

Preparation Of Comprehensive Traffic And Transportation Study

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Abstract- as we know the world is facing pollution problem. Cities are rapidly becoming the engines of economic growth all over the developing world. In India, though only about 30% of the national population resides in urban areas, they generate over 60% of the GDP. It is also expected that cities will propel the future growth of the country. It is, therefore, essential to ensure that these urban centers are well equipped in terms of infrastructure, if India is to continue on its growth trajectory. The concept of Comprehensive traffic and transportation study (CTTS) is to have a long-term vision for desirable accessibility pattern for people and goods in the urban agglomeration. It focuses on the traffic and transportation plan to address urban transport problems and promote better use of existing infrastructure (i.e., improvement of public transport, Pedestrian and NMT facilities). This as such leads to the integration of transport development and is essential to building smart cities.

Keywords- Comprehensive traffic and transportation study (CTTS), long term strategy, short term strategy, medium term strategy, Road Network, Trip, NMT, Travel modes and public transport.

I. INTRODUCTION

It is in this context that the Government of India has decided to promote 100 “Smart Cities” in the country. These will be an initial set of pilots, with the ultimate objective of making all our cities smart cities. Urban transport or the ease of being able to move from one place to another is at the core of a “Smart City”. A highly efficient transport system, which offers easy access to jobs, education, healthcare and other needs, is essential. To ensure perfect transportation for all, cities need to develop a comprehensive urban transport strategy. Under the present scenario, urban transport projects are prepared and implemented in a piecemeal manner and generally not integrated with land use pattern. The major emphasis in these plans remains on extensive infrastructure development such as road network, flyovers, improvement of road geometry, regulatory measures etc.

• Suggested Planning Area for Preparing a CTTS Based on Population Size

1. Metro city (> 10 lakhs) -Metropolitan area/Region (as identified by state government)
2. Large city (5 – 10 lakhs) - Notified Planning area (as indicated in the Master Plan)
3. Other city (<5 lakhs) - Municipal area/Urban Agglomeration

Rapid urbanization and intense commercial developments in the past decades have resulted in steep rise in travel demand, putting Metropolitan region’s transport infrastructure to stress. Metropolitan growth is expected to continue at a faster pace, boosted by various policies and programs of the Government of India (GoI). With the projected increase in the city’s population/ growth, strengthening and augmenting the existing transport infrastructure is the need of hour.

Table No. 1 Indicative Time for Preparing the CTTS

Size of city (Population in lakhs)	Average time for preparation (in months)
<5	8
5-20	12
20-40	18
>40	24

Thus several studies have been carried out for the city to improve transportation system in Metropolitan cities. As short-term measures, road widening, flyovers, junction improvements were suggested and some of them have been implemented also. As long term solution, versatile and comfortable Mass Rail Transit System and commuter rail services have been recommended. However, the traffic and transportation scenario continues to be worsening. Therefore, it was felt by the Government of Maharashtra to take a stock of the prevailing situation and prepare a comprehensive traffic and transportation plan which will not only cover short term requirements but also medium and long transport system

requirements upto horizon year. It should also provide for proper inter-modal transport integration.

- Safety with emphasis on vulnerable road users.

Table No. 2 Scope/objective as per MoUD for different task

SCOPE	CDP	MASTER PLAN	CTTS	CMP 2008	CMP REVISED
Review of existing transport system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport demand survey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Review of land use plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Analysis of urban transport situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparation of future land use scenario	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Future transport network scenario	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Future technological scenarios	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transport demand forecast model	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Model impacts on all sections of society and modes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Network evaluation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Model CO ₂ emissions and air pollutants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Impact analysis of scenarios on measurable indicators	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparation of mobility framework	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Formulation of urban transport measures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social and environmental impact assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Institutional scheme for project implementation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Preparation of implementation programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stakeholder consultation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Periodical update and maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

II. LITERATURE REVIEW

Chennai Metropolitan Region Development Authority [1] carried out study of comprehensive traffic and transportation for CMR region to conclude, the CTTS has drawn up the transport improvement roadmap for Chennai for the future, including transport investment program containing short, medium and long term projects. The Plan has focused on the mobility of the people, and encouraging systems that maximize the throughput of people. The thrust of the strategies and the plans thereof have been the following:

- Improvement to non-motorized facilities to encourage use of NMT modes.
- Bus system improvement
- Improvement and introduction of an array of mass transit systems on identified corridors
- Connectivity to mass transit facility with provision of inter-modal interchange stations
- Traffic Management and Optimization of System

Chandigarh urban complex [2] studied To Provide substantially large network of medium level mass transport system such as BRT to cover the areas beyond the Metro network and on over loaded corridors, Provision of high capacity mass transport corridors along trunk corridors and extension of mass transport system to provide wide coverage and transport integration with other modes of transport and Land use adjustments and densification of corridors along mass transport corridors where possible.

Bangalore Metropolitan Region Development Authority [3] analyzed on the basis of projected traffic, an integrated multi-modal mass transport system plan on various corridors has been suggested in order to cater to traffic up to the year 2025. The mass transport systems have been proposed on various corridors considering expected traffic demand by 2025, available road right-of-ways and system capacity. The balance traffic flow should be carried by road system in order to satisfy the needs of normal bus system and other modes such as two wheelers, cars, bicycles, trucks, pedestrians etc.

Vijayawada Municipal Corporation [4] prepared CMP for Broad Conclusions and priorities for development of consumer rail, bus transit, highway construction, goods transport, goods transport through canal navigation and inter regional bus / rail transport, rapid mass transit, integration of various modes of mass transit and IPTs, traffic management and demand management in short, medium, and long terms, observations on land use strategies, connection of new townships by mass transit systems.

Mumbai Metropolitan Region Development Authority [5] recommended transportation plan for the horizon years 2031, 2021, and 2016. Forecast year assignment model will produce traffic and passenger flows on the future network. Key outputs such as changing in overall trip making, modal share and growth across strategic points compared to the existing situation will be closely monitored to ensure consistency and reliability.

Greater Ahmedabad Region [6] prepared *Integrated Mobility Plan* for the development of integrated transport strategies to improve interaction and physical connectivity, to enable communities and industries to meet their transport needs and to enhance the Greater Ahmedabad Region economic development and environmental wellbeing.

Pune Municipal corporation [7] The Comprehensive City Mobility Plan addresses traffic growth of all modes of transportation and suggests a direction for the multi-modal

transport system of Pune. The CMP will improve and emphasize Sustainable Transport Modes.

The objectives of that Study were:

- To understand present day traffic characteristics and prepare forecasts of these character through the development of a transportation model.
- To develop a transportation vision for Pune.
- To identify specific strategies and measures to address traffic growth of all modes of transportation in an effort to meet set goals.
- Prepare a programe of CMP implementations along with block cost estimates.

Pimpri Chinchwad municipal corporation [8] has undertaken an exercise of identifying the service need for urban transport by preparing a Comprehensive Mobility Plan (CMP). As part of this exercise, PCMC has profiled the current transportation network and patterns in the city and has projected them for the future. Based on these, the needs for urban transport solutions along various corridors of the city have been identified. Road network improvement measures such as road-widening, construction of fly-over and bridges have been recommended. A bus-based rapid transit system (BRTS) has been chosen as the solution to the public transport service needs of PCMC. The report has been structured to profile the city and the current transportation system to start with, followed by the projected traffic patterns and a forward looking comprehensive mobility plan which tries to integrate land-use planning with the proposed transportation system.

III. DISCUSSION

Table No. 3 Desirable Modal Split for Indian Cities (as % of Total Trips)

City population (in millions)	Mass Transport (%)	Walk trips (%)	Other modes(%)
0.1-0.5	30-40	40	25-35
0.5-1.0	40-50		20-30
1.0-2.0	50-60		15-25
2.0-5.0	60-70		10-20
5.0+	70-85	25	10-25

Earlier studies provide significant facts about comprehensive traffic and transportation study characteristics and how these characteristics influence to public transport, NMT and sustainable transport. Such studies have focused on detailed experiments to find out the proposed transport scenario upto horizon year. Previous studies have made theoretical and methodological contribution to a practical

understanding of comprehensive transport study model, traffic management for immediate improvement, short term proposal, medium term proposal and long term proposal.

- Land use Forecast

Sub Area	Population	Employment

- Trip generation/Trip attraction

Area	Equation	R ²

- Trip Distribution

Trip Distribution by using Gravity model

$$T_{ijm} = r_i G_i S_j A_j F_{ijm}$$

Mode	k	α	β

- Modal Split

Mode	Trip	% share	External trips	Total Trip

- Trip Assignment (link v/c condition)

Sr.No.	Road	V/C ratio	Avg

In the light of persistent and vexatious transport problems, Cities has commissioned this Comprehensive Traffic and Transportation Study during the base year.

The Comprehensive Transport Study has focused on making cities a vibrant global metropolis city by proposing a series of new transport initiatives. The goal of the study is to come up with a transport system that places people at the centre and realizes the horizon vision.

The Comprehensive Transport Study is designed to provide the broad parameters for the long term development of our transport infrastructure, for the expansion of public transport services and for setting traffic management objectives for the next horizon years. This important study will have far-reaching consequences for our future mobility as well as economic prosperity and environmental sustainability.

The basic rationale of various recommendations under this Study is to curtail the indiscriminate use of personalized motorized modes, while ensuring public transport accessibility to larger section of the population. A greater level of comfort is expected from mass transportation systems and the increased frequency and expansion of the suburban services increase in the number of rail lines, ensuring a fairly good network for the suburban services well ahead of the horizon period. A substantial shift from private cars and taxis to mass transportation is also expected, in view of the restraints planned that impact on the modal choice.

Improvement in the quality of urban life can be achieved by providing safe and convenient means of facilities for the pedestrians and cyclists alike. This is also being stressed in the National Urban Transport Policy. Accordingly, pedestrian and cyclist improvement measures have been addressed.

Given the vehicular growth, the usual road widening practice is not proposed as a means to actually increase mobility but merely act as a holding strategy. The decline in traffic speeds over the last decade, in spite of moderate investment in infrastructure, clearly shows that we cannot build our way out of the problem.

With the objective of achieving a balanced modal mix and to discourage personalized transport, the study has proposed to introduce mass transport by massive investments. The focus is on introducing robust mass transport options by providing adequate, accessible and affordable modes that are people-centered. With limited land availability and the need to serve a larger and more diverse population, and to protect our environment, the need to make public transport system a choice mode is imperative. The proposed transit plan will represent the evolution of transit policy in the region and contribute to a quality and livable environment. The benefits of this plan include increased mobility options for residents through new routes and new technologies; a strengthened economy as a result of connecting cluster towns around city area; and an improved environment from reducing the necessity for automobile use and the ensuing air pollution produced. There will be a gamut of options like BRTS, Metro, MRTS and Commuter Rail systems to meet the different needs of different sections and needs of the people. A high quality integrated public transport is the need for the future.

Given the constraints on road expansion, travel demand management will remain a priority. The proposed travel demand management schemes will ensure that the usage of private vehicles is discouraged and consequently, a shift towards public transport will happen.

Some of the transportation related schemes that have been identified in the SMP and replicated in the CMP with few additional ones have been duly considered and although separate studies from the point of view of obtaining data from primary surveys was not made at this point in time, nevertheless, the schemes as deemed relevant duly considering the modeled traffic flows obtained on the network is included and cost provided for. Some of the proposals envisaged such as widening the existing roads in the distant Cities from single lane to double lanes are also not inbuilt into the network as it is possible that more traffic could get diverted on traffic assignment leading to increased flows on certain road links that is not likely to materialize.

Particularly for the NMT by provision of grade separated pedestrian crossing facilities and foot over bridges have been additionally included ensuring the worthiness of the same based on safety considerations judged by the link volumes and travel speeds, reconnaissance and experience of the organisation. such as skywalks at major attracting and generating centres, pedestrian network at Central, provisions of ramp / escalators to existing subways, lift facility to pedestrian foot over bridges etc. are looked into outside the ambit of modeled output.

The proposals need to be viewed holistically and whenever capital intensive projects are taken up for implementation at the appropriate stage, the possibility of dovetailing and the redundancy of some, needs to be examined. A case in point is the provision of pedestrian crossing facilities as subways or foot over bridge in the vicinity of Metro stations. These need not be duplicated although the individual projects could fall under the purview of different agencies and it is prudent to facilitate the optimal utilization of facility though with an associated added marginal cost to one agency.

The road widening proposed as per the SMP is taken into the network building exercise and as such needs to be pursued forthwith. Except in respect of higher order MTS that could be taken under ground, all other PT Systems that need dedicated right of way occupy road space to varying degrees and even dense bus corridors need additional road space that facilitates movement of buses. On roads, wherein mass transit systems are contemplated, these need to be widened on priority. While an exclusive bus lane facility would enable conversion to a higher order facility like BRTS, stage construction to other higher order systems is difficult due to the differing requirements in terms of right of way, station dimensions, and other geometric considerations such as turning radius, super elevation, turn round etc.

Transit Oriented Developments need to be encouraged on corridors proposed as mass transit corridors. With emphasis on meeting travel demand of the future by public transport, the first step would be to increase bus ridership ensuring adequate supply with a view to ensure people do not resort to privatized modes for want of a transit facility or the inadequacy of it. At the appropriate stage of implementation of the higher order MTS proposed, the established PT clientele would be easily accommodated into the new system and with UMTA hopefully in place, the smooth transfer from one system to another would be ensured.

IV. CONCLUSION

To conclude, the CCTS has drawn up the transport improvement for cities for the future, including transport investment program containing short, medium and long term projects. The Plan has focused on the mobility of the people, and encouraging systems that maximize the throughput of people. The thrust of the strategies and the plans thereof have been the following

- Improvement to non-motorized facilities to encourage use of NMT modes.
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- Traffic Management and Optimization of System
- Safety with emphasis on vulnerable road users.

The positive impact of the proposed improvement schemes is evident from reduced Travel Times for the cities area, which otherwise would have been too alarming. The benefits (reduction in travel times) considering all the trips and also considering only the work trips establishes the same.

The intensities of travel pattern predicted have resulted in the need for enormous facilities particularly public transport based catering to travel demand and this brings to the fore the immediate and imperative need for Techno-Economic Feasibility studies for a more detailed examination of the system selection and implementation through Public Private Participation and budgetary support for realization of the vision set by authority in respect of transportation scenario for the Metropolitan cities.

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