TRANSPORTATION AND INFRASTRUCTURAL DEVELOPMENT

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ABSTRACT: In building the infrastructure for transportation in any country of the Globe, the built up areas, waterways, dense forests, mountains, agricultural land, etc. are kept out of acquisition as far as possible unless the same is needed for a right and economically viable alignment. The prerequisites for developing infrastructure for transportation for a new city shall be different from those of an existing city. The determinants to decide an ideal traffic network in an existing mega city or a city of deficit road access depend on primary and secondary considerations. The city traffic planners should keep in mind the environmental and the social aspects while planning for the development of the infrastructure for transportation. The developer of a project is to carry out the activities in a manner so as to make the project cost effective, time effective and environment-friendly. The credibility of the developer or the contractor needs judicious investigation before selection for building infrastructural development.

1. INTRODUCTION

There is a worldwide trend, particularly in the developing countries, of continuous migration of people from the rural areas to the cities in search of better livelihood and urban facilities like education, health and other services which are not available to them. There is a growing aspiration for better life style due to the present economic growth resulted from the globalizations. So urbanization becomes an unchangeable necessity for the present society. India is a vast country with a population of more than one billion. It has potential to build up its own infrastructures for urbanization covering the benefits of both the urban and the rural people. Besides housings, water supply, power and telecommunication etc. transportation net work play a vital role in the infrastructural development for urbanization. Unless this is done the very purpose of urbanization is defeated. In the present global scenario, the climate change in the different parts of the world due to deposition of green house gases in the atmosphere is a concern to the climatologists and the environmentalists of the society. So the engineering infrastructures required to be developed for the transportation either by over ground or underground constructions should be eco-friendly. The environment of the neighborhood should not be polluted by any of the construction activities. The city authorities facing congestion of surface traffic are nowadays advocating for environment-friendly underground traffic in lieu of extending or modernizing the congested surface traffic which are prone to emission of carbon dioxide, a vital component of green house gases.

2. PREREQUISITES

(a) Before planning for infrastructure for transportation in an existing city, the access of the surface traffic has to be ascertained. If it is less than twenty five percent of the land area, an exercise is needed to be done whether the constraint in access can be removed by demolishing the structures and the buildings on either side of the traffic roads. If it is cannot be done due to legal complications or the political compulsions then the options left with are, to go for over ground and the underground transportations in lieu of extending surface traffic creating congestion and pollution.

(b) Before commencing any geo-technical engineering work, the topography of the area of geo-technical construction work including the hydrology have to be studied in detail so as to ascertain the nature of ground profile and the ground water table. The characteristics and the properties of soil are required to be known from the laboratory analysis of the bore hole data to determine the strength, stability and deformations under the action of the external forces and the self weight of soil. It is to be remembered that the soil strata profile obtained from the series of bore holes is the indicator to select the foundation level of the transportation infrastructure viz. the bottom of an underground corridor for rail or road.

(c) For geo-technical constructions in the mega city or city it is essential to collect from the concerned authorities, the underground maps showing the locations of embedded dry and wet utilities. If maps are not available the utilities are to be located by pre-trenching or by applying sensor indicators. After the alignment and depth of the utilities are ascertained, the engineer at site with the assistance of the design personnel shall make all arrangement to divert temporarily some of the utilities over ground to ease the cutting and disposal of earth spoils. The same utilities are required to be restored in their original location after the permanent structure is built.
(d) The alignment for underground and elevated corridors has to be accounted for easy grades and curves for comfortable ride. Straight routes to be chosen as far as possible to reduce time of travel and the cost of construction.

3. IMPORTANT PARAMETERS

(a) The right construction methodology for the right infrastructure has to be adopted.
(b) The quality of construction should not be compensated for maintaining the deadline of completion.
(c) The credibility of a developer or contractor needs judicious investigation before selection for the development of infrastructural projects for transportation.
(d) The safety aspects of all the construction workers including the inspection officials should be duly accounted for.
(e) The cost of the project needs to be controlled by maintaining the dead line and avoiding extra works unless those are warranted.

4. DETERMINANTS

Infrastructure for railways or highways in any country are developed keeping the alignment free from built up locations, villages, wide waterways. Agricultural fields, dense forests, Sanctuaries etc. When these locations cannot be avoided to make the alignment viable, lands for those locations are acquired through ordinance for national interest. As the railways and the highways enter the cities or towns, the roads and the streets of the cities and towns should be self supportive so that the passengers can reach their destination in least time and the freights can reach the city without damage.

An ideal traffic network in a mega city or city needs an ideal sustainable infrastructure and is dependant of primary and secondary determinants as listed below:

4.1. Primary Determinants

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(a) Adequate access for surface traffic (to the tune of twenty five percent)
(b) Traffic roads and streets to be made of mastic or concrete for at least 4 lanes.
In case of constrained access.
(c) Multi tier flyovers running over, crossing or bypassing the main roads.
(d) Underground and/or over ground corridors for rail or road.
(e) Express ways for super fast traffic.
(f) Running of light rail traffic/modernized trams on elevated corridor.

4.2 Secondary Determinants

(a) Rigid/flexible pavements for the two wheelers on either side.
(b) Junctions and crossings fewer the better.
(c) Slow moving vehicles to be phased out in stages.
(d) Terminating the heavy duty vehicles on the outskirts of the city.
(e) Synchronizing the traffic signals to prevent piling of vehicles.
(f) Putting a blanket ban on joy walking.
(g) Motivating the pedestrians to use footpaths and to cross the roads by the Zebra line or the nearest FOB.

5. OLD BUILT UP CITIES

The need based infrastructure for surface transportations could not be possible for old built up cities like Kolkata, Mumbai or Hyderabad where the road access is in the tune of 6, 18 and 15 percent respectively. The road area could not be increased by demolishing the buildings and the structures lying adjacent to roads in built up areas because such attempts would invite not only legal complications but also political compulsions. It would be the duty of the city traffic engineers to utilize their knowledge to search a middle path to fulfill the necessities based on ground realities. However, the following steps may reduce the traffic congestion to some extent in case of deficit traffic access.

(a) Roads and streets can be widened by truncating wide dividers and footpaths.
(b) The traffic roads are to be maintained throughout the year to a sustainable condition for minimum wear and tear.
(c) More and more underground and elevated corridors for road and rail.
(d) Multi tier flyovers and expressways for super fast traffic.
(e) Inner and outer ring roads surrounding the city.
(f) De-reserved tracks built on concrete surface for plying of trams and other vehicles.
(g) LRT to run over elevated track without interfering the surface vehicles.

6. CONTROL OF VEHICULAR POLLUTION

To reduce vehicular pollution caused by congestion of traffic, vehicles older than 15/20 years are required to be withdrawn in stages. These are to be replaced by new models conforming to eco-friendly specifications viz. eoro-II and euro-III norms. More and more mass transportation. Vehicles of eco-friendly norms should be encouraged to ply on the surface. Luxury sophisticated air conditioned buses could be introduced at premium for the car owners who opt to travel by such buses. To avail the facility the car owners should be allowed on or off street parking of their cars in between their journeys so that the owners can take their cars during their return journeys. Besides above, use of renewable fuels
should be encouraged in stead of conventional petrol/diesel which is used in the light/heavy duty vehicles.

7. TRANSPORTATION PRACTICE IN OTHER COUNTRIES

Singapore is a small island country and cannot afford their valuable land for agriculture. The country depends on the revenue earned from the tourists. So the Government of Singapore is exceptionally aware of the comfort of the tourists in regard to stay and travel in and around the mega city. Keeping vehicular pollution in mind the country has utilized its valuable road space to offer a need based fast and steady transportation system for the comfortable journey of three million permanent residents and seven millions of tourists visiting annually from different counties. The multiplicity of multi tier elevated corridors accompanied with the neatly maintained roads and expressways constituted an ideal infrastructure for the traffic net work. The net work comprises of metro rail, mono rail, cable cars having interchange facilities among the system. Besides there are air conditioned buses and taxis for utilization as surface traffic.

8. PICTURES OF TRANSPORTATION SYSTEMS IN OTHER COUNTRIES

9. CONCLUSIONS

The city authorities shall have to advocate for environment-friendly and commuter-friendly transportation system while planning for transportation infrastructural projects. If necessary, the transportation practice of other countries can be adopted as deemed viable for road access of the Indian mega cities or cities. The selection of the developers and the contractors shall be based strictly on their past credentials without being biased. The engineering authority should choose a right construction methodology so that the construction agencies can carry out the activities without polluting the environment of the public domain. The transportation system should be developed to provide relief both to the urban and the rural commuters. Otherwise the purpose of planning the transportation infrastructure will be defeated. The developer should take utmost care to maintain the time and budget of the project.

REFERENCES

Hewes, Clarkson H. Highway Engineering.
Tsytovich, N. Soil Mechanics.