

## Transportation Engineering

The areas of research include; sustainable transportation planning, public transport planning and management, optimization of transportation systems, application of geoinformatics in transportation, driver behaviour and road safety, traffic management etc. Research in transportation engineering focuses on the following aspects:

- Capacity Management – Encouraging public transport, cycling and walking; integrated land-use and transportation planning
- Transportation Systems Management – Reducing transportation needs, reducing dependence on car, improving traffic flow, improving road safety
- Environmental Management – Minimizing negative environmental impact of transportation
- Energy Management – Reducing dependence on fossil fuel for transportation

Following are some of the specific research problems that have been planned

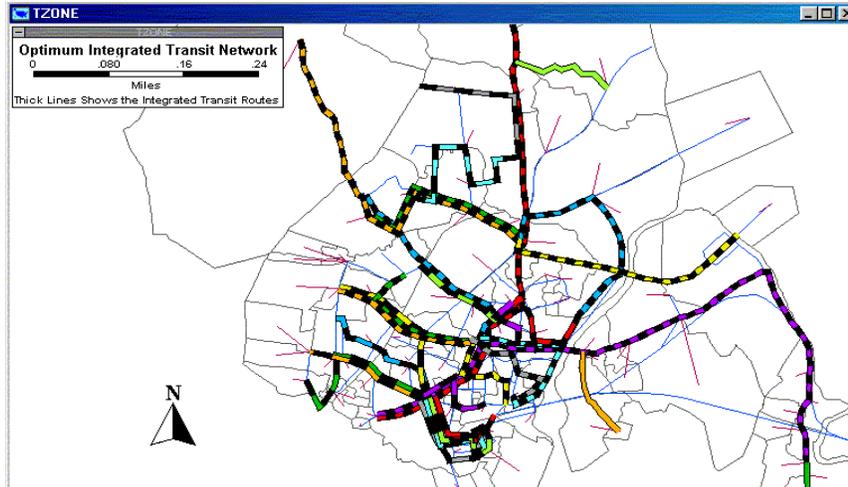
*a) A Goal-Oriented Method for Urban transport Strategy Development for Indian Metropolitan Areas*

Most of the Indian cities today are typically characterized by high-density urban areas, absence of proper control on land use, lack of proper roads and parking facilities, poor public transport, lack of road user discipline etc. The resultant effects are; increased traffic congestion and transport-borne pollution, heavy fuel consumption, poor level of service to the commuter etc.

So far, only isolated approaches to solve single problems are used in most of the Indian cities. An integrated approach which considers different combinations of measures (in infrastructure and traffic management) and their joint impact on the different goal areas (mobility, safety, environment, economy etc.) are fairly not used. Approaches traditionally adopted for developing urban transport strategies for Indian cities are bottom-up in nature and focus largely on infrastructure expansion and do not adequately consider traffic and demand management measures. Hence, the study will focus on a goal-oriented and co-operative method for establishing comprehensive urban transport strategies for Indian Metropolitan Areas.

*b) Development of a Simultaneous Approach for Integrated Mass Transit Planning*

The objective of this project would be to develop a simultaneous and iterative approach for planning an effective and efficient integrated urban mass transit system for any city which has a potential demand for a new rail-based mass transit system besides the street transit system and any existing rail-based system (Figure 69).



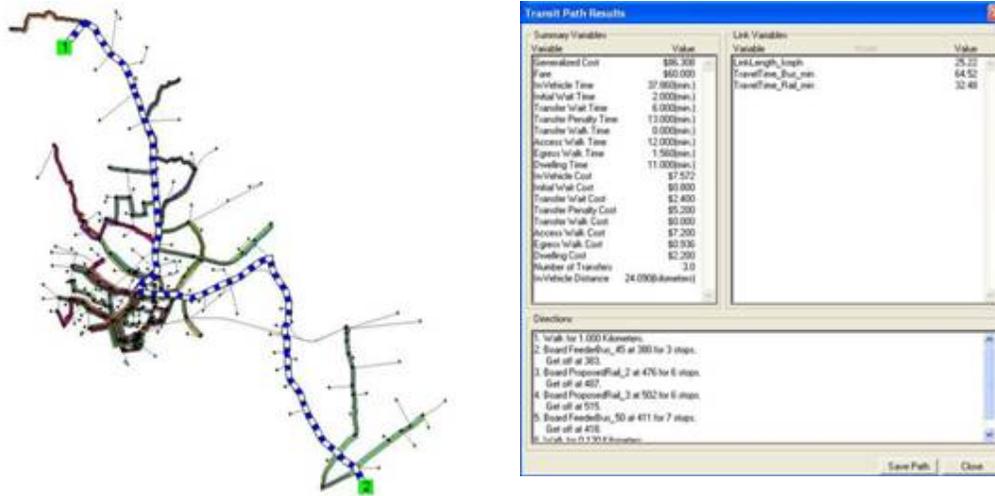
**Figure 69: Integrated mass transit planning**

*c) Air Travel Demand Modeling for Indian Cities*

This would involve work on developing a model for forecasting air travel demand for Indian cities. Unfortunately in India, there has not been any scientific approach used for forecasting the air travel demand. International Civil Aviation Organization (ICAO) forecasts predict worldwide growth in air traffic at 5% a year or doubling in the volume of traffic once in 14 years. Similar trend has been adopted in India for forecasting the air travel demand. Airport Authority of India (AAI) has considered a growth rate of 7% for the period 2007 to 2011. AAI has extended this growth rate for the period 2012-2017, and is taken as 6%. Rapid economic development that has been seen in the last one decade resulted in unpredicted growth in air traffic. A growth rate of 24 % has been observed in over all domestic air traffic for the year 2004-2005. From the observations it can be concluded that there has not been much work done in the past regarding air traffic demand forecasting in India. Trends observed in international air traffic are currently being used for forecasting air traffic in Indian skies. Hence, there is a clear requirement for taking up this study to develop a proper air-travel demand forecasting model for Indian cities.

*d) Development of a Web-based Transit Passenger Information System (PIS) Design*

This study includes work on a web-based multi-objective and Generalized Cost (GC) based *Passenger Information System (PIS) design for multi-modal transit system* that integrates geo-informatics, network analysis, user-interfacing and database management. The GC approach for trip planning is especially important in Indian scenario, where the various modes of transport are generally not harmonized, and the transfer time from one mode to another may be very large. It also imitates the natural tendency of public transport users to attach differential importance to various legs of a trip (walking, waiting, travel time etc.), while planning for it (Figure 70).



**Figure 70: Web-based Transit Passenger Information System**

*e) Effect of Driver Characteristics and Behaviour on Road Safety and Mobility*

Quantifying the effects of improved driver characteristics and behaviour on road safety and mobility needs to be assessed. The aim of this project will be to arrive at a new and comprehensive structure of driver education and testing as part of the driver licensing system in India. A micro-simulation approach will be used to quantify the improvements in road safety and mobility that may happen by introducing the suggested reforms in driver licensing procedure in India.