ABSTRACT

Transportation planning in India indicates that the lack of timely availability of accurate and cost effective information has been a major constraint in preparation of regional transportation plans. Geographic Information System for Transportation (GIS-T) has now emerged as the technology for organization and design of information related to transport infrastructure. The essential aspect of GIS-T is to use the concept of location as the basis for structuring of information. At GIS-T platform the database for transportation is extended by integrating many sets of its attributes and spatial data through linear referencing system. The GIS-T functionalities for integration of socio-economic and other data with transport network adds value to the database. The study region selected consisting of eight taluka with 100% rural areas to about 90% of urban areas with high population density and good economic conditions. Here an attempt is made to develop over all methodology for road users’ movement in regional context with scientific steps in decision making.

The objectives of study are: 1. Creation of GIS database for the regional transportation analysis Zone (TAZs) and road network. 2. To develop methodology for estimation of trip rates trips/HH and trips/ person and estimation of trips for the study region based on socio-economic parameters. 3. Development of GIS based procedures for preparing, planning and monitoring strategy for regional road users’ movement. 4. Transportation Demand Estimation and Capacity Evaluation of existing network. 5. Crash/Accident Analysis in the study region using the GIS database developed. Black spot identification based on hazardous index and average crash frequency per km has been carried out.

The GIS data base for district of Anand was developed using available source maps, secondary and primary data. Geographic layers such as Traffic Analysis Zones at taluka level and district election zone level, Road network with inventory database, have been created. The Populated database was used for thematic map development. The methodology for Household Interview Survey (HHI), Road Side Interview Survey (RSI) with CVC and occupancy have been developed and based on surveys O-D matrix for district of Anand have been developed. Based on occupancy of vehicles, Passenger Car Units of vehicles and proportion of mode choice, the person trip to Passenger Car
Units Conversion Factor (PTPCU) evaluation method developed. The observed and projected O-D trips assigned on state highway road network using GIS-T and important transport corridors for road user movement have been identified. The base year traffic on road network was projected using IRC108 and ADB guidelines and national average growth rate. The links have been identified for capacity augmentation.

Based on design service volume of existing network and base year and projected traffic, it is checked for LOS B to be present during traffic operations for efficiency. The sections are identified for widening or improvements.

The effect of improvement on a small segment of state highway have been studied and recorded with inventory base of road network.

The road crash data analysis for Anand district showed that NH-8 is having highest number of accidents per km length compared with other types of roads network, hence detailed crash data for three years collected, coded and analyzed in GIS-T using LRS and black spots identified. The intersections are vulnerable locations on NH-8.

Thus, research work has demonstrated the following innovative development for travel demand assessment and safe movement of road users in particular.

- Development of O-D matrices in GIS database for Anand District for ready to use in transportation planning.
- Development of methodology for reaching up to traffic assignment on road network and traffic projections.
- Assessment of capacity of SH network in district of Anand.
- Identification of constrained links in network.
- Development of crash reporting and black spot identification tools for ascertaining hazardous location of road network.
- The database development concept developed is proposed for all district zones of Gujarat total for database and problem solving of road users' movement.
- By adopting the research methodology and timely actions road users' movement can be under LOS B and safe by improving black spots on road network.

Keywords: Geographic Information System for Transportation (GIS-T), Database, Traffic Analysis Zones, O-D Matrix, Road Crashes, Linear Referencing, Black Spots.