Look, listen, learn, and go

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WHEN there are more travellers than transporters, when a larger vehicle will save space by replacing several smaller ones, and bring in other environmental joys lesser air and noise pollution, more greenery with roads occupying lesser space for number of persons moved mass transportation emerges as THE solution. Added to that is 'rapid', as of course time is of great meaning and consequence to particularly a city dweller.

For quite a few years now Dhaka has been bubbling with restrained enthusiasm with the prospect of having a mass transportation system, underground or over the ground it hardly mattered as the city traffic situation has been rapidly deteriorating what with the government trying every sauce in the larder to make travelling a little more bearable and, if possible, pleasant. The consequence has been a greater and louder demand for a modern system akin to that of other megacities.

We have had discussion on the topic on this page in the past. Architect Sujaul Islam Khan comes up with yet another encouraging proposal. Considering the huge costs and time involved, and our economic condition as well as the expectation of the people, the allowable margin of error is very minimal. Therefore, every idea, scheme, and proposition should be studied threadbare by the policy makers and decision givers at the very outset. The only thing not rapid about the system should be the planning and design part, which should be meticulously worked out.

Again, given our questionable record in evaluating human life, more specifically with regard to city provisions and construction works, it is essential to address associated issues such as safety, fire, noise, air quality, etc during construction and after commissioning of the mammoth project involving thousands of people round the clock. The experience of all other cities will be useful and that of an Asian city closer to home Bangkok with similar soil condition, population density, and built-up infrastructure will be especially pertinent.

It will be useful to remember that the transportation problem cannot be resolved by linear means, such as the introduction of one hundred buses, double-deckers and all that. The scheme of Mass Rapid Transit (as the system has been coined) requires garnering all related modes of transportation bus, rail (under and over the ground), water so that the options are wide and effective.

The task will not be easy to say the least, but we have overcome greater obstacles. Look forward we must.

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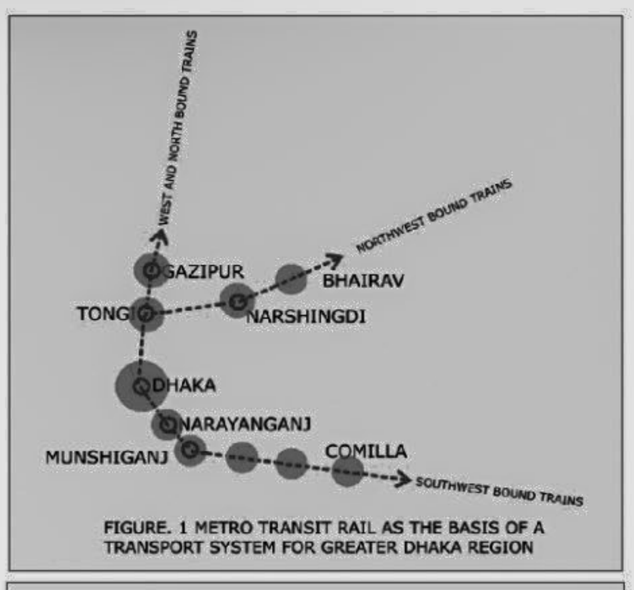

FIGURE. 1 METRO TRANSIT RAIL AS THE BASIS OF A TRANSPORT SYSTEM FOR GREATER DHAKA REGION

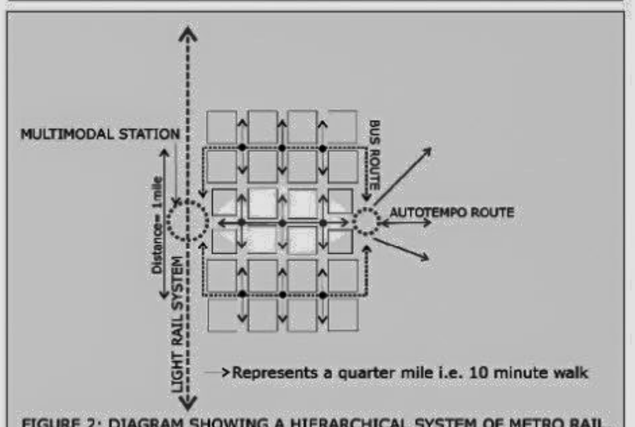

FIGURE 2: DIAGRAM SHOWING A HIERARCHICAL SYSTEM OF METRO RAIL, BUS AND AUTOTEMPO ROUTES

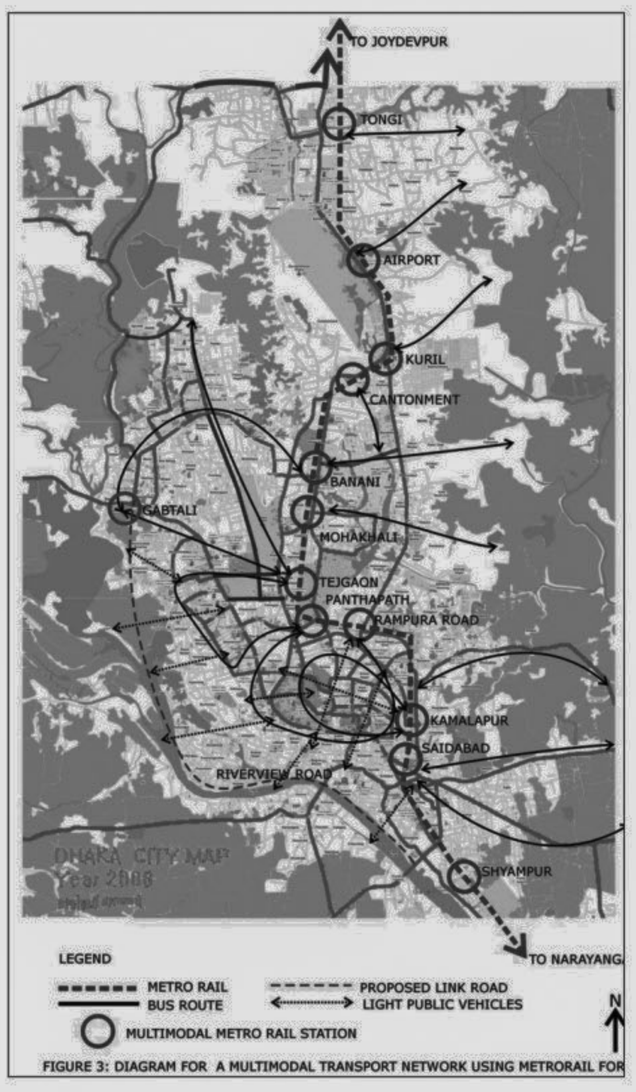

FIGURE 3: DIAGRAM FOR A MULTIMODAL TRANSPORT NETWORK USING METRORAIL FOR

Mass rapid transit for Dhaka: The last ray of hope

SUJAUL ISLAM KHAN

TWENTY million people will live in Dhaka in 2030 if present growth trends continue. Unhindered informal/unplanned and formal/planned growth on its fragile ecology makes it one of the most vulnerable/unlivable cities on the planet in the face of climate change and other natural calamities. The present traffic scenario is connected with this explosive urban growth and has to be treated accordingly.

Successive governments have made attempts to improve the traffic situation. The past BNP government studied proposals for a network of Maglev trains and the present AL government is contemplating a light rail transit system. This is highly encouraging because a well designed Mass Transit System has the potential to reduce traffic congestion and also become the single most powerful tool to consolidate the trends of urban growth, become the key engine to create new satellite cities, renew blighted urban areas and dispersing the extremely dense city centre.

Since the end of the nineteenth century urban planners around the world have used light rail systems as the key component of mass transit networks to shape the urban growth of entire regions by the means of creating satellite townships. Trams, trolleys, street cars formed the back bone of public transport in almost all major cities. Satellite cities and suburbanization eased the lives of millions of citizens. In the US, after the World War II the Federal Government initiated one of the largest public works program to build the interstate highway system and regulated fuel process to encourage automobile manufacturers. Many light rail networks were forced to shut down in the face of stiff competition. A few cities such as New York and Chicago had to run the light rail system because of the shortage of parking space in the dense downtown areas. By the end of the 20th century the proliferation of the automobile has led to excessive dependence on non-renewable fossil fuels, air pollution, traffic congestion, and waste of space required for parking .Urban planners are now using Transit Oriented Development (or in other words how a well integrated transport system based on a rail network) to curb such problems in many cities all over the world.

Satellite cities are planned after carefully analyzing present and future land use patterns and density, ecosystems, utility and road infrastructure, presence of growth magnets such as industry, commerce, institutional facilities, other urban amenities, and travelling time from key urban nodes. A minimum density is required to make light rail feasible. Within a quarter mile radius of the transit station, high density mixed use/commercial growth is considered feasible and the quarter mile belt after this zone is considered a medium density zone, usually residential. This area spreading approximately half mile from the station is termed as the transit shed. In our country the informal networks of lighter public transport such as auto tempos, rickshaw vans have the potential to extend the transit shed much further. Parking lots and cycle stands are built adjacent to the stations so people can park and ride. This is a very powerful tool to reduce congestion in downtown.

Constructing and operating an extensive new underground or elevated rail network will be an extremely complex, expensive and time consuming in a flood prone earthquake zone as ours. This essay examines the potential of developing an integrated transport and urbanization scheme by upgrading the existing railway network and connecting it to a hierarchical network of new circular bus routes and more informal lighter modes of public transport for the greater Dhaka region.

As shown in Figure 1, the key railway junctions connecting the capital to the north and westbound cities must be shifted to Joydevpur and Bhairav. The southbound rail network has to be connected from Narayanganj to Chandpur via Munshiganj. The new light rail will connect Joydevpur and Bhairav with Comilla via Tongi, Cantonment, Banani, Tejgaon, Kamalapur, Narayanganj and Munshiganj. This single act can create the potential for growth of new urban centres and revitalize old ones in the entire region. Along this route new specialized urban centres can be planned for light industries, education, healthcare, housing etc. to relieve the pressure on existing such areas.

Barring the areas developed by the Rajdhani Unnayan Kartripakkha (RAJUK) and some private developers, Dhaka has grown almost spontaneously along the key north-south roads. Typical informal urban growth forms the edges of the wetlands and rivers to the east west and south as a consequence of not having proper road access. If the road networks are improved these areas have the potential to densify further. Such development will depend upon the success of building new roads in the east west direction and connecting them to the existing road network.

Like all cities of similar socio-economic conditions, the key resource of Dhaka is the boundless energy and ingenuity of the people. The informal transport sector of light public transport such as autotempos of various sizes and rickshaw vans have kept the city and indeed the whole country alive and kicking. These are more efficient on the winding narrow streets of Dhaka. Figure 2 shows how an auto tempo route in conjunction with a circular bus route can bring an area of almost one square mile under such a multimodal network. If such a network is carefully planned, the need for rickshaws will decrease.

The diagram shown in Figure 3 shows an integrated transport scheme with circular bus routes connecting the rail network with the rest of the city. The existing railway stations and road intersections at Tongi, Airport, Cantonment, Banani, Tejgaon, Kamalapur and Naranyanganj must be expanded and rebuilt to function as multimodal exchange nodes. New such stations will have to be built at the intersections of the key roads and railway tracks at Mohakhali, Maghbazar, Panthapath and Rampura Road. The tracks must be elevated above the roads at these points and the stations will have to be built accordingly. The diagram also shows some new roads that will relieve overall traffic congestion. It also implies that if such a hierarchical network is introduced the congestion at the existing key transfer nodes such as Banani, Mohakhali, Farmgate, Gulistan and Maghbazar will become dispersed into the network of stations and bus stops and the need for all buses to ply to downtown.

Figure 4 shows a composite transport map of St. Louis, Missouri in the USA. The new metrolink system was rebuilt using the same tracks in the 1990's. The integration between the rail network which spreads out in the east west and the major bus lines running in the opposite direction forms the backbone of the system.

Effectively planned Transit Oriented Development is a product of meaningful collaboration between urban planners, transport and traffic engineers, policymakers, financers, contractors, the government and the

people. The transit stations become the natural nodes in the city where the people connect their movement with the city. Thoughtful urban design can seize this opportunity to shape the stations and the system to enhance the legibility, functional clarity, and experiential quality of the city.

FIGURE 4: COMPOSITE TRANSPORT MAP OF ST LOUIS, MISSOURI,USA
The deep red line shows metrolink, the dotted circles are the key nodes
Where the major bus routes intersect with the metro system. The grey lines show
The bus routes. A hierarchical network of metrorail and bus service makes a viable
system of public transport.

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Acknowledgement:

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Going underground: The Bangkok experience

THE MRT (Mass Rapid Transit), sometimes referred to as the Bangkok Metro, is Bangkok's underground metro system. It was constructed under a concession concept. Most civil infrastructure were provided by the government sector, Mass Rapid Transit Authority of Thailand (MRTA) and handed over to their concessionaire under a 25-year concession agreement. As MRTA's concessionaire, Bangkok Metro Company Limited (BMCL) provides M&E equipment, including electrical trains, signalling systems, SCADA, communication, PSD, etc for the subway project and fully operates the system. To maintain the system, BMCL has subcontracted in 10 years to Siemens which was the M&E system supplier since system opening and 7 years maintenance contract to two local maintenance services for north and south line. The metro has a fleet of 19 trains; the 19th train entered service in October, 2007 after a major accident. Besides the MRT, Bangkok also has an elevated rail system called BTS or informally the Skytrain.

The construction of the first Bangkok Metro line, officially known as Chaloem Ratchamongkhon "Celebration of Royal Auspice" or informally as the "Blue Line", began on 19 November 1996. The project suffered multiple delays not only because of the 1997 economic crisis, but also due to challenging civil engineering works of constructing massive underground structures deep in the water-logged soil upon which the city is built. On 3 July 2004 the line was officially opened by HM King Bhumibol and Queen Sirikit. Within 30 minutes of its opening, sightseers filled the system to its maximum capacity, but after the initial rush ridership has settled down to around 180,000 riders daily considerably lower than projections of over 400,000.

Safety measures during construction

The underground mass transit project is the first megaproject of its kind to be undertaken in Thailand, with the whole of the route constructed entirely underground. As the agency responsible for its implementation, the Mass Rapid Transit Authority of Thailand (MRTA) has set as its objectives the implementation of all aspects of the project to internationally accepted standards. In particular, MRTA wishes to establish the project as one with outstanding safety standards which will elevate the image of the country's construction industry.

The project safety standards and procedures have been full coordinated with the relevant governmental and non governmental safety-related bodies concerned with working conditions and problems of underground works, accident prevention, Mass Transit Safety, industrial products, occupational health & safety.

As Thailand does not have specific legislation in place with respect to the safety measures for underground construction, MRTA has instructed all contractors to carry out construction in compliance with widely used and internationally accepted standards, specifically the British Standard BS 6064.

Noise

A number of measures have been applied to minimize impact of noise from construction activities on the community, such as:

- Careful scheduling of noisy work activities and reasonable advanced notice.
- Provision of temporary noise barriers where practical.
- Proper selection and maintenance of machinery to reduce operational noise levels.
- Continual monitoring and assessment of noise level for control in sensitive areas such as schools and hospitals.
- Community relations activities are carried out so that the affected community have full understanding of the project benefits, and accept the temporary inconvenience.

Air quality

The construction of the underground MRT Chaloem Ratchamongkhon Line involves the removal of large volumes of soil and many high capacity engines in the construction plant. The resulting dust and engine fumes affect the air quality in the vicinity of the construction.

However, MRTA requires the contractors to take measures to reduce these impacts by carrying out the work in strict compliance with BMA regulations. These include establishing effective dust control in the construction sites as required by the Pollution Control Department, such as wheel washing facilities and secure covering of dump trucks to minimize spillage. Proper selection and maintenance of engines are also measures taken to reduce the pollution from fumes. Regular air quality monitoring ensures compliance with specified standards.

Traffic management

By nature, underground mass transit construction in high density areas generally necessitates working at or near major

road intersections for station construction, for which the open cut and cover construction method is employed. Whilst tunnel boring is usually done without any disturbance to the surface, the route generally runs underneath existing major roads and requires work to be done to surface features obstructing the tunnel passage such as underground utilities, bridges, and overpass structures. The impact on traffic is therefore a prime consideration and needs meticulous planning and close coordination with many agencies.

In order to reduce impact on the traffic, MRTA has established guidelines for construction as follows:

- To continually coordinate with all relevant agencies such as the office of the land traffic, the Bangkok Metropolitan Administration (BMA), and the Traffic Police Division to establish the most beneficial traffic schemes.
- To minimize the construction area for least traffic obstruction, and to install adequate construction warning signs.
- To exercise stringent control of construction equipment movement and loading time.
- To use every possible means to give advance notification of the traffic diversion to the public.

Temporary traffic decking is used to minimize openings in the traffic surface during construction.

As a result of coordination and cooperation of all concerned parties, MRTA is proud to report that traffic management has been carried out to the satisfaction of all, particularly the public, with a very low incidence of traffic complaints to date.

Vibration

Some construction activities cause surface vibration, such as piling, excavation, and removal of buildings. However, the impact on neighbouring structures is deemed to be very slight since the route corridor is along a major road lined with large commercial and office buildings on deep piled foundations. Private residences are generally some distance from the corridor and the impact on the nearby residents is usually limited to annoying disturbances. The vibration caused by tunnel boring occurs at the depth of the boring, and is mostly cushioned by the soil. However, in order to minimize the impact, MRTA has required the contractor to select the method of construction which causes least vibration and also to strictly control the operation of equipment causing vibration.

Water quality

During construction, there may be an increase in suspended solids from construction site discharge and also increased quantities of oil and grease from machinery operation. During the rainy season, the surface runoff may wash these discharges into nearby drainage systems and public waterways, affecting the water quality.

In order to reduce this impact, MRTA has required the installation of sedimentation ponds before discharging into the waterways, and for major surface construction activities to be carried out during the dry season. Apart from this, maintenance workshops operations are strictly controlled so that oil and grease residues are correctly disposed of.

Waste and spoil disposal

Most of the waste material from construction consists of broken out concrete, soil, sand, wood and other materials from clearing and removal, as well as the waste from building materials used in construction. Other wastes are oils and solvents used in cleaning of construction machinery and waste from dormitories and labour camps. As far as the removal of

excavated soil is concerned, MRTA requires haulage to take place only at night and the soil to be dumped only at specified locations. Other construction wastes are disposed of at the BMA's sites also during night time. On this project, the Environmental Management Programme and site-specific action plans have been agreed by all parties including an Environmental Monitoring Working Group consisting of environmental planners, BMA, and university academics.

Environmental parameters at each location are regularly monitored and analysed by the Construction Supervision Consultants, and actual site conditions jointly inspected by the Working Group for the contractors' adherence to mitigation measures and follow up action as required.

Source: www.mrta.co.th, Wikipedia