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Transportation System Management For Warangal Using ArcGIS Software

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Abstract: **Urban transportation systems are wilting under the pressure of ever growing demands on inadequate street network. Traffic management is the application of sound management principles and practice to optimize the use of existing road network with a view to improving traffic flow and road safety without impairing environmental quality. With the advent of information technology and its fast changing nature, it has become imperative to make use of better and more efficient techniques of planning. To study the effect of the Transportation System Management (TSM) measures one needs to have a clear view of the flow patterns, locations, as well as existing road network and must be able to analyze the attributes related to them. Geographic Information System (GIS) helps to do these things effectively and efficiently.**

Keywords: **Geographic Information System (GIS), Transportation System Management.**

1. INTRODUCTION

It has been the experience of many traffic planners that most transportation plans rarely progress beyond the drawing board due to lack of financial resources and other related constraints. The only recourse open to the traffic manager therefore is the option of optimizing existing facilities to provide improved accessibility and mobility at a satisfactory level of safety and comfort to most of the road users. This can be achieved by studying and evaluating the problem in the light of sound and tested traffic management techniques, which are essentially low cost, easily implement and flexible. These are short-term solutions, primarily intended to reduce the intensity of inconvenience caused by congestion. They may not offer a permanent solution, yet they lend themselves to sometime earning relief up to a point where the administration may launch the long term and short term planning. Objective of short-term solutions should be within the perspective and is compatible with the goals set out in the long-term measures.

1.1 Planning Activities:

The region's transportation planning organizations manage allocation of transportation funds through a pre-set planning process provided in a transportation program. The plan coordinates the implementation of roadway improvements, transit and congestion management projects. The transportation plans ensure the improvement of an area's air quality by reducing congestion and improving mobility. This is achieved through an emission estimation process that examines conformity of the plan with high international standards.

1.2 Travel Demand Planning:

Transportation planning in Riyadh as in any sound transportation planning agency, employs a travel demand modeling process based on production and attraction of travel between activity areas. Travel demand planning generates the data required for planning decisions. Trip Distribution Models are used to examine the regional travel characteristics. Since activities are based on a network of roads and projects, GIS plays a revolutionary role in illustrating and manipulating the analysis of results. The system enables analysis previously considered impossible because of the very large amounts of data involved (Manogue and Hutch, 1987). Various uses of GIS in modeling activities for long and short range planning can be applied to the roadway network and network maintenance and updating.

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1.3 Road Network:

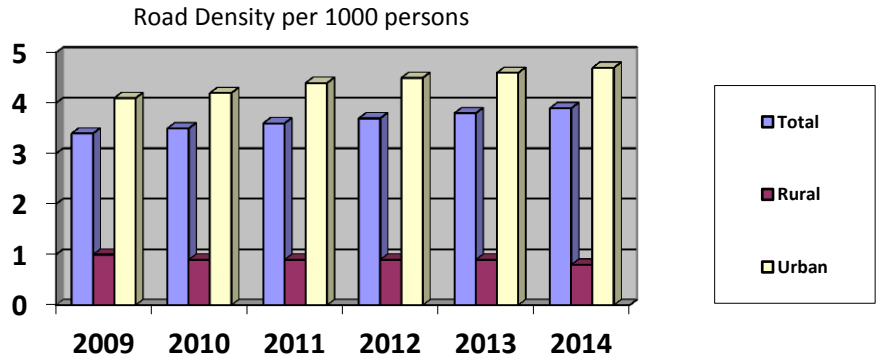
Road networks are composed of intersections and links. If the links are long enough, the intersections will no longer have influence on the behavior of the traffic on a link. The capacity of the road network is thus different near the intersection than on long links.

1.4 Network Maintenance and Updating:

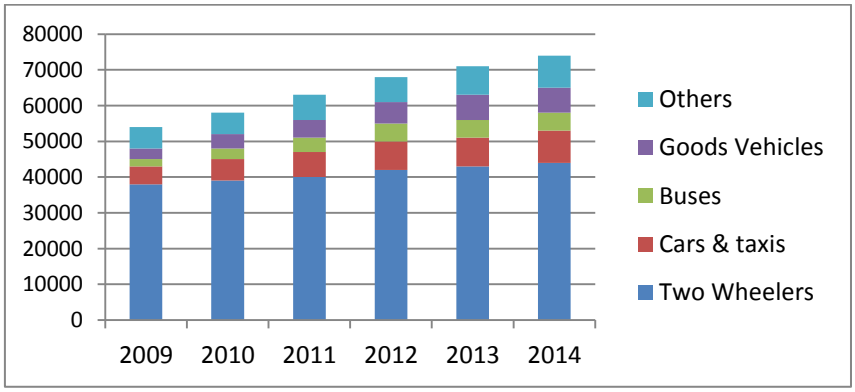
Riyadh's Municipality has adopted various GIS engines (software) regardless of vendors since they feature a so-called open system, GIS via localized database. Due to its compatibility, this certainly enabled various planning departments to use it. In GIS, a links attribute table, which contains links, characterized is attached to the network map. Using the GIS capability of displaying the network attribute table along with a graphic display, link attributes can be corrected and updated. In addition, results of travel demand analysis are attached and stored in the network attribute tables, such as a link's modeled volume, speed, and impedance. As needed, colored maps of the roadway network displaying the different kinds of information are developed illustrating spatial relationships, temporal changes in travel needs, or locating facilities based on class, number of lanes, congestion and speed.

1.5 Buffer Analysis:

The proper approach followed in analyzing added capacity projects is to examine the project's effects upon congestion and air quality within an impact area based on a selected distance. Calculating the travel time saving and emission levels that could result from implementing the project within the impact area (buffer) then tests the project's impacts. Using GIS, buffers are created around each project representing the impact area. In GIS, the links located inside the project's impact area (buffer) can be captured, then, travel timesaving can be calculated from the difference in time, before and after the project's construction. This process involves incorporating the travel demand analysis data into the attribute file, which is transferred from GIS to a date base application (i.e., Access, Oracle. Etc.) To undertake the calculations required. The benefits of GIS in this process is that it allowed for generating the buffers required for each individual projects and identification of the different roads located inside the impact area.



Registered Motor vehicles in India



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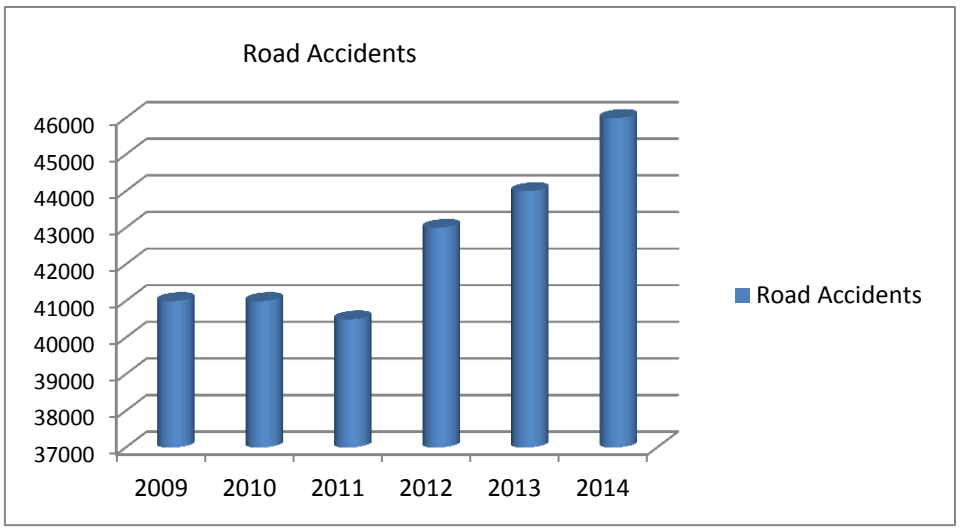

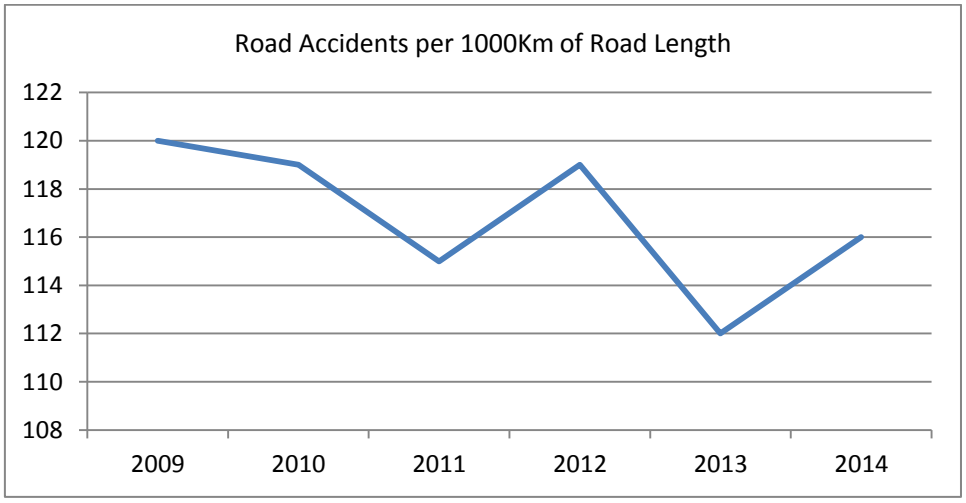

2. STUDY AREA

The Warangal Local Planning Area (LPA) has been selected for study of TSM measures. GIS is used to the study the effect of TSM measures. Warangal LPA road network and location of important places are added as layers. Attributes are added in the form of databases from which one can retrieve data by making queries. Conversion of one-way streets, diversion of traffic, odd-even vehicle restrictions, parking management, effect of ring roads, and overall improvement in the network are studied with the help of GIS. Arc View and Avenue are used for the development of this package

3. METHODOLOGY

- Prepare a Base Map of Warangal.
- Download the Satellite Images.
- Prepare the Base Map of Road network.
- Georeferencing all the Images.
- Digitize the road network.
- Apply the road network analysis tool.
- Propose the Best new road network.

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4. OBJECTIVE OF THE STUDY

The major objectives of this study are-

- GIS Based TSM Forecasting the Traffic
- Road Capacity calculation
- Conversion of One-Way Streets
- Parking Management
- Effect of New links
- Overall Improvement

5. FIGURES AND TABLES

Table:1

TRAFFIC CENSUS

DATE: 16-09-2015 DAY WEDNESDAY — NATIONAL HIGHWAY 202

WARANGAL ROAD — COUNTING STATION AMBEDKAR STATUE

COUNT HOURS FROM HRS TO DISTRICT WARANGAL

COUNT HOUR	FAST / POWER DRIVEN VEHICLES						Slow vechiles				TOTAL for all vehicles for Hour (See Note2)	REMARKS
	TWO WHEELER(motor cycle/scooters/ bicycle)		LIGHT WEIGHT (auto,cars,mini trucks)		HEAVY WEIGHT VECHILES (buses, Dcm etc)		OTHER (Two axle / Multi axle vechiles)		BULLOCK CART/ HOURSE CART/ OTHER ANIMAL DRAWN			
	U	D	U	D	U	D	U	D	U	D		
10:00-11:00 AM	2187	1660	1354	1350	52	360	3	0	0	0	6966	
11:00-12:00 AM	2015	1780	1276	1200	68	173	1	0	0	0	6513	
12:00-01:00 PM	1873	1523	1152	1194	59	80	0	4	0	0	5885	
01:00-02:00 PM	1523	1254	804	993	42	57	0	0	0	0	4673	
02:00-03:00 PM	1724	1790	1278	952	16	30	0	0	0	0	5790	
TOTAL FOR DAY	**9322**	**8007**	**5864**	**5689**	**237**	**700**	**4**	**4**	**0**	**0**	**29827**	
		17329		**11553**		**937**		**8**		**0**		

NOTE:- U: Up traffic D: Down traffic

Table:2

TRAFFIC CENSUS

Date: 18-09-2015 FRIDAY — NATIONAL HIGHWAY 202

WARANGAL to KAZIPET — COUNTING STATION KAZIPET

COUNT HOURS FROM TO DISTRICT WARANGAL

COUNT HOUR	FAST / POWER DRIVEN VEHICLES								Slow vechiles		TOTAL for all vehicles for Hour (See Note2)	REMARKS
	TWO WHEELER(motor cycle/scooters/ bicycle)		LIGHT WEIGHT (auto,cars,mini trucks)		HEAVY WEIGHT VECHILES (buses, Dcm etc)		OTHER (Two axle / Multi axle vechiles)		BULLOCK CART/ HOURSE CART/ OTHER ANIMAL DRAWN			
	U	D	U	D	U	D	U	D	U	D		
07:00 - 08:00 PM	1100	1106	710	660	64	40	18	2	0	0	3700	
08:00 - 09:00 PM	1000	1120	810	501	42	38	0	0	0	0	3511	
09:00 - 10:00 PM	940	876	825	513	38	35	0	0	0	0	3227	
10:00 - 11:00 PM	962	1110	742	593	37	29	0	0	0	0	3473	
11:00 - 12:00 PM	1124	1170	652	552	26	30	0	0	0	0	3554	
TOTAL FOR DAY	**5126**	**5382**	**3739**	**2819**	**207**	**343**	**0**	**0**	**0**	**0**	**17465**	
		10508		**6558**		**550**		**0**		**0**		

NOTE:- U: Up traffic D: Down traffic

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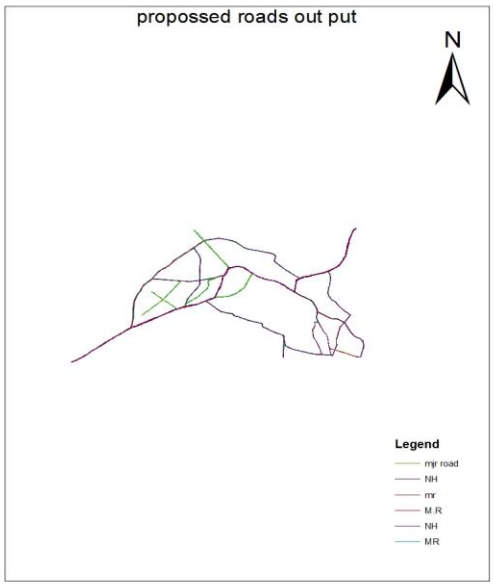
Table:3



6. RESULT AND DISCUSSION

The application of the single technique, in isolation, is rarely sufficient in bringing about a significant improvement in the Level of Service (LOS) and transportation mobility of an area. More often than not, the problems shifted to the adjacent locality or an entirely new problem is spawned as a consequence of the very technique used as a solution, if applied in isolation. It is therefore, essential to seek solutions in a combination of techniques, even in a relatively local situation, for effective management (Venkateswaralu, 1996). A solution must be observed as a part of the total scenario and the systems approach used to prepare a Transportation System Management (TSM) Plan for the entire network. we got around 85% accuracy in output when we compared with the satellite data with the ground data using the transport analyst in GIS we proposed the best routes to the warangal city . there is a possibility to extend the roads of warangal to serve better to the people without any traffic problems.

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