

**Comments on the Detailed Project Report (DPR) for
Pune Sky Bus Metro (SBM)
Konkan Railway Corporation Ltd (KRCL)**
[Technical inputs by Dr. M. V. Bagade, Former Senior Faculty CIRT]

Introduction

1. The PMC signed a MOU with KRCL for preparation of a DPR highlighting the techno economic feasibility of the system in any one of the corridors most suitable, technically and financially, at a cost of Rs. 50 lakhs. The DPR does not include a copy of the MOU. KRCL has also not elaborated on the terms of reference for the DPR. The PMC and other agencies provided most of the secondary data for the preparation of the DPR (Executive Summary, 0.3.1 and 0.3.2). KRCL took up a preliminary survey to ensure data sufficiency through M/s ICRA. KRCL has done the engineering studies and topographic surveys through M/s Infrastructure Development and Design Consultancy, Mumbai. M/s Telos Consultancy Services, Mumbai has done the environmental studies.
2. The DPR is not comprehensive in that it lacks details of surveys (especially hourly traffic count), spacing of columns across rivers, design of columns on single line route on System B; assumptions for gravity model; methodology; reasons for compounded annual rate of growth of 7 % for the population; source, rate and continuity of power supply; safety certification authority, etc. It appears that the data is inadequate and outdated because the DPR does not mention the vintage of the data.
3. The estimates of revenue and costs in the DPR create reasonable doubts in the minds of experts that the KRCL has **over-estimated** travel demand to show additional revenue and **under-estimated** costs in an ad-hoc manner to prove the project financially. It appears that KRCL is taking advantage of the chaos in traffic and transportation planning and implementation in Pune City to sell the SBM.
4. The KRCL gives the impression of using material from other similar reports because there is a mention of Kerala and Kochi in at least two places in the DPR only in Volume I. Coupled with the use of large-scale secondary data, KRCL looks like taking the cash-strapped Pune Municipal Corporation for a (sky) ride and that too at the cost of the helpless citizens of Pune by charging an exorbitant price of Rs. 50 lakhs for the DPR.
5. The DPR deserves the label of a preliminary report, especially because the KRC has not yet proved the sky bus metro technically.

Technical Feasibility

6. KRCL has all along assured the public that the SBM technology is tested and viable. However, the recent accident at Goa during trials is a major setback and shows that KRCL has not yet proved the sky bus metro as technically proven.
7. One of the major factors shown in the DPR that makes the SBM viable is the reduction in travel time of 10 to 15 minutes, which the SBM enables due to high speeds. There are curvatures in the alignments of both Systems A and B. On these curves, it would be essential to reduce the speed and pick it up in quick time. According to press reports, the auto correcting system did not work in the running of high-speed SBM and the brakes of the train were incapable of sustaining high speeds during trials at Goa on 25 September 2004. It is also clear that the compartments could not stand the impact of the collision with the columns.

8. Paragraph 0.11.7.1 of the DPR on page 0-14 states under the heading "Technical Feasibility of Sky Bus Metro" that Dr. Abdul Kalam, President of India as the former Principal Advisor to the Prime Minister of India has stated that Sky Bus Metro proposal is "**Technically sound**". We draw attention to Annexure 4.1 of the DPR (Volume I) which reproduces note No PmSA/ADV/Misc/2001 dated 22 June 2001 from the office of the Principal Scientific Adviser to Govt. of India. While the note says that the SBM proposal is technically sound, it lays down a pre-condition that SBM project should be taken up on a mission mode once the experimental system of 10 km is completed. Apart from the existence of only 1.6 km of trial track, we believe that many of the following suggestions of the Principal Scientific Adviser to the Govt. of India are yet not implemented:

- a. Failure modes have to be visualised and simulated.
- b. There should be no technical design flaws in the operation, and reliability at par or better than the existing Metro Transport system should be ensured.
- c. Apart from reliability aspect, there should be an experimental system established for a limited distance of **minimum 10 km** in order to evaluate the system towards establishing the comparative performance with the existing system.

9. We strongly recommend that the PMC should ensure that KRCL fulfils the above conditions before even considering its feasibility for Pune. In fact, we are surprised at the haste in which the PMC has paid Rs. 50 lakhs to KRCL to prepare a DPR when the KRCL has not even proved the technology and the budgetary provision was for Rs. 25 lakhs.

Capital Costs and Systems (reference: Paragraphs 0.13 and 0.9.7)

10. The capital cost of System A of 14 km is Rs. 742.47 Crores or Rs. 53.03 crores/km. The alignment is Aundh Toll Naka – Varje Toll Naka viz. Pune University-Raj Bhawan-Ashram-Agriculture College-Chaphekar Chowk-Shivaji Nagar-Gymkhana-Garware College-Rajguru Chowk-Karve Chowk-Kothrud-Kal Bhairav Temple-Varje Toll Naka.
11. The capital cost of System B of 7.24 km is Rs. 471.92 Crores or Rs. 65.18 crores/km. The alignment is Pune Railway Station-Sanjay Gandhi Road-Wellesley Road-Shivaji Road-PMC-Bajirao Road-Tilak Road-Swar Gate-along Shivaji Road up to Shivaji Bridge.

Design Considerations

12. We have not gone through the designs and drawings in detail. Our preliminary remarks are given below:
 - a. There is no mention of the projected one-way flyover at Paud Phata in the DPR, which is likely to affect the alignment of System A. The drawings do not show the cross-section of the SBM at Paud Phata.
 - b. There are many gaps in System B. Details of spacing of columns across Mutha River are missing, so are curvature details at approaches to the River. We are not aware whether calculations for the most economic span are available with KRCL. System B is a single line route and hence its design features are different from that of System A. These critical inputs affect the costs adversely and require urgent attention of KRCL.
 - c. Many of the drawings do not show the locations of columns all through.
 - d. The DPR does not elaborate in detail as to how a frequency of one minute is attainable, especially on System B.

Inadequate and Outdated Data

13. The DPR does not show the vintage of the data acquired by RITES. Span had taken a sample size of 0.5 % only for household survey, which is not adequate and fully representative, especially because the population size was of the year 2000. The norm for traffic surveys is about 2 % to obtain realistic results. KRCL has also not given the details of the hourly traffic counts (refers to page 5-2, paragraph 5.2.5) on the routes/alignments that it would cover in Systems A and B. In fact, we expect KRCL should make available the entire details of the data in paragraph 5.2.5). It is thus impractical to conclude that the assumptions of KRCL are viable. KRCL may have depended on outdated and insufficient data, and inadequate sample size for an investment of about Rs. 1214.39 Crores.

Assessment of Travel Demand

14. Reference: Table 0.4, paragraph 0.8.2, page 0-8 of the DPR:

Item	Percentage	Passenger trips/day
Walk	31	11.36 lakhs
2-wheeler	28	10.26 lakhs *
Cycle	13	4.76 lakhs
Bus	13	4.76 lakhs *
Auto	7	2.56 lakhs *
Cars	6	2.20 lakhs *
Mini-bus	2	0.70 lakhs *
Rail	0.2	0.07 lakhs
Total	100.02	36.67 lakhs

Mode-wise Distribution of Trips – Table 1

15. Table 1 above based on Table 0.4, paragraph 0.8.2, page 0-8 of the DPR shows that the Pune Municipal Transport (PMT) carries about 4.76 lakhs passenger trips per day. After the withdrawal of 6-seaters and increase in the number of PMT buses, the figure for PMT is in the range of 6 lakhs but on 171 routes. Such anomalies are bound to prevail in the absence of authentic and updated statistics.

16. The major lacuna in the DPR pertains to the assessment of traffic demand on which the feasibility of the entire project depends. KRCL accepts that the main source of revenue for the project is fare collection and that the assessment of the revenue potential essentially depends on the accuracy of traffic projections (paragraph 5.2.1, page 5-1). Thus, the weakest link of the DPR is the assessment of travel demand on Systems A and B. KRCL has used secondary data to calculate travel demand and the method used is not germane to the desired results. KRCL should use a method that would provide a sound basis for estimating travel demand in terms of passengers and passenger-km. The most direct and appropriate method is to conduct a traffic survey of 2-wheelers, cars, autos and bus users in all sections and at junctions along the alignment for the two systems. KRCL should take assistance from the traffic police and the regional transport office. The sample size should be 20 % (that is surveying every fifth vehicle) to ensure reliability. The survey should be on two consecutive days plus on one randomly chosen day (other than a holiday) to confirm the developing traffic pattern. KRCL should stop vehicles and enquire the details of :

- Origin, destination and purpose of the journey,
- The routes they intend to follow,
- Occupation of the users, and frequency of travel on the route:

17. Chapter 5 of the DPR deals with "Update of Traffic Forecast by ICRA Advisory Services". The DPR states in paragraph 5.1.2, "M/s ICRA have undertaken a detailed Traffic study to assess the potential traffic for the system in Pune". ICRA has assessed the modal shift to and from the newly introduced system on to the existing network and traffic that may accrue at major interchange points due to introduction of the new facility of SBM (paragraph 5.2.1 of the DPR). According to paragraph 0.3.2 of the DPR, KRCL has depended on PMC and other agencies for secondary data. KRCL has carried out a preliminary survey only "to ensure data sufficiency to assess traffic potential through M/s ICRA". ICRA in turn has carried out traffic forecasting with the secondary data of RITES and SPAN. The DPR does not state the period during which ICRA or KRCL carried out the surveys, the locations and the methods employed. KRCL needs to explain unambiguously the methodology adopted and its *raison d'être* for selecting the alignments on Systems A and B. Paragraph 5.13.7 gives the potential corridors and paragraph 5.14.1 gives the final selection of two networks after discussions with PMC, PMT and KRCL. However, details of discussions are nowhere in the DPR.

18. Significantly, paragraph 0.20.1 on page 0.20 states, "In order to validate and also to supplement the RITES traffic survey data along the proposed route, a detailed traffic study was undertaken to assess the potential traffic for the system in *Kochi*" (emphasis supplied). This gives rise to doubts regarding the extent of 'detailed traffic study' that the ICRA actually did in Pune, especially because KRCL has carried out only a 'preliminary survey' as stated earlier. The DPR states on page 5-30 (Tables 5.21 and 5.22) that KRCL has estimated traffic diversion due to travel time and cost for both Systems A and B on "observation by secondary information provided by ICRA". For an investment exceeding Rs. 1200 crores, the PMC should not accept conclusions derived from secondary data.

19. KRCL has concluded that traffic diversions in PMA would be 2.79 lakhs trips per day for System A and 1.41 lakhs per day for System B by assuming a reduction of travel time by 15 minutes. The total for the two Systems thus comes to 4.20 lakh trips per day. This figure for not more than nine PMT bus routes is 70 % of the total passenger trips for PMT on 171 routes as of now. Hence, it does not appear feasible. Further, KRCL has worked out trips by zones and not by routes on which the PMT presently runs its buses and assumed that there would be traffic diversion from the 'catchments' area of the SBM systems (reference paragraph 5.15 on page 5-28). It appears that KRCL has based this assumption primarily on the premise of a reduction of 10 to 15 minutes in travel time. Please also refer to Table 5.16 – Median Travel Time vs. Number of Trips on page 5.27 and paragraph 5.15.2 on page 5-29 in this regard. It is relevant that over the years, the PMT has demarcated its routes after various in-depth studies and practical experience. Hence, to work out such excessive figures for SBM systems on Zonal basis on the principle of 'diversion' appears impractical. Paragraph 0.20.7 on page 0-21 further states that these figures pertain to PMA (Pune Metropolitan Area), which includes both PMT and PCMT operational areas. The traffic demand all along mentions the area of PMT and hence, this inconsistency requires elucidation.

20. We, therefore, doubt the very basis of calculating travel demand. The average travel length (ATL) is 6.9 km (Tables 0.6 and 0.9, pages 0-9 and 0-10) with an average travel time (ATT) of 39 minutes. ATL includes the time that a citizen takes from the time that he departs from the origin either by walk, personal transport or by intermediate public transport (IPT), boards public transport (in this case the SBM) and reaches the destination either by walk or IPT. It is axiomatic that the citizen would not shift over to SBM unless it can take him for the major portion of the ATL of 6.9 km. In other words, the assumption of KRCL that citizens would use SBM even for shorter distances on the principle of diversion of traffic from the catchments areas due to reduction in travel time is not viable.

21. PMC may form a core group to resolve the issues brought out in the preceding paragraphs. The core group should be small (not more than 7) with representation of traffic and financial experts from NGOs, CIRT, railway engineers, PMC and KRCL.
22. Some of the assumptions made and methodology followed in the DPR (Volume I), and diagrams and figures require further discussion and elucidation from KRCL. A few examples are given below:
- The methodology of applying the Gravity model (on page 509) to Pune SBM,
 - Figures showing network assignment in PMA and blown-up PMC area (Figures 5.6 and 5/7 on pages 5-18 and 5-19),
 - Calibrated matrix – target zones (Table 5.14 on page 5-26),
 - Table 5.16 – Median Travel Time vs. Number of Trips on page 5.27 and paragraph 5.15.2 on page 5-29.
 - Reasons/logic of assuming a compounded annual rate of growth of population of 7 % (paragraph 5.16.1 on page 5-31 of DPR Volume I)

Cross check of passenger trips per day

23. We have made a rough calculation to cross check the veracity of the figures of passenger trips per day assumed in the DPR. The potential passengers for SBM can be from those who presently travel by 2-wheelers, buses, autos, cars and mini-busses. This too is on an optimistic assessment because it is unlikely that all those who travel by 2-wheelers and cars would switch over to the SBM even in the long term, especially because their routes of transportation may not conform to the alignments of Systems A and B. There is also a total lack of infrastructure for intermediate public transport, which is essential for the success of SBM. The total number of passengers which could, on this assumption, switch over to the SBM is 20.48 lakhs (please see “*” in Table 1 above). SBM Systems A and B form only 5 % of the routes presently covered by the PMT. As such, the maximum number of passengers who could switch over to the SBM is of the order of 1.02 lakhs only, that is, 25 % of the projections by KRCL. This is a rough estimate in the absence of the latest data of traffic count on the PMT routes falling in Systems A and B.

Selection of Alignment

24. Chapter 6 generally gives the background to the selection of the alignment. KRCL has based its logic on peak hour volume and capacity utilisation carried out by RITES more than four years back. We do not consider this adequate in the absence of the basis and methodology of updating the data.

Availability of Land

25. The DPR does not dwell on the availability of land for different requirements for SBM, such as, SBM stations, maintenance depots, parking for intermediate public transport and personalised vehicles, and the exclusive right of way along the route. There is a requirement to conduct a detailed ‘connectivity survey’ to assess the feasibility of establishing connectivity of the SBM with other modes of transport and intermediate public transport. Further, KRCL expects that the PMC and the government would give the land for the exclusive right of way ‘free of cost’. KRCL has not considered the cost of this land while working out the economics of the SBM project. KRCL has estimated the cost of land as Rs. 5 Crores without giving the. KRCL has not substantiated its assumption that the construction of the SBM would not displace any persons and or demolition of any buildings or structures. KRCL has not carried out detailed land survey at all. Comprehensive connectivity and land surveys should form essential ingredients of the DPR.

Power Supply

26. The DPR envisages power supply from Maharashtra State Electricity Board. This assumption does not appear to be valid in the absence of a comfort letter from MSEB. There is no commitment in the DPR that MSEB would give electricity to KRCL at reduced rates as applicable to the existing railway system. There is no mention of stand-by generation either. In the absence of these vital details, the main source of energy for the SBM is unclear. This lacuna affects the financials of the SBM project adversely.

Financing Structure

27. The financing structure visualises equity of 40 %, convertible debentures of 10 % and debt of 50 %. KRCL proposes a range of institutions such as, promoter groups, FIs, pension/super-annuation funds, government, private sector, infrastructure funds, etc as investors. The assumption of the inflation rate of 4 % per year seems already outdated. With a truncated DPR, it would be difficult to attract any investment. Further, investors look for profits in any venture. It is doubtful if the SBM would make any profits. In fact, there is likelihood of the matter landing in litigation by a PIL due to the heavy burden that it would put on the citizens and in the absence of adequate trials to ascertain its technology and safety.

28. The Indian Express, Pune of 18 September 2004 has reported that the SBM project is yet to elicit any Expression of interest (EOI) in implementing it. The centre has rejected the Sky Bus MOU signed by KRC and the Goa Government. It further says that KRC MD admitted that the Goa project between Panaji and Mapusa is yet to get the Centre's green signal. The former Urban Development Minister Bandaru Dattatreya has expressed doubts about the technical feasibility and the allocation of funds for the SBM. He said it was yet to be decided whether the funds should come from Urban Development Ministry or whether the Planning Commission should make a special provision. In the absence of such loose commitments, it is not practical to assume that the Central Government would be part of the Special Purpose Vehicle visualised for the SBM project.

29. KRCL has often stated that it has developed the technology indigenously. Without a global precedent, KRCL has based its operation & maintenance staffing plan and staffing pattern on *similar* systems globally. The DPR shows the costs for operation & maintenance, marketing, etc as percentages of either income or fixed assets without elaborating on the basis for the assumptions. KRCL has given an ad-hoc figure of Rs. 8 crores per annum for 200 employees without any validation (paragraph 9.10.3.3.1, page 9-29). Even here, there is a contradiction two pages later (page 9-30, Table 9.7) where KRCL states the expenses for salaries and wages as Rs. 9.36 Crores. Similarly, expenses related to administration/miscellaneous, marketing and repairs & maintenance are ad-hoc.

Revenue Estimates

30. KRCL has estimated Rs. 110.02 Crores as revenue from passengers (card tickets) (Table 9.6, page 9-27) for System A and Rs. 58.88 Crores for System B (Table 9.9, page 9-34), without giving its rationale for the same. We have worked out the average daily passenger load that should make the system viable. For this purpose, we have taken the figures for revenues, average trip length and cost of travel as assumed in the DPR. Our calculations show that, based on the assumptions in the DPR and taking KRCL figures, the volume of daily traffic to generate the estimated revenue is 8.61 lakhs on System A and 5.37 lakhs on System B. The maximum daily traffic volume that KRCL itself visualises is only 2.79 lakhs on System A and 1.41 on System B. Please see Table 2 below:

E-mail: scnj@vsnl.comRegn. No. Maharashtra/6199-91/Pune dated 17/12/91 - Societies Registration Act, 1860
(Regn. No.F-7352 (Pune) - Bombay Public Charitable Act, 1950) Eligible for benefit u/s 80G of IT Act, 1961)

20 January 2005

To
Dr. Nitin Kareer
Commissioner, Pune Municipal Corporation
Shivaji Nagar
Pune 411 005Subject: Sky Bus Metro (SBM) Detailed Project Report

Dear Sir,

Please refer to our letter dated 1 October 2004 forwarding you our comments on the DPR prepared by Konkan Railway Corporation (KRC) for SBM for Pune.

Please recall our conversation on 20 November 2004, during the seminar organised by PTTF. You had agreed and accordingly told the representative of KRC to have detailed technical discussions with us based on the presentation that we gave at the Seminar. Mr. Prakash Gokhale, KRC representative was to get in touch with us to schedule a meeting at Mumbai. He has not done so in spite of our e-mails to him.

Meanwhile, we learn from a report in the Maharashtra Times, Pune of date that a door of the compartment of the SBM fell off during a visit of journalists to the 1.6 km trial track at Madgaon, Goa. We also understand that there is some dispute between KRC and the Indian Railways regarding safety certification of the SBM.

We stand by our suggestion that the PMC may form a core group to resolve the issues brought out in our comments. The core group should not be more than seven with representation from traffic and financial experts from NGOs, railway engineers, PMC, CIRT and KRCL. The Core Group should start functioning only after KRCL updates its data with fresh surveys at no extra cost to the PMC, proves the technology, and obtains safety certification after adhering to the suggestions from the Principal Scientific Advisor to the Prime Minister.

Thank you,

Yours sincerely,

Maj. Gen. (Retd) S. C. N. Jatar

(Computer generated mail, signature not necessary)

Serial Number and Item	System A	System B	Remarks
1. Revenue in card tickets/year Rs. crores	110.02	58.88	KRCL assumptions
2. Revenue in card tickets/ day Rs. lakhs	30.14	16.13	KRCL assumptions
3. Fare per passenger Rs.	0.50	0.50	Paragraph 0.24.4.2
4. Daily passenger km to generate revenue	60.28	32.26	In Lakhs
5. Average Trip length km	7	6	Table 0.6
6. Average daily passengers carried Lakhs	8.61	5.37	Serial 4 divided by 5
7. KRCL's traffic potential estimate in lakhs	2.79	1.41	Paragraph 0.20.7

Volume of passenger traffic to generate required revenue – Table 2

Conclusion

31. We regret to note that the DPR does not cover many essential points and has used inadequate, outdated and secondary data. KRCL has not provided details of essential surveys such as traffic count at various time intervals and on existing PMT routes, detailed land and connectivity surveys, etc. KRCL appears to have exaggerated traffic demand to make the SBM project viable. There are many contradictions in the report, which need elucidation. The financial viability, as worked out by KRCL, is also in doubt.

32. We, therefore, strongly recommend the following:

- The PMC should make public its MOU with KRCL and the terms of reference for the preparation of the DPR for which it has charged Rs. 50 lakhs to the PMC, when the budget provision for it was only Rs. 25 lakhs.
- KRCL should use primary data that is adequate and updated for its. The DPR should clearly set out the method of conducting surveys and the period of the surveys.
- KRCL should justify clearly its selection for the alignments for Systems A and B.
- KRCL should carry out detailed land survey and a comprehensive connectivity survey.
- Expenses for salaries/wages, O&M, marketing, etc should have detailed justification.
- KRCL should remove the lacunae brought out in paragraph 24 and Table 2 above in working out the revenues.
- KRCL should firm up the primary power requirement for the SBM project.
- The PMC should consider the project only after KRCL proves the sky bus technology.

33. We suggest that the PMC may form a core group to resolve the issues brought out in the preceding paragraphs. The core group should not be more than seven with representation from traffic and financial experts from NGOs, railway engineers, PMC, CIRT and KRCL. The Core Group should start functioning only after KRCL updates its data with fresh surveys at no extra cost to the PMC and proves the technology after adhering to the suggestions from the Principal Scientific Advisor to the Prime Minister.

Pune

Pune Traffic & Transportation Forum

Dated 1 October 2004