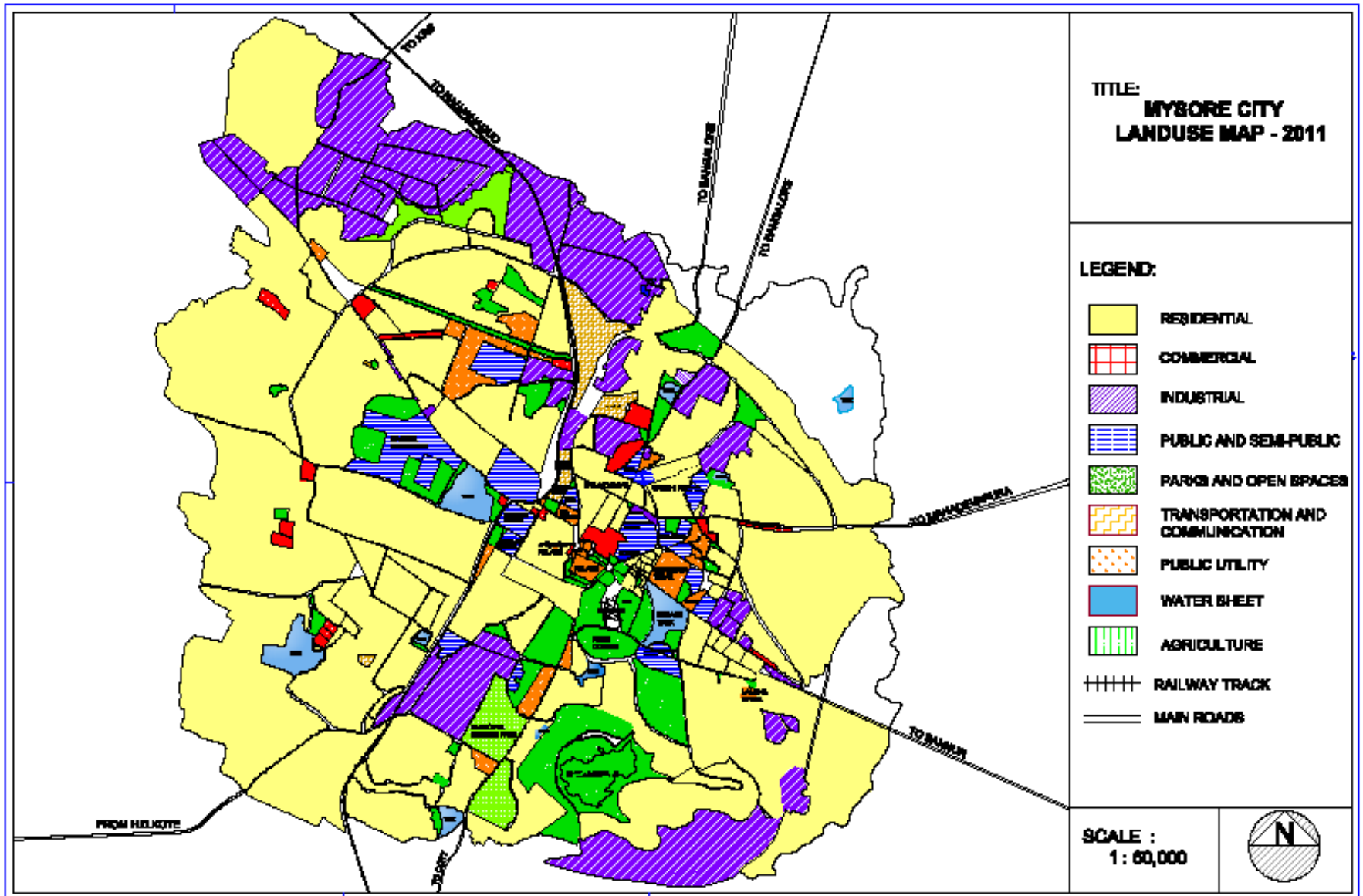
Category	Area in hectares	% Area 2001
Residential	2,849.91	39.9
Commercial	215.95	3.02
Industrial	962.61	13.48
Park and open spaces	981.7	13.74
Public semi-public	639.69	8.96
Transportation	1,150.27	16.1
Public utility	36.48	0.51
Water sheet	143.99	2.02
Agricultural	162.33	2.27
	7,142.93	100
Nehru Loka	2,078.14	
Total	9,221.07	

Category	Area in hectares	% Area 2011
Residential	6,097.87	43.45
Commercial	344.07	2.45
Industrial	1855.05	13.22
Park and open spaces	1055.05	7.52
Public and semi-public	1180.78	8.41
Traffic and Transportation	2,380.56	16.96
Public utility	43.35	0.31
Water sheet	178.95	1.27
Agricultural	898.99	6.41
Nehru Loka	1,634.82	-
Total	15669.49	100

private developers have lined up an array of proposals to develop malls, convention centres and golf course etc

Table 1.1: Landuse in 2001

Table 1.2: Landuse in 2011



Demography

According to the 2001 census of India, the population of Mysore is 7.86 lakhs, while the current population (2006E) is estimated to be around 8.9 lakhs (assuming growth of 2.5%).

The literacy rate of urban Mysore is considerably higher than that of the State average, at 82.8%. Majority of the city's population speaks Kannada, while other languages such as Tulu, Tamil and Hindi are also spoken.

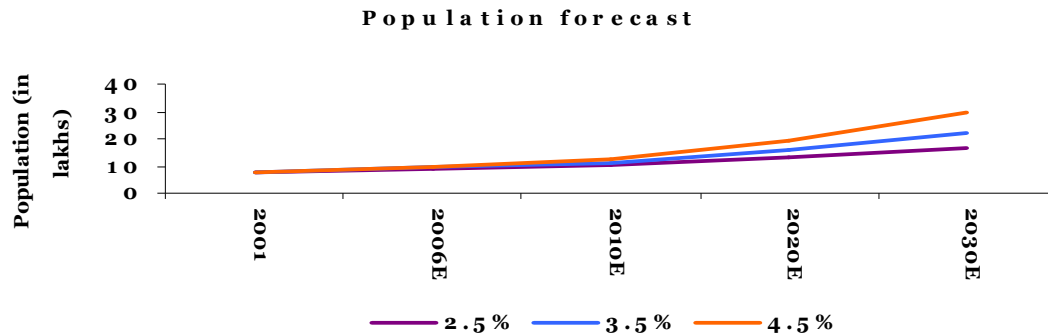
The population has been increasing at a compounded annual rate of 2.5% in the last two decades, which is higher in comparison to the population growth for the state of Karnataka. The population of Mysore has experienced a spike in the last 4 decades with the population increasing to 7.86 lakhs in 2001 (Census, 2001) from 2.54 lakhs in 1961 (Census, 1961). While the growth in the period up to 1971 is attributable to industrialization like automobile and engineering, the growth in the period from 1971 to 1991 is due to the increase in heritage, culture, spiritual tourism and Mysore becoming a regular feature on the tourism circuit.

Mysore has multiple industrial zones such as Hebbal, Metagalli, Belagola, Belavadi and Hootagalli industrial areas. The growth in the decade of 1991–2001 and in the last five years is largely due to the growth of IT and ITeS industry in the city. The table below depicts the historical population trends.

Year	Population (lakh)	Average decadal Growth rate (%)
1901	0.68	-
1911	0.71	4%
1921	0.84	18%
1931	1.07	27%
1941	1.5	40%
1951	2.44	63%
1961	2.54	4%
1971	3.56	40%
1981	4.79	35%
1991	6.53	36%
2001	7.86	20%

The population of Mysore has been projected using the curve extrapolation method. This method extends the past population growth trend to project the future population, assuming the historical rate of growth, as stated above. Assuming the historical rate of growth (2.5%), Mysore is forecasted to reach around 16.5 lakhs in the year 2030.

There has been no increase in population due to jurisdictional changes. The composition of population growth has been calculated assuming that the natural increase in population growth for Mysore has been identical to that for the entire state of Karnataka i.e. 17.25% for the period 1981-91 and 21.12% for the period 1991-01., and the balance is attributed to in-migration.



Tourist Population

More than 20 lakh tourists visit the city annually. Every year, about 5 lakh foreign tourists and dignitaries visit Mysore from Countries like UK, USA, France, Germany, Netherlands, Italy, Japan, China, Korea, Srilanka, Maldives etc. The foreign dignitaries include State leaders, Members of Trade Committee, Members of Parliament, and Heads of Global Companies etc.

A minimum of 2500 to 3000 visitors including overseas tourists visit Mysore everyday. The highest tourist inflow into the City is during the Dasara festival time and in the months of December and April. These tourists visit heritages places viz. Mysore palace, Jaganmohan Art Gallery, Hammond Temple, Mysore Zoo, Jayalakshmi Vilas Mansion, Devaraj Market etc

Economy

Industries: The city is host to a large number of industries including tyre manufacturing (Vikrant Tyres), Textiles (K.R. Mills, now called Atlantic Mills), Silks (KSIC), Electronic Systems (L & T), earthmoving and mechanical systems (BEML).

Information Technology: Mysore is being promoted as an alternative destination for the IT Industry. The city has become a new heaven for IT and ITeS industry, with establishment of software giants like Infosys, Wipro, SPI etc. Mysore has contributed Rs.370 Crores to Karnataka's Rs.38, 000 Crores IT exports during 2005. A number of small IT companies have significantly contributed to the city. Efforts are being made by the State administration to persuade the MNC & IT companies to establish at Mysore so that the infrastructure burden on Bangalore is eased out and thereby the overall development of the state is enhanced.

Tourism: Tourism, centered around numerous attractions and the ten day Dasara festival contribute to the economy and fame of the city. The city is host to an annual inflow of tourists to the tune of around 25 lakhs.

Education and Research

The city has a number of Engineering, Medical, Dental, Pharmacy & Law Colleges, thus enhancing the academic reputation of Mysore. Academics in Mysore centers mostly around Mysore University which was one of the earliest institutions of its kind in India. The university campus which is now called Manasagangotri occupies around 740 acres of land and conducts post graduate courses in over 40 disciplines.

The City is famous for research institutes such as Central Food Technological Research Institute (CFTRI), All India Institute of Speech and Hearing (AIISH), Karnataka State Open University (KSOU), Defence Food Research Laboratory (DFRL), Central Sericulture Research & Training Institute (CSRTI), Central Institute of Plastics Engineering and Technology (CIPET).



1.2 Base line information in terms of user coverage & access

Connectivity

Mysore is connected to Bangalore by SH-17 which has been recently upgraded to 4-lane divided carriageway from the earlier 2-lane road. This up gradation has tremendously reduced the commuting time between the 2 cities. National Highway 212 and State Highways 17, 33, 88 pass through Mysore connecting it to nearby cities. The expressway which is being developed under BMIC, would not only reduce the travel time but would also create new townships, which would be self-contained.

Rail Network

Mysore city is the divisional headquarters of Southern Railways and has railway lines passing through the city with Mysore–Arasikere line connecting Bangalore–Poona main line at Arasikere and Bangalore–Chamarajanagar line ending at Chamarajanagar.

Road Network of Mysore City

Mysore city has radial and gridiron pattern road network with arterial roads originating from the city centre. Palace is the focal point of origin of all arterial roads running radially to outer areas of the city. The city has 5 main arterial roads, which are also the State Highways connecting

- Bangalore and Ooty
- Bannur and Kanakapura
- Hunsur and Mangalore
- H.D. Kote and Manantvady

The total road network in the city was 335 kilometers in 1971. It increased to 432 kilometers in 1981, which accounts for 29% of increase over a decade. There are 48 main roads in the city covering a total length of around 58 kms. As on 2001, the total length of all types of roads was about 1773 km.

Ring Roads

The road network of the city includes three ring roads viz. outer ring road, intermediate ring road and inner ring road and also arterials roads, sub-arterial roads, collector roads and others. The three ring roads not only collect traffic from

other roads but also act as by-pass roads at their respective locations in order to avoid congestion especially at the core of the city. The details are as follows:

Outer Ring Road (ORR)

Outer Ring Road (ORR) around Mysore City was conceived to divert the traffic from the city area, which are crossing through the city and minimize the congestion within the city. The entire length of ORR takes off from Bangalore – Mysore Road (SH-17) and circumferences Mysore City on the western side crossing KRS Road, Hunsur Road, Bogadi Road, HD Kote Road and joins the Ooty Road near the Regulated Market; and in the eastern side crossing Bannur Road and joins Mahadevpura Road near Star Poultry Farm.

Along the western side of the city, the ORR of 25 km stretch is mainly 2 lane which is proposed to be widened to 4 lane divided carriageway. Towards the eastern side, 7.2 Km stretch ORR is 4 lane divided carriageway of 20m wide and 9.5 Km stretch between Bannur and Nanjangud is yet to be tackled. However, MUDA has proposal to construct / widen ORR so that the total width would be 45m. ORR has been constructed with total crust thickness of 515 mm with the top portion comprising 40 mm Bituminous Concrete. There are 40 curves with design speed of 80 km/h; however in certain stretches design speed has been restricted to 65 km/h due to sharp curves and steep gradient.

Intermediate Ring Road

The Intermediate Ring Road is not a new alignment. It is proposed along the existing roads only. It is proposed to increase the width along the entire stretch to 30 m. The Intermediate Ring Road starts from new Kantharaja Urs road, passes through Vishwamanava Double Road, Bogadi Road, Open Air theatre Road, Hunsur Road and Gokulam Road. The existing road passes through Manjunathapura, in front of Ideal Jawa up to Highway Circle and then passes through Bannimanatapa, old Bangalore–Mysore Road, Hyderali road, Karanji Tank Bund Road, Race Course road, Bangalore – Nilgiri Road, J.L.B Road to join Kantharaja Urs road. The width of this intermediate ring road along Kantharaja Urs road has been retained at 24 m, as many structures have come up on either sides of this road.

Inner Ring Road

The inner ring road is also not a new road but its alignment is proposed along the existing roads and the width is proposed to be widened to 30 m. The width along Shesadri Iyer road and Sawday road are kept as 24 m whereas in other reaches it has been proposed as 30 m. The inner ring road starts from Sawday Road and passes

through Bangalore–Nilgiri Road, Chamaraja Double road, J.L.B Road, Shesadri Iyer road and then joins Sawday Road.

Vehicle Growth

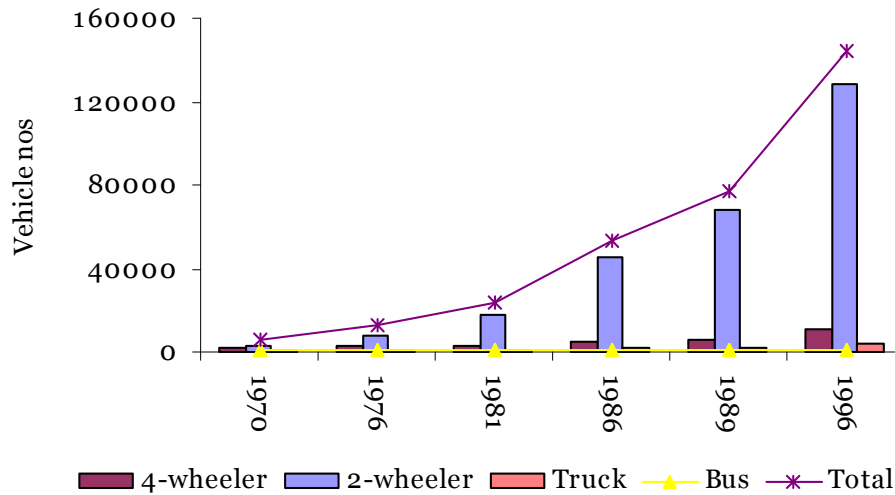
The total number of vehicles which was about 6000 in 1970 increased to 1.45 lakhs in 1996 and the current vehicle population is 3.55 lakhs (upto Nov'2005). 2-wheelers constitute more than 75% of total vehicular population. The city has now attracted a large number of IT/ITES companies like Infosys, Wipro etc. which has resulted in increase in the number of vehicles registered. The number of vehicles registered in Mysore upto 30.11.2006 is 3.55 lakhs of which 2.86 lakhs is 2-wheelers constituting 80.56% of the total vehicle population. Based on the vehicle growth during the last few years, it is observed that the vehicle growth in Mysore city is about 8 to 9% p.a.

The vehicular growth is shown in below:

Table 3.5: Statistics on vehicular growth

Types of vehicles	1970	1976	1981	1986	1989	1996
4-wheeler	2099	2843	3323	4829	57 17	11291
2-wheeler	2602	8219	17978	45125	68060	128336
Truck	866	1161	1351	2145	2310	37 12
Bus	499	651	659	1021	1318	955
Total	6066	12874	23311	53120	77405	144294

Vehicle Traffic



The number of vehicles registered from 1.1.2005 upto Nov'2006 is given below:

Table 3.6

Vehicles registered in Mysore (From 1.1.2005 to 30.11.2006)

Sno.	Types of vehicles	Total No. of vehicles
1.	2 - wheelers	286079
2.	Cars	32431
3.	Autorickshaws	14677
4.	Motor cab	1615
5.	Omni Buses	2757
6.	KSRTC & Pvt. Buses	2693
7.	Trucks	5937
8.	Others	8825
	TOTAL	355014

Accidents

Accidents in any city are a cause of major concern to the ULBs of the city. A study of accidents enables to clearly assess the extent of discordance of different traffic units. This also helps in clearly analyzing the predominant conflicting movements and to plan remedial measures as required (both engineering and management) so that the occurrence of accidents is minimized.

The accident data collected during the last 17 years is given below:

ACCIDENTS IN MYSORE CITY						
YEARWISE FROM 1990 TO 2006 (AS ON 31-12-2006)						
Sno.	Year	Number of accidents		Total number of Accidents	Number of persons	
		Fatal	Non-fatal		Killed	Injured
1.	1990	94	398	492	107	517
2.	1991	79	445	524	82	594
3.	1992	97	323	420	100	453
4.	1993	75	446	521	76	520
5.	1994	68	493	561	70	588
6.	1995	84	613	697	95	834
7.	1996	102	624	726	116	903
8.	1997	80	593	673	88	796
9.	1998	106	577	683	114	762
10.	1999	99	510	609	106	690
11.	2000	94	474	568	100	604
12.	2001	104	503	607	110	585
13.	2002	89	481	570	94	533
14.	2003	77	514	591	88	615
15.	2004	96	613	709	102	806
16.	2005	105	765	870	108	997
17.	2006	151	752	903	154	1011

Source: Traffic Police Department, Mysore

From the above table, it is evident that there has not been tremendous increase in the number of accidents although there is a marginal increase in the fatal accidents as compared to the non-fatal accidents.

Accidents, though cannot be eliminated, can be minimized by providing proper street furniture (like median, guard rails, signages etc.), pedestrian facilities (like footpaths, subways / Foot over bridges etc.), awareness among people through education by electronic and print media as also through road user education.

Urban Transport Scenario

Mysore has inter-city and intra-city suburban public transport bus system albeit not very robust. Personalised modes of transport namely 2-wheelers and auto-rickshaws constitute the major proportion of vehicles in the city.

As bus is the only public transport available and the same is not fully organized to provide quality and dependable service to the residents of Mysore, the gap between the supply and demand has been met with dependence on personalized vehicles.

Mysore city road traffic is heterogeneous in nature i.e. a mixture of fast moving motor traffic and slow moving vehicles like animal drawn carts (Horse drawn, bullock carts etc). The fast moving vehicles mainly comprises of cars, light vans, LCVs, jeeps, different kinds of mopeds, commercial vehicles, buses, autos etc. There is a considerable % of pedal cycles in the city. Pedestrian traffic is high in the CBD of the city due to commercial activities and tourist movement.

The mixing up of different classes of vehicles and their increase has had its remarkable effect on the speed and capacity of the road. The city road network which was basically planned for slow moving vehicles and leisurely way of life has not been able to cope up with the increase in vehicle population.

The above mentioned factors have tremendously resulted in over crowding of the narrow roads, traffic jams and delay to road users. The most important aspect to be given due consideration is the safety of pedestrians, especially the aged and children. In Mysore city, it is observed that on an average about 16% of the accidents are found to be fatal.

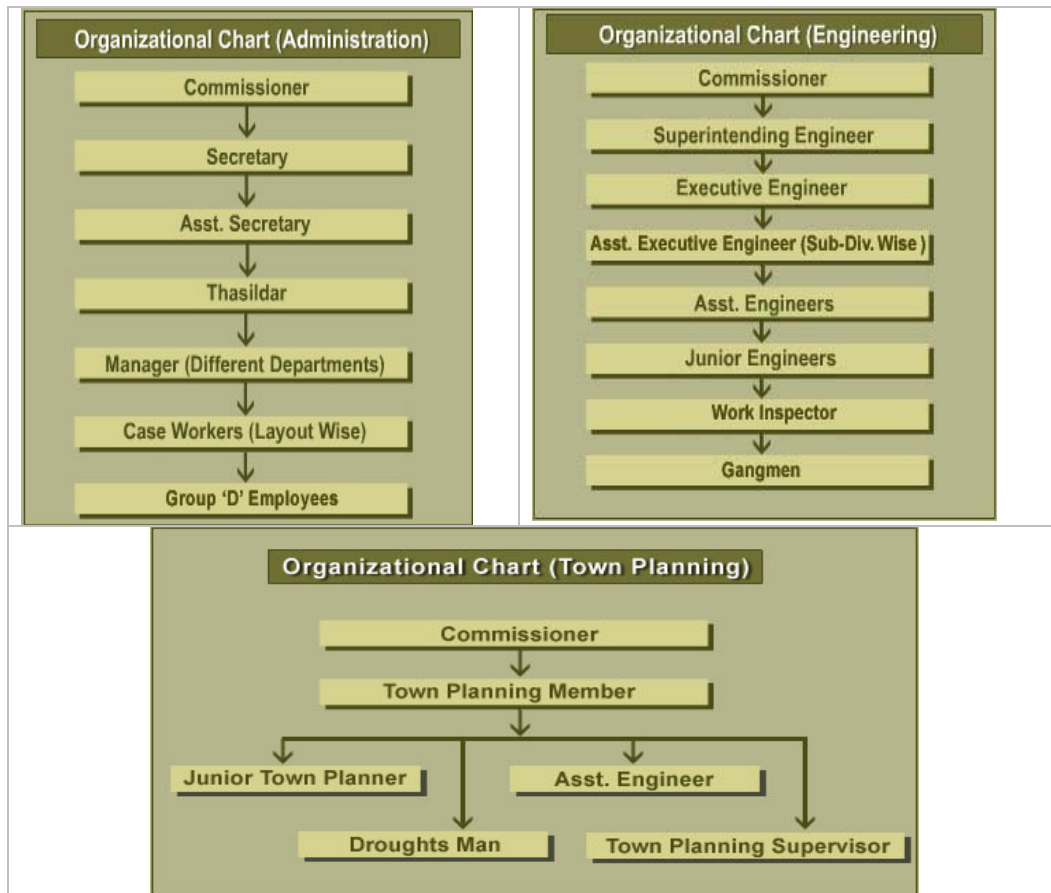
1.3 City Development Plan: Mysore City

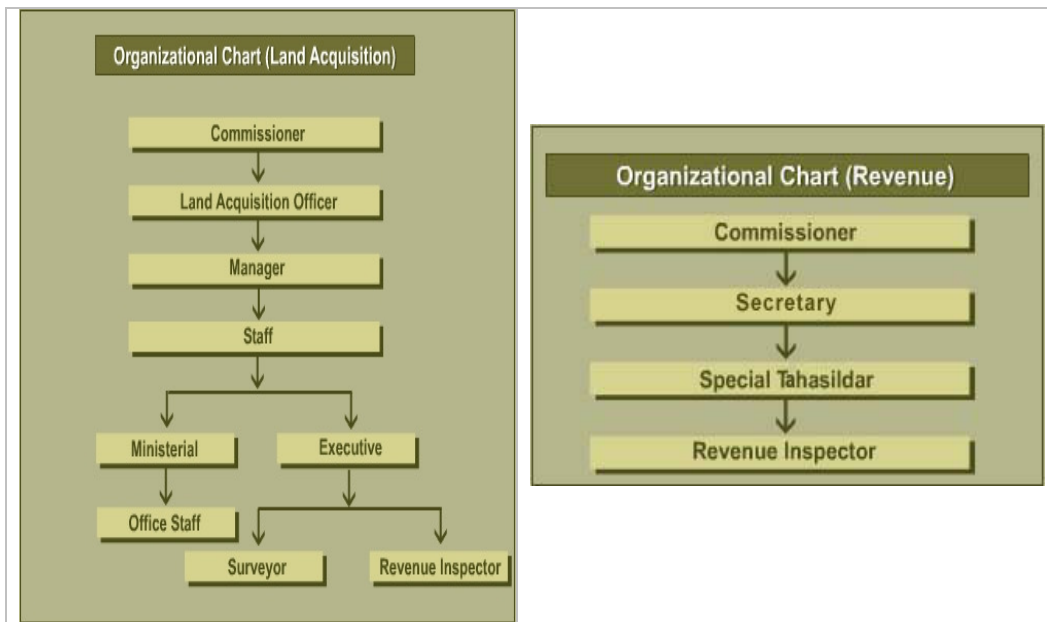
1.3.1 About MUDA:

The Government of Karnataka established the Urban Development Authorities for the planned development of major and important urban areas in the State and the area adjacent thereto and to matters connected therewith under the Karnataka Urban Development Authorities Act 1987. As per the said Act, the City Improvement Trust Board (C. I. T. B), Mysore and Local Planning Authority of Mysore was amalgamated and the present Mysore Urban Development Authority came into existence. The Mysore Urban Development Authority (MUDA) was constituted on 16th May 1988.

As per the KUDA Act 1987, the Commissioner of the Authority is the Chief Administrator and Chief Executive of the authority. The Chairman heads the authority. He can call the meeting of the authority and put policy issues before the authority for decision.

The authority has formed many layouts and distributed nearly 35,000 sites and 10,000 houses after it came into existence. Also it has handed over the developed layouts to Mysore City Corporation for further maintenance. Vijayanagara Layout Ist, IInd, IIIrd and IVth Stage, formed by the Authority, is the biggest layout in South Asia, covering an area of nearly 2000 acres having 25,000 sites.





1.3.2 City Development Plan for Mysore City:

In the Mysore City Development Plan, prepared in December 2006 as part of the JNNUR Mission, it is proposed to configure the transport infrastructure for the city the CDP further emphasizes to develop a “vision” for the major interventions in the city’s transport infrastructure. The various interventions proposed in the transport sector have been enumerated below and include ring roads, improvement to radials, and introduction of mass transport system.

Proposed projects envisaged under CDP, Mysore:

The activities proposed by the administration of the city for developing the network of roads and developing an efficient transportation system are as indicated below:

- Completion and expansion of ring road in phases:
 - Completing the 2 lanes, expansion of 2 lanes to 4 lanes.
 - Development of outer ring roads in sync with the growth of the city
- Strengthening/ improvement of the roads including resurfacing
- Maintaining the roads and related infrastructure to prescribed standards
- Construction and/or widening of road bridges/ culverts etc.
- Construction and maintenance of radial roads & inner ring road
- Construction and maintenance of footpaths

- Construction and maintenance of storm water drains
- Maintenance (erection of street lights as required) of street lights to prescribed specifications
- Junction improvements and installation of road markings and signage
- Provision of vehicle parking facilities at bus stand and railway station and provision for auto stands etc.
- Hop in hop off tourist shuttles are also proposed for better mobility.
- More emphasis would be placed on safety related maintenance and upgrades on congested roads.
- Examine the feasibility of providing mass transport systems such as Bus Rapid Transit, Electric Trolley Buses, or light rail systems.
- Congestion on main roads will be managed by a combination of traffic engineering, capital work projects and controls (zoning etc)

The strengths of the City are encapsulated in the following:

- Old-world charm and confluence of heritage and culture
- Salubrious climate
- Planned city, having one of the oldest plan authorities in the country
- High standard of education
- City growth (till recently) has been gradual and well-managed
- Low slum population (< 10%)
- Room to grow
- Good linkages with Bangalore, Tamil Nadu, Kerala
- The City benefiting from its proximity to Bangalore, and the 'push-effect' on industry seeking to expand out of Bangalore.

The challenges that the city faces are:

- Tourism industry in a status-quo for the past many years
- Not much development beyond the 'sight seeing' circuit
- No attempt to convert into better public amenities, longer stays, and 'experiential tourism'
- Or to convert Mysore into a heritage, culture, and tourism 'hub'
- Inadequate transportation infrastructure
- No proper airport, which could be a key reason why Mysore's development has been so different from that of Bangalore
- Inadequate urban transport system
- Inadequate bus system
- No local tourist shuttles, which are very important in a tourist city

- Rail connectivity with Bangalore is poor & doubling still not on the fast-track
- Can the city cope with increased growth of industry?
- Bangalore's congestion is forcing companies to look at alternatives, but can Mysore absorb such investment, and still retain its heritage and culture?

Mapping of Objectives: Road related infrastructure

The sectoral theme is to decongest the city and provide an easy access to the users around the city by means of providing an outer Ring road which is fully functional and constructed.

1.3.3 MUDA plans to align with CDP for Mysore City

As is evident from the above, infrastructure development in the city has not kept pace with the economic and population growth of the city. With the accelerated growth of the city, activity concentration and increase in travel demand, Mysore Urban Development Authority (MUDA), have realized the need for systematic planning, operation and management of an efficient transport (roads) infrastructure for the city.

MUDA plans are:

To enhance the existing stretch of ORR from 2 lanes to 4 lanes, and to complete the Outer Ring Road by constructing the balance length of 9.5 Km. this would lead to efficient transit around the city instead of across the city thereby reducing congestion within the city.

1.4 Other major capital expenditure projects under other schemes in the Transport Sector

A Investment in Roads and the time horizon

Project Themes	Rs. Crores				
	Time Horizon				
	2007-12	2013-17	2018-22	2023-27	2028-31
Roads					
Completion & conversion of Outer Ring road into 4 and 6 lanes in phases	69	148	126	137	147
Capital expenditure	<i>69</i>	<i>141</i>	<i>105</i>	<i>105</i>	<i>105</i>

	Rs. Crores				
	Time Horizon				
Project Themes	2007-12	2013-17	2018-22	2023-27	2028-31
O&M		7	21	32	42
Land acquisition	10	21			
Radial roads connecting the rings roads to the CBD and other new roads	50	54	58	87	93
Capital expenditure	50	50	50	75	75
O&M		4	8	12	18
Land acquisition	8	8	8	11	11
Main road improvement	65	140	71	77	71
Capital expenditure	65	132	45	45	45
O&M		9	26	32	26
Land acquisition					
Other road improvement	127	134	134	228	228
Capital expenditure					
O&M	127	134	134	228	228
Land acquisition					
Summary					
Capital expenditure	184	323	200	225	225
O&M	127	153	189	303	314
Land acquisition	18	29	8	11	11
Total	329	505	396	539	550

1.5 Existing tariff and cost recovery methods and extent of cost recovery.

At present, there is no tolling over the existing ORR. In the proposed ORR there is no plan to put a toll for the users. Hence not applicable.

1.6 Existing areas of private sector/community participation in the sector for design, construction, project management, and/or O&M services

MUDA has partially completed the stretch of ORR in the year 2000 through ADB funding. For that project the following parties were involved in various activities. The details of the parties has been presented in a table form.

Sr	Activity/ Task	Agency involved
1	Design Consultants	M/s. Dalal Consultants and Engineers Limited
2.	Surveys, Other estimates	M/s. Kaushik Consultants
3	Street lighting estimates, pole shifting, street furniture, painting and detailed drawings	Private agency
4	Construction	ECl Engineering and Construction Company Limited, Hyderabad.
	Construction Supervision	M/s. Dalal Consultants and Engineers Limited
5	Project Management Consultants	M/s Louis Berger International Inc, Bangalore – ADB appointed Consultant.
6	O&M Services	Annual Maintenance Contract is tendered by MUDA every year to private agencies.

1.7 Other qualitative information

Growth of Mysore City

Mysore is home to several education and research institutes of national importance. The tourism sector alone attracts more than 25 lakh visitors per annum to Mysore.

The alarming rate at which the city of Mysore is growing can be attributed to the increasing presence/ establishment of IT/ ITeS industries. The city is growing in the peripheral areas as can be seen in large scale residential/ housing layout developments in areas such as Vijayanagar, Belawadi, (along Hunsur Road) Siddalingapura (along Bangalore–Mysore Road), JP Nagar (along Nanjangud Road), Sathgalli (along Mahadevapura Road), Kurubarahalli (along Bannur Road) and Srirampura (along H.D. Kote Road)

Vijayanagar and Belawadi localities along Hunsur Road on the North–Western part of Mysore is experiencing rapid growth and this trend is likely to intensify further in the coming years. The spatial expansion of Mysore is largely contiguous and relatively compact.

1.8 Project Rationale:

The city of Mysore has a ring cum radial system of major roads. There are eight major entry points all along the circumference of the city. The city has over the years been expanding in a circular fashion and the existing rings have come inside the developed area, forcing the through traffic to come into the city and follow the city roads and increase the traffic density inside the city area. Therefore to facilitate the through traffic to bypass the city and relieve the city roads of undue congestion the Outer Ring Road was planned in the Comprehensive Development Plan.

The development of existing stretch of ORR was undertaken with the financial assistance from the Asian Development Bank (ADB) through Karnataka Urban Development Project-Package-1 (Mysore). As per the traffic studies conducted then, a road of six lane was envisaged and accordingly the land acquisition was envisaged.



However, six laning was not taken up for entire stretch of the road. On the western side of Mysore from Ch 0.00 to 24.872 km (Mysore-Bangalore road to Mysore -

Nanjangud Road) is completed as two laned road. And. On the eastern side of Mysore from Ch 0.00 to 7.485 km (Mysore –Bangalore Road to Mysore–Bannur Road) is completed as four laned road.

Since the land is already under possession with MUDA which is required for completing the road as six lane road, it is now proposed that the same may be taken up to comply with the growing traffic. MUDA is proposing to seek assistance under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) scheme of Central Government.

Chapter 2

Project Definition Concept and Scope

2.0 Introduction:

As mentioned in Chapter 1, several initiatives have been taken up/ proposed for Mysore City in the transportation sector. Emphasis is being given to enhanced public transport services with enhanced support infrastructure facilities as well. In view of this, MUDA has undertaken the construction of Outer Ring Road ORR.

Need for the Project:

Economic growth means more personalised vehicles and more transport activity in an irreversible spiral. People's personal choices and freedom get expressed in increased ownership and use of personalized vehicles. The existing road space cannot meet the growing number of private motorized transport. For any city to be in position to support its future growth, it should ensure excellent status of physical infrastructure. In terms of economic progress, transport network form major part of the required physical infrastructure. As indicated in the National Urban Transport Policy, the cities need to gear up by improving its infrastructure to take on the future needs arising from increased economic activities.

Mysore possesses vast potential in Industrial and Tourism sectors. The existing state of its road network is getting choked day by day. Hence to tap the potential of economic progress, the need of the day for the Mysore City is to decongesting the inner part/roads of the city which are narrower and make seamless way for the by passable traffic via the outer ring road in order to ease the situation on the inner roads.

Over the past few years there has been a rapid increase in the traffic of Mysore. This stems the increased use of city roads for the HTV's etc leading to traffic congestions. MUDA intends to reverse this trend by providing the completed ORR to users.

In the long run, the completed ORR provides solution to resolving traffic congestion, air pollution, concerns and economic development. Also the proposed developments

of the ORR are essential to gain full benefits out of the investment made in the partial completion of the ORR.

Project Objective:

In the above backdrop, MUDA now plans to develop following two projects:

1. Project 1:

Upgrading of the existing stretch of ORR from 2 lane to 6 lane with service road (from Ch 0.00 km to 24.872 km) and from 4 lane to 6 lane with service road (from Ch 0.00 to 7.48 km)

2. Project 2:

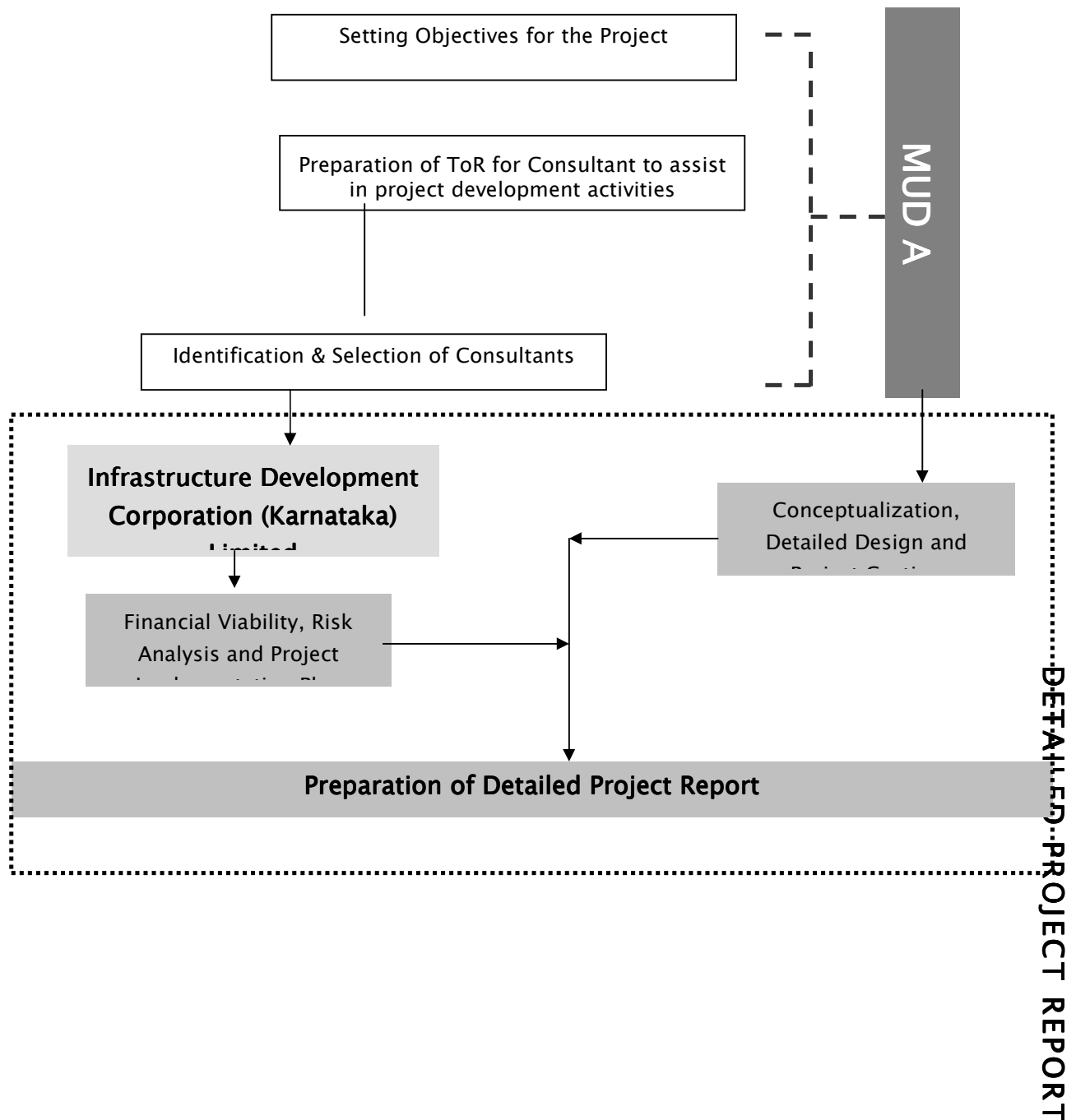
Construction of the 6 lane ORR from with service road (balance length) from Bannur Road to Nanjangud Road (from Ch 7.49 km to 16.635 km).

While both projects have been taken up for development, the preliminary activities in the design stage were completed during its initial phase of development of Project 1.

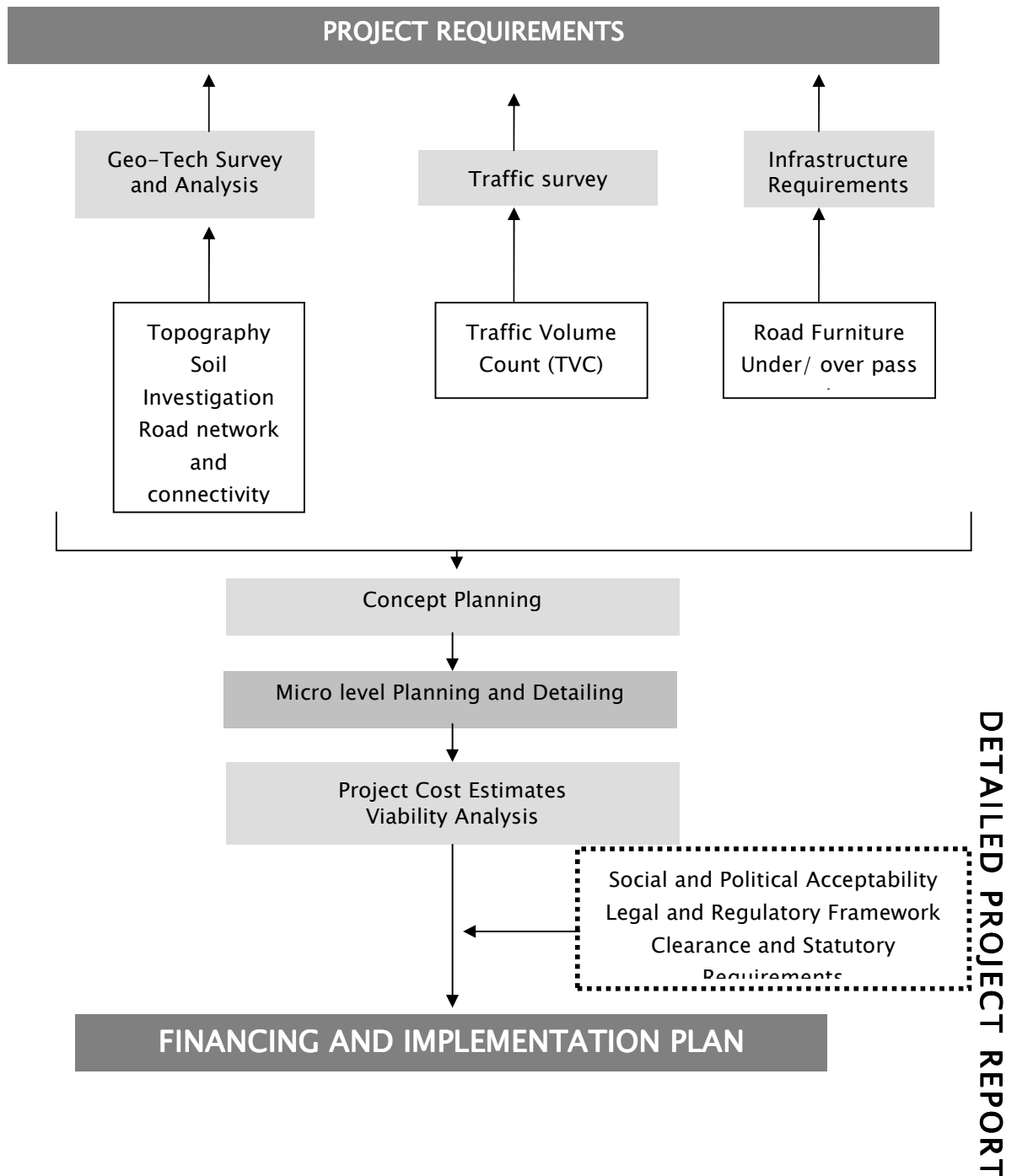
This DPR is being prepared for the Project 1 only.

The activities for Project 2 are being taken up separately and simultaneously.

Proposed Methodology



Project Concept Planning



Preparation of Detailed Designs and Costing

For the selected option, detailed designs and costing were prepared which involved:

- Structural designs (but not including Working Drawings)
- Detailed cost estimates

The above have been detailed out in the following sections and the drawings have been attached as Volume II with this Report.

Revenue

There is no plan to put a toll for the users, so there is no source of revenue from the proposed project. The Operation and Maintenance would be carried out by MUDA initially and subsequently will be transferred to Mysore City Corporation (MCC).

Financial Analysis for Viability and Sustainability:

The financial viability analysis for the Project was carried out based on the detailed cost estimates of the development of the ORR. Details of financial viability have been given in Chapter 5.

Project Implementation Structure and Risk Analysis

Based on the project viability analysis, a suitable structure for implementation of Project has been recommended. The evaluation of various implementation structures has been set out in Chapter 5. Detailed analysis of the project risks has also been carried and provided as part of this section.

Legal and Regulatory Feasibility

The list of approvals and clearances required, both internally by MUDA and from external agencies (body of elected representatives, ULB, other agencies, state government etc.) and the status of each has been set out in Chapter 6. This section also lists out the statutory clearances required for the project and the compliance thereof.

2.1 Location and Land

2.1.1 Project Site

Project site is situated around the periphery of the Mysore Urban City Limits.

2.1.2 Site Boundaries

The ORR starts from the Bangalore–Mysore Road and joins Mysore–Bangalore Road circumventing the city on the western periphery upto Mysore–Nanjangud Road (km 0.00 to km 24.175). The ORR was planned as a four lane divided carriage way. However, part of the road developed under KUIDP only two lanes were taken up for completion. However the underpasses are completed for four lane width. The existing stretch of ORR also includes a four lane road from Mysore–Bangalore Road circumventing the city on the eastern side upto Mysore–Bannur Road (0.00 km to 7.50 km).

2.1.3 Land – Ownership and Possession

The entire land requirement for the six laning of the existing stretch (**Project 1**) was acquired during the development of the existing stretch. Then the plan was to develop the 6 lane ORR however, only 2 and 4 lanes were completed. A copy of the certificate from Superintending Engineer, MUDA, is enclosed as **Annexure 2.1.3**, which certify that the entire required land for the **Project 1** is in the possession of MUDA.

2.2 Physical Infrastructure Components of ORR

2.2.1 Planning Guidelines

Broad guidelines followed in the preparation of the layout are:

1. Segregation of traffic by type and function
2. Coordination of different activities in terms of functional and spatial inter-relationships
3. achieving overall functional and spatial efficiency

The components considered for the design and development of the ORR are;

1. Functional zones– access, circulation, lighting, utilities, drainage etc
2. Design considerations for convenient, efficient and cost effective maintenance
3. Design considerations for safety and security
4. Compliance with zoning guidelines, construction codes and standards

2.2.2 Codes and Standards

The following codes and standards have been followed for the planning and design of Project.

1. Indian Road Congress (IRC) Codes and Standards; and
2. Ministry of Road Transport and Highways (MoRT&H) Specifications

2.2.3 The project components have been described in detail below:

	Components	Sub-components	Compliance
1	Road works with drainage		
(i)		ROW availability and utility shifting	Available
(ii)		Road work	included
(iii)		Drainage work	included
(iv)		Street lights/signals	included
(v)		Street furniture	included
(vi)		Painting/Markings/Signages	included
2	Bridges		
(i)		Bridge work	included
(ii)		Lighting	included
(iii)		Painting/markings/signages	included
3	Flyovers/ROBs/RUBs		
(i)		Flyover/ROBs/RUBs work	included
(ii)		Lighting	included
(iii)		Painting/markings/signages	included
4	Terminals		
(i)		Area demarcation	included
(ii)		Civil work	included
(iii)		Access	provided
(iv)		Provision of basic urban services (Water	included
		Supply, Drainage Network, Sewerage	Not applicable
		Network, Solid Waste Collection, other	Not applicable
		Service lines and Ducts)	Not applicable
5	Other Infrastructure development		
(i)		Street lighting	included

(ii)		Signalization	included
(iii)		Junction improvement	included
(iv)		TSM	included
(v)		Parking	Provided

Note:

The DPR for Roads and Transport project shall in general be in line with the National Urban Transport Policy and shall refer to the MORTH guidelines and IRC codes as applicable. **MORTH guidelines and IRC codes are considered**

Detailed engineering design:

1. General drainage conditions, HFL, water level:
Specified in Estimate

2. Traffic analysis, traffic growth, desire line based on O-D survey, traffic flow diagrams:
Excerpts of the Report prepared by the Consultants during the development of existing stretch of the ORR is attached with DPR (Annexure 2.2.3)

3. Evaluation of alternative proposals/structural solutions:
(Annexure 2.2.3)
4. Characteristics of existing facility and integration with new facility supported with maps:
As described earlier the project development include widening of a part of the ORR which is already existing and construction of a missing link of the same orr. The details are as follows;
Project 1: Upgrading of the existing stretch of ORR from 2 lane to 6 lane with service road (from Ch 0.00 km to 24.872 km) and from 4 lane to 6 lane with service road (from Ch 0.00 to 7.48 km)
Project 2: Construction of the 6 lane ORR from with service road (balance length) from Bannur Road to Nanjangud Road (from Ch 7.49 km to 16.635 km).

Map included as Annexure 2.2.4.

5. Design life:
10 years

6. Planning and design criteria considering overall scenario:
Done

7. Layout plan, CAD and detail drawings:
Volume II of the DPR
8. Cost estimate–assumptions, basis of adoption of rates supported with rate analysis:
Volume II of the DPR
9. Source of construction material:
Local quarries

The construction of ORR comprises of the following major components:

1. General and Site clearance
2. Earthwork and Embankment
3. Granular base
4. Bituminous Construction
5. Construction of Retaining walls and Box drains
6. Bridges and Culverts
7. Miscellaneous items
8. Construction of Underpass
9. Providing Street lighting

2.2.3.1 General and Site clearance:

- Clearing and grubbing, road land including uprooting rank vegetation, grass, bushes, shrubs, saplings and trees by manual means. In area of thorny jungle, removal of stumps, disposal of unserviceable materials and stacking of serviceable materials near road boundary.
- Cutting of trees girth, including cutting of trunks, branches and removal of stumps. Stacking of serviceable materials and earth filling in the depressions / pit.
- Shifting of electric poles.

2.2.3.2 Earthwork and Embankment

- Earthwork excavation by manual means in hard soil, excavated surface leveled and sides neatly dressed, the disposed earth is leveled neatly after breaking the clods.
- Excavation in soft rock with blasting for formation of roads including stacking neatly, to uniform line and level.

- Excavation in hard rock with blasting for formation of roads including stacking neatly, to uniform line and level.
- Excavation in hard rock by chiseling and/or wedging where blasting is prohibited for formation of roads including stacking to uniform line and level.
- Compaction of original ground including filling in depression occurring during rolling.
- Rolling, watering the earth work to get desired moisture content, dressing of earthwork etc.

2.2.3.3 Granular base

- Construction of granular sub base by providing close graded material, mixing in a mechanical mix plant at OMC, spreading it in uniform layers and compacting to achieve the desired density.
- Construction of granular sub- base by providing coarse graded material, spreading in uniform layers, mixing and compacting to achieve the desired density.
- Providing laying spreading and compacting graded stone aggregate, laying in uniform layers with pavers in sub base / base course and compacting to achieve the desired density.

2.2.3.4 Bituminous Construction

- Cleaning the existing WBM road surface including removing of binding materials and other foreign matter to receive bituminous treatment
- Providing and applying primer coat with bitumen emulsion on prepared surface of granular base.
- Providing and applying tack coat with bitumen emulsion prepared on granular surface.
- Providing and applying tack coat with bitumen emulsion prepared on normal bituminous surface.
- Providing and laying bituminous macadam leveled aligned and rolled.
- Providing and laying dense graded bituminous macadam, leveled aligned and rolled.
- Providing and laying bituminous concrete, leveled aligned and rolled.

2.2.3.5 Construction of Retaining walls and Box drains

- Earthwork excavation for foundation of buildings, water supply, sanitary lines and electrical conduits either in pits or in trenches in hard soil.
- Excavation in soft rock without blasting for foundation of buildings water supply, sanitary lines and electrical conduits either in pits or in trenches.
- Excavation in hard rock by chiseling and/or wedging where blasting is prohibited for foundation of buildings water supply, sanitary lines and electrical conduits either in pits or in trenches.
- Providing and laying in position plain cement concrete.
- Providing ruled pointing to coursed stone masonry with cement mortar.
- Providing and fixing to wall, ceiling and floor high density polyethylene pipes.
- Providing and removing centering, shuttering, strutting, propping etc. and removal of form work for vertical surface.
- Providing and laying in position reinforced concrete.
- Providing H.Y.S.D. steel reinforcement for R.C.C work.
- Providing stone pitching on slopes.
- Providing and fixing at site precast cement concrete.
- Providing and applying floor painting with ready mix paint.
- Painting the road surface using approved quality thermoplastic material.

2.2.3.6 Bridges and Culverts

Construction of Underpass

- Earthwork excavation for foundation of buildings, water supply, sanitary lines and electrical conduits either in pits or in trenches.
- Providing and laying in position plain cement concrete.
- Providing and laying in position reinforced cement concrete including centering and shuttering.
- Providing for reinforcement bars. Providing and laying wearing coat with reinforces cement concrete.
- Providing and casting, and fixing in position reinforce cement concrete railings.
- Earthwork excavation and forming in embankment.

2.2.4 Design, Estimation and Bill of Quantities

BoQ, Estimation and other drawings have been appended as **Volume II** of the DPR.

2.3 Environment Compliance / Protection Measures / Improvement Measures (EIA, Environment Management Plan)

The major objective and benefit of utilizing Environment Impact Assessment (EIA) in project planning is to prevent avoidable losses of environmental resources & values through the development of a judicious and appropriate Environmental Management Plan (EMP). Environmental Management Plan includes protection /mitigation / enhancement measures as well as monitoring.

In the process of planning, it is essential for every project to formulate an EMP to ensure that resources are used with maximum efficiency and that each of the adverse impacts, identified and evaluated as significant be prevented, attenuated or where required compensated. Possible mitigation measures generally include:

- Changing project sites, routes, production technology, raw materials, disposal methods, engineering designs, safety requirements.
- Introducing pollution controls measures, recycling and conservation of resources, waste treatment, monitoring, phased implementation, personnel training, special social services or community awareness and education.
- Devising compensatory measures for restoration of damaged resources, off-site programs to enhance some other aspects of the environment or quality of site for the community.

Monitoring is required to evaluate the success or failure (and consequent benefits and losses) of environmental management measures and subsequently to reorient the EMP. For the ORR planned in Mysore, sound environmental management plan has to be formulated and continuously implemented after the project becomes operational.

The EMP will have to include the following:

2.3.1 EMP During Construction Phase

For proper environmental management of the proposed ORR nearly 1245 trees will be cut for the construction of the road. It is planned to take environmental improvement measures in terms of planting 5000 trees subsequently maintained by the forest department for a period of three to four years.

The mitigation measures to control adverse impacts during construction phase are discussed below. Also the cost has been assessed for the compliance of the Environment concerns and has been described in the Chapter 3 of the DPR.

2.3.1.1 Site Preparation

The development of site will involve the movement of topsoil, removal of trees, shrubs, soils, rocks, debris etc. The site grading operation will also involve stock piling of backfill material. All the distorted slopes will be stabilized suitably. During dry weather, control of the dust nuisance created by excavation, leveling and transportation activities will be carried out by water sprinkling. It should be ensured that both petrol and diesel powered construction vehicles are properly maintained to minimize smoke in the exhaust emission.

2.3.1.2 Noise

There will be intense movement of trucks, passenger vehicles, earthmovers etc. in and around the project site. These will create noise and air pollution. Poor visibility, accidents, damages to health of local people etc. are foreseeable consequences. The maintenance of construction equipment has to be done properly. This will be done by provision in the various contracts with the contractors. Vehicular movement towards the construction sites should be properly regulated to minimize the air and noise pollution consequences. Movement of cargo trucks should be minimal during night.

2.3.1.3 Construction Equipment and Waste

The project would involve construction activities and would thus involve the use of construction equipment/instruments. These at times would require on site maintenance and repairing. It will be ensured that both petrol and diesel powered construction vehicles are properly maintained by the contractors to minimize pollutant emission from exhaust. The vehicle maintenance area will be so located that contamination of surface water bodies by accidental spillage is avoided. Unauthorized dumping of waste oil will be prohibited.

2.3.1.4 Storage of Hazardous Material/Dumping Materials

Petrol, diesel, blast equipment, lubricating oil etc. will be required to be stored at site. These materials will be stored as per stipulated safety standards. Also a lot of material may be generated for disposal during construction activity. These, if disposed off haphazardly can pollute the nearby water bodies adversely. They would increase the accident incidences also. Utmost care will be taken to store these

materials at a suitable place and then disposed off at a place in consultation with and as per the guidelines of Karnataka State Pollution Control Board and Central Pollution Control Board.

2.3.1.5 Site Security and Safety

1. A construction site forms a potentially hazardous environment. To ensure that the surrounding population is not exposed to these hazards, the site will be properly secured by fencing or by construction of a boundary wall and also guards will be posted at entry points.
2. First aid facilities should be created at different locations for immediate assistance in case of emergencies and accidents.
3. Important information about nearby hospitals, fire stations, police station etc. should be kept available in the first aid centres for speedy action at the time of emergency.
4. In case inflammable materials are to be kept at the site, they should be stored and handled in accordance with guidelines of inspectorate of safety and health of the State and Central Governments.
5. Fire hydrants and extinguishers should be located at all vulnerable sites.

2.3.2 EMP During Operational Phase

The following measures are suggested to mitigate the different kind of pollution with regard to this project.

2.3.2.1 Air Pollution

The air pollution potential of the project will be significant in terms of emissions from vehicles and utilities. There will be less or no likelihood of any emissions of hazardous or toxic nature into the environment. To mitigate the effect the following measures need to be implemented.

- a) General housekeeping should be of high standards.
- b) Suitable air pollution control equipment if required would be installed.
- c) Vehicle maintenance to be accorded priority.

2.3.2.2 Green Space

An additional mitigation measure that has a broad definition in as much as it can be used to alleviate a number of adverse impacts due to air and noise emissions is the development of a green space around the facility.

It has been proposed to develop green cover at appropriate locations. These would not only absorb air and water pollutants but also help in arresting noise and soil erosion and creating favourable aesthetic condition. It has been proposed the plantation of trees and maintenance of the same for a period of three years.

2.3.2.3 Emergency and Hazards Management Procedures

(a) Emergencies:

<u>Emergencies Possibility</u>	<u>Measures Taken</u>
<u>Water Supply</u> Stoppage of water supply from tube wells owing to failure of supply mains	Minimum one day water requirement shall be stored
<u>Pollution Control</u> Failure of air pollution control equipment	Proper maintenance of equipment and provision of standby equipment.

(b) Disaster Management:

The possibility of any natural Hazard or Disaster for the proposed ORR cannot be ruled out. To safeguard against any such eventuality an emergency plan would be prepared to tackle the situations. For this, the rules and regulations of appropriate authorities would be complied with. To prepare an emergency plan, prior knowledge of the following is considered essential:

- Emergency declaration procedures and evacuation of personnel
- Designate personnel to take charge of emergency actions.
- Accident investigation and reporting system.

Thus the typical duties in case of a disaster would be overall control of hazard to the extent possible, evacuation of public from threatened areas, use of appropriate disaster control methods. Advance knowledge of nature and scale of possible emergencies is essential.

2.4 Rehabilitation and Resettlement

During the preliminary survey it has been found that 10 houses would need to be demolished in order to construct the ORR. This puts a case for the rehabilitation for the houses at some other location.

MUDA will be following a rehabilitation and resettlement plan for those 10 houses. A compensation as per the policy will be provided. An amount of Rs 5,00,000/- (Rupees five lakhs only) would be provided as a compensation for each of the houses.

The resettlement would be done for the house owners at some other locations that would be provided by MUDA. The cost of the same would be borne by MUDA. The total quantum of cost for rehabilitation and resettlement has been provided in Chapter three of this report.

2.5 Specialized Procured Services For Design, Independent Supervision, etc.

Advisors for the Project

MUDA has appointed Infrastructure Development Corporation (Karnataka) Ltd. (iDeCK) for assisting MUDA in preparation of the Detailed Project Report (DPR) for the project. The appointment of iDeCK has been as per the provisions of the Karnataka Transparency in Public Procurement Act, 1999 (KTPP Act). iDeCK is a joint venture between the Government of Karnataka and the Infrastructure Development Finance Company Ltd. (IDFC), and is one of the consultants empanelled by the Ministry of Urban Development, Government of India for preparation of DPRs for JNNURM. For the purpose of preparing the DPR MUDA would carry out the detailed design and cost estimates for the Project.



S no	Activity	Procured Services from
1	Surveys and Investigations-Technical	Kaushik Consultants, Mysore
3	Concept Designs and Cost Estimates	MUDA
4	Financial Analysis & Project Structuring	iDeCK
5	Detailed Design	MUDA
6	Preparation of DPR	iDeCK
7	Construction Supervision and Project Management Services	MUDA/Private Agency

2.6 Other Information

2.6.1 Details Of Surveys And Investigation

2.6.1.1 Soil Investigation

Activity performed through MUDA by specialist consultant. MUDA appointed Karnataka Engineering Research Station, K. R. Sagara for detailed soil investigation and surveys. The report of the same has been provided in Volume II of the report.

2.6.1.2 Traffic and Passenger Surveys

The following surveys were carried out in order to assess the traffic situation within and around the site. One-day traffic count survey, including directional surveys. The TCV consists the survey for HMV, Mini lorries, LMV two wheelers etc.

Summary provided in **Annexure 2.2.3**

Traffic Characteristics

2.6.1.3 Traffic Characteristics

Traffic surveys were conducted on three days (including one holiday). Surveys were carried out all round the day on 31st march 2006 – volume count done on hourly basis. The results of the traffic survey have been detailed below:

Traffic flow

- Dense between 15.00 to 17.00 hrs and 17.00 to 19.00 hrs
- Moderate between 6.00 to 11.00, 11.00 to 14.00 & 14.00 to 15.00 hrs
- Low between 1.00 to 6.00 hrs
- Regular flow during rest of the day – average vehicle

Currently, ORR caters 6000 trips per day including the HMV, Lorries, LMV's and two wheelers. Currently the lorries and the LMV's use the city roads in the absence of ORR, The users will be using the ORR thereby increasing the traffic on ORR and reducing the congestion on the city roads.

2.6.2 Assessment of Requirements Related To Utilities Shifting:

Currently there are no major utility shifting required, only an estimate of shifting 100 electric poles has been done as a part of the cost estimates the details of the same has been provided in volume II of the report.

2.6.3 List of Clearances And Agencies From Which These Are To Be Obtained

- (a) Internal Clearances
 - Board approval for the project in terms of
 - Design
 - Financial Outlay
 - User charges
 - Implementation Plan
- (b) Clearances from Other Agencies
 - CHESCOM
 - Department of Telecommunication
 - Forest Department
- (c) Conformance to Statutory requirements
 - State Pollution Control Board

2.6.4 NUTP compliance:

MUDA has been involved in the planning and development of residential layouts in Mysore city. The design of the proposed ORR complies with part of the guidelines set out by National Urban Transport Policy (NUTP). The details of which have been presented below.

- (a) Facilitating non-motorised traffic:

The proposed 6 lane road of 45m width provides pedestrian way of 4m width on either side of the road. Looking at the future development in and around the city along the proposed ORR demands the provision of the pedestrian way and the same has been provided for. Also, the proposed BRTS on the ORR provides for the dedicated lane for the cyclists.

- (b) Integrated planning:

As brought out above MUDA is also involved in the development of residential layouts in Mysore city. Planning of the proposed ORR and also the layouts has been in accordance with the Master Plan. An

attempt has been made to focus on accessibility and transportation to the layouts. A brief write up on the same from MUDA has been appended as **Annexure 2.6.4**.

(c) Proposed Bus Rapid Transit System:

Keeping in view the need for promoting efficient and affordable public transport, the proposed BRTS too is being planned on the proposed ORR. As mentioned above, the BRTS also proposes to provide a dedicated lane for the cyclists.

Chapter 3

Project Cost

Project Cost

The detailed project costing has been provided as Volume II of this Report. The abstract of the construction cost of the project has been provided in the table below.

3.1 Land Acquisition

As per the information provided by MUDA, the Land required for the four laning of entire existing stretch (Project 1) for the ORR of 45m width and 23 km is already under the possession of MUDA.

3.2 Physical Infrastructure component-wise cost

	Components: Project 1		Estimated Cost (in Lakhs)
1	General and Site clearance		35.220
2	Earthwork and Embankment		2856.807
3	Granular Sub base		2573.258
4	Granular base		1464.149
5	Bituminous Construction		5160.841
6	Medians and Road Appertances		1218.402
7	Construction of Retaining walls and Box drains		6844.359
8	Bridges and Culverts		491.389
9	Miscellaneous items		122.250
10	Providing Street lighting		449.319
	Construction Cost		21215.994
11	Cost of shifting Utilities		50.000
	Construction and Other Costs		21265.994
12	Contingency	3.00%	636.480

	Total Project Cost	21902.474
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3.3 Environmental Compliance Cost

It is estimated that towards Environmental Compliance cost would be incurred at Rs. 50,000/- per km for 32.50 km for plantation of trees. Total cost thus calculated comes to Rs. 16.25 Lakhs, which is considered in the Sub Estimate 9 under miscellaneous items.

3.4 Rehabilitation and resettlement cost

The entire required land for the proposed project is already under the possession of MUDA hence there is no rehabilitation and resettlement cost involved.

3.5 Cost of surveys and investigations

The cost of surveys and estimate is **Rupees One Crore Fifty Lakhs only (Rs 1,50,00,000/-)**

3.6 Cost of shifting Utilities

Cost of shifting the electric poles is estimated as **Rupees Fifty Lakhs only (Rs 50,00,000/-)**

3.7 Cost of Consultancy Services a) Design b) supervision c) Quality assurance

The cost of consultancy services is Rupees Four Lakhs only (Rs 4,00,000/-)
Consultancy services include DPR preparation

3.8 Other statutory compliance costs if applicable

NIL

3.9 Finance/interests cost during construction

The Interest during construction is Nil

3.10 Contingency

Contingencies are assumed to be 3 % of the total Project Cost.

Contingencies for this project is Rupees Six Crores and Ninety Six Lakhs (Rs. 6,96,12,,000) Lakhs

3.11 Any Other

NIL

Chapter 4

Project Institutional Framework (for Construction)

4.1 Roles of different institutions involved in Construction Phase

The major activities involved during the construction phase have been discussed in this Chapter. The broad sub activities have also been indicated. As construction involves a number of activities carried out by different entities, coordination among these various entities is of prime concern.

The major activities involved are:

Regulatory Management

- Design of project components compliance requirements
- Approvals/ clearances requirements
- Advise Client on all statutory permissions / clearances / approvals necessary at various stages of project execution.

Planning and Scheduling

- Project scope definition
- Contract packaging
- Work breakdown structure definition
- Preparation of an overall plan for control and monitoring of project
- Preparation of project schedules – master and control, milestones
- Estimation of required materials, equipment and manpower resources to carry out activities on which to base the project schedule
- Identification of key milestones and critical path and establishment of base line schedule
- Monitoring project schedule regularly and recommending remedial measures to maintain scheduled progress
- Documentation for funds drawl from Central Government/State Government.
- Update project estimates and schedules to ensure they indicate project status

Cost Management

- Bill of quantities
- Derivation of rates
- Escalation allowances, if any
- Financing /cash flow considerations
- Comparison of budgeted and forecast costs
- Remedial measure recommendations
- Estimation of change costs
- Examination of contractors' claim submissions

Procurement and Contract Administration

- Procurement procedures
- Preparation of bid lists and pre-qualification of bidders
- Preparation of tender documents
- Evaluation of bids and recommendations to owners
- Monitoring progress and expediting as necessary
- Administration of approved changes to contracts/purchase orders
- Identification of possible exposure to contractors' claims and strategy to avoid or minimise these
- Review of contractors' claims for changed conditions, force majeure or extra work, negotiating and optimum position for owner protection and making recommendations to owners
- Project accounting
- Verification and processing of project accounts
- Generating project financial reports to meet specific project requirements
- Ensuring smooth transition of engineering data to a construction program
- Planning, coordination, management and status reporting of field Construction work

Construction Quality Assurance and Inspection

- Review of contract documents, purchase orders
- Establishing quality standards
- Preparation and monitoring of quality surveillance plan
- Review and/or audit of manufacturers' material quality controls

- Preparation of special inspection procedures and specifications
- Material verification
- Detailed inspection reports

Construction Management

- Review of contractors' detailed construction methodology and drawing submissions for overhaul design intent and specification compliance
- Monitoring workman standards and check site materials quality, in field, laboratory facilities, for contractor compliance with specification
- Monitoring construction progress and costs
- Monitoring site safety programmes and environmental monitoring
- Administrating construction contracts, including field changes, a check work measurement
- Certification of contractors' statements for payment.
- Preparation of As-built drawings & documents
- Preparation of Operation & Maintenance manuals

A summary of all such activities involved in the construction phase has been detailed in the following table.

Sr No	Activities Involved in Design and Construction Phase	Prepared By	Approved By
I	Design Stage		
a.	Assessment of Project Requirements	MUDA	MUDA
b.	Preparation of Conceptual Plans	MUDA	MUDA/JNNURM
c	Preparation of Detailed Design & Estimation for Civil & Structural, Mechanical , Electrical System and Fire Fighting	Kaushik Consultants	MUDA
d	Preparation of Detailed Project Report (Financial/Cost Benefit Assessment and other details required as per JNNURM)	iDeCK	MUDA
II	Preparation of Bid Document & Floating of	Project Advisors ¹	MUDA

¹ Project advisors to be appointed by MUDA once the Grant is sanctioned for the project.

	Tender document		
III	Evaluation of Bids, Selection of Contractor and Award of Contract	Project Advisors	MUDA
IV	Project Management Services		
a.	Regulatory Management	Project Advisors	MUDA
b.	Planning and Scheduling	Project Advisors	MUDA
c.	Cost Management	Project Advisors	MUDA
d.	Procurement and Contract Administration	Project Advisors	MUDA
e.	Manufacturing Quality Assurance and Inspection	Project Advisors	MUDA
f.	Construction Management	Project Advisors	MUDA

4.2 Manner of undertaking construction work and 4.3 Involvement of Construction Entity in the subsequent O&M activities

The three basic options for implementing each of the components are as follows:

- **Construction and Operation & Maintenance by MUDA**

In this option, MUDA takes the responsibility of constructing the road and subsequent operations and maintenance (including letting out of Public Usage space). It is envisaged that most of the activities related to both, construction and O&M, would be outsourced. The construction would be carried out through turnkey/unit rate contracts under the supervision of Project Management Consultants.

During the operations phase, it is envisaged that the entire building maintenance would be outsourced to single/multiple facility management agencies under short-term contracts.

- **Construction by MUDA, O&M by private agency**

In this option, MUDA takes the responsibility of constructing the facility. As in the above case, the construction would be carried out through turnkey/unit rate contracts under the supervision of Project Management Consultants.

During the operations phase, it is envisaged that the entire operations and maintenance of the building would be done by a single private agency under a medium/long-term contract.

- **Design, build, finance, operate and maintain by an SPV sponsored by MUDA with participation from private developer(s)**

In this option, MUDA forms a special purpose vehicle (SPV) for implementation and subsequent O&M of the facility. MUDA would also identify a private partner(s) for the SPV. MUDA would, through a long term concession contract entrust the SPV with the responsibility of design, financing, construction, operation and maintenance of the facility.

- **Design, build, finance, operate and maintain by private developer**

In this option, MUDA would, through a long term concession contract entrust a private developer with the responsibility of design, financing, construction, operation and maintenance of the facility.

The pros and cons of the above options have discussed in the following table:

No	Option	Merits	Demerits	Remarks
1	Construction and Maintenance by MUDA	<ul style="list-style-type: none"> - Payment towards risk premia would be minimal - Space usage can be controlled to be in line with basic character of the facility - Low tenure and standard contracts reducing legal risks 	<ul style="list-style-type: none"> - Increased administrative and operation responsibility 	Possible in the case of propose project.
2	Construction by MUDA, O&M by private developer	<ul style="list-style-type: none"> - Space usage can be controlled to be in line with basic character of the facility - Low tenure and standard contracts reducing legal risks 	<ul style="list-style-type: none"> - Increased revenue risk profile since project revenues depends on marketing ability of one private entity 	Possible in the case of propose project.
3	JV structure	<ul style="list-style-type: none"> - Implementation and market risks could be substantially passed on to the private partner - MUDA could retain some control over building design and end-use 	<ul style="list-style-type: none"> - Overall project success dependent on one entity - Legal risk is higher 	Not possible in the case of propose project because no specific and revenue stream is identified in the project. Had the toll

No	Option	Merits	Demerits	Remarks
		through its representation on the Board of the SPV		been proposed for the project this option might have become possible.
4	Concession structure	<ul style="list-style-type: none"> - All implementation and market risks borne by the bidder - Lesser documentation and administrative load on MUDA 	<ul style="list-style-type: none"> - All risks perceived by the bidder would be loaded onto the project resulting in lower realisation by MUDA - General tendency of bidder would be to compromise on passenger/bus facilities that do not earn revenues - Overall project success dependent on one entity - Legal risk is higher 	Not possible in the case of propose project because no specific and revenue stream is identified in the project. Had the toll been proposed for the project this option might have become possible.

Therefore, based on the above analysis, it is proposed that the project be constructed, operated and maintained by MUDA. Construction would be carried out through turnkey/unit rate contracts under the supervision of Project Management Consultants. .However, in order to mitigate the risks involved and to reduce the administrative load, MUDA would explore outsourcing of repetitive and labour-intensive activities to the extent possible.

4.4 Areas of involvement of private sector in the Construction Phase

		Tick	Other Info
i	Project Feasibility Study	✓	In house by MUDA
ii	Project Engineering Design	✓	Kaushik Consultants, Mysore
iii	Specialized Surveys	✓	Kaushik Consultants, Mysore
iv	Construction Works	✓	To be tendered to private contractors
v	Supervision Consultants	✓	MUDA
vi	Quality Assurance Consultants	✓	Karnataka Engineering R esearch Centre, KR Sagar, Mandya
vii	Any Other Please Specify (DPR Preparation for JNNURM Grant Application)	✓	Infrastructure Development Corporation (Karnataka) Limited

4.5 CONSTRUCTION PACKAGES FOR CONSTRUCTION

The various sub activities involved in the construction are listed below. However it is proposed that the entire Project would be treated as a single package for the purpose of executing the construction.

- General & Site Clearance
- Earth Work & Embankment
- Granular Sub Base
- Granular Base
- Bituminous Construction
- Construction of Retaining wall and Box drains
- Bridges and Culverts
- Miscellaneous Items
- Construction of Under Pass
- Providing Street Lighting

4.6 Risk Analysis

Sponsor Risk

Sponsor risk may be analyzed under two heads; experience of the sponsor and their financial capability.

MUDA has completed the development of the existing stretch of the ORR. Also MUDA has been instrumental in developing various residential layouts around the Mysore city. MUDA has sufficient experience in developing similar projects.

Completion Risk

Delays in Site Delivery

For the existing stretch of the ORR for the proposed enhancement the required land is already in the possession on MUDA. However for the proposed new stretch of the ORR the required Land is being acquired. The details of which have been discussed in Chapter 2.

Delays in Approvals

Project specific clearances/permits are to be procured by MUDA. However, MUDA has implemented similar projects in the past and hence no such delay is foreseen.

Construction Risks

The Project is expected to be completed within a time frame of 18 months. MUDA already is proposing to appoint consultants to assist in preparation of tender documents, tendering and also in providing Project Management Consultancy services. The decision about the same would be taken once the Grant sanction is in place. The involvement of such consultants would ensure that design issues with the contractor are resolved quickly.

Risk of Cost Overruns

The project would be tendered on the basis of the detailed designs and costing and comprehensive field investigations, thereby reducing the risk of quantity variation.

Design & Engineering Risk

The design and technical specifications is being provided by MUDA and is being scrutinized by the engineering experts as mentioned in the table above.. Hence, it is felt that the design and engineering risk is likely to be minimal.

Revenue Risk

Since no toll is being proposed to be collected form the users of the ORR the project would not have any specific revenue source.

Operating Risk

Increase in traffic on the stretch is likely to lead to increased wear and tear of the roads, the pavement and the connecting roads, and consequently increased maintenance requirement. In order to minimize the O&M requirement, a detailed O&M plan is being proposed as set out in the Chapter 7.

Chapter 5

Project Financial Structuring

5.0 Project Financial Structuring

5.1 Overall Financial Structuring of the Project

The financial structuring is proposed as per the details given in following table. Other than grants from both State and Center, entire project cost is being funded from the internal resources of MUDA. The analysis carried out for different financing alternatives has been presented in next section.

Sr	Govt.	Project Contribution Source	Amount (Rs Lakhs)	% share by specific Source	% share by gov. entity	Remarks (on when and how state and ULB shares would be arranged)
1	Central	ACA Grant	2499.07	80%	80%	
2		Grant towards its share in project	2499.07	10%		
3	State	Loan taken by state govt. for its share in project			10%	
4		Devolved funds	19992.57			The internal accruals would be utilized for MUDA resource. The schedule of it has been presented in Annexure 6.2.
5		Own Surplus Resource (of MUDA)		10%		
6	ULB/	Debt/Term Loan taken from State govt.			10%	
7	Parastatal	Debt/Term Loan taken from Bank/FI				
8		Debt from accessing capital market				
9		Private equity/community resource funding others				
			24990.70	100%	100%	

5.2 Review of Options for Institutional Debt & Private Sector Participation

5.2.1 Institutional debt

For any infrastructure project, use of debt would enable development of more number of projects for given amount of equity source. However, while it is beneficial to use debt funding for the project from the project/promoter's point of view, the decision of the lender/debt financier to provide fund to the project depends on the project cash flows and the debt service coverage provided. In case the project's cash flows do not comfortably support the debt servicing then tying up of debt funds for the project may not be possible. In the case of the proposed project since no toll is being collected from the users, the project per se would not have specific revenues. Hence getting a non-recourse financing for the proposed project would be very difficult.

Also, given the nature of the project, which has more of societal benefits which can not be quantified to justify the financial analysis of the lenders, no debt is being proposed. Only grant component which forms 90% of the project cost (from both Centre and State Grant) is being proposed

5.2.2 Private sector participation

While analysing various options of developing the project through private participation, it is important to look at the financial viability and returns available from the project. Since no specific revenue source is envisaged for the proposed project, the private participation is not being considered. Also, the project is eligible for seeking the Grant under the JNNMURM scheme, under which Grant upto 90% of the capital cost of the project can be availed. This would have long term benefits for all the users of the road as against a case where a project developed through private participation would impose toll on the users.

However, for the operations and maintenance of the project road as brought out in the Chapter 7 various alternatives for private participation are being explored.

Chapter 6

Project Phasing

6.0 Project Phasing

The schedule of activities linked to implementation of the overall project is as follows:

No	Activity Description	Time Frame
	Tendering Period	
1	Preparation Bid documents and Floating	M0 to M3
2	Evaluation of Bid and selection of Contractor	M4 to M5
3	Award of Work	M6
	Construction Period	
4	Project approvals/clearances	M1 to M6
5	Project award and implementation	M1 to M18

6.1 Schedule for tendering/selection for procurement of services

Selection of any agency by MUDA for the project, either during the period of construction or maintenance, would be as per the provisions of the Karnataka Transparency in Public Procurement Act, 1999.

6.1 Construction Contractors

MUDA would invite open tenders as per the provisions of the KTPP Act, 1999 for appointing contractor(s) to execute the project.

Schedule for Tendering

The details of the schedule for tendering has been provided in Annexure 6.1

6.2 Consultants/firms for supervision and quality assurance

As mentioned in the previous Chapters, MUDA has retained the services of iDeCK for providing Consultancy Services for the preparation of DPR. MUDA will be providing in-house supervision and quality assurance for the Project.

6.2 Schedule for bringing State level & ULB level contribution to the project

The detailed schedule in absolute terms and on percentage basis has been presented in the Annexure 6.2.

6.3 Schedules for obtaining all clearances (along with list of major clearances)

List of clearance to be obtained.

	Clearance Details	Status
1.	MUDA (Board)	Underway
2.	CHESCOM	2 Months from sanction of Financing Plan
3.	Dept. of Telecom	3 Months from Sanction of Financing Plan
4.	Forest Department	2 Months from Sanction of Financing Plan

6.4 Schedule for shifting utilities

	Utility service	Shifting Time
1	Electric Poles and Cables	2 Months from Sanction of Financing Plan
2	Telephone Poles and Cables	3 Months from Sanction of Financing Plan
3	Cutting of Trees	1 Months from Sanction of Financing Plan

6.5 Project infrastructure component-wise implementation

The above have been provided as Annexure 6.1

6.6 Presentation of PERT and CPM diagrams along with Gantt Charts.

The above have been provided as Annexure 6.1

Chapter 7

Project O& M Planning

7.1 Institutional Framework (Organization and Operations) strategy:

7.1.1 Institutions Involved:

As brought out in earlier chapters the project involves two main parts, one is enhancement of the existing stretch and other part is constructing a new stretch. The O&M is being planned to be undertaken as discussed in the section 7.4 of this chapter.

7.1.2 Brief outline of the existing method of billing & collections

Not Applicable

7.1.3 Select performance metrics in regard to billing & collections (for the most recent completed financial year and if possible for the current quarter of the ongoing financial year)

Not Applicable

7.1.4 Brief description/analysis of the key issues and obstacles in regard to O & M and proposed countermeasures to overcome them for the sector in general and for the project in particular.

The key issues and obstacles while carrying out O & M are the risk involved with the same. Operating risk is one of the issues for O & M; Increase in traffic on the stretch would lead to increased wear and tear of the project facility, the pavement and the connecting roads, and consequently increased maintenance requirement. By outsourcing the facility maintenance to a private party the issue can be addressed. The documentation and administrative load is the sole responsibility of the single entity which is to be managed along with the operations and maintenance of the facility. Similarly the administration can be outsourced through a concessionaire for a period of time.

7.1.5 Scope of private entity/NGO to be involved in the O&M.

The scope of the entity has been detailed in the section 7.5 of this chapter.

7.2 Tariff and user cost recovery

Not Applicable

No toll is being envisaged to be collected from the users of the proposed Project Road. Also, in case of existing road also no such toll is being collected.

7.3 Existing O&M Planning by MUDA

MUDA has been contracting out the maintenance of the existing stretch of Outer Ring Road. MUDA invites the tenders for such maintenance work on yearly basis. The agreement in place currently is for a period of one year. (Sample copy of the work order and agreement has been attached as **Annexure 7.3.1**).

However for the proposed project, a comprehensive O&M strategy has been devised which is detailed in the following sections. O&M of the ORR is done by MUDA until the property/asset is handed over to Mysore City Corporation. (A rough estimate of the O&M cost of the ORR is also included in the **Annexure 7.3.1**)

7.4 Institutional Framework: Options and strategy for the proposed project

MUDA/Agency is expected to carry out Operation and Maintenance of the project road. The Project Road would have to be maintained as per the standards set out. The O & M activities would have to be carried out for all the facilities, including those that have been set up by specialist agencies, except facilities that would be maintained by the respective Government Agencies / MUDA.

The basic options for implementing each of the components are as follows:

- **Construction and Operation & Maintenance by MUDA:**

In this option, MUDA takes the responsibility of constructing the project and subsequent operations and maintenance (including letting out of Public Usage space). It is envisaged that most of the activities related to both, construction and O&M, would be outsourced. The construction would be carried out through turnkey/unit rate contracts under the supervision of Project Management Consultants.

During the operations phase, it is envisaged that the entire maintenance would be outsourced to single/multiple facility management agencies under short-term contracts.

- **Construction by MUDA and O&M by private agency:**

In this option, MUDA takes the responsibility of constructing the project road. As in the above case, the construction would be carried out through turnkey/unit rate contracts under the supervision of Project Management Consultants. During the operations phase, it is envisaged that the entire operations and maintenance of the road would be done by a single private agency under a medium/long-term contract.

- **Design, build, finance, operate and maintain by an SPV sponsored by MUDA with participation from private developer(s):**

In this option, MUDA forms a special purpose vehicle (SPV) for implementation and subsequent O&M of the road. MUDA would also identify a private partner(s) for the SPV. MUDA would, through a long term concession contract entrust the SPV with the responsibility of design, financing, construction, operation and maintenance of the facility.

- **Design, build, finance, operate and maintain by private developer**

In this option, BMTC would, through a long term concession contract entrust a private developer with the responsibility of design, financing, construction, operation and maintenance of the facility.

The pros and cons of the above options have discussed in the following table:

No	Project Structuring Option	Merits	Demerits
1	Construction and Maintenance by MUDA	<ul style="list-style-type: none"> - Payment towards risk premia would be minimal - Space usage can be controlled to be in line with basic character of the facility - Low tenure and standard contracts reducing legal risks 	<ul style="list-style-type: none"> - Increased administrative and operation responsibility
2	Construction by MUDA, O&M by private developer	<ul style="list-style-type: none"> - Space usage can be controlled to be in line with basic character of the facility - Low tenure and standard contracts reducing legal risks 	<ul style="list-style-type: none"> - Increased revenue risk profile since project revenues depends on marketing ability of one private entity
3	JV structure	<ul style="list-style-type: none"> - Implementation and market risks could be substantially passed on to the private partner - MUDA could retain some control over 	<ul style="list-style-type: none"> - Overall project success dependent on one entity - Legal risk is higher

		building design and end-use through its representation on the Board of the SPV	
4	Concession structure	<ul style="list-style-type: none"> - All implementation and market risks borne by the bidder - Lesser documentation and administrative load on MUDA 	<ul style="list-style-type: none"> - All risks perceived by the bidder would be loaded onto the project resulting in lower realisation by MUDA - General tendency of bidder would be to compromise on passenger/bus facilities that do not earn revenues - Overall project success dependent on one entity - Legal risk is higher

Therefore, based on the above analysis, it is proposed that the project be constructed, operated and maintained by MUDA. However, in order to mitigate the risks involved and to reduce the administrative load, MUDA would explore outsourcing of repetitive and labor-intensive activities to the extent possible. Operation and Maintenance of the facilities to ensure delivery of design standards in service need to be given paramount importance. MUDA / Private Developer may also take the services of a reputed O&M franchise, of international repute, having sufficient exposure to user needs, to maintain the common facilities.

7.5 Detailed O&M Planning for the proposed project:

7.5.1 O&M planning requirements:

While planning for the O&M of the proposed project the consideration has been given separately for the required activities during the Construction phase and during the operations phase.

7.5.1.1 During Construction Period

In the design, planning and implementation of all works and functions associated with the operation and maintenance of the Project facilities, the issue of O&M has been given due consideration in such manner that it should:

- (i) Ensure the safety of personnel deployed on and users of the Project Facilities or part thereof;
- (ii) Keep the Project Facilities from undue deterioration and wear;
- (iii) Permit unimpaired performance of statutory duties and functions of any party in relation to the Project;

7.5.1.2 During the operations period:

MUDA / O&M Agency shall ensure that

- (i) The Project Facilities are kept free from undue deterioration and undue wear;
- (ii) applicable and adequate safety measures are taken;
- (iii) minimum delay is caused to users of the Project Facilities
- (iv) adverse effects on the environment and to the owners and occupiers of property and/or land in the vicinity of the Project Facilities, due to any of its actions, is minimized;
- (v) Any situation which has arisen or likely to arise on account of any accident or other emergency is responded to as quickly as possible and its adverse effects controlled/minimized;
- (vi) disturbance or damage or destruction to property of third party by operations of the Project Facilities is controlled/minimized;
- (vii) Users are provided with adequate information and forewarned of any event or any other matter affecting the Project Facilities to enable them to control/minimize any adverse consequences by such event or matter;

- (viii) Registers to be maintained to record grievances or appreciations of members of public in relation to the operation and maintenance of project/project facilities.
- (ix) Traffic data and data relating to the operation and maintenance of the Project Highway and its Facilities and events on the Project Highway are collected and disseminated such that the Authorities and statutory duties or functions in relation to the Project Highway or adjoining roads are able to perform those duties and functions efficiently;
- (x) All materials used in the maintenance, repair and replacement of any of the Project Facilities shall meet the Design Requirements/standards.
- (xi) The personnel assigned by the Concessionaire have the requisite qualifications and experience and are given the training necessary to enable the Concessionaire meet the O&M Requirements.

7.5.2 Operations O&M Manual:

7.5.2.1 Operations part of O&M Manual:

It shall prescribe procedures and systems for activities including following for the regular and emergency operations of the project highway and facilities thereon:

- Permitting smooth and uninterrupted flow of traffic during normal operating conditions.
- Functioning of the Toll System including charging and collecting the fees from the road user in accordance with the Concession Agreement.
- Functioning of the Patrolling System
- Functioning of rescue and medical and aid services
 - Ambulance
 - Fire Brigade

- Tow away trucks and cranes
- Functioning of the Project Facilities
 - Administrative, Operation and Maintenance camp
 - Pickup bus stops
 - Parking Laybys & Rest Areas
 - Electrical Services at Laybys, bus stops and rest area
 - Potable water supply system including supply of drinking water at truck parking laybys, rest areas etc.
 - Public toilets and other sanitary facilities
 - Solid wastes disposal system including those from litterbins

7.5.2.2 Maintenance part of O&M Manual:

This section of the O&M manual, shall include the activities required for the regular and preventive maintenance of the equipment during the operations period, so that the project Highway is maintained in a manner that at all times it complies with the specifications and standards set out.

7.5.2.2.1 Routine Maintenance

In order to ensure smooth and uninterrupted flow of traffic during normal operating conditions for all 24 hours of a day, routine maintenance shall include:

- (i) Prompt repairs of concrete joints, drains, lane marking, signage; patching, raised berms, drain cleaning, repairing of signs, road marking, carrying out repairs to pavement crack by sealing; barricades, railing etc.
- (ii) Replacement of equipment/consumables, horticultural maintenance and repairs to equipment, pavements, elevated highway, overpasses, bridges,

structures and other civil works which are part of the Project/Project Facilities;

- (iii) Maintenance of the approach roads to overpasses and drainages within the Project Site in accordance with Good Industry Practice;
- (iv) Keeping the Project Site/Project Facilities in a clean, tidy and orderly condition free of litter and debris and prevent damage. Removing and disposing of all rubbish, debris, etc;
- (v) Undertaking maintenance works in accordance with the O & M Plan and O&M Manual;
- (vi) Preventing any unauthorized entry to and exit from including any encroachments on the ROW / Project Site;
- (vii) Taking all reasonable measures for the safety of all the workmen, material, supplies and equipment brought to the Project Site.
- (viii) Maintenance of road furniture like KM post etc. and attending to repairs to various parts of the road furniture
- (ix) Follow standards like IRC/MORT&H for each of the performance indicators covered under pavement condition survey, roughness and BBD deflections.
- (x) All traffic signs and markings shall always be kept clear visible and in correct alignment and position.
- (xi) Repairs will be attended to elements of landscape as and when necessary and irreparable items replaced.

7.5.2.2.2 Preventive Maintenance

\To ensure that during the Concession Period and at its end is in sound, durable and functional condition, it would be required to carry out the necessary preventive

maintenance activities for the Project Facilities to ensure adherence to the Design Requirements and specifications throughout the operations period.

7.5.2.2.3 Periodic Maintenance

This activity shall be carried out as required and at least once every 5th (or any other period as decided by MUDA from time to time) year (from COD)

- (i) The periodic maintenance activities shall also include profile corrective course of overlaid with the periodic renewal of the wearing course of the road pavement. The same shall be undertaken on all roads and pavements in the Project facilities.
- (ii) The periodic renewal shall result in improvement of the riding quality, meeting road roughness value at least as at the time of COD.
- (iii) The separator islands shall be restored to the design cross section.
- (iv) Road marking as specified and other roadside features wherever required shall be restored to meet the relevant standard specified.
- (v) The crash barriers should require minimum maintenance except in case of damage due to impact.
- (vi) Concrete Posts and Steel Beam crash barriers will require repairs or replacement from low to medium impact damage caused by vehicles. Periodic painting will also be required.

7.5.2.2.4 Special Repairs

Damages occurring due to natural calamities like heavy floods, sand storms, hurricanes, cyclones, earthquakes to any element or system of the Project Highway shall be rectified and the system restored to function as per programme prepared in

consultation with Independent Consultant. All such activities shall fall under the Maintenance and shall form a part of the said Maintenance Manual.

7.5.3 Maintenance Standards

7.5.3.1 During Implementation Period

During Implementation Period, MUDA/Agency shall maintain the existing stretch of the ORR in traffic worthy condition as per the detailed specifications which would be finalised upon receiving the sanction of the funds for the project (the Financial Closure) A illustrative sample of such specification is presented below, which would be suitably modified in the due course of time for the proposed project.

Intervention levels 1 and 2 provided in following table;

	Service Factor	Level 1 (Desirable)	Level 2 (Acceptable)
1	Roughness by Bump Integrator (max. permissibility)	2500mm/Km (Allowable Tolerance: +5%)	3000mm/Km
2	Potholes /km (max)		
	i) upto 75mm deep	Nil	5 Nos. of size < 5 sq.m
	ii) more than 75mm deep	Nil	Nil
3	Percent Cracking	Nil	No Unsealed cracks > 6mm wide on 95% Project Highway.
4	Rut Depth not exceeding 10mm	Length not more than 10% of the Project Highway	Length upto 20% of Project Highway
5	User Information	All road signs, Km post and road marking in good condition.	All road signs, Km post and road marking in good condition
6	Percentage Defective bridge Deck area and bump at approach	Nil	Nil
7	Drainage (including shoulders)	No visible water pool within the ROW	No visible water pool within the ROW.
8	Pavement Marking	Full reflectivity in wet conditions	The adequate wet reflectivity should exist.

7.5.3.2 During Operation Period

During Operations Period, all the road works and pavements contained in the Project Facilities (including those in the ancillary facilities) shall be maintained in traffic-worthy condition as per the detailed specifications which would be finalised upon receiving the sanction of the funds for the project (the Financial Closure) A illustrative sample of such specification is presented below, which would be suitably modified in the due course of time for the proposed project.

Intervention levels 1 & 2 through the various maintenance activities.

	Service Factor	Level 1 (Desirable)	Level 2 (Acceptable)
1.	Roughness by Bump Integrator (max. permissibility)	2000mm/Km (Allowable Tolerance: +5%)	3000mm/Km
2.	Potholes /km (max)		
	i) less than 75mm deep	Nil	2 Nos. of size < 5 sq.m
	ii) more than 75mm deep	Nil	Nil
3.	Percent Cracking	Nil	No Unsealed cracks > 6mm wide on 95% Project Highway.
4.	Rut Depth not exceeding 10mm	Length not more than 5% of the Project Highway	Upto 10% of length of Project Highway
5.	User Information	All road signs, Km post and road marking in good condition in 3 language formula.	All road signs, Km post and road marking in good condition in 3 language formula
6.	Percentage Defective bridge Deck area and bump at approach	Nil	Nil
7.	Camber		
	i) Mainline	(+ or -) 0.05% variation from the Camber as per Design Requirements	(+ or -) 0.15% variation from the Camber as per Design Requirements
8.	Drainage (including shoulders)	No visible water pool within the Project Highway	No visible water pool within the charge of concessionaire
9.	Characteristic Deflection as per IRC: 81-1997	Upto 0.50mm	Upto 0.80mm

10.	Pavement Marking	Full reflectivity in wet conditions	Adequate wet reflectivity.
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7.5.4 Traffic Management

Traffic Management shall be undertaken during scheduled and unscheduled construction work and maintenance activities and also during any Emergency. The extent of the traffic management shall be assessed as per the site conditions.

The basic principles to be followed for traffic management and lane closure in this project highway shall be as follows:

- (i) Work programme schedule shall be prepared such that diversion roads for the main traffic are minimized to the maximum extent possible.
- (ii) Measures shall be taken that the traffic is guided from closed lane into the operating lane without its conflict with the traffic from the opposite direction.
- (iii) The traffic diversion and road where provided shall be appropriately designed for the traffic plying on the highway. It shall also be properly maintained during its operation period.
- (iv) During traffic detour involving traffic diversion adequate safety measures as per safety standards shall be followed.
- (v) Proper and adequate information about the maintenance activity shall be notified to the Road Users in advance and displayed at the work site during the Operation Period.
- (vi) Traffic Management plan and programme for planned scheduled construction and/or maintenance activity shall be prepared in advance of that activity keeping mentioned above.

7.5.4.1 Inspections & Frequency

A detailed programme of Inspection and its frequency would be developed specific to the proposed project, once its financial closure is achieved. A sample table illustrating such schedule is presented below.

Object	Item	Daily	Monthly	Quarterly	Before and after rainy season
Riding Surface	Pavement	..	#		.
	Expansion joints	..	#		.
Median	Kerb	..	#		.
Side Slopes	Shape	..		#	.
	Turfing		♦		.
	Pitching Masonry		♦		.
	Retaining Wall		#		.
Drainage	Side drain	§	#		
	Gullies and catch pits	§	#		
Bridges	a) Superstructure			#	.
	b) Substructure			#	.
	c) Head wing walls and aprons			#	.
	d) Painting				.
	e) Hand rail		#	•	
Culverts					.
Safety Barrier		♣		#	.
Traffic operation facilities	Signs		•		.
	Marking	♣	#	#	.
	Delineator	♣	#	#	.
	Lighting	♣		#	.
Other facilities	Vegetation / landscaping/toll plaza/wayside amenities	♣	#	•	
Traffic Conditions		♣	•	#	
Encroachments		♣	•		
♦	Visual inspection				
#	Close inspection				
•	Thorough inspection				
♣	Visual inspection during rainy season only				

7.5.5 Staff Recruitment & Training

O & M AGENCY shall identify, recruit, train and supervise all onsite staff to exact standards. Also one professional staff member is typically assigned whose role would be to supervise all other staff employed.

7.5.6 Budgets

O & M AGENCY shall prepare annual budget forecasts of management expenses, for approval to ensure that there are no unexpected outgoings for the property, which also serve as a cross checks to service payment requests.

Chapter 8

Financial Viability and Sustainability Analysis

8.0 Financial Viability and Sustainability Analysis

8.1 Overall project perspectives:

As there is no revenue source envisaged for the Project, hence no financial viability study has been carried out. However, the benefits to the society have been detailed out in the Chapter 9.

8.2 ULB level perspectives and financial situation assessment

8.2.1 ULB cash flow:

As per the guidelines of the DPR toolkit the impact of the proposed projects on the MUDA's financial position is analysed. The cash flow statement in the required format has been presented in as Annexure 8.2. The impact has been assessed with following grades:

	Impact	Grade
1	+/- 20% and more	High
2	+/- 5% to 20%	Medium
3	+/- 5% and Less	Low

Cash flows of MUDA are presented below:

As per the projected cash flow statement, which also enclosed as Annexure 8.2., at the end of Financial Year 2008, there would be closing cash balance of Rs. 2981.75 Lakhs. This is a very healthy cash flow situation as far as the proposed project is being considered.

Rs. Lakhs	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-9
Capital Surplus(Deficit)	-711.87	60.51	1021.86	-154.61	632.64	755.75	940.00	1034.00
Closing Balance	763.25	776.35	1829.08	1546.55	2573.56	4950.72	2981.57	3279.73

As per the guidelines of JNNURM, the for the analysis of impact on the ULB cash flows, all the current projects being proposed by the MUDA has been considered.

On the revenue account the project is expected to have only routine O&M Cost. MUDA has provided a estimate of the O&M expense for ORR which is enclosed in Annexure 7.3.1.

The total estimate annual maintenance cost comes to Rs. 130 lakhs. Looking at the financial status of the MUDA it is felt that, the impact on the revenue account of the both projects (Project 1 and Project 2 together) would be of “Low” category.

On the capital account, the entire project being proposed by MUDA is at various stages of development. The estimated cost for the project is 8885.97 lakhs MUDA would be required to finance 10% of the cost at various stages of the construction period. Even though we consider the investment requirement by MUDA in all such projects, the investment being spread over number of years, it would have a low to medium impact on the financial position of MUDA.

Financial Year end	2008	2009	2010	2011	2012	2013	2014	2015
Revenue Receipts	Low	Low	Low	Low	Low	Low	Low	Low
Revenue Expenditure	Low	Low	Low	Low	Low	Low	Low	Low
Capital Receipts	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium
Capital Expenditure	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium	Low to Medium

8.2.2 Other Financial Information:

MUDA has not been credit rated as of today.

Chapter 9

Project Benefit Assessment (Social Cost Benefit Assessment)

9.1 Benefits from the societal perspective:

Sr	Benefits Description	Comments	Quantitative Impacts	Underlying Assumptions
1.	Access	The balance (new) stretch of ORR will provide enhanced access to the users.	Reduced travel time.	The assumption is that, the passengers/commuters think rationally to save time and cost by using the ORR to the maximum possible extent.
2.	Coverage	The project would increase the number of people/users it is covering, since at present there is no such road is available to the people in the South East section of the city.	Although the exact quantitative assessment is very difficult but substantial proportion of commuters/passengers who are at present relying on city roads will be diverted to the ORR.	Same as above.
3.	Service Quality	Through wider and better road for travel.	Reduced travel time and Enhanced user experience	Same as above
4.	Supply continuity	During construction time although there would be some disruption to the normal traffic, proper planning of construction would ensure minimal problems.		
5.	Safety	Wider road (6 lane) with medians would reduce head on collisions which are seen in case of the existing 2 lane roads without medians.	Roads being de-congested would reduce the number of accidents.	Increased used of ORR would reduce the heavy traffic in city.

Sr	Benefits Description	Comments	Quantitative Impacts	Underlying Assumptions
6.	Cost Savings	Use of ORR would reduce the cost of travel for the users as they wont have to use the city congested city roads	Mass transport would ensure economies of scale.	Decongested road would ensure faster travel of vehicles which would improve the efficiency of the vehicles hence reducing the fuel cost.
7.	Time Savings	Decongested roads, would save substantial time of commuting.	Time saving would improve the efficiency of the system and the economy.	Time has monetary value.
8.	Environment Improvement	Reduced use of private vehicles on the city road would minimize pollution level.	In the short term although the improvement might not be visible, in the long run, lesser pollution would ensure cleaner environment.	
9.	Improved Quality of life etc	Reduced traffic problems would lessen the travel time and stress on the commuters in the city.	This would be an indirect benefit. Of the use of ORR	

9.2 List of Negative Externalities (i.e. adverse impact)

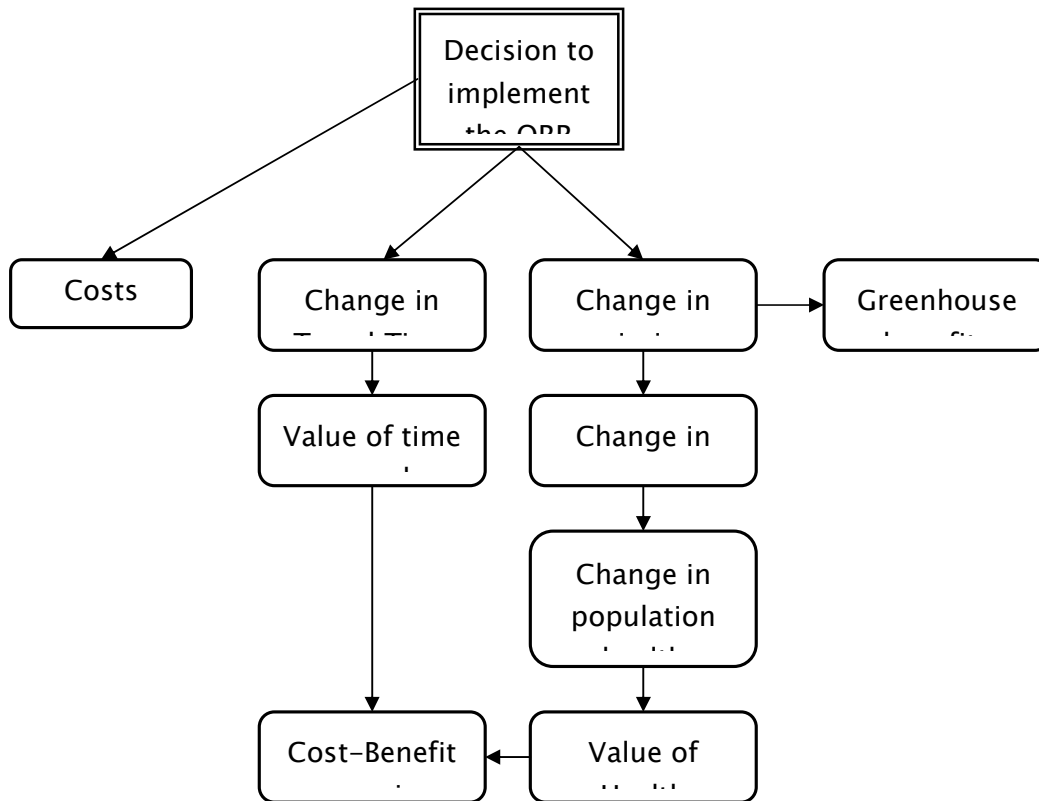
Sr	Benefits Description	Comments	Quantitative Impacts
1	Pollution, environmental distortions, reduced green cover etc	Project would have impact on environment as their would be cutting of trees.	To counter the cutting of trees More trees will be planted and will be maintained for a period of 3- 4 years.
2	Reduced access to any specific user segments	Project would not lead to any such effect.	Not applicable.
3	Commutation interruptions (especially during project construction phases etc)	Construction activity is being planned properly to ensure alternative plan for regular management and usage of road would ensure no interruption during construction phase.	Partial commutation interruption will be present that would be tackled through efficient traffic management.
4	Displacement of inhabitants	Nearly 10 houses would be demolished though Rehabilitation and resettlement of the inhabitants would be done accordingly.	This would increase indirect cost over the ULB

Sr	Benefits Description	Comments	Quantitative Impacts
5	Disruption of livelihood / reduced employment /labour redundancy	No such effect is expected to occur since it is expected that more opportunities would come up in both direct and indirect category of employment.	Not disruption.
6	Possible Haphazard development around/adjacent project site areas	N/A	N/A

9.3 Economic IRR

The economic IRR (EIRR) takes a much broader perspective of the impact of the proposed project. It considers several indirect benefits which are not readily quantifiable or reducible to financial measures. These impacts which are measured in this category are classified as “economic returns”. A societal perspective is taken when calculating costs and benefits: that is, all the costs and benefits are considered without considering who the payer or the beneficiary is. Under this perspective, transfers like taxes or interest are not included in the cost benefit calculation. Proposed ORR can provide a number of benefits to a diverse set of local and global stakeholders, from a improved travel experience to reduced greenhouse gas (GHG) emissions etc. Social benefits of ORR include the following as stated below.

A Framework for Analyzing the Economic IRR from ORR Implementation



Economic

Various economic benefits which can be realized from the proposed project are listed below.

- (i) Reduced travel times
- (j) Reduced fuel cost to the economy
- (k) More reliable transportation
- (l) Increased economic productivity
- (m) Improved road conditions

Social

- (i) Reduced traffic and congestion in the city
- (j) Reduced accidents and injuries
- (k) Increased civic pride and sense of community
- (l) Improving the image of the city as a host to Heritage properties.

Environmental

- (i) Reduced emissions of air pollutants
- (j) Reduced noise

Urban form

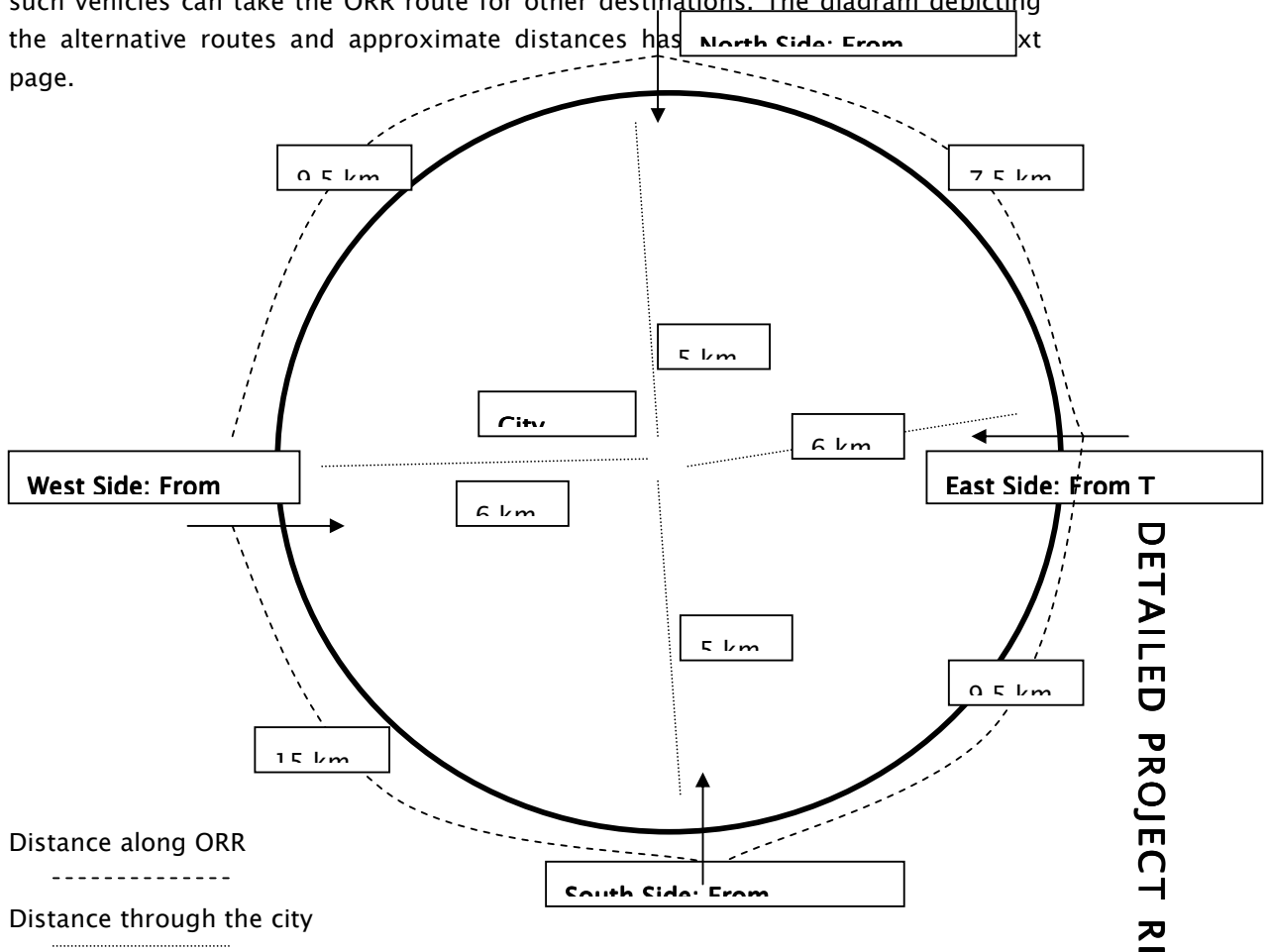
- (i) More sustainable urban form, including densification along new ORR.

9.3.1 Quantification of Savings and Economic IRR

An attempt has been made to quantify the saving made out of the fuel cost and based on the same Economic IRR has been calculated.

Background:

Four major entry points at four directions cut the ORR to enter the city are considered for the analysis. In the absence of the ORR those vehicles also which are not destined for the city need to traverse through the city. With the presence of ORR such vehicles can take the ORR route for other destinations. The diagram depicting the alternative routes and approximate distances has North Side: From xt page.



Quantifying the savings:

For the purpose of quantifying the savings out of fuel cost, the basic traffic data is obtained from the Traffic Study and projections are used which was conducted by Dalal Consultants at the time of obtaining the ADB finances during initial stages of project. The Vehicle numbers, and not PCUS, are considered. Traffic projections from year 2009 to 2036 has been considered.

Major assumptions made for the analysis are presented below:

- a) Of the total vehicle from a particular direction entering the city, 25 % are considered to be destined for the city. Remaining vehicles are assumed to be divided equally to be destined for other three directions (i.e. 25% for each direction).
- b) Buses, cycles and other vehicle categories are not considered for the analysis.
- c) Average speed through the city: 30km/hr
- d) Average speed along ORR: 50km/hr
- e) Average Fuel Efficiency for 4 wheelers through the city: 6.3 km/hr
- f) Average Fuel Efficiency for 4 wheelers along the ORR: 6.3 km/hr
- g) Average Fuel Efficiency for 2 wheelers through the city: 40 km/hr
- h) Average Fuel Efficiency for 2 wheelers along the ORR: 50 km/hr
- i) Average Fuel cost (petrol at 50 and diesel at 35): Rs. 43 per liter
- j) Escalation in fuel cost: 3% per annum.

Further details on the assumptions is presented in **Annexure 9.3.1**

Based on these assumptions, a detailed analysis has been carried out which also is enclosed in the **Annexure 9.3.1**, the total savings for years upto 2036 in Present Value terms comes out to **Rs. 186.85 Crores**.

Economic IRR:

Based on the fuel savings described above, with project cost of Rs. 249.9 Crores, the EIRR comes to **9.06 %**.

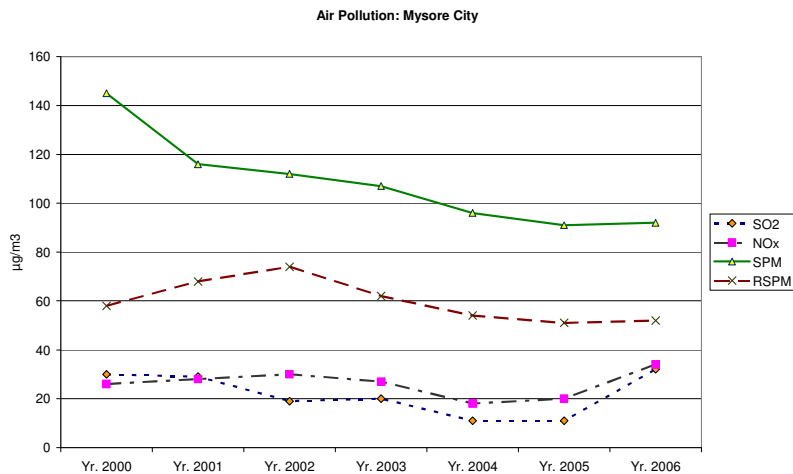
The Economic IRR thus calculated is based on the fuel cost to the users, which is a subsidized price of the fuel. If we add back the subsidy component to the same the Economic IRR increases by 2 percentage points. The resulting Economic IRR is the actual Economic IRR to the system as a whole.

However, if we factor in other social benefits like reduction in travel time, reduction in pollution, reduction in accidents etc, which are described in the next section in detail, the EIRR is expected to go up substantially.

9.3.2 Other Social Benefits in detail:

(i) Reduction in Pollution

Overall, the SPM and RSPM concentration is coming down over the period; however, there is a gradual increase in the Nitrogen Oxides and Sulphur Dioxides emissions.



The graph above shows the concentration of air pollutants in Mysore city.

Key:

SO₂ – Sulphur Dioxide

No_x – Nitrogen Oxides

SPM – Suspended Particulate Matter

RSPM – Respirable Suspended Particulate Matter

With the ORR in place, and reduced traffic and congestion in the city, the pollution levels in the city are expected to come down substantially. If we quantify the benefits out of the same, the EIRR would go up.

Apart from the reduction in air pollution, there would also be a reduction in noise levels in the city. This will also, contribute to improving the Economic IRR calculated above.

(ii) Change in Travel Time

One of the primary economic benefits expected with the implementation of the BRT is the speeding up of journey or reduction in travel time. With the ORR it is expected that the speed

of travel along the new alternative would enhance substantially. The design speed of ORR is above 60km per hour. Currently the average for travel through the city, as indicated by the traffic study ranges form 20–30 km per hour. This increase in speed will mean man–hour savings being generated over a long period of time are presented in the Annexure 9.3.1. This reduction in time will have direct savings in man–hours and would have marginal impact on indirect monetary saving and boosts the Economic IRR substantially. It improves the overall quality of life by giving the people more utility time to spend.

(iii) **Conservation of image as a host to precious Heritage properties**

Mysore being host to many heritage monuments it attracts number of international tourists. First impact ORR would have on the city is reduction in pollution which will help in conserving the heritage properties in Mysore. Also, by decongesting the city areas the image in the minds of tourists of Mysore city would improve substantially. Although it is extremely difficult and complex to quantify such a benefit, it would certainly have a long term benefit to the image of the city as a host to heritage properties.

(iv) **Reduction in Accidents**

The traffic survey report carried out by Dalal Consultants, which has also been enclosed as Annexure, has presented the Road Accident data.

Sr	Heads	1997	1998	1999	2000	2001	Total	%age
1	Fatal	80	105	99	94	103	481	14.44
2	Grievous Injury	142	140	155	147	186	770	22.23
3	Minor Injury	338	339	262	240	243	1422	47.78
4	Non–Injury	113	99	93	87	75	467	15.61
TOTAL		673	683	609	568	607	3140	100

With the ORR in place, the bypassbale traffic, which otherwise would pass through the city, would de congest the city areas and the number of accidents taking place in the city roads would come down substantially.

The effect of the reduction in accidents too would be to improve the Economic IRR calculated above.