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ROAD INFRASTRUCTURE MAPPING FOR SADASIVPET TOWN OF MEDAK DISTRICT OF TELANGANA

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Abstract— The goal of this dissertation work is to locate specific GIS maps for various public utility services such as road network, educational institutes, electric transformations, water bodies, graveyards etc.., showing connectivity and accessibility. The first part of investigation is to study the area of Sadashivapet town of Medak district of Telangana state. It includes area, population, literacy rate, agriculture, road network, Infrastructure, etc., to know the utilities can be made for road infrastructure mapping by GIS.The second part of investigation is to collection of data the Sadashivapet town, which includes the road dataset, building, bridges, landmarks, infrastructures, water bodies, etc., for GIS mapping. The third part was import all the data collection to geo-references satellite which consists of hardware and software components for the preparation of raw data. The fourth part is to interactive GIS used for road infrastructure mapping for the purpose of analysis of different data collected which overlapped of images and formed consolidated maps, This consolidated maps is imported to GIS software identify utilities like road network, infrastructure, water bodies, bridges, route analysis. The final part has confirmed road network and utilities planning in sadshivpet town of medak district in an organized manner and this are the first step towards the development of the district. Hence investigation can be carried out by the proposed methodology, there are several improvements that can be implemented in order to have a more user-friendly and automated system and to make data accessibly for all the road users and to implement various procedures to provide more safety on roads.

Key words: Road Infrastructure, Mapping, GIS.

I. INTRODUCTION

Transportation system facilitates movement of people and goods. They consist of roads, railroads, waterways, and air transportation facilities. Among these modes of transportation, road is the most common and widespread. Indian roads are basically classified as National highways, state highways, district roads (major and minor) and village roads on their dimensions and functional status. The absence of roads in these areas because of geographic conditions and other reasons leads to the stagnation of socio-economic conditions of the villagers. Because, quality of life in a settlement very much depends on the level of availability, accessibility and quality of infrastructure it provides. J.M.Nongkynrih, D. Barman.(2018). “Road infrastructure mapping development under ArcGIS Geodatabase”. Manyazewal. (2018). “Geographic Information System (GIS) based rural road database so that planners, decision makers, researchers and other different level authorities in the rural road sector will be benefited from the final output”. Asadi et al.(2017) .“The micro level planning which is ready for manageable advancement of Singarayakonda mandal of prakasham area in digital thematic maps has prepared namely, landuse/land cover, hydro geomorphology, slope, physiographic, soil, geography, drainage and so forth utilizing satellite symbolisms on ARC/INFO GIS platform”. Gupta et al .(2017). “Developing a Web GIS framework for planning Infrastructural facilities at village level”. Mishrara and Naresh. (2016). “Geo-informatics for development of rural roads under Pradhan Mantri Gram Sadak Yojana (PMGSY), created GIS database for the DRRP and core network”. Chang and Park. (2016).“The development of a prototype model of Web-based Geographic Information System (GIS) application for efficient management of borehole and geological data. More than 10,000 boreholes and other geological data were archived into the database and Web-based GIS system was implemented for a local urban area of Seoul in Korea”.

II. STUDY AREA

Sadashivpet is a Block located in Medak district in Telangana. Located in urban part of Telangana, it is one among the 46 blocks of Medak district. According to the administration register, the block code of Sadashivpet is 186. The block has 30 villages and there are total 11298 houses in this Block. Study has been carried out for Sadashivpet is a town in Medak district of the Indian state of Telangana which covers an area of 21.70 Sq. Km with a population of 80000 as per 2011 census. The region is still poor in transportation and communication. NH 65 is the only National Highway passes through the district. The district has a total road length of 893.017kms which includes National Highway, State highway, and Major district road. As per Census 2011, Sadashivpet's town population is 51387. Out of this, 25739 are males while the females count 25648 here. This block has 6074 kids in the age group of 0-6 years. Among them 3046 are boys and 3028 are girls. Literacy ratio in Sadashivpet town block is 53%. 27310 out of total 51387 populations are educated here. In males the literacy rate is 62% as 16131 males out of total 25739 are educated while female literacy ratio is 43% as 11179 out of total 25648 females are literate. The Negative side is that illiteracy rate of Sadashivpet block is 46%. Here 24077 out of total 51387 persons are illiterate. Male illiteracy ratio here is 37% as 9608 males out of total 25739 are illiterate. In females the illiteracy rate is 56% and 14469 out of total 25648 females are illiterate in this block. The count of employed individual of Sadashivpet block is 26511 however 24876 are un-employed. And out of 26511 employed people 6021 persons are completely reliant on farming. The objective of the study is to identify road network connectivity for the newly developing village, to develop specific GIS maps for various public utility services such as educational institutes, hospitals, community health centers, bus terminus and stops, airport etc. showing connectivity and accessibility, to develop Query based services based on buffering and proximity analysis, route information like shortest route, alternate route etc. based on network analysis during emergency situation like natural disaster, movement of civil authorities during election. The study area is presented in Figure 1.

Figure 1 Study area

III. DATA COLLECTION

Roads are one of the basic modes of transportation system and also an important priority sector of Infrastructure. Systematic development of road network is one of the important pre-requisites for development and acceleration of Socio- economic growth. Among the different modes of domestic transportation systems, Road transport carries more than 80 percent of the Goods and Passenger traffic. The network of roads, particularly from rural to urban facilitates speedy movement of goods and services and ensures higher growth trends, social integrity and well being of the society. The productivity and efficiency of Road transport is directly linked with the availability and quality of Road network as presented in Table 1.

Table 1 Road Network

District Name	No. of Roads	Total Length	Length of Road (In Kms)					
			BT Roads	CC Roads	WBM Roads	Gravel Roads	Earthen Roads	Other Roads
Medak	697	1593.73	781.92	97.83	235.92	112.42	365065	0

IV. RESEARCH APPROACH

Geographic Information System (GIS) technology in the development of Road Information System, which will help the planners and administrators to identify the problems associated with rural road development activities, location and provision of appropriate facilities, monitoring and maintenance management of the assets created in the rural areas. Roads play an important role in all aspects of development such as agriculture, fishery, health, education, small-scale industries, and trade etc. The absence of roads in rural areas leads to the stagnation of socio-economic conditions of the villagers. An up-to-date road information system is the first step towards proper infrastructure building in any state. The development of model for the study is shown in Figure 2.

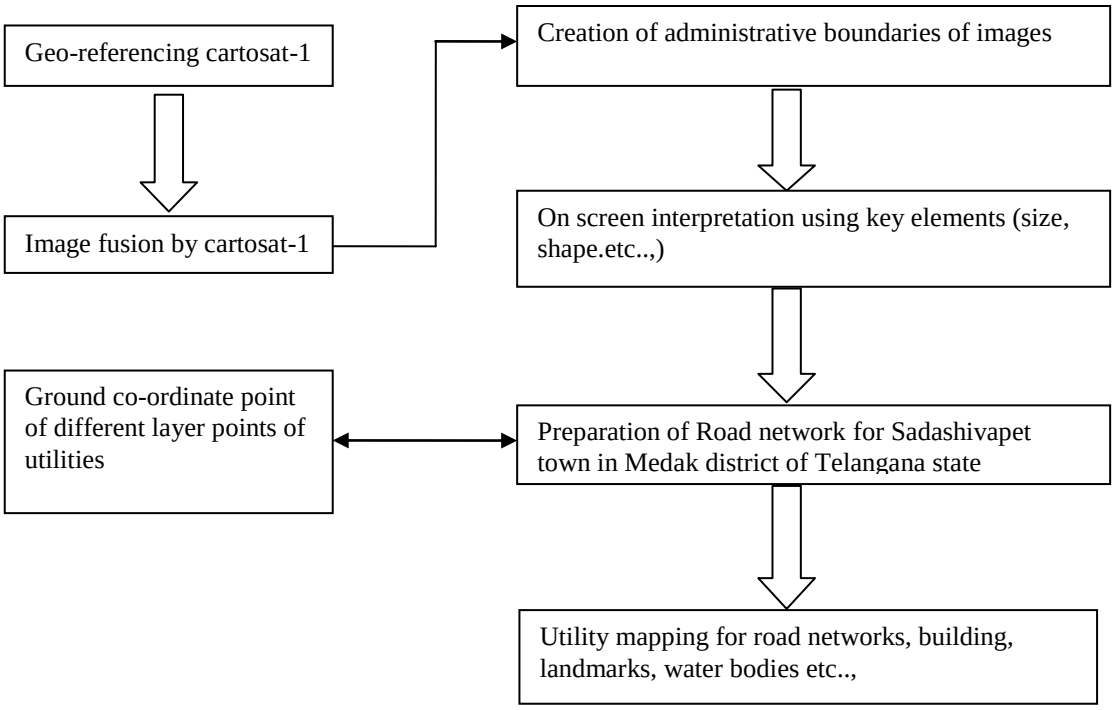

Figure 2 GIS Data Model

Step 1: Locating of roads, roundabout and bridges address using SELECTION TOOL.

Map View

The lines blue color on map in the figure automatically found the location and attribute of the federal roads in the Sadashivpet area. Same processes can be used for the state and local government roads in order to know the extent of road for developments.

Figure 3 Select road using selection tool.

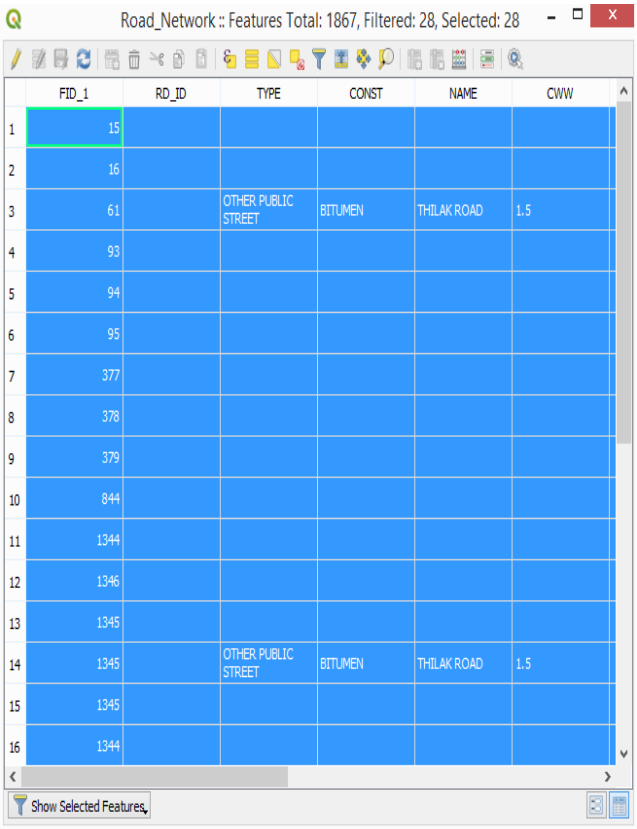

Figure 4 Features of road network

Step 2: Select road based on attributes

Figure 5 Road surfaces that are not tired

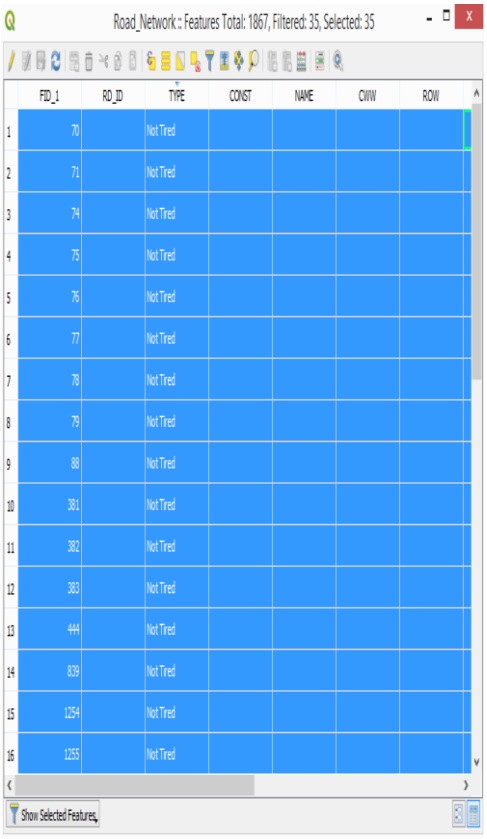

Figure 6 Features of road network not tired.

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Step 3: Identify information on a particular road, bridge and junctions using IDENTIFY TOOL.

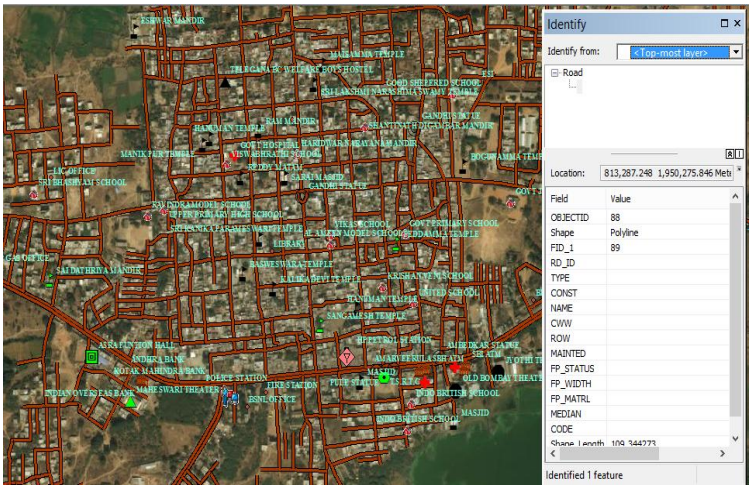

Figure 7 View of road network

***Step 4*:** Measure a road distances using MEASUREMENT TOOL.

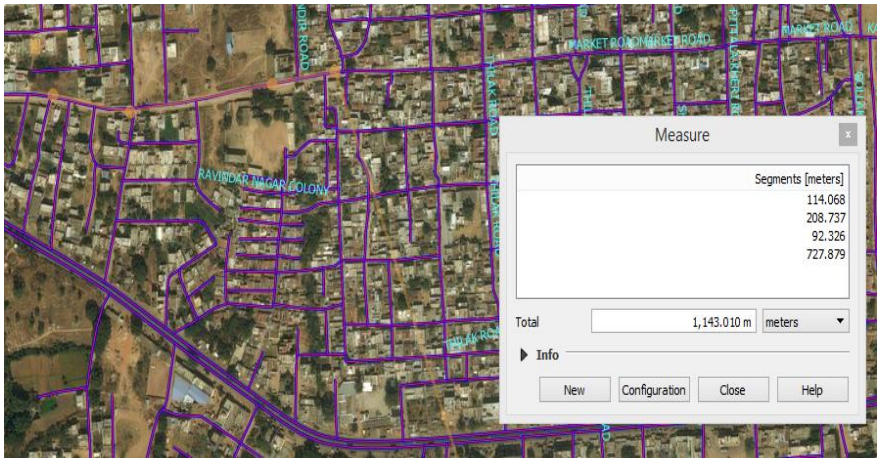

Figure 8 Measure a road distances

Step 5: Selecting Landmark

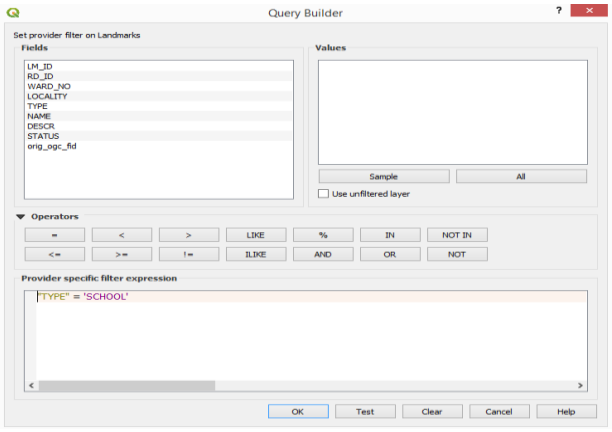

Figure 9 Query builder menu bar

Figure 10 Classification of land marks

***Step 6*:** Finding the nearest roads that are 150m from a roundabout using BUFFERING.

Figure 11 Roundabout using BUFFERING tool

By using the BUFFER TOOL, in the first figure, the roundabout that was highlighted green was the one selected for the analysis. The analysis was carried out to show how powerful GIS is in selecting features that are within a specific range for any decision pertaining road infrastructure development and management. This analysis was carried out to provide necessary information on the nearest roads and building around the roundabout within a distance of 150 m which will help road transport planner with management information to know the various houses that will be affected within the 150 radius when allocating contracts on expanding the roundabout for proper development and management.

Step 7: Route Analysis

Creating a route can mean finding the quickest, shortest, or most scenic route, depending on the impedance chosen. If the impedance is time, then the best route is the quickest route. Hence, the best route can be defined as the route that has the lowest impedance, or least cost, where the impedance is chosen by the user. Any cost attribute can be used as the impedance when determining the best route. Routing analysis for finding shortest or alternate route has the following main components: ***Route analysis layer:*** It stores all the inputs, parameters, and results of route analysis. ***Network locations for route analysis:*** Stops and Barriers are the network locations used for route analysis. ***Route analysis parameters:*** Mainly impedance, Restriction and direction are the route parameters set for set for route analysis. ***Directions*:** It displays turn-by-turn directions and maps with the impedance after the generation of a route in route analysis and closest facility analysis. If the impedance is set to length, then it will give each individual length for each segment of the route.

Figure 12 Route analysis

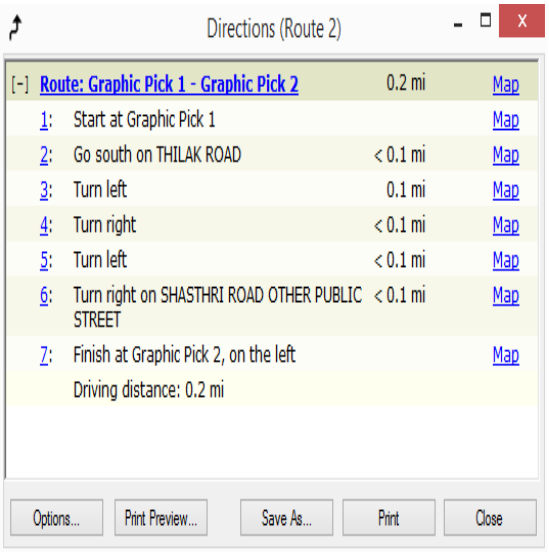

Figure 13 Menu of directions

V. RESULTS

This study has confirmed the need for road network and utilities planning in the district in an organized manner and this are the first step towards the development of the district. Moreover, all of the resources can be managed in a more efficient way, reducing the time needed to process the data. First of all, for the import of data, configured forms can be used, while for the process of the data, specific tools, based on the local needs, can be developed.

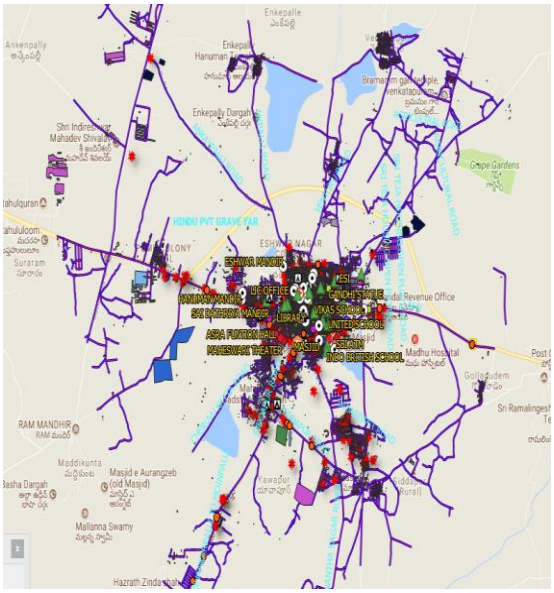

Figure 14 Road network

Figure 15 Road network

VI. CONCLUSIONS

Prepared of road network connectivity for the newly developing village. Prepared of location specific GIS maps for various public utility services such as educational institutes, hospitals, community health canters, bus terminus and stops, etc. showing connectivity and accessibility. Based on network analysis during emergency situation like natural disaster, movement of civil authorities during election etc.

VII. FUTURE SCOPE

The future aspects of the proposed methodology, there are several improvements that can be implemented in order to have a more user-friendly and automated system and to make data accessibly for all the road users and to implement various procedures to provide more utilities on roads network.

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