International Journal For Technological Research In Engineering
Volume 5, Issue 8, April-2018 *ISSN (Online): 2347 - 4718*

TRAFFIC DENSITY AND ROUTE DIVERSION ANALYSIS AT DIFFERENT JUNCTIONS FROM BN REDDY TO DILSHUKNAGAR

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ABSTRACT: Geographical Information Technologies are very useful in the collection, management, maintenance, manipulation and presentation of geographic data and or information. The uses of these technologies are known to simplify decision making to a non technical level and to support the stakeholders in sustainable-oriented decision making.For making the vector map of traffic density and route diversion analysis at different junctions from BN Reddy to Dilshuknagar with Transport Network and Settlement Areas. To create the boundary of BN Reddy to Dilshuknagar, we collected the Topo sheet from Survey of India. The image was geo referenced and created the boundary. This boundary was used to create all the features by using base image map as vector data. After vectorization each feature class area was calculated as hectors and with percentage. All the features are represented on the map with the required data finally the total data was showed with the thematic layer map and the map was prepared with the legend and north arrow. The final results were explained with the layout view.

I. INTRODUCTION

A road is a thoroughfare, route, or way on land between two places that has been paved or otherwise improved to allow travel by foot or some form of conveyance, including a horse, cart, bicycle, or motor vehicle. Roads consist of one or two roadways (British English: carriageways), each with one or more lanes and any associated sidewalks (British English: pavement) and road verges. Roads that are available for use by the public may be referred to as public roads or as highways. The Organization for Economic Co-operation and Development (OECD) defines a road as "a line of communication (travelled way) using a stabilized base other than rails or air strips open to public traffic, primarily for the use of road motor vehicles running on their own wheels," which includes "bridges, tunnels, supporting structures, junctions, crossings, interchanges, and toll roads, but not cycle paths." In urban areas roads may diverge through a city or village and be named as streets, serving a dual function as urban space easement and route. Modern roads are normally smoothed, paved, or otherwise prepared to allow easy travel. Historically many roads were simply recognizable routes without any formal construction or maintenance.

II. LITERATURE REVIEW

Karn and Harada (2001); Bouman et al. (2002); Liu and Diamond (2005) adds that the water quality in most Asian rivers, lakes, streams and wetlands has been heavily degraded, mainly due to agricultural runoff of pesticides and fertilizers, and industrial and municipal wastewater discharges, all of which cause widespread eutrophication. Less than 50% of the domestic wastewater in Asia is treated, compared with 80% in the developed world. In major metropolitan areas, more than 95% of wastewater from Asian cities is discharged directly into rivers, lakes and streams without any treatment at all. Consequently, the bacterial level resulting from human waste found Asian rivers is threefold higher than the world average and 50- fold higher than World Health Organization guidelines (UNEP, 1999).

The Indian experience on use of satellite data for LULC analysis is mentioned in the Manual on National land Use Mapping at 1:250000 scale using IRS-P6 AWiFS data (NRSA, 2004), The work was carried out by National Remote Sensing Centre (erstwhile NRSA). Department of Space, Government of India, in collaboration with various central and state government organizations. Realizing the need for an up-to-date nationwide LULC maps by several departments in the country, as a prelude, a LULC classification system with 24 categories up to Level-II, suitable for mapping on 1:250,000 scale, was developed by NRSC by taking into consideration the existing land use classification adopted by NATMO, CAZRI, Ministry of Agriculture, Revenue Department, AIS & LUS, etc., and the details obtainable from satellite imagery. After discussions with nearly 40 user departments / institutions in the country a 22 fold classification system was finalized and adopted for Nationwide LULC Analysis.

Bisht and Kothyari (2001) have carried out land cover change analysis of Guru Ganga watershed in Uttaranchal. The study from 1963 to 1996 and 1986 to 1996 revealed that the area under agriculture and settlement has increased whereas the forest and barren land show decline in area. Dhinwa et al. (1992) studied land use change of Bharatpur district, the analysis in the study reveal that forest cover has been depleted whereas wasteland undulating terrain with or without scrub and rock out crops has been increased during 1986 to 1989.

III. METHODOLOGY

3.1 STUDY AREA

B N Reddy Nagar is a Locality in Hyderabad City in Telangana State, India. It belongs to Telangana region . Gurram Guda , Hastinapuram , Vanasthalipuram ,

Chintalakunta , Keshavapuram Colony are the nearby Localities to B N Reddy Nagar. Hastinapuram is a neighbourhood of Hyderabad. It is located towards Nagarjuna Sagar highway road. Its neighbouring areas are B.N. Reddy Nagar, Vanasthali Puram and LB Nagar. Vanasthalipuram is a very busy commercial and residential locality in the L. B. Nagar zone of Hyderabad. It is located towards (Vijayawada) and Nagarjuna Sagar highway roads. Lal Bahadur Nagar, well known as L. B. Nagar, is a commercial and residential hub. It was once a Municipality in Ranga Reddy district. It is the main entrance for Hyderabad when approaching the city from eastern direction through Vijayawada highway NH 65. Dilsukhnagar is one of the largest commercial and residential centres in Hyderabad. It was once part of the Municipal Corporation of Hyderabad, but later merged with the Greater Hyderabad Municipal Corporation.

Coordinates: Left: 78°30'40"E, Top: 17°22'30"N, Right: 78°34'50"E, Bottom: 17°18'30"N

Figure 1: Local Area Map

3.2 FLOW CHART

3.3 SOFTWARE USED

3.3.1 ARCGIS

History of Software Development:

Developer – ESRI - Environmental Systems Research Institute, Inc., in 1969 as a privately held consulting firm that specialized in land use analysis projects. Software Developers originated at Harvard graphics lab. Arc Info – early version of software

- Main-frame, unix-based software
- “arc” refers to line segments of map elements
- “info” refers to information in database system
- Command driven software package (analogous to “DOS”)
- ArcView (1990’s)– first release of a windows-based, GUI (graphical- user interface)based GIS system for desktop computers; still available but phasing out.
- ArcGIS (2000’s) – next generation GIS software merging codes and routines from best of ArcInfo and placed in a GUI-Windows environment of ArcView, compatible with desktop computing.

3.3.2 ArcGIS 8.x

In late 1999, Esri released ArcGIS 8.0, which ran on the Microsoft Windows operating system. ArcGIS combined the visual user-interface aspect of ArcView GIS 3.x interface with some of the power from the Arc/INFO version 7.2 workstation. This pairing resulted in a new software suite called ArcGIS, which included the command-line Arc Info workstation (v8.0) and a new graphical user interface application called ArcMap (v8.0) incorporating some of the functionality of Arc Info with a more intuitive interface, as well as an ArcGIS file management application called ArcCatalog (v8.0). The release of the ArcGIS suite constituted a major change in Esri's software offerings, aligning all their client and server products under one software architecture known as ArcGIS, developed using Microsoft Windows standards.

One major difference is the programming (scripting) languages available to customize or extend the software to suit particular user needs. In the transition to ArcGIS, Esri dropped support of its application-specific scripting languages, Avenue and the ARC Macro Language (AML), in favour of Visual Basic for Applications scripting and open access to ArcGIS components using the Microsoft COM standards. ArcGIS is designed to store data in a proprietary RDBMS format, known as geodatabase. ArcGIS 8.x introduced other new features, including on-the-fly map projections, and annotation in the database.

Updates of Arc View 3.x extensions, including 3D Analyst and Spatial Analyst, came later with release of ArcGIS 8.1, which was unveiled at the ESRI International User Conference in 2000. ArcGIS 8.1 was officially released on April 24, 2001. Other new extensions were made available with ArcGIS 8.1, including GeoStatistical Analyst. ArcGIS 8.1 also added the ability to access data online, directly from the Geography Network site or other ArcIMS map services. ArcGIS 8.3 was introduced in 2002, adding topology to geodatabases, which was a feature originally available only with ArcInfo coverage's.

3.3.3 ArcGIS 9.x

ArcGIS 9 was released in May 2004, which included ArcGIS Server and ArcGIS Engine for developers. The ArcGIS 9 release includes a geo processing environment that allows execution of traditional GIS processing tools (such as

clipping, overlay, and spatial analysis) interactively or from any scripting language that supports COM standards. Although the most popular of these is Python, others have been used, especially Perl and VBScript. ArcGIS 9 includes a visual programming environment, similar to ERDAS IMAGINE's Model Maker (released in 1994, v8.0.2). The Esri version is called Model Builder and as does the ERDAS IMAGINE version allows users to graphically link geoprocessing tools into new tools called models. These models can be executed directly or exported to scripting languages which can then execute in batch mode (launched from a command line), or they can undergo further editing to add branching or looping.

3.3.4 ArcGIS 10.x

- In 2010 Esri announced that the prospective version 9.4 would become version 10 and would ship in the second quarter of 2010.
- In June 2012 Esri released ArcGIS 10.1.
- In July 2013 Esri released ArcGIS 10.2.
- In December 2014 Esri released ArcGIS 10.3. The release included ArcGIS Pro 1.0, which became available in January 2015.
- In February 2016 Esri released ArcGIS 10.4.
- In December 2016 Esri released ArcGIS 10.5.
- In January 2018 Esri released ArcGIS 10.6

3.3.5 Geodatabase

Older Esri products, including ArcView 3.x, worked with data in the shapefile format. ArcInfo Workstation handled coverages, which stored topology information about the spatial data. Coverages, which were introduced in 1981 when ArcInfo was first released, have limitations in how they handle types of features. Some features, such as roads with street intersections or overpasses and underpasses, should be handled differently from other types of features.

ArcGIS is built around a geodatabase, which uses an object-relational database approach for storing spatial data. A geodatabase is a "container" for holding datasets, tying together the spatial features with attributes. The geodatabase can also contain topology information, and can model behaviour of features, such as road intersections, with rules on how features relate to one another. When working with geodatabases, it is important to understand feature classes which are a set of features, represented with points, lines, or polygons. With shape files, each file can only handle one type of feature. A geodatabase can store multiple feature classes or type of features within one file.

Geodatabases in ArcGIS can be stored in three different ways – as a "file geodatabase", a "personal geodatabase", or an "ArcSDE geodatabase". Introduced at 9.2, the file geodatabase stores information in a folder named with a .gdb extension. The insides look similar to that of a coverage but is not, in fact, a coverage. Similar to the personal geodatabase, the file geodatabase only supports a single editor. However, unlike the personal geodatabase, there is virtually no size limit. By default, any single table cannot exceed 1TB, but this can be changed. Personal geodatabases store data in Microsoft Access files, using a BLOB field to store the geometry data. The OGR library is able to handle this file type, to convert it to other file formats. Database administration tasks for personal geodatabases, such as managing users and creating backups, can be done through ArcCatalog. Personal geodatabases, which are based on Microsoft Access, run only on Microsoft Windows and have a 2 gigabyte size limit. Enterprise (multi-user) level geodatabases are handled using ArcSDE, which interfaces with high-end DBMS such as PostgreSQL, Oracle, Microsoft SQL Server, DB2 and Informix to handle database management aspects, while ArcGIS deals with spatial data management. Enterprise level geodatabases support database replication, versioning and transaction management, and are cross-platform compatible, able to run on Linux, Windows, and Solaris.

Also released at 9.2 is the personal SDE database that operates with SQL Server Express. Personal SDE databases do not support multi-user editing, but do support versioning and disconnected editing. Microsoft limits SQL Server Express databases to 4GB.

3.3.6 Components and product levels

ArcGIS consists of Desktop GIS products, as well as GIS products that run on a server, or on a mobile device.

3.3.6.1 ArcGIS for Desktop and Product Levels

ArcGIS for Desktop is available at different product levels, with increasing functionality.

ArcReader (freeware, viewer) is a basic data viewer for maps and GIS data published in the proprietary Esri format using ArcGIS Publisher. The software also provides some basic tools for map viewing, printing and querying of spatial data. ArcReader is included with any of the ArcGIS suite of products, and is also available for free to download. ArcReader only works with pre authored published map files, created with ArcGIS Publisher.

ArcGIS for Desktop Basic, formerly known as ArcView, is the entry level of ArcGIS licensing offered. With ArcView, one is able to view and edit GIS data held in flat files, or view data stored in a relational database management system by accessing it through ArcSDE.

ArcGIS for Desktop Standard, formerly known as ArcEditor, is the midlevel software suite designed for advanced editing of spatial data published in the proprietary Esri format. It provides tools for the creation of map and spatial data used in GIS, including the ability of editing geodatabase files and data, multiuser geodatabase editing, versioning, raster data editing and vectorization, advanced vector data editing, managing coverages, coordinate geometry (COGO), and editing geometric networks. ArcEditor is not intended for advanced spatial analysis.

ArcGIS for Desktop Advanced, formerly known as ArcInfo, allows users the most flexibility and control in "all aspects of data building, modelling, analysis, and map display." ArcInfo includes increased capability in the areas of spatial analysis, geoprocessing, data management, and others.

Other desktop GIS software include ArcGIS Explorer and ArcGIS Engine. ArcGIS Explorer is a GIS viewer which can work as a client for ArcGIS Server, ArcIMS, ArcWeb Services and Web Map Service (WMS).

ArcGIS Online is a web application allowing sharing and

search of geographic information, as well as content published by Esri, ArcGIS users, and other authoritative data providers. It allows users to create and join groups, and control access to items shared publicly or within groups.
ArcGIS Web Mapping APIs are APIs for several languages, allowing users to build and deploy applications that include GIS functionality and Web services from ArcGIS Online and ArcGIS Server. Flex, Adobe Air and Windows Presentation Foundation (WPF) are supported for desktop applications.

3.3.6.2 Com
ArcGIS for Desktop consists of several integrated applications, including ArcMap, ArcCatalog, ArcToolbox, ArcScene, ArcGlobe, and ArcGIS Pro. ArcCatalog is the data management application, used to browse datasets and files on one's computer, database, or other sources. In addition to showing what data is available, ArcCatalog also allows users to preview the data on a map. ArcCatalog also provides the ability to view and manage metadata for spatial datasets. ArcMap is the application used to view, edit and query geospatial data, and create maps. The ArcMap interface has two main sections, including a table of contents on the left and the data frame(s) which display the map. Items in the table of contents correspond with layers on the map. ArcToolbox contains geoprocessing, data conversion, and analysis tools, along with much of the functionality in ArcInfo. ArcScene is an application which allows the user to view their GIS data in 3-D and is available with the 3D Analyst License.[55] In the layer properties of ArcScene there is an Extrusion function which allows the user to exaggerate features three dimension-ally. ArcGlobe is another one of ArcGIS's 3D visualization applications available with the 3D Analyst License. ArcGlobe is a 3D visualization application that allows you to view large amounts of GIS data on a globe surface. The ArcGIS Pro application was added to ArcGIS for Desktop in 2015. It had the combined capabilities of the other integrated applications and was built as a fully 64-bit software application.
3.3.6.3 Extensions
There are a number of software extensions that can be added to ArcGIS for Desktop that provide added functionality, including 3D Analyst, Spatial Analyst, Network Analyst, Survey Analyst, Tracking Analyst, and Geostatistical Analyst. Advanced map labeling is available with the Maplex extension, as an add-on to ArcView and ArcEditor and is bundled with ArcInfo. Numerous extensions have also been developed by third parties, such as the MapSpeller spell-checker, ST-Links PgMap XTools and MAP2PDF for creating georeferenced pdfs (GeoPDF), ERDAS' Image Analysis and Stereo Analyst for ArcGIS, and ISM's PurVIEW, which converts Arc- desktops into precise stereo-viewing windows to work with stereoscopic image models for accurate geodatabase-direct editing or feature digitizing.

3.3.6.4 Address locator
An address locator is a dataset in ArcGIS that stores the address attributes, associated indexes, and rules that define the process for translating nonspatial descriptions of places, such as street addresses, into spatial data that can be displayed as features on a map. An address locator contains a snapshot of the reference data used for geocoding, and parameters for standardizing addresses, searching for match locations, and creating output. Address locator files have a .loc file extension. In ArcGIS 8.3 and previous versions, an address locator was called a geocoding service.
3.3.6.5 Other products
ArcGIS Mobile and ArcPad are products designed for mobile devices. ArcGIS Mobile is a software development kit for developers to use to create applications for mobile devices, such as smart phones or tablet PCs. If connected to the Internet, mobile applications can connect to ArcGIS Server to access or update data. ArcGIS Mobile is only available at the Enterprise level.
Server GIS products include ArcIMS (web mapping server), ArcGIS Server and ArcGIS Image Server. As with ArcGIS Desktop, ArcGIS Server is available at different product levels, including Basic, Standard, and Advanced Editions. ArcGIS Server comes with SQL Server Express DBMS embedded and can work with enterprise DBMS such as SQL Server Enterprise and Oracle.[64] The Esri Developer Network (EDN) includes ArcObjects and other tools for building custom software applications, and ArcGIS Engine provides a programming interface for developers.
For non-commercial purposes, Esri offers a home use program with an annual license fee.
3.3.6.6 ArcGIS Engine
The ArcGIS Engine is an ArcGIS software engine, a developer product for creating custom GIS desktop applications.
ArcGIS Engine provides application programming interfaces (APIs) for COM, .NET, Java, and C++ for the Windows, Linux, and Solaris platforms. The APIs include documentation and a series of high-level visual components to ease building ArcGIS applications.
ArcGIS Engine includes the core set of components, ArcObjects, from which ArcGIS Desktop products are built. With ArcGIS Engine one can build stand-alone applications or extend existing applications for both GIS and non-GIS users. The ArcGIS Engine distribution additionally includes utilities, samples, and documentation. One ArcGIS Engine Runtime or ArcGIS Desktop license per computer is necessary
3.3.7 Goals of the Software
This exercise introduces you to ArcMap and ArcCatalog. You use these applications to create a map of pan evaporation stations in Texas, and to draw a graph of monthly pan evaporation data measured at these stations.
The relationship between ArcGIS and MS Word and Excel is demonstrated so that you can create graphs in Excel, maps in ArcGIS and place the result in a Word file as a report for this homework. You use ArcCatalog to create a new personal geodatabase and import shape files to a feature dataset.
3.4 PROCEDURE
Attaching of toposheet or any data to the arc map:
3.4.1 ArcMap
To Open ArcMap: Open A rcMap through Start button - all programs – ArcGIS- ArcMap. It opens the ArcMap window as shown below.

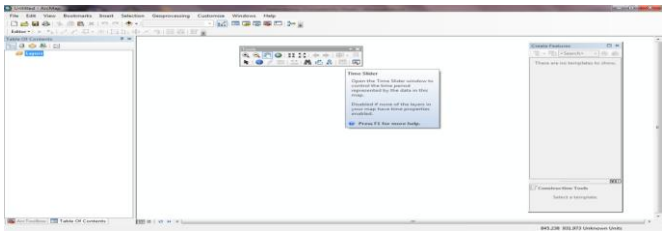

Figure 7: ArcMap Window

To add the any data we use add (+) data tool which is located on the standard tool bar. Add data tool as shown below and go to the location of toposheet - Add - Yes - Ok. To add either raster or vector data we use the same tool as above.

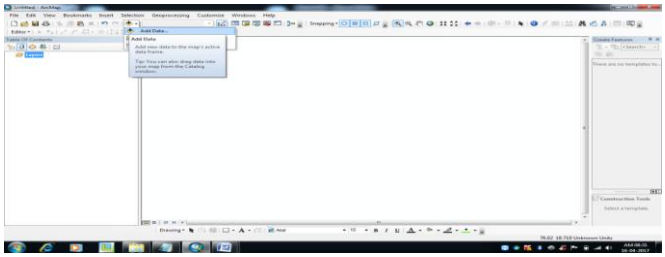

Figure 8: Add Data Window

Add the base map using add (+) data tool which is located on the standard tool bar. Add Base map tool as shown below. To add either raster or vector data we use the same tool as above.

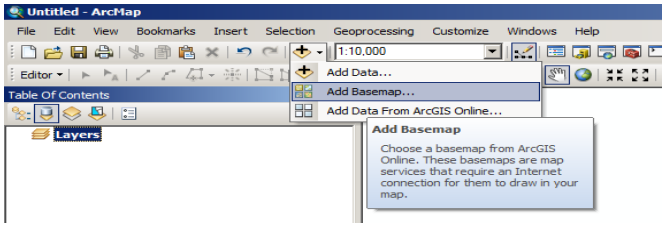

Figure 9: Add Basemap

Select the Imagery and Select the Add. We get the image as shown below. After adding it looks as below.

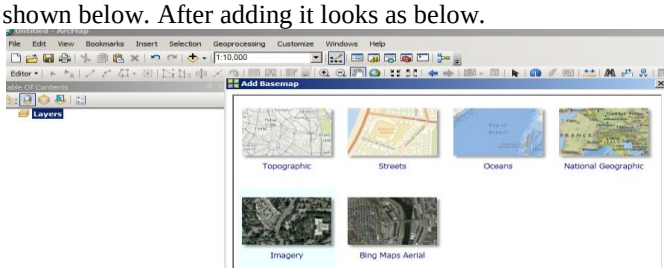

Figure 10: base map

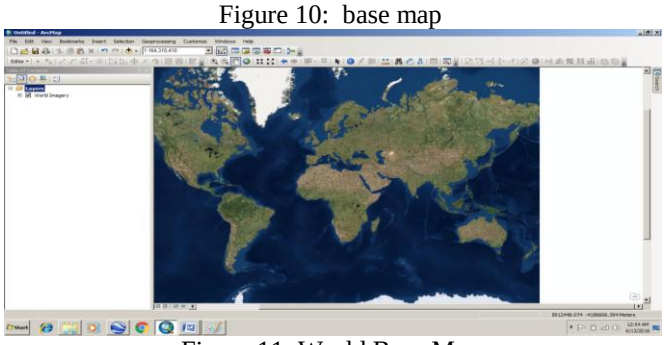

Figure 11: World Base Map

After adding the base map to identify all the features, this map will give the clear picture than toposheet. Toposheet is to identify the location easily and Base map for the clear picture.

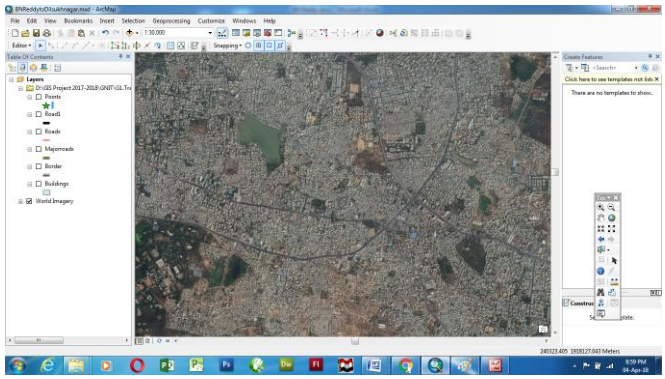

Figure 12: Toposheet

3.4.3 Creating of Feature classes and Shape files

Open ARCCATALOG: Start button – All programs – ARCGIS – Arccatalog10.2

In Arccatalog window select any one of the drive as ArcMap and shown below.

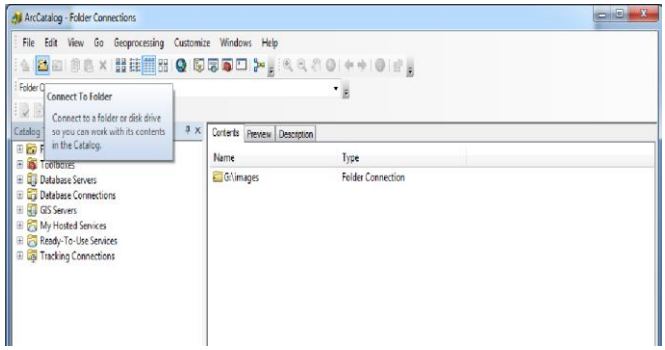

Figure 13: Create folder

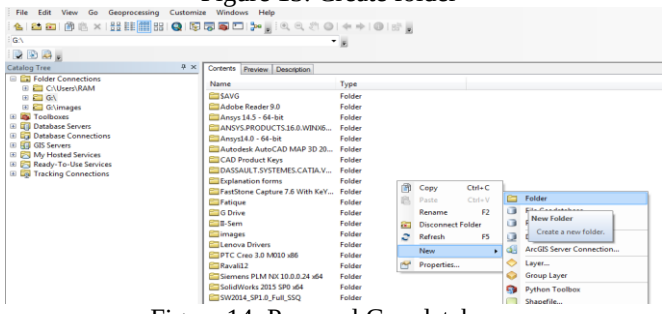

Figure 14: Personal Geo database

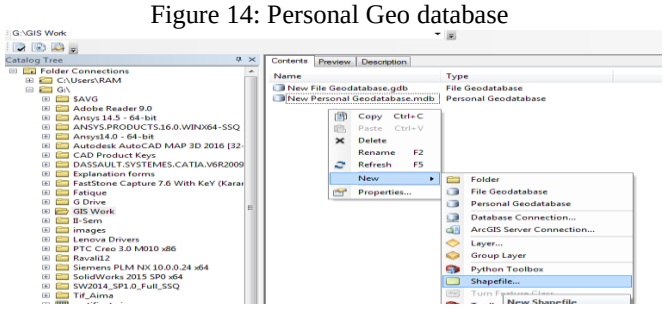

Figure 15: Shape File

The file Geodatabase will be used as server to work many people at a time on single project.

But in Personal Geo database only one person can work as individual.

After creating file or personal geo database double click on that and in that right click-new-feature dataset – Name: All – Next – Favourites – Next – Finish.

Double click on feature dataset – Right click – new - feature

class – Name: Type the required name (Schools) – In Type – Select Point Features – Next – Finish. Do the same procedure for the remaining feature classes ex: roads (Line Feature), Buildings (polygon) etc.

While Creating the files use the coordinate system as below.

ex: For Shape file . go to any one of the drive – to create a folder – Right click – new - personal geodatabase – double click on the database file - Right click – new – Feature dataset – All – next – select –Geographical coordinate system – world - WGS1984 – Next – Next – Finish.

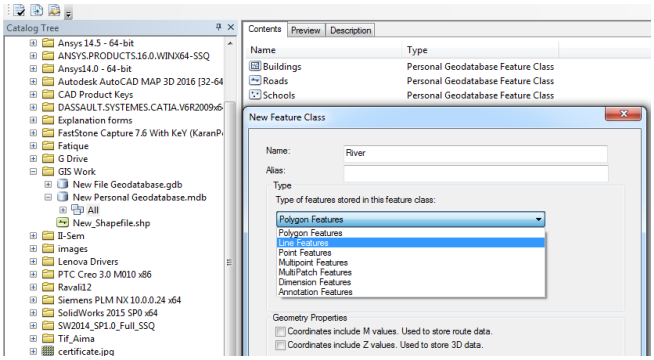

Figure 16: Create Feature classes

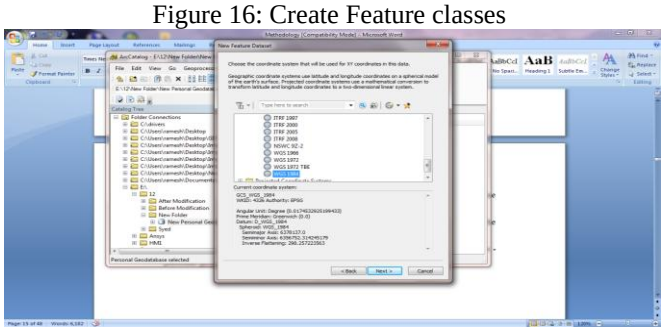

Figure 17: After Creating Shape File.

While creating the shape file we select the required coordinate system for the referenced work to place at it's original location. with the created poly line. In this we can create the contours. To add the shape file go to Arc Map – Select Add data tool and go to the location of file and add as shown below.

To start the editing select start editing tool from editor tool bar. Now we have to start the vector data creation (rectangle border).

Draw the boundary as shown below. This was used to create all the features like roads, Buildings, Water Bodies, Greenery etc. To draw the boundary use the toposheet for easy understanding.

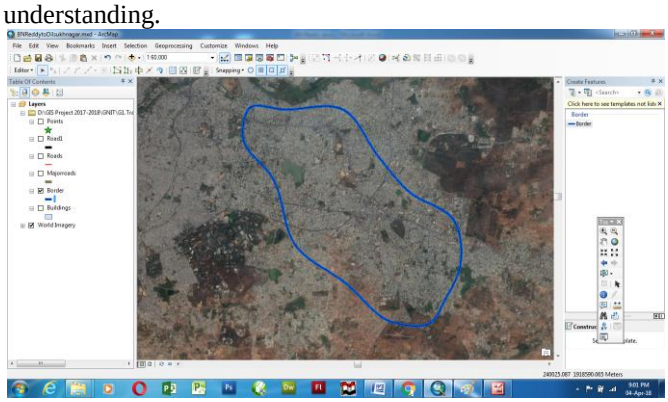

Figure 18: Toposheet boundary map

3.4.3.1 Road Network

A road is a thoroughfare, route, or way on land between two places that has been paved or otherwise improved to allow travel by foot or some form of conveyance, including a motor vehicle, cart, bicycle, or horse.

3.4.3.2 Major Roads: These roads connects the major cities in the state.

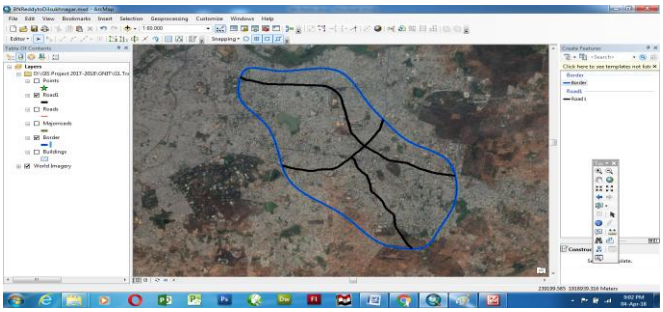

Figure 19: Major Roads

3.4.3.3 Minor Roads: These roads connects the internal city roads and some major roads.

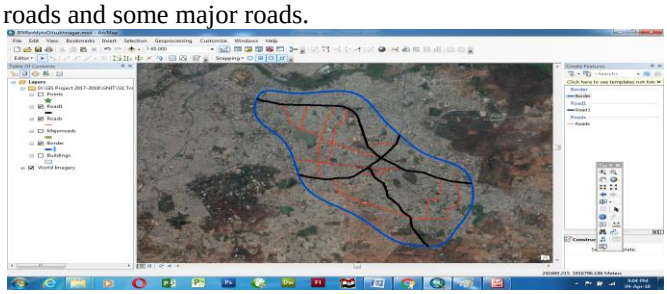

Figure 20: Minor Roads

3.4.3.4 Buildings

It is a place where people live. This can be a community that's smaller than a town, like a village. Also, if one country establishes a colony somewhere else, that can be called a settlement.

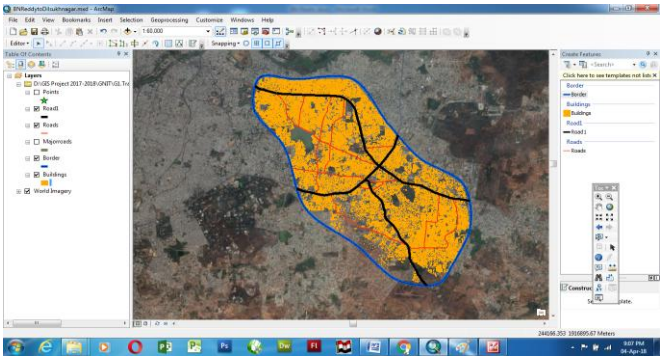

Figure 21: Buildings

To see the buildings clearly see the some portion showed below, this show the buildings as real.

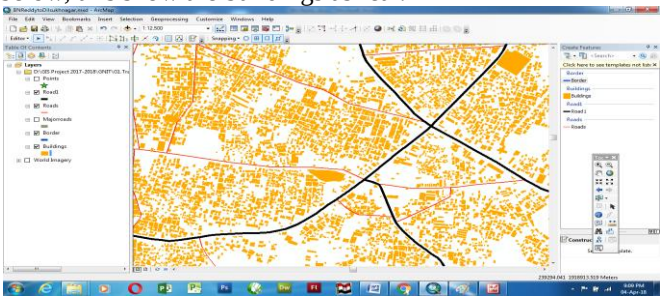

Figure 22: Clear Portion of building

3.4.3.5 Settlement and Roads Network

It is a place where people live. This can be a community that's smaller than a town, like a village. Also, if one country establishes a colony somewhere else, that can be called a settlement.

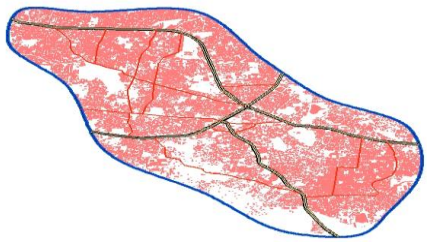

Figure 23: Settlement and Road Network

After creating all the features to display the labels on the features. Add the data in the attribute table.

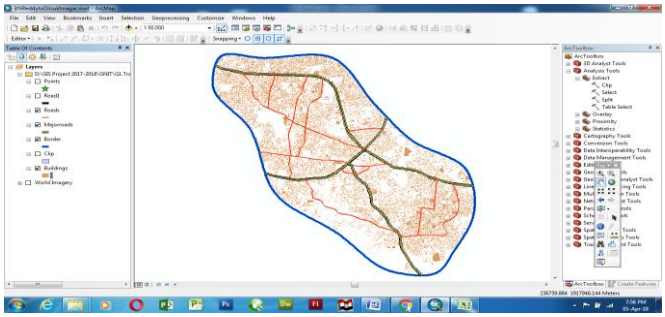

Figure 24: Create the Fields

To create the fields – right click on feature class – Open Attribute table – Options – Add fields – Type the name of field – Ok. In the fields type required.

Display the Name Right Click Properties - Labels - Select Label features in the layer -In the Text string select State - OK.

3.4.4 Legend and North Arrow

To prepare the map with title , Legend , North Arrow and etc. The default layout we get as portrait this is not suitable for our map, so convert into landscape and fit the frame into border.

Figure 25: map with Title, Legend, and North Arrow

After fitting the border into layout frame it looks as shown below.

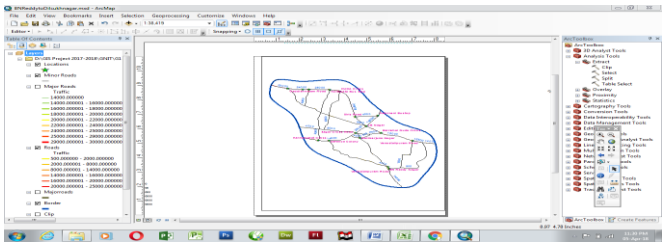

Figure 26: Layout Frame

3.4.4.1 To assign North Arrow map title etc.

Select Layout View in this we get Portrait keep it as portrait – Ok. But it won't fit into the screen to fit – Drawing – Distribute – Fit to screen – select full extent tool from tools toolbar.

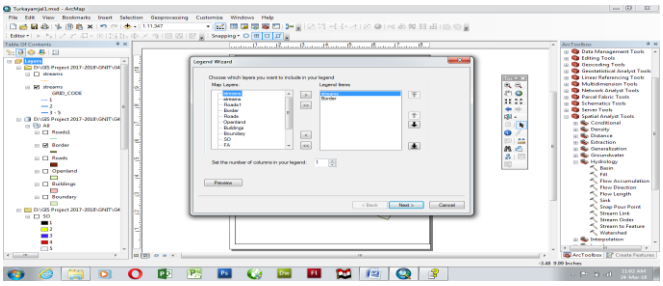

Figure 27: Assign North Arrow Map

To add the title – insert menu – Title – Now type the Project Title. Add North Arrow from insert menu .To add the Legend – Insert – Legend – In the legend Item keep only required feature class and remove the unnecessary – next – next – next – next – Finish.

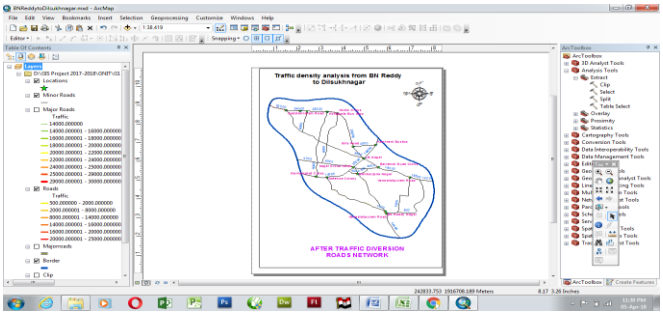

Figure 28: Adding Coordinate Points

Adding of Coordinate points on the layout view: Layer - Properties - Grid - New Grid - Next - Next - Next - Next - Finish - OK.

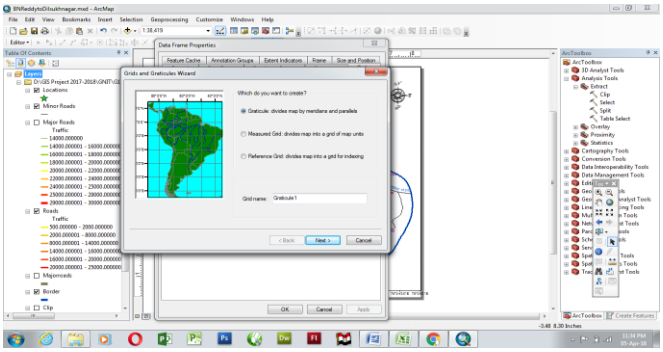

Figure 29: Layout View

The Coordinate points displays on the layout view. Now change the grid properties as shown below.

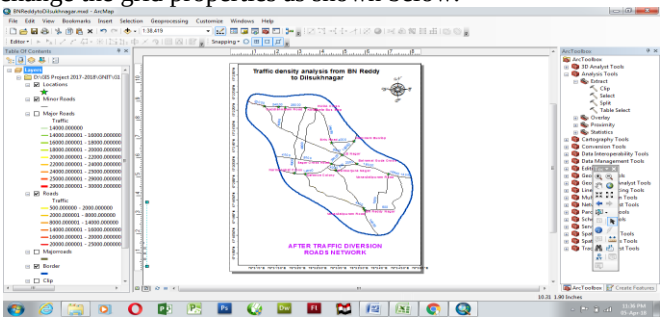

Figure 30: Grid Properties

Place the legend at required location. After completing all the tasks we can see the map as shown below. After adding the title now it is the final output of resultant map with all the data. This can be used as a demonstration map based on our requirement.

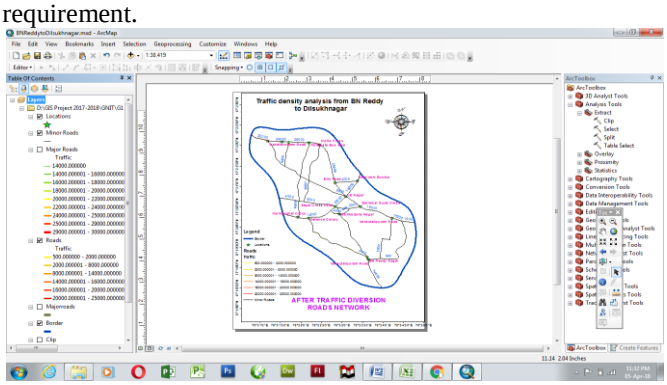

Figure 31: Final Map

IV. RESULTS AND DISCUSSIONS

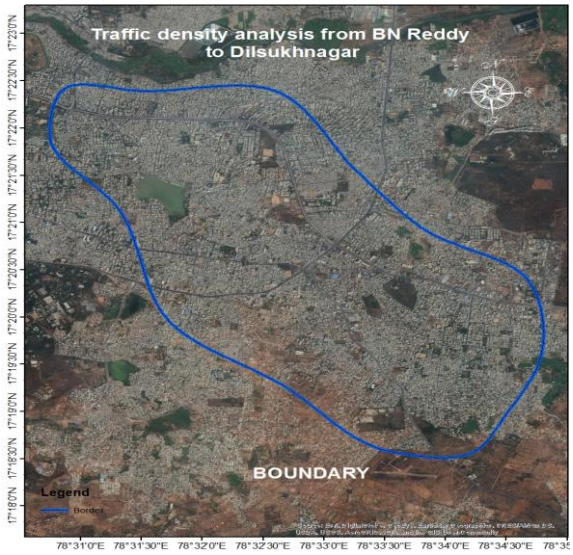

Figure 32 Boundaries Map

The above boundary with image was taken from the base image map to cover BN Reddy Nagar and Dilsukhnagar, which was used to create the features.

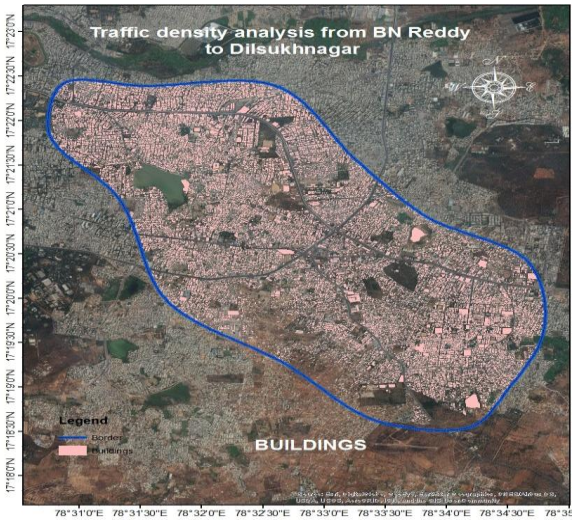

Figure 33 Buildings Map

Building features were created from the above boundary with base image map to cover BN Reddy Nagar and Dilsukhnagar.

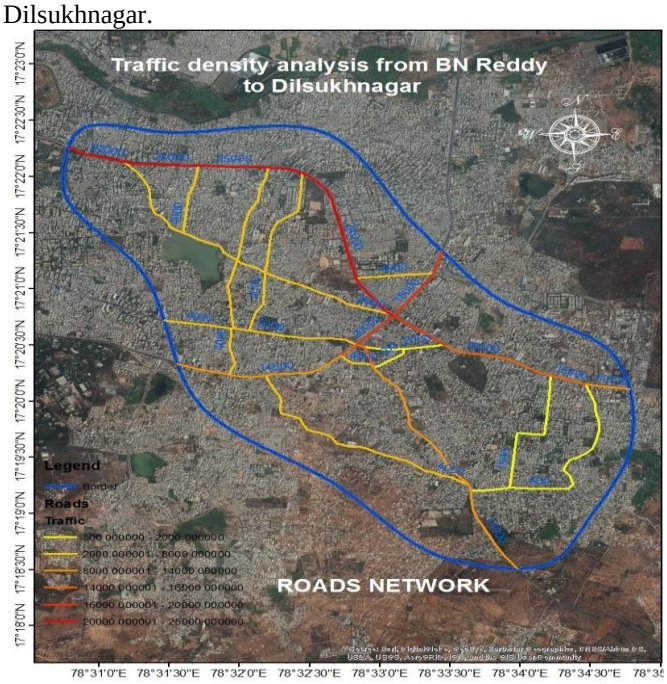

Figure 34 Road Network

Roads network was created from the above boundary with base image map to cover BN Reddy Nagar and Dilsukhnagar.

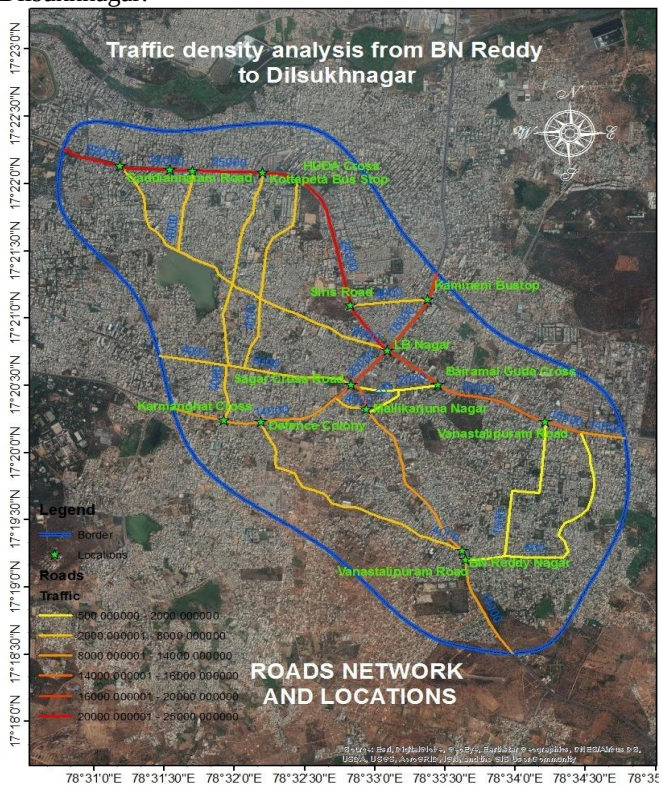

Figure 35 Road Networks and Locations

Junctions and roads network was created from the above boundary with base image map to cover BN Reddy Nagar and Dilsukhnagar.

Figure 36 Roads, Buildings and Locations

Buildings, Junctions and roads network was created from the above boundary with base image map to cover BN Reddy Nagar and Dilsukhnagar.

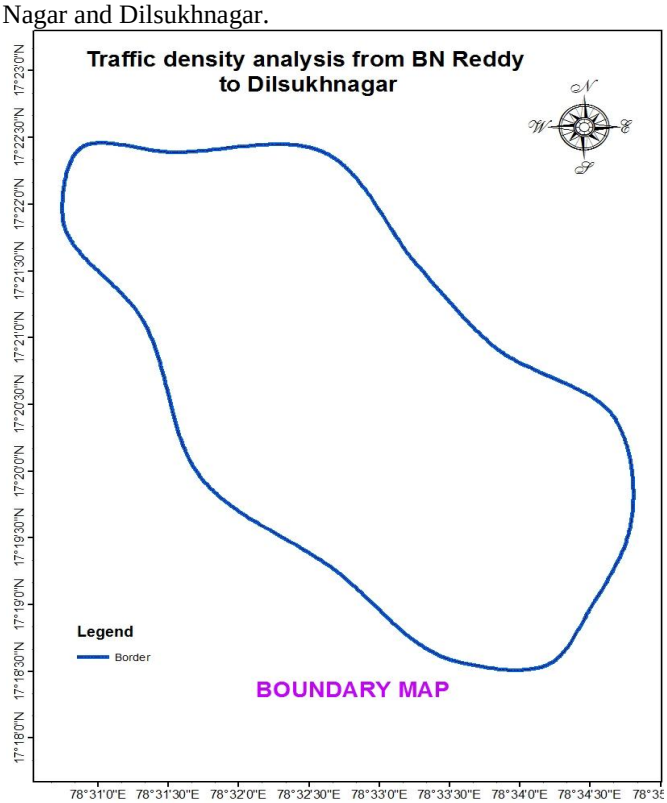

Figure 37 Final Boundary Map

The above boundary was shown without image for easy understanding of area, which was used to create the features like road network, buildings etc.

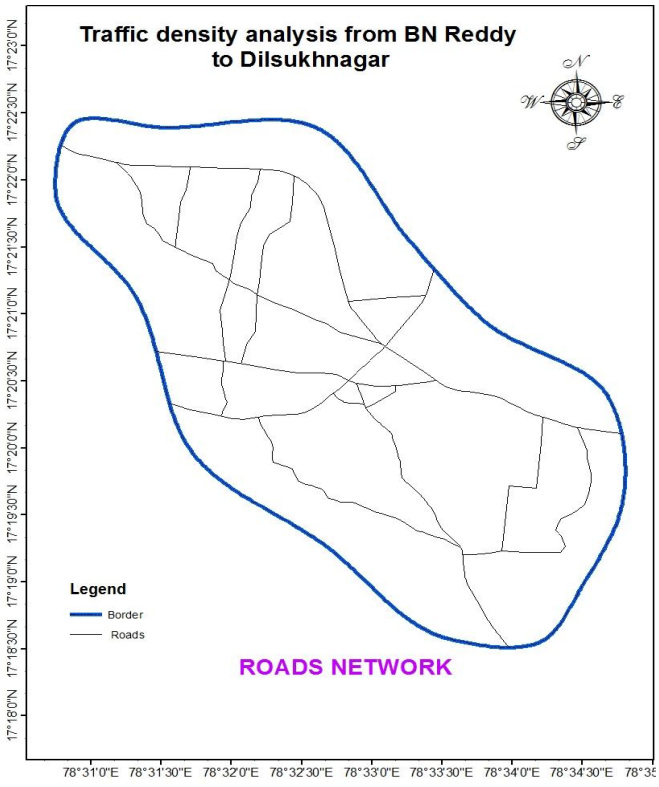

Figure 38 Final Roads Network

The road network was created from the above boundary, which was shown without image for easy understanding of area, which was used to create the remaining features.

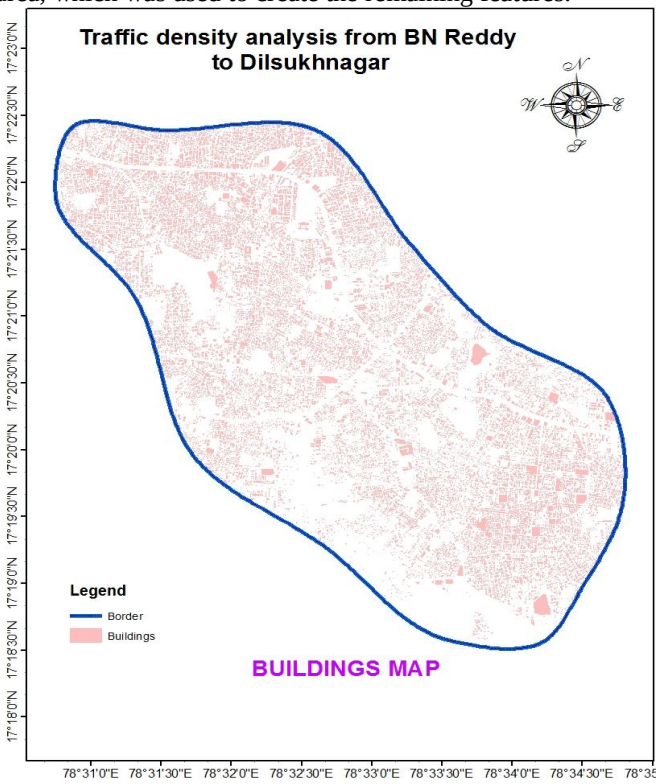

Figure 39 Final Buildings Map

The buildings were created from the above boundary, which was shown without image for easy understanding of area, which was used to create the remaining features.

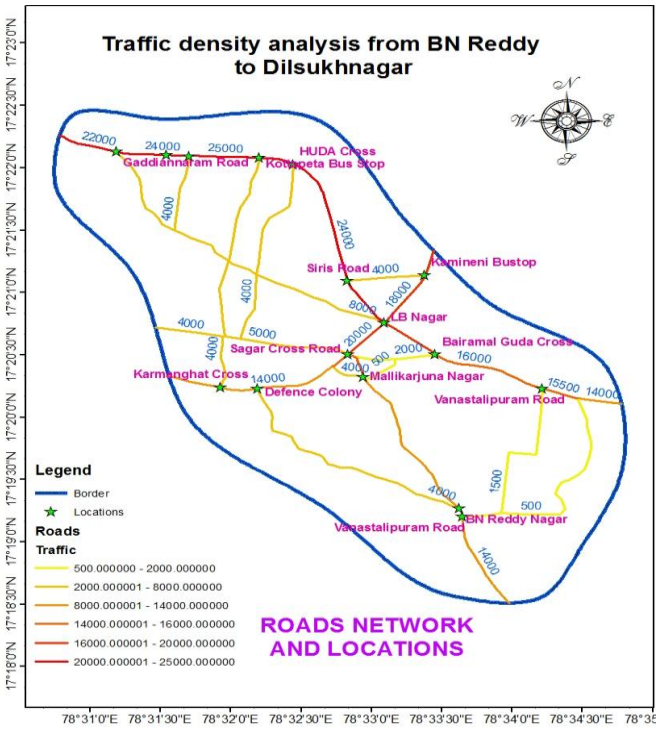

Figure 40 Final Roads Network and Locations

The road network was created and analysed based on the density in the above boundary, which was shown without image for easy understanding of area, which was used to create the remaining features.

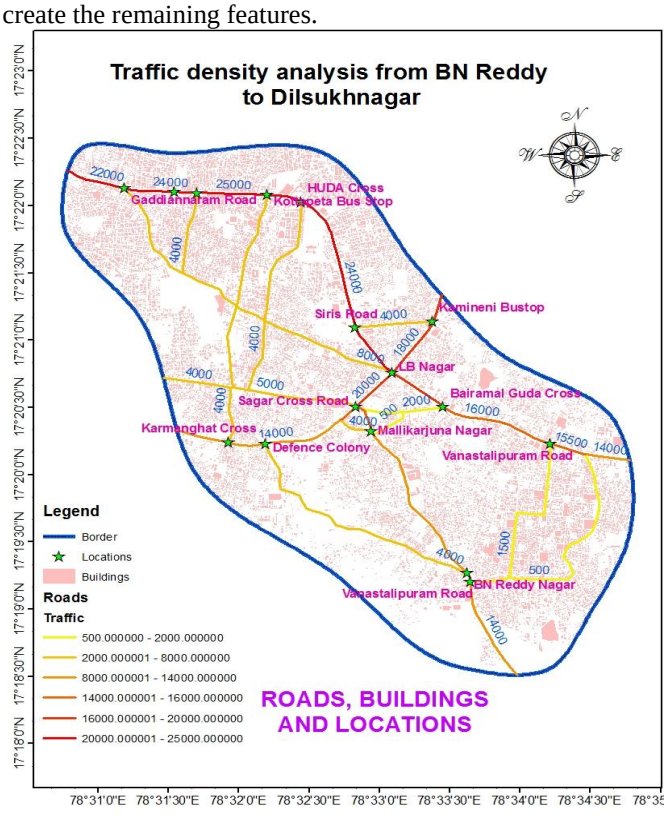

Figure 40 Final Roads, Buildings and Locations

The road network, junctions and buildings were created and analysed based on the density in the above boundary, which was shown without image for easy understanding of area, which was used to create the remaining features.

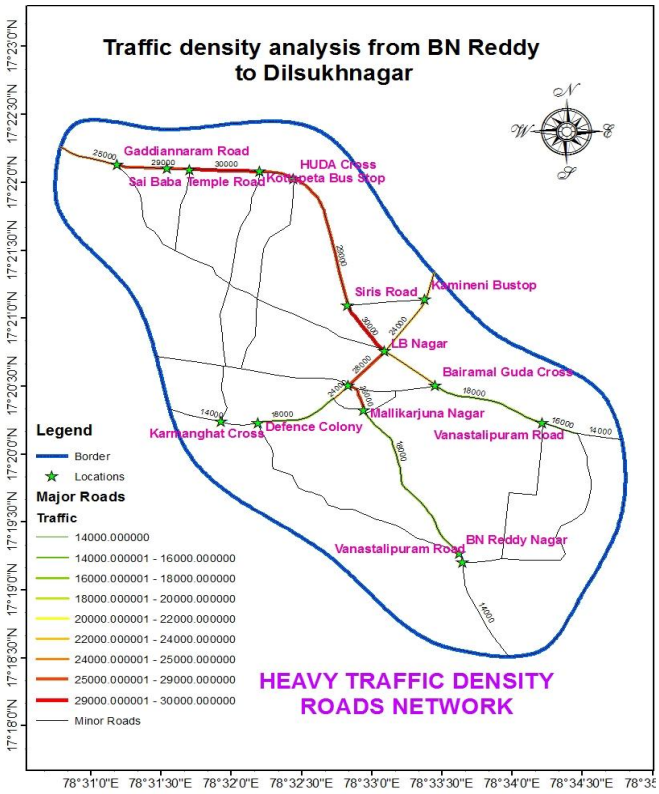

Figure 42 Heavy Traffic Density Roads Network

Above analysis map was created before traffic diversion. In this case the traffic is going through BN Reddy Nagar to Dilsukhnagar via Nagarjuna Sagar Cross road. So the traffic density was very high.

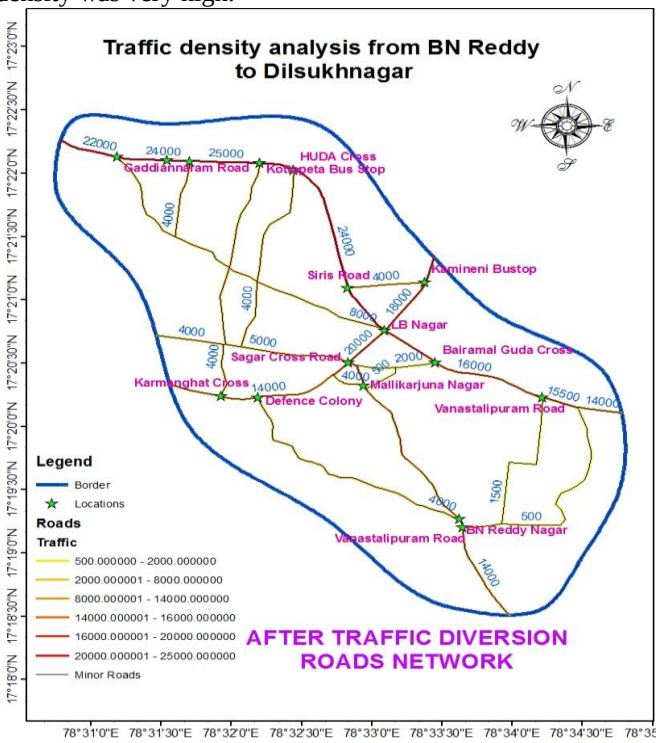

Figure 43 Roads Network After Traffic Diversion

Above analysis map was created after traffic diversion from BN Reddy Nagar to towards Vanasthalipuram, towards Defence colony etc. This traffic diversion leads to reduced

traffic which will be useful to reduce the traffic jams and at the same time fuel consumption will be reduced.

V. CONCLUSION

- From the above results the maximum density is in the two routes one is LB Nagar to Dilsukhnagar and the other is BN Reddy to Nagarjuna Sagar Cross to reduce the traffic some diversion routes were identified and diverted.
- According to the diversion of traffic the density was reduced, which was shown in the maps.
- Above analysis map was created after traffic diversion from BN Reddy Nagar to towards Vanasthalipuram, towards Defence colony etc.
- This traffic diversion leads to reduced traffic which will be useful to reduce the traffic jams, fuel consumption and at the same time pollution will be reduced.
- By providing new roads or flyovers we can prevent heavy traffic jams and accidents and by making necessary improvements of existing roads and to make utilise of these roads can also decrease the heavy traffic jams and can prevent accidents.

VI. FUTURE SCOPE

- Because of heavy traffic in some junctions like sagar ring road and LB nagar there are chances for the occurrence of accidents and heavy traffic jams hence by providing the new roads and fly over's we can reduce traffic jams and accidents.
- By providing all these facilities noise pollution and air pollution can also be reduced

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