
5. Past Studies

5.1 General

PMC & PCMC have carried out several traffic studies to improve the transport of study area. Some of the recommendation of the studies is already implemented and some are under considerations. Major studies carried out are briefly detailed here.

5.2 Mass Rapid Transit System for Pune Metropolitan Area, RITES LTD, January 2001

Scope

The scope of the study include

- Forecast the demand for travel on a High Capacity Mass Transport System using a fresh economic forecast.
- Selection of an optimum system to meet the demand to suit conditions of Pune. Geometric design of the route alignment, land for facilities, structural outlines, typical station plans, environmental impact assessment and evaluation of economic/ financial viability of the transit system.
- Identify private parties to implement the system on BOOT (Build, Own, Operate and transfer) basis and recommended means to raise finance for implementation, through cross subsidy schemes

CONCLUSIONS

- Approximately 91 lakhs passenger trips by all modes are expected in PMA by 2026.
- Transport demand analysis established that the transport demand is beyond the capacity of road based mass transport system.
- Public transport facility for 35lakh passenger trips/day by the year 2026 is to be provided which emphasizes a need for a rail -based mass transport system supplemented by feeder bus.
- The most desirable MRTS network comprising 6 lanes (91.278 km) radiates from the Agriculture College at Shivaji nagar. This system will be most effective to carry 23 lakh passengers daily by year 2026. Phase I of the above network with a corridor length of 22.646 km comprising Lines (1) and (2) is to be commissioned by the years 2002 and 2006 respectively.
- The system will carry 9.4lakh passengers daily by the year 2026 on phase I-stand alone basis. Phase-II and Phase III of the network with corridor length of 68.632 km comprising Line (3) ,Line (4),Line (5) and Line(6) are proposed to commissioned by the year 2026 and will carry the balance 13.6lakh passengers daily by the year 2026. The Proposed alignments are shown in **Appendix 5.1(Figure a)**.

- About 132.18 hectares of land is required for Phase I, which includes 20.96 hectares of land already acquired for earlier proposed MRTS alignment.
- For the remaining phases 95.865 Ha of land shall be required, most of which is agriculture. The total power requirement for Phase I shall be 15.64 MVA for year 2002, traction power demand for Phase I, II and III will be 39.75 MVA for year 2026. Maharashtra State Electricity Board (MSEB) has agreed in principle to supply power to meet this demand.
- Rolling stock recommended for this system is of modern design, energy efficient electrically operated and single or double articulated vehicles. These vehicles are not being manufactured in India at present and will have to be imported.
- The technical feasibility of the full system has been examined in detail and is technically feasible.
- The full system is estimated to cost Rs.4326.10 crores at 1998 level of prices. The operations and maintenance cost of full system will be Rs141.15 crores for the year 2026.
- The fares to be charged depend on the fares of competing modes of transport. It is proposed to charge Rs5 for an average trip length of 7.6km in Phase I, 6.86 km for Phase I and II and 6.92 km for Phases I, II and III. In case higher fares are charged, the ridership will fall.
- This project has very low internal rate of return. Since the IRR is much below the commercial borrowing rates, it is not attractive for private sector investment. Therefore, other remunerative projects are required to be combined so that the package as a whole is financially viable. However, operations and maintenance cost of the system can be recovered through fare box revenue. Establishment of the separate authority is necessary to execute the project and operate the system.

5.3 Comprehensive Traffic & Transportation Study, Span Consultants, 2003

The main objectives of the study shall be to match the demand and supply in terms of the existing and proposed infrastructure system control and management with optimal utilization of existing infrastructure. The study will cover the City area and suburban areas, linkages for inter and intra-vehicular movements and goods traffic.

The study will include the estimation of existing traffic situation and project proposals. Intention would be to arrive at an Action Plan which will primarily trust on low-cost and short-term solutions in addition to outlines of medium and long-term strategies for safe and efficient traffic -transportation system.

1. The long term recommended improvements include
 - To reduce the traffic congestion due to through traffic 6 links must be developed to complete the outer ring road
 - To complete the inner circumferential road network 5 links have to be developed
 - Flyovers are proposed at 9 locations for improvement of speed on arterial roads by reducing delays caused at the intersections

2. Short term improvements include
 - Widening of existing roads
 - Improving road surface
 - Central verges and medians
 - Foot-paths
 - Road Safety and Prevention of accidents
3. Various junction improvement measures in terms of geometric improvements are suggested for the 32 intersections.
4. Regulatory traffic management techniques such as use of traffic control devices, road marking and signage and no hawking zones are suggested.
5. 9 mid block locations are identified for separation of pedestrians from vehicular traffic. Out of that 6 locations are recommended to have separate pedestrian crossing and 3 locations are recommended for grade separation.
6. 22 roads are selected for providing cycle track. On existing arterial and sub-arterial roads Cycle track of 2 M width would be provided on either sides of the road. On other roads having narrow width it is recommended to mark a separate bicycle lane. Existing cycle tracks must be demarked properly
7. Parking Improvements
 - Off-Street Parking - Out of the seven plots reserved for Parking, currently only two are partly developed as multi-storey parking lots. The PMC has been able to acquire only four plots. We propose that the PMC should acquire remaining plots and construct parking facilities using space saving techniques like Auto-Parking.
 - On-street parking - In densely developed zones, to maintain a good flow of traffic, parking can be designated P1/P2.
 - 2 new parking areas have been identified.
 - No Parking zone is recommended in the surrounding areas of Pune station and on the roadside of Jawaharlal Nehru Road.
8. Various Parking Policy measures on pricing etc were made
9. Improvement of Terminals –ST buses can be restricted to outskirts of Pune by providing integrated passenger terminals at five locations along the national highways, state highways etc on arterial roads. Terminal improvement schemes are also recommended for the existing terminals.
10. To prevent the heavy goods vehicles from operating in required parts of the road network truck terminals are proposed and 5 sites have been identified for the purpose.
11. The Octroi nakas in Pune are located in congested areas of the city. So it is recommended to relocate them to the ones with proper parking spaces provided. There is also a need to integrate these octroi nakas with the truck terminal facilities.
12. Various proposals restructure PMT services and operations are made
13. Keeping into account the existing public transport system & issues thereof following policy guidelines & measures were proposed, these include: Fleet augmentation, Headways, Bus stops location, HCBS etc. The proposals are shown in **Appendix 5.1(Figure b)**.

5.4 Detailed Project Report - Sky bus, Konkan Railway Corporation LTD, July 2004

A preliminary proposal for implementing Sky Bus Metro in Pune was submitted by Konkan Railway Corporation Limited (KRCL), KRCL to Pune Municipal Corporation (PMC), Pune. A Detailed Project Report (DPR) highlighting the techno-economic feasibility of the Sky Bus Metro system for implementing the same in Pune in the most technically suitable and financial viable Corridors was prepared and submitted. The Traffic forecasts by RITES were retained in the study.

CONCLUSION

- Various alternative systems proposed earlier by various agencies have been studied and it is concluded that the Sky Bus Metro System is the ideal system to provide relief for traffic congestion in Pune City.
- Two alignments were proposed.
 - System "A": Aundh Toll to Varje Toll viz. Pune University – Raj Bhavan – Ashram – Agricultural College – Chaphekar Chowk - Shivajinagar – Gymkhana – Garware College – Rajguru Chowk – Karve Chowk – Kothrud – Kal Bhairav Temple – Varje Toll Naka. The approximate length of Sky Bus Metro System A is 14.00 Kms.
 - System "B" Pune Railway Station (along Sanjay Gandhi Road and Wellesley road – Shivaji Road – Pune Municipal Corporation – Baji rao road – Tilak Road – Swargate – along Shivaji Road up to Shivaji Bridge). The total length of the System B is 7.24 Kms.
- The service hours will be from 5hrs to 22 hrs on all days. The total passenger trips have been assessed at 2.14 lakhs for System A and 1.1 lakhs for system B. Annual earnings in the year 2009 and from other sources are assessed at Rs.115.54 Crores.
- The annual operations and maintenance expenditure for the year 2009 have been assessed at Rs.46.32 Crores.
- The risk involved in investment in the project is low and can be mitigated as analysed by ICRA in chapter 10 of Detailed Project Report.
- For the implementation of Sky Bus Metro, a suitable legislation will have to be made under Ministry of Transport, Government of Maharashtra.

RECOMMENDATIONS

- It is recommended that Government of Maharashtra should initiate action to take up the project of Sky Bus Metro Mass Transit System for Pune City as per the proposed alignment on Build Own and Operate and Transfer (BOOT) basis, being financially remunerative.
- Sky Bus Metro System "A" from Aundh Toll to Varje Toll for the length of 14.00 Kms be taken first and completed within period of two years and commence for operation from the year 2009, followed by taking up of Sky Bus Metro System "B" from Pune Railway Station to Swargate (Laxmi Narayan) Station.

- Sky Bus Metro System “A” maintenance facilities have been recommended at Varje. The Proposed alignments are shown in **Appendix 5.1(Figure c)**.

5.5 Comprehensive Study of Integrated Traffic Dispersal System for PCMC & PMC, CES, July 2004.

The overall objective of the techno-economic feasibility study is to prepare Master Plan for road network improvement and road linkages to rail stations in the study area.

Various road network improvements proposed in PCMC and PMC areas. A combination of widening of the existing roads, elevated roads, missing links etc. has been proposed. Some of the identified road network improvements are required to be implemented immediately where as others are required at a later stage.

Road Improvement Works were proposed at

- Mundhwa Kharadi road
- Katraj Kondhawa Hadapser Saswad Road in PMC Limits
- Katraj Kondhawa Hadapser Saswad Road in PWD
- Hadapser Saswad Loni Kalbhor Road
- Tingarenagar to Longaon Road
- Wakad Aundh Road Widening
- Baner Road Widening

ROBs were proposed at

- ROB at Phursungi
- ROB at Mundhwa
- ROB at Theur, ROB at Truck Terminal Road at Kiwale
- ROB at Khadki Railway station
- ROB at Ghorpadi
- ROB at Udaybag Kawade Road
- ROB at Sasanenagar
- ROB at Manjari
- Widening of ROB at Wadia College

River Bridges were proposed at

- Bridge on Mula River at Sangamwadi
- Bridge on Pawna River near Ravet

Flyovers were proposed at

- Flyover at Hadapsar Saswad Phata
- Flyover at Swargate
- Flyover at Hotel Seven Loves Square
- Pune Flyover at Balgandharva chowk
- Flyover at University + Senapati Bapat Road
- Flyover at Null Stop Junction
- Flyover at Alka Talkies
- Flyover at Sinhgad Road near Panmala
- Flyover at Mundhwa
- Flyover at Sancheti Hospital
- Flyover at Simla Office Junction
- Flyover at Rahul Talkies Junction
- Flyover at Vetar chowk on Senapati Bapat Road
- Flyover at Market Yard Junction Flyover at Nehru Road Junction.

The proposals are shown in **Appendix 5.1(Figure d)**.

5.6 Common Wealth Youth Games Report

The cultural capital of Maharashtra, Pune is the host city for the III Commonwealth Youth Games. Keeping in mind the participation from seventy one countries, Pune Municipal Corporation have identified projects costing up to 477 crores to develop the city on par with standards set worldwide. Important among these are:

- Bus rapid transit System (BRTS), which will segregate traffic by designing a special buses-only corridor on selected roads.
- Road improvements for connectivity. Connectivity to the areas where these games are going to take place is a major issue of concern.
- Tunnels to avoid the congestion on the roads leading from various parts of the city to the Balewadi stadium and Flyovers as a part of long-term strategy for improvement of speed on arterial roads by reducing delays caused at the intersections.
- Pedestrianization / Non-motorized transport schemes for improving and retrofitting of existing facilities for pedestrian use by introducing cycle tracks, footpaths and pedestrian subways
- Terminals Facilities designed more precisely to improve the efforts to segregate traffic according to mode (pedestrian/ IPT/ Private Vehicles/ public transport etc).
- Junction development by the inclusion of Area traffic control system and the civil works. Area traffic control system will be provided both at junctions and mid-block pedestrian crossings. Civil works will include provision of footpaths at junctions, fixing of railings, provision of channelizers etc.

- Heritage sites improvement by developing the tourists places and improving the excursion facilities
- Sewerage and Drainage improvement will include the cleaning of roads, corridors and maintaining the ambience of the city.

The proposals are shown in **Appendix 5.1(Figure e)**.

5.7 DPR on Tramways, Consult Team Bremen, 2007

PMC & PCMC under the city sistership cooperation with Bremen prepared a detailed project report (DPR) for the tramways. The consultancy firm Consult Team Bremen (CTB) prepared the study report and recently submitted to the civic bodies. The following are the observations and conclusions from the report:

- The tram system is recommended not based on the Ridership but from cost and energy considerations.
- No right of way acquisition is assumed in the report as all the constructions would happen within the ROW. Land acquisition for depots and other electrical facilities are however assumed.
- The Tramway Network is proposed to be developed in two Phases, Phase-I and Phase-II with a total of 92KM of network. Proposed Tram network is shown in **Table 5.1**. The network is also shown in **Appendix 5.1(Figure f)**.
- The report does not estimate candidate Ridership based on the planning data and demand. Assuming 2 minute tram frequency on important routes and 5 minutes on other routes the Ridership is estimated to be 2,98,500 trips per day for all the alignments.
- The capital cost is estimated to be approximately Rs. 4,440 crores. Unit cost per km works out to be approximately Rs 48 crores per km.
- Capital subsidy is considered at 30% of basic capital cost

Table 5.1: Proposed Tram Network

No.	Route/ Line No.	Type	Description	Length (Km.)
1	1	At Grade	Nigdi (Bhakti Shakti chowk) to Government Poultry Farm at Wakdewadi	15.8
2	1	Under ground	Government Poultry Farm at Wakdewadi to Naraveer Tanajiwadi junction Shivajinagar to Shimla Office to Court	2.025
3	1	At Grade	Court to Kumbharves to Juna Bazar	1.148
4	1	Underground	Juna Bazar to Pune Railway Station to MG Road	3.86
5	1	At Grade	MG Road to Cantonment Water Works to Race Course to Hadapser	6.64
6	1	A	At Grade Government Poultry Farm Wakdewadi to Patil Estate River Bridge to Kharadi along the River.	9.804
7	2	At Grade	From Nashik Highway Junction to Tata Motors along HCMTR corridor	5.582
8	2	A	At Grade Branch out from route-2 on Telco road to Bhosari, further along NH50 towards CIRT joining Route-2 opposite CIRT	5.428
9	3	At Grade	Cantonment Water Works to Swargate to Saras Baug	3.35
10	4	At Grade	Kumbharves to Surya Hospital	0.25

No.	Route/ Line No.	Type	Description	Length (Km.)
11	4	Under ground	Surya Hospital to Mahatma Phule Market to Laxmi narayan Cinema	2.82
12	4	At Grade	Laxmi narayan Cinema to Katraj	5.39
13	5	At Grade/Elevated	From Pune Municipal Corp. building to Warje	7.98
14	6	Under ground	Shimla Office to University Junction up to Rajbhavan	3.583
15	6	At Grade	Rajbhavan to Aundh to Jagtap Dairy to Hinjewadi	12.78
16	6	A	Nashik Phata to Rahatni joining Route-6 at Jagtap Dairy	4.643
			Total Length at Grade	78.795
			Total Length Underground	12.288
			Total Length	91.083

5.8 Master Plan for Bus Rapid Transit System, CIRT, March 2008

Master plan for Bus Rapid Transit System integrated with bicycle network was prepared by CIRT. In that master plan about 21 corridors are proposed for implementations. Riverside roads and BRT on this are also proposed.

- To make it integrated with other land uses and with other modes of transportation; the bicycle plan was proposed.
- The cycle network phasing was assessed based on estimated benefits, philosophy and network level proposal was carried out. A detailed design criterion was done and the network level, facility level and traffic calming measures were done.
- Costing and phasing of project includes the estimation of costs, cost estimate criteria, estimated project cost, catchments area of BRT system and efficient use of road space.

The proposals are shown in **Appendix 5.1(Figure g)**.

5.9 DPR for Metro Rail in Pune Metropolitan Area, DMRC, February 2008

The objective of the study was to provide Detailed Project Report for Metro Rail System in Pune Metropolitan Area for a length of 30 km.

Scope of Work

The study included the following tasks:

- Update Travel Demand Model
- Identify Landuse Development in Horizon Years
- Identify Phase I network (approximately 30 km)
- Detailed ridership on priority network

- Detailed plans, system selection, Depot location
- Social & Environmental Study
- Cost Estimates

The traffic study was done by IIT-Mumbai and contained a travel demand forecast model. The study recommended a high capacity rapid transit system on a few selected alignments. The following alignments were finalized for the Metro:

- Line 1: Agricultural College to Nigdi via Pune Mumbai Rd elevated of 16 km length
- Line 2: Agricultural College to warje Via JM and Karve Rd elevated of 8.7 km length
- Line 3: Agricultural College to Swargate and Katraj via Shivaji Rd elevated of 7 km and underground of 5 km length
- Line 4: Agricultural College to Vagholi via Bund Garden Rd elevated of 16 km length
- Line 5: Agricultural College to Hinjewadi via Aundh elevated of 17.5 km length
- Line 6: Agricultural College to Hadapsar via Mhatre Bridge elevated of 16 km length

5.10 Bus-based Rapid Transport System, PCMC, March 2008

The objective of the study was to develop a comprehensive mobility plan for Pimpri Chinchward including a feasibility report for developing BRTS master plan for the Pimpri Chinchward city.

The study included the following tasks:

- Traffic surveys to capture the present traffic scenario
- Development of a transportation forecast model
- Land use study to study existing land use patterns and recommend transit oriented pattern
- Feasibility of BRTS

The study considered the following parameters for identifying BRTS corridors:

- Estimated traffic load along the corridor
- Estimated revenues that can be generated along the corridor by using land as resource
- Availability of land for implementation of the project and
- Alignment of roads being considered by PCMC for improvement through its Annuity road projects coinciding with BRT corridors

Seven trunk routes are proposed for BRTS: Aundh Ravet, NH4, Telco Road, Dehu-Alandi, NH50, KSB Chowk to Kalewadi, MDR 31 to Auto Cluster. Two of the BRTS corridors, NH4 & NH50 are planned as mixed use corridors without dedicated bus lanes. About 55km of the feeder routes have been planned as part of the master plan. Bi-cycle network was also planned as part of the CMP.

The study also concluded the following:

- BRT system should be implemented as part of a comprehensive transportation network which includes a good feeder network and pedestrian friendly services.
- Based on the land use study, it has been observed that by using the concept of Transit Oriented land- use structure and developing transport infrastructure, land along BRT corridors can be used as a resource by PCMC. In the long term large amounts of revenues can be generated from the land along proposed BRT corridors.
- It was observed that except for NH 50, the existing ROW of all other BRT corridors are under the possession of PCMC. NH 50 is currently with the National Highways Authority, but is expected to be handed over to PCMC. Dehu Alandi road and Kalewadi to KSB Chowk are at present 30 m ROW. They are proposed to be widened to 45 m in this span.
- PCMC has proposed improvement along Aundh Ravet, Dehu Alandi and Kalewadi phata to KSB Chowk corridors.
- The transportation systems in both the cities of Pimpri-Chinchwad and Pune are being managed by a single organization (PMPML), it is recommended that the rolling stock that would be procured shall conform to the requirements of both the cities. This is an important factor too to be considered especially for the corridors which connect the two cities, namely Aundh-Ravet and the NH4.