

Sustainable Transport Solutions for Calcutta

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Appendix 1: List of organisations and individuals consulted in the course of this study

SECTION 1: THE BACKGROUND

1 This report is a completely independent assessment of the transport and environment situation in Calcutta in August 1996.

2 The report has been produced at the request of Non Governmental Organisations (NGOs) in Calcutta and is made to them. A list of the NGOs involved in this commission is attached as Appendix 1. Their full co-operation and participation in this process is gratefully acknowledged.

3 The report has not been prepared in a policy vacuum. Both the report and the process that has produced the report take their conceptual orientation and context from sustainable development principles and the operational definitions of sustainable transport. These principles have been clearly articulated at the Rio de Janeiro conference on Environment and Development in 1992 and given more substance at the Habitat II conference in Istanbul in March 1996. The Indian government was represented at both these occasions and made its commitment to sustainable development.

4 It is important that we are very clear about what this policy context and orientation actually means. This can be summarised in a number of brief points:

- the growth in the demand for mobility and the demand for motorised transport is the largest single source of greenhouse gases and the source that is growing the fastest;
- transport is the largest single source of health damaging air pollutants in urban areas;
- transport is the most important source of health damaging noise pollution in urban areas;
- there is a measurable, direct, and statistically significant relationship between the volume of traffic in urban areas and the health of urban residents;
- those who live in polluted cities have a shorter life span, an increased incidence of cancers and respiratory disease, more frequent absences from work and school because of illness and more frequent spells of hospitalisation;
- the volume of motorised traffic will rise in direct proportion to the amount of road space and parking space that is provided;
- the construction of new roads, new bridges and new tunnels and additional car parking capacity will increase the demand for private motorised transport and damage public transport and non-polluting modes of transport;
- it is not possible to provide enough space, energy and financial resources to cope with the remorseless increase in demand for motorised transport;

- a new equilibrium has to be struck through demand management (i.e. reducing the demand for transport), by improvements in accessibility through careful land use planning, and by improving the conditions for walking, cycling and public transport.

Most journeys made in urban areas are short (<10 km). These journeys can best be catered for by improvements in the conditions for walking, cycling, non-motorised vehicles and public transport. High speed systems, expressways, and capital intensive modes of transport are not relevant to the vast majority of the population of large cities and especially not relevant to the needs of Calcutta with its income profile heavily skewed to the lower end of the scale.

5 Sustainable transport solutions are solutions that meet the need of all residents regardless of income; protect, preserve and enhance the health of the residents; and are not damaging to the present and future conditions for life. Sustainable solutions reduce energy consumption, reduce the space requirements for transport, reduce pollution and improve the welfare of disadvantaged groups such as the poor, the elderly, the handicapped and young children.

Sustainable transport solutions are also economically efficient. They reduce dependency on imported oil, saving large amounts of valuable foreign exchange, they are capable of local development and local implementation, and they do not need Japanese, British or US technology. They maximise local input and local employment generation benefits. They are appropriate solutions and must be designed with a substantial local input.

Sustainable transport solutions make the best possible use of existing assets. Every city has assets and Calcutta has an abundance of assets (see Section 3).

Sustainable transport solutions are identified by their linkage to targets and objectives.

Transport planning and transport investment must have a purpose which must be clearly identified and reflect the views of residents and NGOs. There is a general level of agreement that these targets and objectives should include:

- reducing air pollution;
- reducing noise levels;
- increasing the space, security and comfort for pedestrians and cyclists;
- reducing the number of cars and lorries on the roads and increasing the proportion of journeys accomplished by walking and cycling;
- developing and improving those modes of transport that are zero pollution on the streets (e.g. the tram);
- establishing safe routes to schools, hospitals, workplaces, etc.;

- reducing road traffic accidents;
- reducing total energy consumption;
- increasing the amount of green space in urban areas;
- increasing the number of trees.

All targets and objectives can be quantified in terms of the progress that is expected over a pre-defined time period. For example it is possible and desirable to plan to reduce particulate pollution (black smoke) in Calcutta by 10% (or more) each year for the next 6-7 years until a minimum level is achieved.

SECTION 2: THE ASSESSMENT

6 There have been many assessments of the conditions of traffic, transport and pollution in Calcutta. The results are alarming and indicate that Calcutta is certainly among the top three cities of the world in terms of the seriousness of its traffic pollution. It may well be the most polluted city in the world.

7 An assessment of traffic, transport and associated environmental problems has to consider air pollution, noise pollution, congestion and road traffic accidents, as well as the health problems associated with each individual environmental factor. Evidence on health damage in Calcutta is not very extensive except in the work of Dr. Dipanker Chakraborti of the School of Environmental Studies at Jadavpur University, Calcutta.

8 Dr. Chakraborti's work is based on extensive environmental monitoring in Calcutta. Some of his results and conclusions are very relevant to this study:

- traffic levels have doubled in the city in the period 1985-1994;
- particulate matter pollution in Calcutta is very severe. The WHO recommended level (which should not be exceeded) is 90 µg/cubic metre. Calcutta levels in winter are in the range 1,300-3,000 µg/cubic metre. Particulate matter and its health damaging effects have been extensively studied in the USA by Dockery and his colleagues at Harvard and it is possible to extrapolate from the USA data to predict the number of deaths that can be expected in Calcutta from these exceptionally high levels of particulate pollution;
- benzene levels are also exceptionally high in Calcutta. Benzene is a carcinogenic compound. Measurements of benz(a)pyrene in several cities (mg/cubic metre) puts Calcutta in the top ranked position at 30-120, followed by Paris at 4.6-15.0, Brussels at 3.9-12.0 and London at 2.0-14.0.
(Source: D Chakraborti: 'Calcutta City in Pollution Perspective' in Banabithi, Environment Special Issue, June 1996).

9 Noise pollution in Calcutta is severe. The combination of traffic volume, poor mechanical condition of most vehicles and universal use of the horn as a key part of driving behaviour produces noise levels frequently in excess of 90 dB(A). On most streets where there are four lanes of traffic and at all intersections it is physically impossible to hold a conversation and be understood unless the distance between the speakers is less than 0.5 m. These noise levels are considerably in excess of WHO recommended levels which indicate that in daytime a level of 55 dB(A) should not be exceeded and at night-time, 45 dB(A). In many parts of Europe even more stringent levels are applied in the vicinity of schools, hospitals, residential homes for the elderly, etc. These noise limits are designed to protect human health. Noise is not just a matter of aesthetics and its health damaging effects go far deeper than damage to hearing. Excessive noise levels are a direct cause of high blood pressure, stress and cardiological problems. They are associated with psychological difficulties, mental illness, loss of energy, difficulties in coping, learning difficulties in children and delays in recovering

from illness. Noise is a serious health hazard in Calcutta.

10 Traffic congestion is a serious problem in Calcutta but its extent should not be exaggerated. Congestion levels (and time delays) are not as extensive as they are in Los Angeles, Bangkok or some South American cities. Many journeys in Calcutta of 5-10 km can be achieved by car or taxi in 30-40 minutes which compares very favourably with most cities around the world. Congested traffic also has an effect on reducing the severity of road traffic accidents. London has the lowest level of fatal and serious road traffic injuries in Britain precisely because it has congested traffic conditions. It is difficult to kill people when the traffic is moving slowly. Nevertheless congested traffic is polluting, noisy and unpleasant, and represents an economic loss. Reducing congestion whilst reducing the demand for transport and reducing the speed of vehicles is the target for sustainable transport planning.

11 Road traffic accidents (RTAs) are a serious problem in Calcutta. Data quoted in the CEMSAP report on transport and environment in Calcutta (Environmental Transport Strategy) shows that in 1995 there were in the Calcutta police administrative area :

8,895 recorded accidents

3,186 injuries

480 deaths

These figures are almost certainly a considerable underestimate. There is extensive evidence from all parts of the world to show that accidents are under-reported by a factor which can be as high as 2 to 3. This means that the actual number of accidents in Calcutta could be around 20,000. The number of injury accidents is also under-recorded. The actual number of injuries is likely to be 80-120% higher than recorded by the police. Even the number of deaths is under-reported (though to a much lesser degree) from a combination of misclassification of cause of death to statistical definitions of when death has to occur in order to qualify as a RTA death. For example, in Britain a death has to occur within 30 days of the accident to qualify as a RTA death.

12 In Calcutta pedestrians are the largest group in the fatality data representing 64% of the total. This fact alone indicates very clearly that the seat belt debate is irrelevant to the fate of the vast majority of Calcutta's citizens. Pedestrian safety and the safety of cyclists is the most important concern for Calcutta. They will not receive any benefits from seat belts.

13 The environmental conditions in Calcutta for the pedestrian, the cyclist, the public transport user and those who live and work by the side of busy roads are amongst the worst in the world and are totally unacceptable.

(Source of RTA data: Calcutta Environmental Management Strategy and Action Plan (CEMSAP) Draft EMS (Appendix F) Environmental Transport Strategy (ETS), February 1996, GHK International).

SECTION 3: THE ASSETS

14 Calcutta is well provided with a basic transport infrastructure that can, given the right stimuli, respond to the challenge of sustainable transport planning and meet the needs of its residents for clean air, safe streets, reliable public transport and highly attractive walking and cycling journeys.

15 The assets are as follows:

- a reasonably compact city, densely populated with many journeys that have to be made being well within the capabilities of walking, cycling and public transport.
- a rich network of trams with a route length of approximately 70 km, highly effective penetration of the central areas, almost 30 km of fully segregated, reserved track and good quality links to the northern and southern parts of the city. The system is already one of the best in the world in terms of its network and has enormous potential to play a key role in a sustainable transport solution for Calcutta. Importantly, the tram system provides a link to the two main railway stations in Calcutta (Howrah and Sealdah) which between them handle 2 million passengers per day. Regrettably, the link to Howrah has been cut but the infrastructure is still there and could easily be reinstated.
- a metro line that caters very well indeed for north-south movements and connects densely populated areas in the north and the south with the CBD and important areas for employment. The metro does not provide a connection to the two main railway stations in Calcutta.
- a river (Hooghly) that offers enormous potential for north-south passenger movement and for improved river crossing facilities to connect Calcutta with Howrah. Existing cross-river links already provide a much needed service that is efficient but one that could be improved by full integration into a north-south service. The river also has the potential to enhance the beauty of Calcutta with attention to the development of riverside activities and their full integration into a RiverBus service.
- a system of canals and waterways that has potential to provide passenger and freight transport for the whole of Calcutta. In a city where the most often quoted complaints are about congestion and lack of road space the use of the river and waterways in combination has enormous potential to improve quality of life and transport choices for the citizens of Calcutta.
- a Circular railway which, if completed, would provide the basis for a world class urban commuter line similar to the German “S bahn”. The German S Bahn to be found throughout the Ruhr and in many big cities provides a distinctive identity, 20 minute interval frequency (or better) and high quality transport that interacts very efficiently with other modes including the tram (and in Calcutta, the river).

SECTION 4: THE SOLUTIONS

16 There can be no solutions to Calcutta's transport and environmental problems unless two things are done first:

- (i) establish the machinery for high level co-ordination of all transport modes, their financing, their performance to agreed objectives, and their detailed integration;
- (ii) establish clear targets and objectives (as in paragraph 5) within a given time frame and within a public system of data availability and monitoring.

17 Solutions do not come from thin air. In this report a very distinctive approach has been adopted. The solutions come from four different sources:

- (i) The citizens of Calcutta and the organisations they have created;
- (ii) My own direct observations and experience of all modes of transport over 5 weeks of intense activity over most of the geographical area of Calcutta;
- (iii) International experience of best practice. What has worked best all over the world (especially in countries like India) and why;
- (iv) The work of other scientists and expert groups in Calcutta e.g. CEMSAP, Jadavpur University, IITian.

18 The most important source has been the citizens themselves and their organisations. A public hearing was held in the Ramakrishna Mission, Gol Park, Calcutta on 8th August 1996 where 12 presentations were made by Calcutta-based NGOs. Careful note was taken of the content of verbal and written presentations and the ideas have been incorporated into the solutions presented in this section.

19 The solutions that have emerged from this collaborative process fall into five main groups:

- Maximum utilisation of existing infrastructure and assets, and full implementation of all road traffic regulations, vehicle exhaust regulations and road worthiness regulations;
- Specific plans and policies to improve the situation for cyclists and pedestrians;
- Full integration of Bus, Tram and Metro with single ticketing systems, attention to detail of interchange facilities and introduction of MetroBus;
- Land use planning strategies to steer, where possible, new developments of offices, schools, hospitals, etc. to points of maximum public transport accessibility (e.g. interchange points);

- Traffic exclusion from congested streets, pedestrianisation schemes, area licensing schemes.

20 Maximum utilisation of existing infrastructure, assets and regulations

(i) Currently poor use is made of the tram and metro system. Both can carry far more passengers than they now do with relatively small amounts of additional investment. The tram system carried 2,755 lakhs passengers (one lakh = 100,000) in 1981-82 compared with 699 lakhs in 1995-96. It should aim to restore its 1981-82 performance in the next two years and then continue to increase patronage thereafter. Specifically:

(ii) The TRAM system should be completely refurbished, i.e. all track repaired and replaced where necessary, all overhead wiring repaired and/or replaced, and all vehicles refurbished. The tram system should retain all segregated workings and expand the amount of track which is segregated. This will improve reliability and journey times in the congested street network.

The Tram system should be extended by restoring those sections that have been closed in previous years. The closed sections actually represent some of the most profitable and essential routes in Calcutta and their loss has been partly responsible for the drop in passengers. The restored sections should include:

- Chowringhee section between Esplanade and Hazra road junction.
- Howrah Bridge
- Hare St/Strand Rd
- High Court section
- Chitpore-Esplanade Jn

A new service with high frequency should be established to link Howrah Station with Sealdah Station, connecting with the Metro at a suitable station in the BBD Bag area (e.g. Central Station).

(iii) The METRO system is a good example of a modern transportation system but is very poorly connected into the tram system and into the two main railway stations. The proposed new tram route using a re-established Howrah Bridge link will correct this deficiency and bring much improved passenger numbers and revenue to the Metro.

The Metro currently performs at only a very modest level. 2 lakh passengers per day is not enough to justify the large capital investment represented in the metro system. Co-ordination and improved linkages with the tram system, with the railway stations and at Dum Dum will add 2-3 lakh to the Metro's daily total. With special trains starting at Dum Dum in the evening peak period the Metro will be utilised as part of a longer journey and will relieve the huge pressure on Sealdah.

The Metro should add clean, comfortable METROBUSES to its service pattern. These would deliver passengers from points to the east and west of the metro

itself, direct to the metro station, on reserved bus lanes with a single ticket that would cover the bus and the metro together. Special discounts should be given for weekly or monthly tickets for the combined system.

Discussions about new metro lines should not be allowed to stop essential progress in these less costly areas. Metro extensions will cost up to 500 crore (one crore = 10 million) rupees each, will take many years to complete, will have to compete very hard with other schemes throughout India and meanwhile Calcutta needs relief now.

(iv) The CIRCULAR RAILWAY is very much under-utilised and has enormous potential to move significant numbers of passengers in comfort around Calcutta. The Circular Railway could function in the same way as a German S-Bahn system providing trains throughout the day every 20 minutes, running in both clockwise and anti-clockwise directions and having excellent interchange possibilities with trams and metro. Dum Dum and Tollygunge would become major public transport interchanges. The Circular Railway should be completed as a matter of priority, double tracked and electrified and then subject to single ticketing systems in the same way that the tram and metro systems would be operating.

(v) The SUBURBAN RAILWAYS are working to maximum capacity and are under great strain. Over two million passengers per day arrive at Howrah and Sealdah. There is an urgent need to upgrade facilities on the suburban trains especially new rakes, higher capacity trains and the better interchange facilities noted in the sections on the metro and the circular railway to relieve the pressure on suburban trains. Better facilities and less crowded conditions will make it possible to be far more disciplined in terms of detecting non-fare paying passengers and implementing regulations for the comfort of all passengers through the presence of roving inspectors. There is also a need for modest investment in new track e.g. an additional chord on existing suburban rail on Sealdah South line to provide a direct link from the south to the CBD. This will relieve pressure on the system as a whole.

(vi) WATER TRANSPORT is greatly under-utilised in Calcutta. The River Hooghly and the canal system offer enormous potential to provide alternative passenger services on a north-south axis (Hooghly) and to provide east-west and circular possibilities using the canal system. Water transport is congestion-free, low polluting, relatively cheap and has many other advantages in the development of attractive riverside and canal-side locations for residences and offices.

Many cities in the world have experimented with RIVERBUSES. These would be most effective on the River Hooghly and could be linked by dedicated buses connecting ferry points with tram and metro interchanges. Integration is the key to success in all these cases.

Calcutta is ideally suited to a circular waterway system as recommended by Forum for Calcutta:

- Hastings to Garia Railway station following the existing Tolly's Nullah, with the provision of a lockgate at Hastings Point (15.6 km);
- River Hooghly from Hastings to Chitpur lockgate (8.5 km);
- Chitpur lockgate to Beliaghata Pumping Station (8.2 km);
- New link from Dhapa pumping station to Bagha Jatin and finally to meet Tolly's Nullah (10.3 km).

Water Transport has many other advantages that go beyond improving transport links and reducing pollution. Bodies of water in cities are universally attractive and add to the pleasure and beauty of a city. They become attractive locations for new developments with a better microclimate and they become valuable ecosystems encouraging biodiversity, green areas and water-based recreation. They also distribute water very cheaply from one part of the city to another.

(vii) BUS TRANSPORT in Calcutta is perhaps the most significant mode of transport in terms of people carried. The Calcutta bus system is, however, of unrelieved poor quality exposing its passengers to conditions of discomfort and danger that would not be tolerated elsewhere. Buses are also a significant source of pollution and it is unusual to see a bus that is not belching out huge clouds of black smoke. None of this is necessary. Buses can operate to very high standards and in Curitiba in Brazil buses provide the backbone of the transport system and are world famous for their cleanliness and efficiency. If Brazil can do it then so can India. Bus operations in Mumbai also provide a good model for efficiency and cleanliness.

The BUS SYSTEM is in urgent need of attention. All buses must conform to vehicle exhaust emission standards and must be removed from the road if they emit black smoke or fail an emission test. Bus owners (state and private) should be given 12 months to put their buses into a state of good repair.

The BUSES themselves should meet high standards in terms of passenger safety and comfort. They should be higher capacity and in perfect mechanical condition inside and out. The ideal situation is far fewer buses on the streets but with a larger total capacity. Any buses not meeting mechanical condition standards should be removed from the roads.

Buses in Calcutta are largely in the private sector. I recommend that the State Government of West Bengal institute negotiations with the bus companies to provide financial assistance for the necessary upgrade in facilities. Some element of state support would be more than justified for the air pollution benefits that would follow and for the benefits of integration (e.g. single ticketing) that would be a condition of accepting state support for upgrading.

The Bus System should also be improved by the provision of dedicated bus lanes on key routes to smooth their progress and by the elimination of bus services that run in direct competition with tram and metro. The urgent need to reduce pollution on main routes to BBD Bag is enough justification for the removal of buses that simply duplicate existing metro routes and the restored Chowringhee tram section.

The Bus System should be reformed so that basic discipline of buses is guaranteed. Buses should stop only at marked bus stops and at the kerbside or in marked bays. Stopping in the middle of the road is dangerous on road safety grounds and should be forbidden. Buses that stop in the middle of the road should be removed from duty.

(viii) TAXIS are an important part of any urban transport system. They provide a valuable function and enable people either not to own a car or to use their car less in cities. If cars are banned from certain parts of congested city areas taxis can be given access as long as they meet all registration and emission regulations.

Taxis in Calcutta are in poor condition. They contribute significant amounts of air pollution and are frequently in poor mechanical condition. All TAXIS should meet the highest emission control and mechanical condition regulations and be removed from the road if they do not comply.

Taxis must be regulated and these regulations must be enforced. The situation at Howrah and Sealdah stations with many dozens of taxis offering non-metered journeys at prices of over 100 rupees and only a few legal taxis servicing a queue of 50 to 100 people is not acceptable. Many taxis also refuse to carry passengers on certain kinds of journeys. All taxis breaking the regulations should be removed from the roads and the illegal taxis at the main railway stations should be removed.

(ix) PEDAL RICKSHAWS and HUMAN POWERED VEHICLES are cheap to purchase, operate and use, and provide valuable employment for many of the poorest in Calcutta. They are non-polluting and they are part of a sustainable transport strategy that pays attention to pollution and social conditions. These modes of transport should be provided, where possible, with their own segregated lanes which would be shared by bicycles and kept free of rubbish, building materials and all forms of encroachment.

A programme of research and development should be established to improve these modes of transport so that they will make the task of rickshaw pullers and pedal rickshaw drivers easier and less damaging to their health. This will include gearing and changes in design to reduce friction and make best use of human power.

(x) AUTORICKSHAWS have grown in number in Calcutta as a response to congestion and to poor conditions in public transport and the poor levels of co-ordination between bus, tram and metro. Improved bus services would provide a much better substitute for autorickshaws in the majority of circumstances. As

these things improve and as land use planning steers developments to interchange locations autorickshaws will decline in use and eventually disappear. In the meantime autorickshaws must still conform to the highest standards of exhaust emission and air pollution reduction objectives. Autorickshaws should be given 12 months to bring themselves up to these standards and if they do not do so by the expiry of that period then they should be removed from the roads.

21 Specific plans and policies to improve the situation for cyclists and pedestrians.

(i) WALKING trips form part of every trip even for the journey to a parked car. For many millions of people in Calcutta walking is the only mode of transport available to them. The walking environment in Calcutta is very poor indeed. The air pollution and noise pollution are enough in themselves to deter all but the most dedicated or poor walker. Crossing roads is very difficult and very dangerous, pavements are cluttered with a large number of obstacles including rotting garbage, building materials, sharp metal objects sticking out of the ground, large paving stones at a variety of angles and even larger holes. In flooded conditions which are common in the monsoon period the obstacles and the large holes are covered by water and walking is extremely dangerous. Uncovered drains and uncovered access points to sewers (2-3 metres deep) add to the variety of hazards.

(ii) All these negative factors are very easily rectified to improve the conditions for walking. Top priority is the removal of all obstacles, covering of all open drains and sewers, removal of all garbage on a regular basis, repair of all uneven surfaces and removal of all sharp metal objects. Attention has to be paid at every intersection and crossing to provide safe crossing facilities for pedestrians. The same attention is required for long stretches of open road where continuous streams of traffic make crossing very dangerous indeed.

(iii) Walking and Cycling require shade from roadside trees. All trees should be protected and a new tree planting programme should be established. Trees also mitigate the worst effects of air pollution and create a pleasant microclimate.

(iv) In the case of CYCLING it is imperative that safe, traffic-free conditions be provided. A network of cycle routes, physically segregated from vehicular traffic should be established on all main roads in Calcutta and on all routes from residential areas to schools, hospitals, shopping centres, universities, office complexes and railway/metro/tram stations.

22 Full integration of bus, tram and metro with single ticketing system, attention to design of interchange facilities and MetroBus concept

(i) The success of a transport system is dependent on the integration of its component parts and on the ease with which passengers can make a transfer from one mode to another. Failure to integrate damages all modes of transport and adds to the pressure for higher levels of car ownership and use.

(ii) Calcutta has a very fragmented and uncoordinated public transport system. It is essential that all modes are co-ordinated and that the machinery for doing this is established.

(iii) I recommend that the State Government and the City of Calcutta set up a transport co-ordinating body with key personnel from railways, metro, tram and bus operators. The purpose of such a body is to maximise comfort and service for the passenger, eliminate wasteful and expensive duplication of services and increase the number of passengers using all modes of public transport. It would establish a single ticketing regime and set high standards for all aspects of public transport operation. The co-ordinating body would take a keen interest in points of interchange in the total system to ensure that passengers could move very easily from one mode to another, under cover, in safety, in clean conditions, with maximum information and with helpful staff available to answer questions and provide security. Distances between any two modes of transport should be minimised. Special attention would be given to linking modes, e.g. METROBUS and RIVERBUS, and to the circumstances that ensure priority in all traffic for trams and buses.

23 Land use planning strategies

(i) Land use planning has to take place for several reasons. The mix of activities on a city-wide scale, the precise location of activities that generate traffic and the distances that separate them will all determine whether or not the city can be made to work efficiently in its travel and transport arrangements. A compact city (such as Calcutta) has many advantages over widely dispersed cities (like Perth in Western Australia or Los Angeles). At the very least, land use planning has to capitalise on these advantages by resisting dispersion and by maintaining green areas, water areas and maximum use of existing facilities. Calcutta is very fortunate indeed in the proximity of the wetlands to the east. The Salt Lake area is an area of international ecological significance and should be maintained as such, protected from all urbanisation and industrial development.

(ii) At a more detailed, level land use planning is essential for the reduction of the demand for transport. If large traffic generators (e.g. offices, universities, schools and hospitals) can be located at key interchange points on the tram/metro/railway system then life is much easier for the commuter, pollution is reduced and the economics of public transport is improved.

(iii) I recommend that new developments that will attract many people be steered to points of maximum public transport accessibility. Where new developments are contemplated and tram/metro lines are absent, the tram line should be put in place first and AHEAD of the development.

24 Traffic Exclusion

(i) Calcutta has many densely populated, congested areas where road space is limited. These areas are very important to the life of Calcutta and are often

centres of employment, retailing and small scale manufacturing. They add to the rich diversity of life in Calcutta and care should be taken not to throw away these advantages in the search for solutions to congestion and pollution. International experience points towards the advantages of traffic-free zones as the most successful strategy to be pursued in these areas.

(ii) Traffic-free zones (sometimes referred to as car-free city concepts) are increasingly common in Europe and North America. Indeed Darjeeling (The Mall) provides a more local example of the advantages of such a concept. Traffic-free zones, pedestrian zones and lorry ban zones are seen as particularly important in cities with a rich architectural, historical and cultural heritage. This certainly applies to Calcutta which is a city of world importance in these respects. Munich in Germany has Europe's largest pedestrian area which is also penetrated by trams. Lubeck and Aachen in Germany and York and Chester in Britain ban cars in their historic cores. Florence and Bologna in Italy do likewise. Such bans actually stimulate the economy and increase retailing income and property values.

(iii) Traffic-free areas give priority to pedestrians, have low pollution levels and stimulate economic regeneration. They happily co-exist with trams and special arrangements can be made for disabled access, emergency service access, bicycle access and taxis.

(iv) I recommend that Calcutta identify a number of areas that would benefit from this treatment and establish traffic-free areas within the next 12-18 months. All streets in the north of the City area with tram routes should be converted to traffic-free zones.

(v) I further recommend that Calcutta introduce an Area Licensing Scheme (ALS) along the lines of that currently in place in Singapore. An ALS applies to the whole area of the CBD and a wider area surrounding the CBD. Motorists who wish to enter this area with only one person in their car must pay a fee which in Singapore is set at \$120 per month. Motorists who enter the area with four people in their car need not pay a fee. This measure has been very successful indeed in Singapore and has contributed to the economic success of that city state.

(vi) Receipts from the ALS can be used to fund general improvements to pavements, cycle and pedestrian facilities in congested areas. This will reduce the size of any financial outlay from the State Government of West Bengal.

SECTION 5: THE NEXT STEPS

(i) This report is formally presented to Calcutta NGOs and to the Minister of Transport of the State of West Bengal. The report is intended to stimulate debate and produce action. The action that is required will come from the NGOs of Calcutta and other prestigious organisations such as the Calcutta Chamber of Commerce. This action will provide evidence of local support and local enthusiasm for these recommendations which is so important if they are to be taken seriously by Government.

(ii) It is then the duty of government, particularly the State Government of West Bengal to take action on implementing the recommendations speedily.

(iii) At the international level it is also possible for action to take place. India has played an important and active role in the international debate about sustainable development and environmental protection. It has signed several international conventions on environmental concerns and the implementation of these conventions actually involves action at national and local level to reduce pollution, particularly from vehicles. Failure to take action to limit the number of vehicles, especially in cities, and to control pollution will lead to a national failure to meet international obligations, and more difficulties in the future in meeting the foreign exchange costs and debt burden associated with high levels of oil imports.

SECTION 6: CONCLUSION

Calcutta must now make the choice. The solutions I have identified are all based on extensive discussions with citizen groups in Calcutta, with professionals and with prestigious organisations like the Chamber of Commerce. They have met with their general approval and they have met with real enthusiasm and desire that something be done on a short timescale. All the solutions can be implemented in a minimum of three years and a maximum of five years. All the solutions will cost less than a new metro line, or a new 30 km highway, or a high speed tram/monorail system. They are appropriate to Calcutta and appropriate to a city with one of the richest inheritances and natural beauty of any world class city. The choice now facing Calcutta is very serious.

The choice can be expressed as that between MODEL A and MODEL B:

MODEL A

Calcutta continues along its present path. It remains one of the world's most polluted cities with life getting increasingly difficult for its citizens. Life expectancy for its citizens will be lower than in non-polluted cities. People will die younger than they would do elsewhere, children will have more respiratory disease and allergies, middle aged men will suffer more heart disease. Car drivers will be exposed to levels of cancer causing chemicals in their cars higher than most cities in Asia. Companies looking for locations to invest in new activities will choose to go elsewhere. Why should they locate in such a polluted city? Breathing in winter pollution conditions will become more difficult and road traffic accidents will increase.

MODEL B

Calcutta begins to solve the problem and reduces its air pollution year on year for the next ten years. It develops the best example of clean, safe non-polluting urban transport in Asia and becomes a model for this approach throughout Africa, Asia and South America. With much reduced noise and air pollution the citizens of Calcutta begin to enjoy better health. Heart disease and respiratory disease decline. People get more exercise through walking and cycling in non-polluted conditions and this contributes once again to reduced disease. The economy of Calcutta grows faster than any other city in India because of its reputation for cleanliness and good health and its architectural and cultural assets which have been preserved and developed and can be enjoyed in traffic-free areas and in attractive riverside locations. Road traffic accidents decline to the lowest of any city in India because of improved pedestrian crossings, cycle lanes and well maintained, disciplined buses. Its tram system is the envy of the world for its extensive network, its reliability, its comfort and its penetration of quiet, calm, non-polluted central areas.

The CHOICE must now be made and must be made by the people of Calcutta. Which path will Calcutta choose?

SECTION 7: SUMMARY OF RECOMMENDATIONS

- (i) In line with best practice around the world retain, refurbish and extend the tram system. Restore those lines lost in the last few years particularly the direct link to Howrah Railway Station.
- (ii) Link the metro and the tram systems together with a direct tram link between Howrah and Sealdah stations. A first class interchange facility should be provided to the metro at an appropriate metro station near the CBD.
- (iii) Increase metro patronage from 2 lakh per day to 1 million per day and increase tram patronage by a factor of 5 to 8. This to be done by better ticketing, improved interchange, Howrah-Sealdah connections and MetroBus concept. MetroBus is a dedicated bus service running directly into metro stations with common ticketing with the Metro system. Improve metro and suburban railway interchange possibilities at Dum Dum.
- (iv) Complete the Circular railway, construct double track, electrify and establish 20 minute frequency service in both directions. Clear the tracks of rubbish, set up new stations where appropriate and plan for best possible linkages into the suburban railway system.
- (v) Improve suburban railway trains with more rakes, higher capacity, and new running possibilities from the south (avoiding Sealdah) direct to CBD area.
- (vi) Establish traffic-free zones in congested areas and on streets with tram routes in congested areas. Create high quality pedestrian zones which are low in pollution and attractive locations for residential and retail activity.
- (vii) Ban lorries on key routes and in congested areas at certain times of the day.
- (viii) Rigorously enforce all bans with spot checks and heavy fines.
- (ix) Enforce strict vehicle exhaust emission regulations with spot checks and heavy fines. Polluting vehicles (including buses and taxis) to be removed from the roads.
- (x) Establish high quality water transport on the River Hooghly and the canal system. The RiverBus concept on the Hooghly to be linked by dedicated bus service direct to metro stops.
- (xi) Clear all pavements of obstacles, garbage, metal objects, building materials and repair them regularly whilst clearing rubbish on a daily basis.
- (xii) Plant trees on all routes where people walk or cycle. Trees reduce air pollution and provide shade.
- (xiii) Encourage cycling with dedicated cycle lanes, physically segregated from traffic.

- (xiv) Repair all road surfaces and keep in a well-maintained condition.
- (xv) Introduce Area Licensing Schemes as in Singapore to charge drivers who wish to enter the CBD with only one person in the vehicle. Cars with 4 or more passengers are exempt from the charge.
- (xvi) Remove buses from direct competition with metro and tram on congested routes. Buses should serve areas not well served by metro or tram and feed into those rail based systems with the advantage of single/common ticketing.
- (xvii) Support cycle rickshaws, rickshaw pullers and handcarts until such a time as normal market forces reduce their use. They provide much needed employment, they are low cost and non-polluting and they provide a service which, currently, is in demand.
- (xviii) Establish overall co-ordination of all public passenger transport in Calcutta. High levels of co-ordination between Indian Railways, Metro, CTC and bus operators is essential to the success of transport policies and environmental policies. It is also essential for the introduction of common ticketing systems and to reduce wasteful duplication in a situation where resources are scarce.
- (xix) Establish better planning of land uses to focus developments where high quality public transport can be provided. This will include the banks of the Hooghly, tram/metro interchanges, and circular railway/suburban rail/metro interchanges.
- (xx) Controls on the urbanisation of valuable ecological areas to the east of Calcutta. Development of the wetlands threatens a site of international ecological significance and a site that is invaluable to the economy and environment of Calcutta. Urbanisation of this area will make transport problems worse and exacerbate environmental problems.

Appendix 1

List of organisations and individuals contributing information and views to this study.

NB All the addresses are in Calcutta. Only the city code is given.

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