

DELHI METRO RAIL

A NEW MODE OF “PUBLIC” TRANSPORT ?



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Introduction

All cities in India are changing. As the Indian economy is integrated into the global one through a series of “reforms”, the dreams of city planners also begin to change. Thus, metropolitan centers like Delhi and Mumbai are often compared to “world class” ones like Paris and London, Singapore and Shanghai. There is a political perception of “law and order”, of “disciplined citizens”, and of “cleanliness” and “rising high”. This is accompanied by a real transformation from being hubs of industrial manufacture to extensions of global tertiary services. In the process, industrial units are being closed down, slums are being removed, there is large investment in infrastructure, utilities are being privatised, and older systems of governance are being steadily eroded.

Much of this sense of deliberate transformation is now appearing in city plans. For instance, the new Master Plan 2021 of Delhi unabashedly admits that the city must be a welcoming place for tourism, conventions, and sport. While anticipating that the working population will increase by almost 80% in the next 20 years, it nevertheless states, “No new major economic activities will be permitted which will result in the generation of large-scale employment”. For housing the urban poor, it prioritises the significant involvement of the private sector. The ecologically fragile river bed is targeted for “development”. Social infrastructure is to be expanded through “optimization” and “intensification” of existing structures, while physical infrastructure is merely allotted targets without any analysis of where it is going to come from. There is, thus, a garbled and confused vision of a city free from the poor, providing services for the globally mobile, and somehow maintaining a pristine picture of sustainable elegance.

One of the major concerns is, of course, that of “congestion”. As the globally mobile begin to acquire more and more personal vehicles and public transport collapses by design, the roads do not quite conform to the image of the elegant city. Hence, every city administration begins to dream of a urban mass transport system that will somehow clear up the mess. The Metro is the new visible, and hugely attractive, face of the global “world class” city of Delhi. Ever since the completion of Phase I of the Metro there has been a massive media campaign to assert that it has revolutionised the public transport system. There have also been several attempts, as well as unsubstantiated claims, by transport experts to assess the viability of the Metro in the context of the stated objectives of reduction of pollution and congestion in the city. Now that Phase I is over, there is a need and possibility

to examine it within a much larger context. The present booklet tries to evaluate the overall impacts of Phase I of the Metro project within the rubric of the changing physical, social, economic, and political worlds of the city.

This booklet is broadly divided into *four* sections. The *first* section is a critical look at the ***Environment Impact Assessment (EIA)*** done by RITES in the year 1995 for Phase I. The *second* section examines the ***financial issues*** involved in the Metro project. The *third* section attempts to explore the present status of Phase I in the ***characteristics of its ridership***. Based on the issues that emerge in the first three sections, the *fourth* section discusses ***how “public” is the Metro (MRTS) as a mode of public transport.***

Section I

Environment Impact Assessment of MRTS

It should be noted in the beginning that the EIA of the Metro project has never been put in the public domain, and that it took an application under the Right to Information Act, as well as several phone calls, visits, and arguments over three months to extract the document out of a reluctant Delhi Metro Rail Corporation (DMRC). A critical examination of the document reveals many methodological flaws, which call into question the very logic of the EIA.

1.1 Modifications

An EIA is an instrument used to examine the possible environmental impacts of a proposed project and to suggest mitigation measures, if necessary. However, this project itself has been modified a number of times since it was first proposed. The first modification took place in 1995, when RITES prepared the EIA for the modified Phase I of the MRTS. Out of a total proposed project length of 198 km, the modified Phase I, which was supposed to be commissioned by 2005, covered **55.3** km, subdivided as 11 km under-ground, 22.15 km elevated, and 22.15 km at-grade, with **45** stations. This modified Phase I was divided into 8 operational sections, as given below in Table 1:

SI.No.	Section	Length (km)
1	Vishwavidyalaya - ISBT	4.5
2	ISBT - Connaught Place	4.2
3	Connaught Place - Central Secretariat	2.3
4	Shahdara - ISBT	6.4
5	ISBT - Shakur Basti	10.6
6	Shakur Basti - Nangloi	8.0
7	Subzi Mandi - Siraspur	12.8
8	Siraspur - Holambikalan	6.5
Total Length		55.3
Source: Environment Impact Assessment for Integrated Multi Modal Mass Rapid Transport System for Delhi, RITES Government of India, November 1995, p .13		

As noted above, Phase I was modified in 1995, but the present status shows that, during the period of construction, it has gone through further major re-modifications, as shown in the Table 2 below (for details see Map 1 and Map 2).

Table 2			
Present Routes of Metro, 2005			
Line	Route	Length (km)	Stations
1	Shahdara - Tri Nagar - Rithala	22.06	18
2	Vishwavidyalaya - Central Secretariat	10.84	10
3	Indraprastha - Barakhamba Road - Dwarka Sub City	32.10	31
Total		65.00	59
Source: http://www.dmrc.delhigov.in			

It should be noted that the EIA done for the modified Phase I (55.3 km and 45 stations) cannot comply with the actual status of Phase I (65.0 km and 59 stations) of the present Metro project because the present project comprises only the first four sections of the modified Phase I along with additional lines to Rithala and Dwarka. Therefore, the actual environmental impacts will differ from those predicted in the EIA report of 1995.

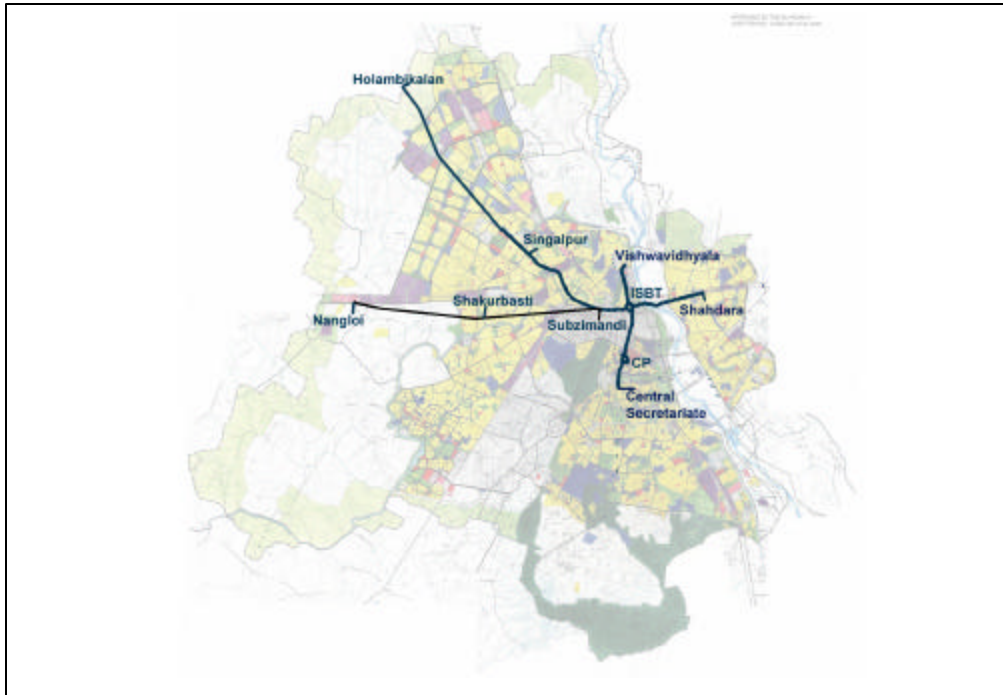
The EIA has stated that there will be “no impact” on the environment because of the following features: platforms, inlets, and outlets; ventilation and lighting; earthquakes; pedestrian issues; and visual impact. “Positive impacts” are claimed on behalf of factors like employment; economic enhancement; mobility; safety; congestion reduction; less fuel consumption; less air pollution; reduction in buses; and reduction in infrastructure. We shall now examine how far these claims are borne out by the analysis in the EIA and by future developments.

1.2 Project description

There are several flaws in the description of the project in the EIA.

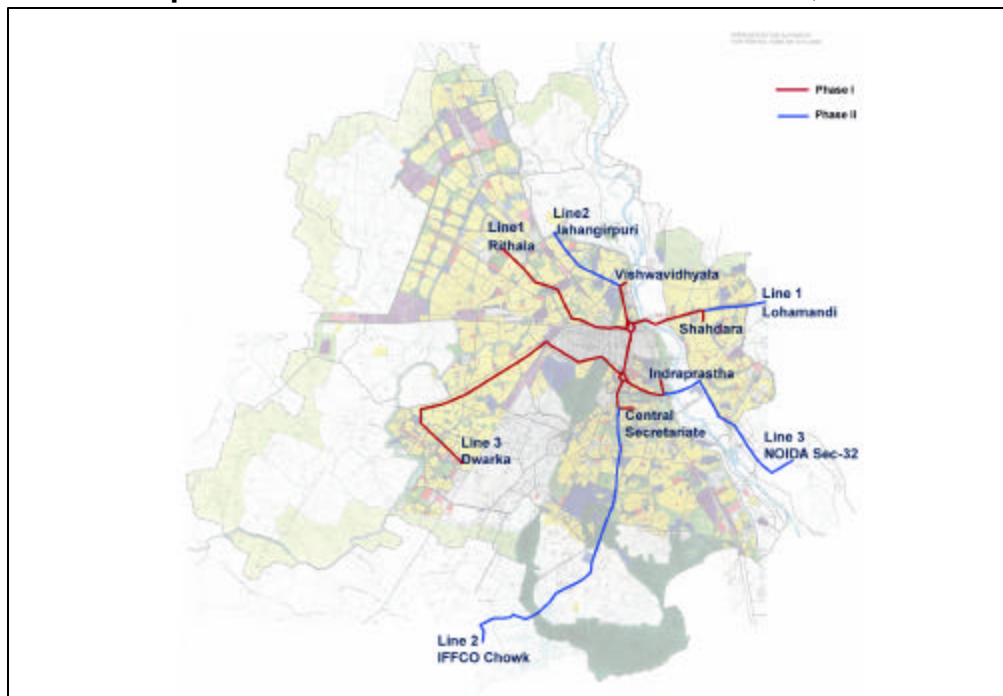
- The Project Description chapter does not mention anything about the impacts of land requirement, land acquisition, power and water requirements, and other details of the design and infrastructure, although more than half the land is to be devoted to infrastructure, such as stations and depots.

Map 1: Proposed Modified Phase I of MRTS, 1995



Source: Hazards Centre, 2005

Map 2: Actual Routes of Metro Phase I & Phase II, 2005



Source: Hazards Centre, 2005

- There is no “no project” scenario, or even an alternative proposal to the Metro, which should be an indispensable part of an EIA study.
- No detailed maps or diagrams were provided with the EIA, which are essential to explain the impact of the project with relation to the geography and land use/land cover of the project area.
- The Project Description contains no description of the construction phase activities as well as construction materials to be used and their impacts.

These omissions strengthen the perception that the EIA was not performed seriously but carried out merely to get the environmental clearance for the proposed route.

1.3 Impact on ground water

Since about 1/6th of the route is underground, it is expected that the EIA would assess the impact of construction of tunnels on ground water regimes. However, while the document acknowledges the problem it tends to bypass it on technical grounds

- Thus the EIA observes, *“The water table in Delhi generally varies from 3-7m which rises after the rains to about 2m in low lying areas. Problems of water flow associated with tunnelling are bound to take place.”* But then it does not specify what these problems are. Instead, it resorts to subterfuge, *“In cut and cover type construction continuous pumping is an economic alternative.”* Hence, the issue is not one of the impacts of the project on ground water, but the other way round!
- It is also not acknowledged that extensive pumping of water will actually create depletion of the ground water table in and around the area. Additionally, the ground water recharge will be reduced, as the construction of large concrete structures will prevent the percolation of water.
- In Delhi, it has been observed for the last several years that as the water table falls, the contamination of ground water also increases. Extensive pumping out of depleting ground water will further deteriorate the quality of water, especially in terms of increase in nitrates and fluorides.

1.4 Impact on land use and ecology

The EIA agrees that the change in land use and ecology will have some negative impact - which is not specified - but the EIA was carried out for a particular route, while DMRC has constructed the MRTS on a separate, and longer alignment. Such construction would significantly alter the land use pattern converting agricultural, residential, and recreational areas into built-up areas. This would significantly impede the natural drainage pattern of the city. While the EIA does not give any drainage details, it is also obvious that the actual adverse impacts will differ from the impacts as assessed in the EIA. In addition, there are already reports of impacts on utility lines, particularly sewerage, and of vibration on nearby buildings, which have not been considered at all in the EIA.

The EIA predicts, *“Keeping in view the growing demand of commuters 666 ha of land will be required by 2001 for buses and other modes of public transport.”*¹ It should be noted that the “other modes” do not include the requirements of personal vehicles. At the same time, it is also specified that the first Phase alone of the Metro would require 348.45 ha of land.² There is no comparative analysis of the impacts on, and benefits of, land use for buses as compared to the Metro – where more land is required for depots and stations (including parking for personal vehicles) than for the alignment. Hence, the projected saving of Rs 1000 crores on infrastructure appears to be quite mythical.

1.5 Predicted positive impact on air quality

The EIA report claims that the Metro would bring about a significant decrease in the emissions of Carbon Monoxide, Particulate Matter, Sulphur Dioxide, Nitrogen Oxide and Hydrocarbons. On the other hand, the data on air pollutants at ITO (data source: CPCB – see Appendix I) does show that the concentrations of sulphur dioxide and suspended particulate matter have decreased in early 2001. However, this is not correlated to the advent of the Metro, but is due to the conversion of diesel/petrol fuelled public transport to CNG. On the other hand, concentrations of particulate matter, nitrogen oxide, respirable particulate matter, and carbon monoxide have been showing an increasing trend, as compared to the predicted values (see Table 3) which, curiously enough, do not include data on the last two parameters.

Table 3						
Predicted Average Ambient Levels in 2005						
Place	Without MRTS			With MRTS		
	SPM	SO ₂	NO _x	SPM	SO ₂	NO _x
Ashok Vihar	396.0	11.0	44.5	259.0	8.4	31.3
Town Hall	830.0	102.7	70.6	643.0	51.2	61.7
Shahdara	374.0	17.3	44.1	325.0	17.3	24.6

Source: Environment Impact Assessment for Integrated Multi Modal Mass Rapid Transport System for Delhi, RITES, Government of India, November 1995, p 85

The data presented in Appendix I and II also illustrates that concentrations of air pollutants have greatly exceeded the minimum values predicted after commissioning of three lines of Phase I of the Metro. Thus, one is forced to conclude that the Metro has played no role in regulating air pollution in Delhi and the claims in the EIA are no more than unsubstantiated aspirations. Even otherwise, the EIA accepts, “*Vehicles contribute 70% of total ambient air pollution. It is estimated that about 406,000 tonnes of petrol and 843,000 tonnes of diesel is consumed every year in Delhi. In the year 2005, these consumptions would be about 630,000 and 1594,000 tonnes respectively.*”³ The following Table 4, from the EIA, clearly indicates that, of the different kinds of vehicles, it is petrol vehicles that contribute the highest to toxic pollution loads of carbon monoxide and hydrocarbons. Hence, if any public transport system is not able to reduce the number of petrol-driven personal vehicles, there is actually no merit in introducing that system.

Table 4		
Exhaust Emission Factors (kg/1000 litres)		
Pollutants	Exhaust Emission Factor	
	Petrol	Diesel
Carbon monoxide	391.0	10.2
Hydrocarbons	34.0	23.1
Oxides of Nitrogen	19.2	37.7
Oxides of Sulphur	1.5	6.8
Particulates	1.9	18.7

Source: Environment Impact Assessment for Integrated Multi Modal Mass Rapid Transport System for Delhi, RITES, Government of India, November 1995, p 36

1.6 Congestion and Vehicle and Fuel Reduction

The above evidence also calls into question the project claim, reinforced by the EIA, that congestion would be reduced along with the number of buses. No data has been cited from, for instance, the Kolkata Metro, to prove that the Metro did indeed result in the reduction of the number of buses or of fuel consumption or of congestion. In fact, as the Delhi Metro seeks to increase its ridership, it also promotes the development of bus feeder services, while also forcing the closure of bus routes along the Metro alignment. In addition, in order to increase revenue it demands the relaxation of building codes in its “influence” zone, permitting the construction of high-rises and thus further increasing the demand for civic services and congestion in its vicinity. Whether such developments will lead as claimed to greater safety and mobility – particularly for pedestrians – in the long run is, therefore, questionable.

It is also curious that the EIA mentions, “*Mass transport needs of Delhi are currently met by buses only. It has, however, not been able to meet the needs of Delhi commuters. This has resulted in growing use of personal vehicles, leading to increase in road congestion, delays, fuel wastage and environmental pollution.*”⁴ The EIA further declaims, “*DTC has achieved the highest productivity amongst city bus undertakings in the country and has carried about 5 million trips a day.*”⁵ But, based on these observations, the EIA does not consider the comparative impacts of an alternative scenario to Metro: that is, if buses were the only – and most efficient – mode of mass transport in Delhi, but were unable to meet the needs of consumers, then should the bus system have been expanded or should a completely new system be introduced? Similarly, if the growth in personal vehicles is responsible for various environmental ills, then why does the EIA not consider the alternative techniques for reducing the number of personal vehicles? Nor is there any analysis of the bland statement that MRTS would achieve this reduction.

The EIA does observe, “*Based on the carrying capacity of the bus system at least 40% of roads will not be able to cope with transport demand in the year 2005. To meet the future transport demand by buses, it is estimated that future number of buses will increase two and half times and that of personal vehicles three times.*”⁶ But this observation deliberately obscures the fact that buses comprise only 1% of the total vehicle population of Delhi. So, even if the buses were to increase two and half times, they would have little impact on road congestion, as compared to the tripling of personal vehicles that comprise 85% of the vehicles on the road. It should also be

noted that, quite contrarily, the EIA specifies that the real savings are expected in petrol-driven personal vehicles and not diesel buses: *“It is estimated that 4.6% of diesel and 27.3% of petrol is likely to be saved due to the implementation of project.”*⁷

Even the EIA acknowledges the limitations of the Metro in this respect. *“The modified first Phase is estimated to carry 3.18 million trips per day leaving 10.99 million trips to be carried by buses in the year 2005.”*⁸ Even though this estimate was arbitrarily downgraded during remodification (for a longer route) to 1.5 million passenger trips per day, the fact remains that the present status of rider ship, after the completion of the first Phase is only 0.5 million passenger trips per day (Appendix III), which means that, at present, the much-maligned (and depleted) bus system should be carrying much more than the projected trips per day. This again demonstrates the weakness of the EIA in not considering the possible impacts of reinvigorating the bus system.

1.7 Noise Pollution

The EIA acknowledges that during the operation phase, the Metro workers as well as the commuters would be exposed to high levels of noise (70-100dB). Drivers will be exposed to more than 92dB of noise and even the passengers will be exposed to 70-72dB of noise level. As the EIA report states, *“The levels are not comfortable for communication and other functional activities of commuters and can cause hearing impairment.”* Unspecified “control” measures are supposed to reduce the level to not less than 70dB. It should be remembered that the permissible levels in residential areas are much lower at 55dB by day and 45 dB by night.

1.8 Seismicity of the Area

The project falls under seismic Zone IV, as defined by the Bureau of Indian Standards, which is referred to as High Damage Risk Zone and means that earthquakes of 3 to 6.7 magnitudes on Richter scale have occurred in the past in the zone, being second in severity only to the highest Zone V. Any seismic episode may affect the stability of the underground and overhead structures of Metro. But, curiously enough, the checklist of impacts in the EIA bluntly states that there will be “no impact” from the risk of earthquake. It accepts the India Meteorological Department’s seismic factor of 0.07 (which was set in the 1930s) to be adequate for design of civil engineering structures. It is not mentioned in the EIA how this factor will be incorporated for the proposed phase and what are the geological faults and other unstable

structures in and around the project area. DMRC has also not been willing to part with its Disaster Management Plan, on the grounds that it is a “confidential” document.

1.9 Waste Generation and Disposal

The EIA treats the issue of waste generation and disposal lightly, without referring to any data generated by the operation of other existing Metro systems, such as the one at Kolkata.

- **Oil Pollution:** “*The collected oil could be either sold or incinerated to avoid any water pollution problem.*” This statement ignores the possible pollution after sale or incineration. MRTS includes workshops for maintenance of rolling stock at Khyber Pass, Shastri Park, Nangloi and Badli, of which Shastri Park is in the fragile ecological zone of the Yamuna river. The EMP suggests measures for removal of waste oil at the source, but no specific treatment, recycling, or disposal provisions have been mentioned in the EIA.
- **Excavated Soil Disposal:** According to the EIA, the first Phase would handle 5.59 million cum of excavated soil, which would be disposed in 6 different sites including 2 sites in the Ridge area, which are under reserve forest. The potential conversion of disposal sites into wastelands and pollution of the groundwater, particularly in the fractured terrain of the Ridge, have not been considered in the EIA.
- **Waste from maintenance of MRTS:** There is no treatment and disposal facility for the wastewater generated from washing of coaches. An automatic washing facility has been installed at Shastri Nagar, but the treatment of the wastewater has not been specified. Thus, there is every possibility of all the wastewater draining into the Yamuna.
- **Water and Sanitation for the Workers:** The EIA does not mention any facility for water supply, human waste disposal and drainage for the workers’ camps during construction.
- **Refuse:** The amount of refuse to be generated at railway stations is arbitrarily set at 1% of an average of 200 gm, or 2 gm per person. This does not conform with the average amount of per capita waste generated in Delhi of about 450 gm, nor is there any data offered from other railway and Metro stations to substantiate the 1% assumption.

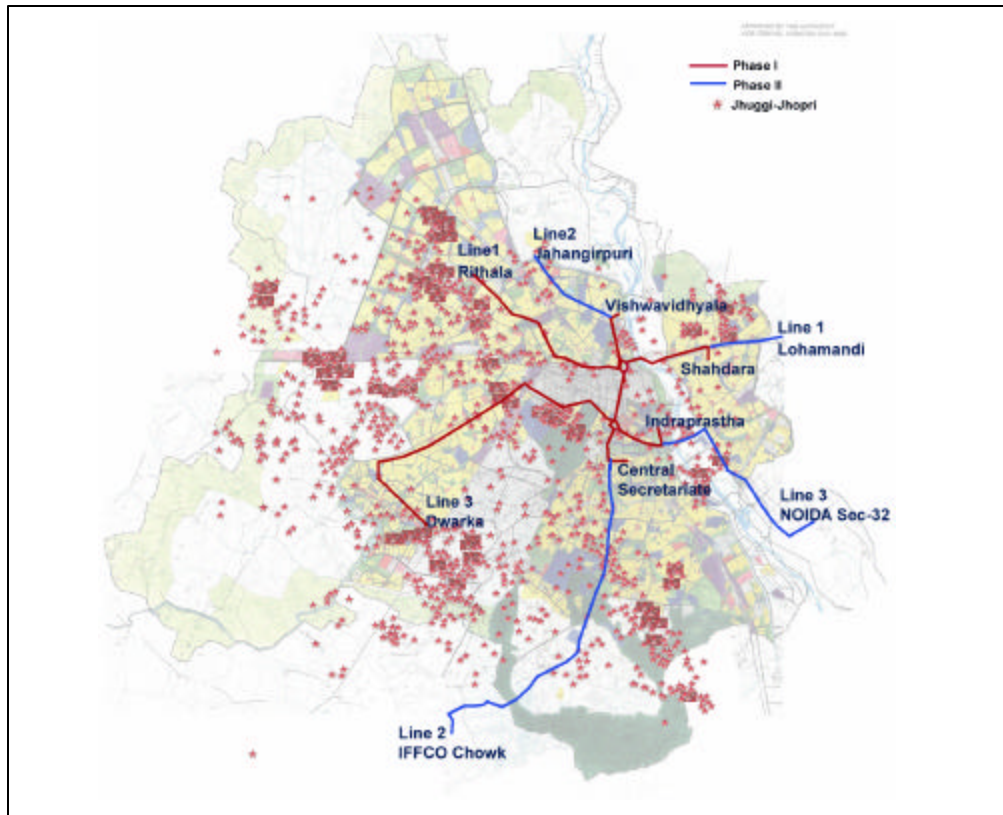
1.10 Rehabilitation and Resettlement

As per the EIA report, 2502 jhuggies were supposed to be rehabilitated due to the project.

Number of Slum Squatter Families Actually Displaced by MCD during the Construction of Phase I of Metro Rail			
Year	Name of cluster	Relocated Families	Relocation Site
1999 - 2000	Makki Sarai	271	Narela
1999 - 2000	Shahdara Railway Station	21	Narela
1999 - 2000	Shastri Park	120	Narela
1999 - 2000	Taj Colony	65	Narela
2000 - 2001	JJ Cluster Pul Bangash	71	Tikri Khurd
2000 - 2001	Seelam pur	14	Bhalaswa
2000 - 2001	JJ Cluster Thomson Road	15	Narela
2000 - 2001	JJ Cluster Amba Bagh	10	Bhalaswa
2003 - 2004	Bhai Veer Singh Marg, Gole Market	82	Holambi Kalan
Total		669	
Source: Information acquired through RTI from Municipal Corporation of Delhi, 10 January 2005			

The table above shows that till the completion of Phase I of the project only 669 families were relocated by the Municipal Corporation of Delhi (MCD), as given in data acquired from MCD through the Right to Information Act. Since the EIA report of 1995 is applicable to only some of the sections of the present Phase I of the project, and there have been ad-hoc extensions into other areas, there is a possibility that many more families would have been displaced. Map 3 shows that there were several jhuggies that were demolished during the construction of Phase I of the Metro. The EIA does not mention anything about the demolition and displacement unfolding in the process of property development along with the Metro corridors (see next section).

Map 3 : Potential Demolitions due to the construction of Phase I & Phase II of Metro



Source: Hazards Centre, 2005

Any Resettlement and Rehabilitation Plan requires a complete listing of all the affected families and their socio-economic condition. 2,502 jhuggies in unauthorised areas, 195 permanent (pucca) houses, 292 permanent shops, and 371 temporary shops houses with a total population of 10,788 people were supposed to be displaced because of acquisition of land for the project.⁹ However, for the purposes of the EIA, only an 8% sample of the affected families has been taken to determine their profile. Even this statistically insignificant sample indicates that more than 75% of the families had been living at the site for more than 7 years (that is, from before 1988), and over 92% were on the voters' list, while almost 89% held ration cards. However, in spite of this long record of settlement, the level of insecurity can be gauged from the fact that only 15% had built pucca houses, and merely 9% had their own toilets.

In spite of this perceptible level of sub-standard living, the EIA states rather glibly, "*potable drinking water is available to all families*" (although only

44% is from handpumps), “*medical facilities are available for all*” (63% from private doctors), and “*education facilities are utilized by 89.5%*” (with enrolment dropping rapidly from 56% at the primary school level to 6.1% at the college level). A more realistic estimate is that 50% of the people work as casual labourers and 86% fall in the “*low income group of less than Rs 18,000 per annum*”, of which 76% is spent on routine items such as food and clothing.¹⁰ For this unfortunate population, DMRC has set aside the princely amount of Rs 45,000 per family for construction of “*new jhuggies*”,¹¹ where “*reasonable and adequate community facilities*” will be provided. But the EIA makes no attempt to analyse what would be the impact on livelihoods and services when this population was eventually relocated.

1.11 Environmental Impact Assessment Method

Environmental Assessment in an EIA can be effectively used for inter-comparison of various alternatives. The Weighted Average Method is effective when selecting the most environment friendly project from amongst a mix of options. Since Delhi Metro Rail Corporation (DMRC) has not given any alternative to the MRTS, the application of Weighted Average for assessing impact is neither relevant nor appropriate. Also, there has to be some rationale for selecting weightages. The EIA mentions the following procedure that was adopted for assessing the impacts:¹²

- *select a group of concerned individuals for evaluation, and explain to them the weighting concept and the use of ranking and weighting,*
- *prepare a table indicating the various environmental impacts,*
- *provide this table to each individual evaluator for assigning appropriate weights and*
- *on the basis of such individual’s indications of weights, prepare a collective consolidated weighting*

Such a weighting exercise was carried out and the weight assigned to each parameter in the project is shown in Table 6. It clearly indicates that a much higher weightage has been arbitrarily given to factors like air pollution, noise pollution, fuel saving, and decongestion, while employment opportunities, mobility, health risk, and water pollution are much lower in value. This illustrates the bias in the minds of those who designed the values. This bias has to be linked to the manner in which the “concerned individuals” were selected for the exercise. If these individuals were car owners then their responses would obviously have strengthened the biases of the EIA experts, and been very different from the concerns of, say, casual labourers living in the slums affected by the project.

Table 6							
Weights Assigned to each Parameter for MRTS							
Ecology 150		Environmental Pollution 400		Human Interest 400		Others 50	
Vegetation	60	Stream Flow	10	Rehabilitation	60	Soil Erosion	10
Land Use	70	BOD	10	Monuments	30	Bank Stability	10
Fisheries	10	Air Pollution	20	Employment	70	Sepage	15
Eutrophication	10	Land Pollution	10	Fuel Saving	80	Less Infrastructure	15
		Oil Pollution	10	Mobility & Safety	20		
		Noise Pollution	100	Health Risk	10		
				Decongestion	80		
				Solid Waste	50		

Source: Environment Impact Assessment for Integrated Multi Modal Mass Rapid Transport System for Delhi, RITES, Government of India, November 1995, p 91

Thus, the method adopted in the EIA is arbitrary and subjective as it is based on the unqualified opinion of a group selected specially for the purpose. Consequently, the adopted values give great emphasis to reduction in air pollution, noise, congestion, and fuel use, while ignoring the potential impacts of earthquakes, and of the project on safety and health, without providing any reason for these choices. Also, as the real scenario displays, these weightages do not conform to actual impacts. It may, therefore, be concluded – on the basis of the evidence presented so far – that the EIA is a deeply flawed document that does not assess the impacts on the basis of realistic data, that has not considered alternatives to the Metro for comparative purposes, and whose sole purpose seems to be to obtain the necessary clearance for speedy construction of a “world class” project.

Section II

Financial Status of MRTS

2.1 Generation of Funds

DMRC is generating funds from the following different sources for Phase I of the project (Table 7):

Table 7	
Funds from different Sources for Metro	
Source of Fund	%age of Total Cost
Equity contribution from Governments of India and Delhi	15% each
OECF (Japan) Loan	56% approximately
Revenue from property development	6% approximately
Subordinate debt towards cost of land	8% approximately
The above financial plan is based on:	
(i) Debt equity ratio of 2:1	
(ii) Fare:Base rate of Rs. 5.00 (at April, 1995 prices) per passenger trip of 7.12 km.	
Source: http://www.dmrc.delhigov.in	

Excluding taxes and duties, the estimated completion cost of Phase I of Metro rail project by the year 2005 was about Rs.10,570 crores including the cost of land and rolling stock. Since there has been an expansion of the third line there would be a definite increase in the actual cost of the project. Going by the present figures, 30% of the project cost has been financed through equity contributions subscribed equally by the Central Government and the Delhi Government.

The two Governments also gave an interest-free loan to cover the cost of land acquisition, which roughly works out to 8% of the project cost. The Japanese Government has financed about 56% of the cost through a soft loan at the rate of 1.8%. This soft loan has a repayment period of 20 years with a moratorium period of 10 years. The balance 6% of the project cost is to be met by raising money through property development.¹³ Table 8 shows the places where DMRC is developing its property.

Table 8	
Property Development along Metro Rail	
Residential	
Place	Area (sq.m.)
Khyber Pass	68,000
Rithala	12,026
Vishwavidyalaya	30,000
Dwarka	30,000
Netaji Subash Nagar	12,000
Najafgarh	60,000
Commercial	
Place	Area (sq.m.)
Shahdara	7,704
Inderlok	5,630
Inderlok Annexe	3,195
Pratap Nagar	2,000
Tis Hazari	1,892
Seelampur	1,446
Seelampur	41,000
Welcome	1,097
Kashmiri Gate	2,500
Source: Times of India, Metro Matters, 7 January 2006	

DMRC is using the land along Metro lines as an opportunity to raise funds to finance the project. It is using the land to develop malls, offices and residential apartments. DMRC has also plans to sell space at stations for shops and ATMs, and for billboards and hoardings. The main stations where major development work is unfolding are Khyber Pass, Vishwavidyalaya, Seelampur, Welcome Colony, Rohini West, Subhash Nagar, Pratap Nagar, Rithala, Dwarka, Najafgarh, Khayala, Inderlok, Wazirpur, Kashmiri Gate, Kohat Enclave, and Pitampura. Recently Municipal Corporation of Delhi (MCD) has accused DMRC of misusing land. MCD argues that the land was given to DMRC for building tracks, stations and offices, but now it has been seen that DMRC is trying to earn crores of rupees by opening shopping malls and office complexes leading huge monetary losses to civic body.¹⁴ This controversy shows that property development by DMRC is actually violation of land use. It becomes quite explicit from this controversy

that in order to sustain the financial health of metro, DMRC can even take a step, which is not in accordance to law. Hence, DMRC not only violates the law but through this rampant property development it would also defeat its stated objective of decongestion and sustainability.

2.2 Annual Accounts of DMRC

The issue of generation of revenue of DMRC has been a secret for the outside world. This section attempts to predict the future financial scenario of DMRC on the basis of the reports of annual accounts of three years. Table 9 summarises the profit and loss account from 2001 to 2005, as available from DMRC and media report.

Table 9				
Profit and Loss Account of DMRC				
Particulars	Amount (Rs. Crore)			
	2001 - 02	2002 - 03	2003 - 04	2004 - 05
Income		5.9	46.6	72.2
Expenditure	67.6	5.8	32.0	52.2
Profit before depreciation & interest	1.7	0.1	14.6	20.0
Profit/(Loss)		(8.3)	(32.4)	(76.3)

Source: 1) Annual Report 2001-02, 2002-03, 2003-04, Delhi Metro Rail Corporation Ltd.
2) Metro hurtles into financial abyss, Times of India, 22 May 2006

Table 9 above shows that till the year 2004-05 DMRC was running at a significant loss, although the declared profit of almost Rs.1.7 crore before depreciation and interest in the first year (2001-02) is quite inexplicable. It is obvious that any infrastructure project during the period of construction will make losses. But based on the particulars of four years of accounts of DMRC one can try and predict the future financial trends. At present the major heads of income are from operation, property development, and consultancy. Since only one fifth of the expected ridership is commuting in Phase I of the Metro, (see Sec. 1.6) therefore the generation of revenue through operation is also one fifth of the expectation. DMRC expected to generate 6% revenue from property, but presently it is generating only 3% revenue from it. Going by the latest trends there is 135% rise in loss between the years 2003-04 and 2004-05. Since the construction of MRTS is going to be continued for another 15 years, given the present circumstances, it is going to continue to run in a state of heavy loss.

2.3 Repayment of funds

Before examining the issue of repayment of funds there is a need to understand the issue of the type of the Japanese loan. The loans given on soft interest for any public infrastructure project are normally tied loans, which leads to overcapitalisation of the project increasing the project cost by 30% to 40%. In the case of the Metro in Delhi it is quite explicit that it is a tied loan because DMRC has hired Japanese manpower in the form of consultants and engineers. The construction of Phase I of the project was contracted to six Japanese companies and most of the equipment purchased for the project is from Japan. This means that the actual loan taken from Japan is much more than what DMRC pretends to show on paper. As far as the issue of repayment of funds is concerned, every year DMRC has to generate huge revenues in order to repay various types of funds. Three major categories of repayments of funds are as follows:

Repayment of Funds per Annum	
Type	Amount (Rs. Crore)
Interest on Japan Loan	Rs 108
Repayment of Loan	Rs 300
Dividend to Government	Rs 476
Total	Rs 884

The table above shows that Metro has to generate Rs 884 crore per annum for the repayment of various funds, which means that, apart from the operational cost, revenues have to cross Rs 2.4 crore every day. Based on the figures for October 2005, around 3 lakh passengers commute daily on the three lines of the Metro. On an average every passenger buys a ticket for Rs 10 (this calculation is based on the information obtained through RTI from DMRC on the revenue generated from ridership per month, and is twice the assumed base rate [for details see Appendix III]). Going by the current figures of ridership (see next Section), generation of revenue from passengers per day would not exceed Rs 60 lakhs. Revenue generated from property development and advertisement is 3% of the annual income. Putting together both the major sources of income, it would still be difficult for DMRC even to meet its operational cost. The question that arises from the data above is how is DMRC going to repay its interest, loan, and dividend without even generating its operational cost?

Section III

Present Status of MRTS

At present all the three lines of the Metro are operational. The revised ridership of Metro after the completion of all the three lines was supposed to be 15 lakh passengers per day.¹⁵ With respect to the ridership of Metro the Managing Director of DMRC, Mr. E. Sreedharan claimed that 'the first phase will generate substantial benefits to the economy by way of siphoning off the roads 21.8 lakh commuter trips per day. This would mean 2,500 less buses on the roads'.¹⁶ Despite being a fast mode of transportation Metro is catering to the need of limited number of passengers. Put together the ridership of all the three lines at the end of 2005 is officially claimed to be only 5 lakh passengers per day.¹⁷ Even this is only one third of the revised expected ridership (the expected ridership claimed in the EIA of Phase I done in 1995 was 31.8 lakh trips per day). This appears to be primarily because of three reasons – inequitable fare, no concession scheme, and distance from Metro station. And there is no evidence that, as per the Managing Director's claims, the number of buses on the roads has reduced by 2,500 – except for those routes that have deliberately been taken off the Metro alignment to artificially increase the ridership on the Metro (see later in this section).

3.1 Inequitable fare structure

No. of Kms	Metro	DTC
1 - 2	6	2
2 - 4	8	2
4 - 6	9	5
6 - 9	11	5
9 - 12	12	7
12 - 15	13	10
15 - 18	14	10
18 - 21	15	10
21 - 24	16	10
24 - 27	17	10
27 - 30	18	10
30 - 33	19	10
33 - 36	20	10
36 - 39	21	10
Over 39	22	10

Source: i) <http://www.dtc.nic.in.dt.htm>, ii) *Times of India, New Line, New Route, 25 Dec. 2005*

The need to take buses off the Metro routes is explained by the above table that shows that there is a prominent disparity between the fares of Metro and public buses. Metro has a fare structure of minimum Rs 6 and maximum Rs 22 as compared to the public buses' minimum of Rs 2 and maximum of Rs 10. This means that the Metro cannot really attract low-income group commuters who travel short distances. It would only attract the more affluent commuters who travel for long distances. It has to be noted that there has been a significant increase in the fare of the Metro after the completion of the third line of Phase I. Earlier the maximum fare was Rs 14 and now it is Rs 22. One could hypothetically argue that the fare should increase because the network has increased. But this means that each time the network increases there will be a rise in fares. However since the Metro is projected as a mode of public transportation, the fare cannot be increased arbitrarily merely on the basis of an increase in the network. In fact, the logic should be the other way round, since a larger network would presumably mean increased ridership.

3.2 No Concession Scheme

Table 12			
Concession Scheme in DTC and Metro			
Sl. No.	Type of concessional passes in DTC	Charges (in Rs.)	Concession in Metro
1.	Student Passes		No passes for any category of commuters.
	a) Monthly Destination	13/-	
	b) All Route Passes	13/-	
	c) All Route (G.L.S.)	55/-	
	d) All Route Ordinary	150/-	
2.	a) Resettlement Colony 0 to 10 km.	50/-	Only 10% bonus travel on smart cards for all categories of commuters.
	b) Resettlement Colony Above 10 km.	100/-	
3.	General All Route Passes (G.L.S)	450/-	
4.	Police All Route Passes	400/-	
5.	Press All Route Passes	100/-	
6.	Senior Citizens (All Route G.L.S.)	50/	
7.	Free Passes		
	a) Disabled Persons		
	b) Freedom Fighters with one Attendant		
	c) Sportsman (International)		
	d) National Awardees		
	e) War Widows and their Dependents		
	f) MLAs/MPs of Delhi with Attendant		
Source: http://www.dtc.nic.in/dt.ht			

Any mode of public transportation should offer concessional fares to the vulnerable categories of commuters. Unfortunately, there is no concessional pass scheme in the Metro. All it offers in the name of concession is 10% bonus travel on Smart Cards.¹⁸ On the other hand, there are several concessional pass schemes in Delhi Transport Corporation (DTC) buses, as given in Table 12 above.

3.3 Distance from Metro station

The third factor that discourages passengers from travelling in the Metro is the distance between the Metro station and residence. A study done by TRIPP (Transport Research and Injury Prevention Program), IIT shows that majority of the passengers who travel in Metro take feeder services to reach Metro stations. This highlights the structural fact that Metro does not provide door to door service to its passengers as provided by public buses.

In order to force commuters to travel on the Metro, DMRC demanded that the DTC and STA de-route buses on the routes parallel to the Metro. In response to this 15 Metro-parallel routes of DTC and 3 Metro-parallel routes of STA have already been affected. 106 buses of STA and 58 buses of DTC have been curtailed, de-routed or cancelled. Following are the details of the routes affected due to the induction of the Metro. More bus routes are likely to be cancelled as the Metro network grows (Table 13 and 14) and so does its financial crisis.

	Route No.	No. of buses plying
Discontinued routes	247	
	132	-
	167	-
Routes curtailed upto Metro	817	13
	832	10
	405	10
	805	2
	61	1
Routes extended upto Metro	778	3
	801	4
	915	2
	927	1
	968	1
Routes diverted through Metro station	233	1
	917	1
Total	15	58
Source: Data acquired from DTC through RTI, 2006		

Table 14		
STA Buses affected due to Metro		
	Route No.	No. of buses plying
Route curtailed	832	29
	817	61
Route cancelled	247	16
Total	3	106
<i>Source: Data acquired from Transport Department through RTI, 2006</i>		

The issues discussed above show that Metro is not able to cater to the need of large sections of commuters. It only caters to the need of a certain section of commuters, who can pay more, or are ready to travel on feeder services to catch the Metro.

Section IV

Conclusions

Three major issues emerge from the preceding discussion:

1. Environment Impact Assessment done by RITES in 1995 is not applicable to the present corridors of Metro because the present corridors comprise only half of the planned sections for which the EIA was done, while the distance is more. The EIA report was never brought into the public domain and there has been no public participation in the plan. In fact, there has been no public or expert review to look into the several methodological flaws contained in the EIA.
2. The majority of the amount invested in the Metro has been generated through loans. In the present scenario the Metro is not in a position to cover its operation costs, leave alone pay back its returns. It is currently running at a loss and the trends show that in the future also it will continue doing so. Eventually other heads of government funds (public money) would be exploited for the repayment of the existing loans.
3. The Metro is meeting only one-third of its revised expected ridership and one fifth of its claimed ridership of 1995 because of the inequitable fare structure, no concession scheme, and the distance from the Metro station. This means that Metro as a mode of public transport is only catering to the needs of a more affluent section of the public, which is ready to pay more for its travel. Those who avail of different types of concessional schemes for commuting in DTC buses would probably find it uneconomical to travel on the Metro.

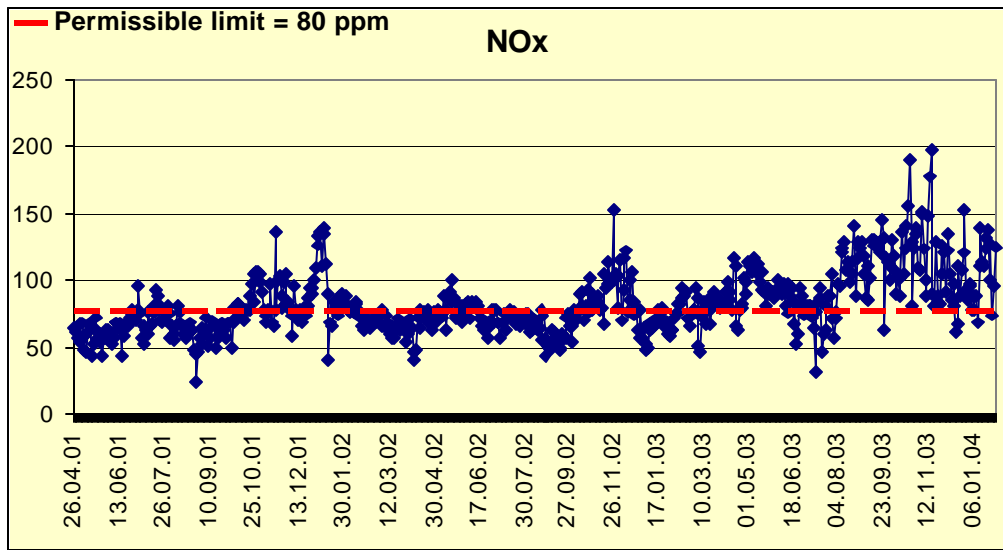
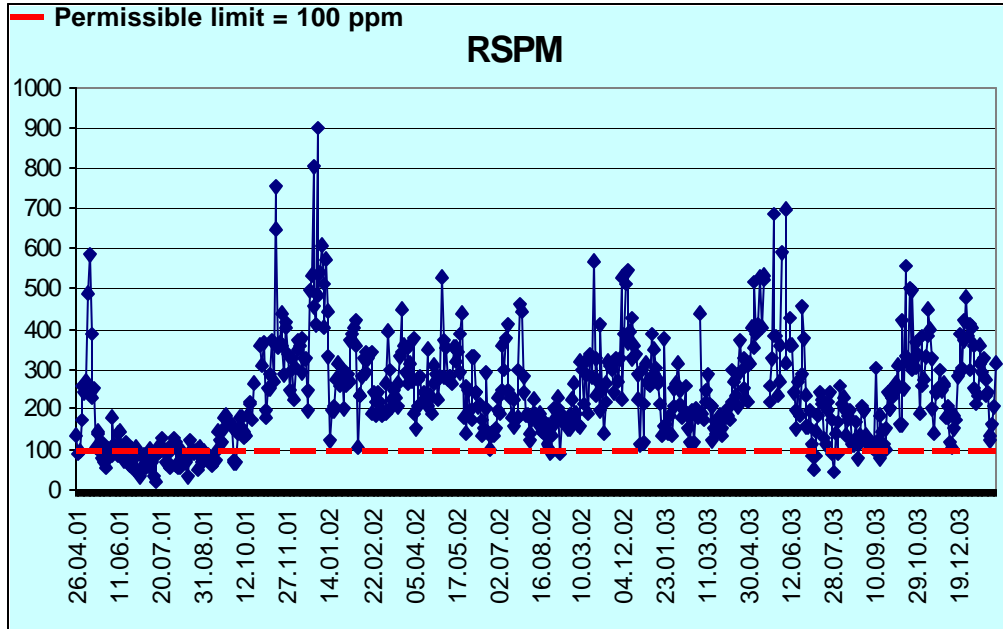
It is quite explicit from these three issues that Metro in the city is a part of a larger agenda. And this larger agenda is to transform Delhi into a 'world class city' in order to facilitate and encourage global capital. Metro has been brought into the city as a part of this reconfiguration process. Development of property on both sides of Metro lines is an indicator that Metro has not been brought into the city to provide better transport options to the commuter. Rather it has been introduced to encourage real estate business in the city. Its present and proposed networks ensure that it will

transport only the white-collar workforce, which inhabits the middle class settlements of Rohini, Dwarka, Noida, Gurgaon, and Faridabad, so that it can contribute more efficiently to the process of capital accumulation. Eventually in the name of fast, efficient and pollution free 'public' transport, the Metro would benefit only a small section of the 'private'.

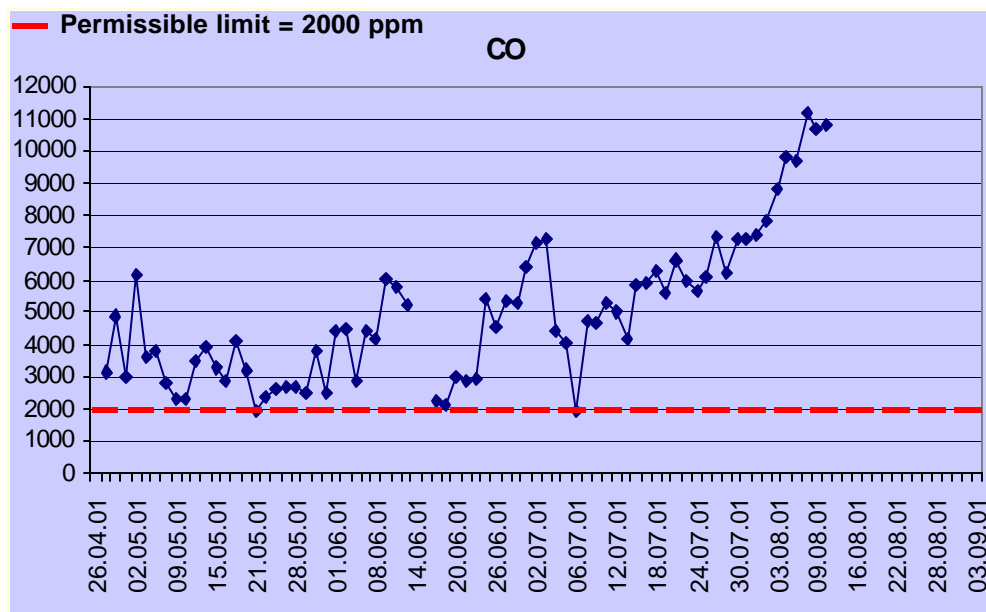
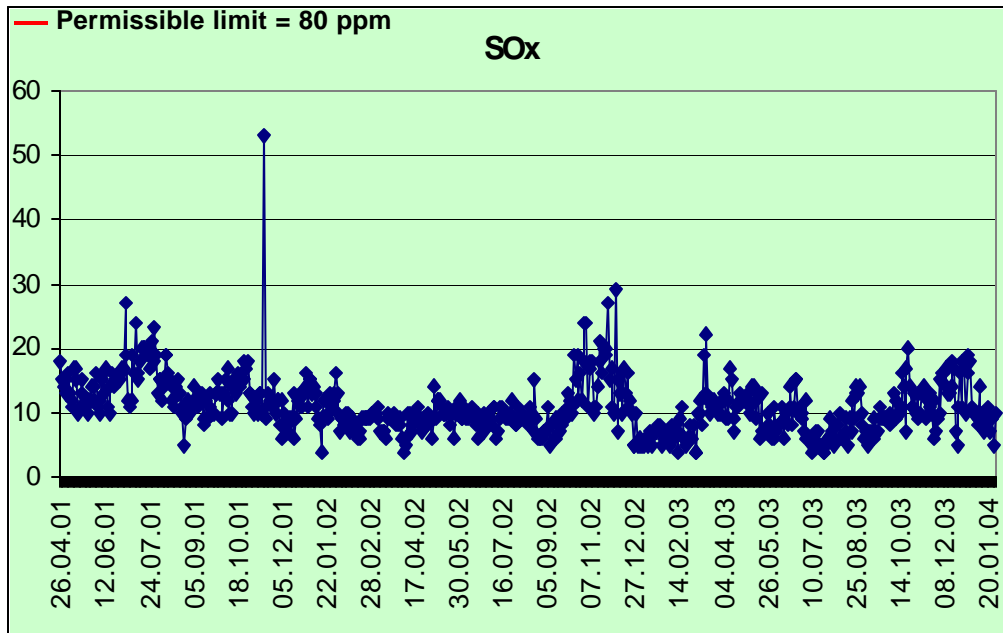
This fundamental fact of transfer of public money into private pockets and distributing social and environmental costs over a much larger population that will not even travel by Metro, has been systematically camouflaged and concealed under a huge propaganda barrage by the media and all the vested interests who stand to benefit from the myth of the "World Class" city.

Appendix I

Daily Values of Ambient Air Quality at ITO (CPCB Data)

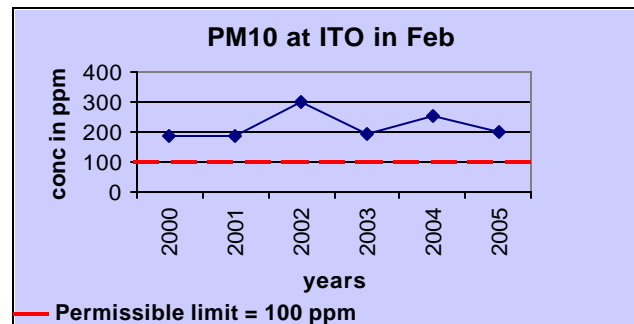
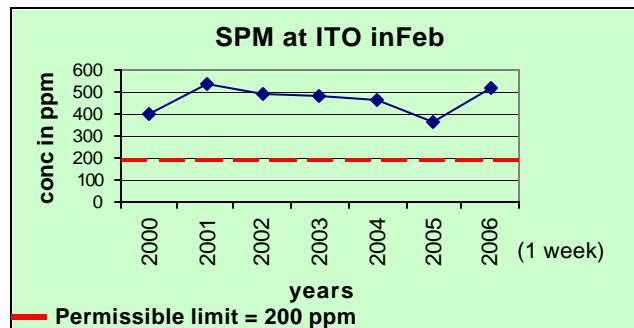
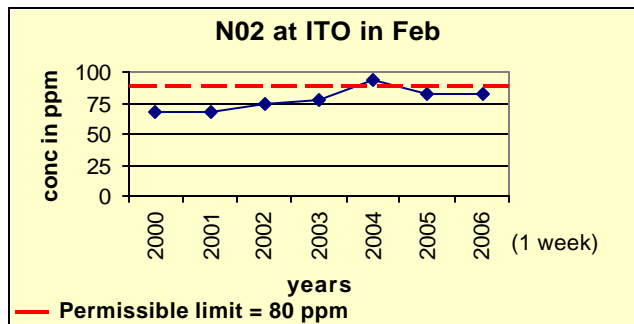
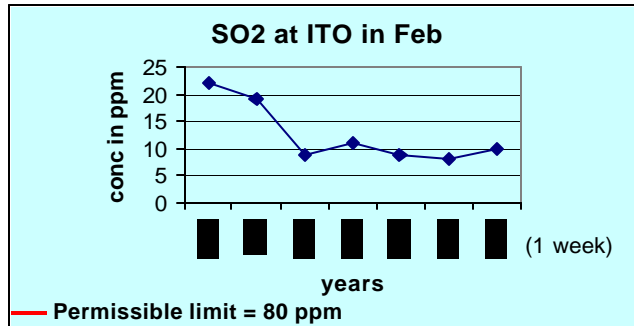


Daily Values of Ambient Air Quality at ITO (CPCB Data)



Appendix II

Annual Averages of Air Quality at ITO (CPCB Data)



Appendix III (DMRC data obtained under RTI, 2006

COMPARATIVE RIDERSHIP, REVENUE COLLECTION FOR OCTOBER ' 2005

Date	COMPARATIVE RIDERSHIP (CST + CSC + Group Booking)				COMARATIVE REVENUE (in Rs.)			
	OCT'05	SEPT'05	VARIATION	%VAR	OCT'05	SEPT'05	VARIATION	%VAR
1	289,756	258,613	31,145	12.04	2,869,998	2,826,833	63,165	2.23
2	248,211	259,891	-11,680	-4.49	2,519,851	2,683,517	-163,666	-6.10
3	278,056	265,564	12,492	4.70	3,069,218	2,677,088	392,130	14.65
4	288,816	213,880	74,936	35.04	3,021,481	2,179,363	842,118	38.64
5	281,407	299,404	-17,997	-6.01	2,892,551	3,207,774	-315,223	-9.83
6	274,591	276,341	-1,750	-0.63	2,758,294	2,831,568	-73,274	-2.59
7	281,932	268,196	13,736	5.12	2,767,626	2,751,773	15,853	0.58
8	283,095	262,932	20,163	7.67	2,796,950	2,676,127	120,823	4.51
9	208,641	264,747	-56,106	-21.19	2,105,663	2,641,171	-535,508	-20.28
10	305,290	276,823	28,467	10.28	3,122,949	2,741,232	381,717	13.93
11	270,141	224,744	45,397	20.20	2,659,270	2,286,581	372,689	16.30
12	230,039	286,194	-56,155	-19.62	2,296,052	2,932,103	-636,051	-21.69
13	286,275	278,262	8,013	2.88	2,929,803	2,812,439	117,364	4.17
14	282,806	276,329	6,477	2.34	2,762,250	2,776,757	-14,507	-0.52
15	233,089	259,222	23,867	9.21	2,723,893	2,543,961	179,937	7.07
16	211,106	238,568	-27,462	-11.51	2,131,433	2,264,669	-133,236	-5.88
17	291,018	260,694	30,324	11.63	2,956,110	2,523,294	432,816	17.15
18	298,477	213,446	85,031	39.84	3,004,160	2,156,482	847,678	39.31
19	284,541	297,655	-13,114	-4.41	2,758,500	3,021,736	-263,236	-8.71
20	258,553	289,453	-30,900	-10.68	2,472,884	2,832,535	-359,651	-12.70
21	280,166	274,719	5,447	1.98	2,674,805	2,703,999	-29,194	-1.08
22	283,974	265,800	18,174	6.84	2,693,963	2,599,380	94,583	3.64
23	207,065	268,885	-61,820	-22.99	2,073,863	2,562,018	-488,155	-19.05
24	304,693	232,991	71,702	30.77	3,006,766	2,201,806	804,960	36.56
25	289,827	217,696	72,131	33.13	2,780,003	2,164,473	615,530	28.44
26	296,678	297,788	-1,110	-0.37	2,822,582	3,006,654	-184,072	-6.12
27	293,998	287,010	6,988	2.43	2,781,041	2,819,297	-38,256	-1.36
28	295,516	279,769	15,747	5.63	2,766,227	2,713,527	47,700	1.75
29	297,584	271,001	26,583	9.81	2,829,474	2,639,296	190,178	7.21
30	175,968	284,454	-108,486	-38.14	1,745,293	2,751,577	-1,006,284	-36.57
31	261,752	-	-	-	2,534,734	-	-	-
DAILY AVERAGE RIDERSHIP & REVENUE	OCT'05	SEPT'05	VARIATION	%VARIATION	OCT'05 (Daily Average)	SEPT'05 (Daily Average)	VARIATION	%VARIATION
	271712	265036	6676	2.52	2688636	2651134	37502	1.41

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