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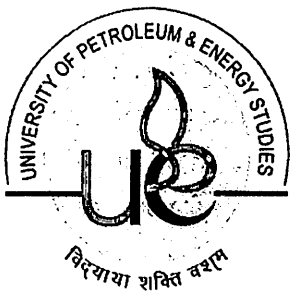
&

ENERGY STUDIES



"Analysis Of Rapid Transportation System In Ahmedabad Using Remote Sensing & Geo-Information"

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SUBMITTED BY:

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(MAJOR PROJECT - VIII Semester)

B.TECH- GEO-INFORMATICS

DECLARATION

We hereby declare that the project entitled "**Analysis Of Rapid Transportation System In Ahmedabad Using Remote Sensing & Geo-Information**" is our original work, done under the guidance of **Dr. Sabyasachi Maiti, Assistant Professor, UPES Dehradun** and the project has not formed the basis for the award of any degree, associateship, fellowship or any other similar titles.

Arpit Bhardawaj

Manas Nagi

Place:
Date:

CERTIFICATE

This is to certify that the project work on "**Analysis Of Rapid Transportation System In Ahmedabad Using Remote Sensing & Geo-Information**" is submitted to the **University of Petroleum & Energy Studies, Dehradun** by the students of **B.Tech Geo-Informatics** of Academic Year 2008-12, is a bonafide work carried out by them under my supervision and guidance.

Project Members:

Arpit Bhardawaj (R350308005)

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1 May 2012

(Signature of HOD)
(Dept. of Petroleum Engineering & Earth Sciences)

(Signature of Mentor)

KNOWLEDGEMENT

A very sincere and honest gratitude to Dr. Sabyasachi Maiti for providing us an opportunity to work in the domain of Hyper Spectral Remote Sensing and undertake a project of such importance.

My earnest thanks to Dr. Pankaj Srivastav under whose guidance i have performed my duties during this phase of training .He provided us the necessary inputs and imparted us the very significant knowledge about the use and applications of Hyper Spectral Remote Sensing, without which i would not have been able to successfully accomplish the project.

PREFACE

In this project of **Analysis Of Rapid Transportation System In Ahmedabad Using Remote Sensing & Geo-Information** we wish to provide knowledge about Geographic Information System and Remote Sensing using the case of a major transport system.

Use of software like ArcGIS and ERDAS is also very well shown and explained during the project.

1. INTRODUCTION:

Transport in the Republic of India is an important part of the nation's economy. Development of infrastructure within the country has progressed at a rapid pace, and today there is a wide variety of modes of transport by land, water and air. Transportation needs of cities and nations around the world differ in detail, there is much benefit to be derived by sharing research findings and practical experience. Transportation lends itself to information exchange by publishing carefully selected papers which advance the international fund of knowledge. Transportation is relevant to all parts of the world: industrialized, newly industrialized or developing. Its mission is simply to help improve the transportation of people and goods by bringing an improved understanding of the subject to the theorists, practitioners and policy makers who study it. Buses are an important means of public transport in India, particularly in the countryside and remote areas where the rail network cannot be accessed and airline operations are few or non-existent. Due to this social significance, public bus transport is predominantly owned and operated by public agencies, and most state governments operate bus services through a State Road Transport Corporation.

1.1 Network Analysis:

Network Analyst provides network-based spatial analysis, such as routing, fleet routing, travel directions, closest facility, service area, and location-allocation. Using ArcGIS Network Analyst, you can dynamically model realistic network conditions, including one-way streets, turn and height restrictions, speed limits, and variable travel speeds based on traffic. You can easily build networks from your GIS data by using a sophisticated network data model.

With ArcGIS Network Analyst following things can be done:

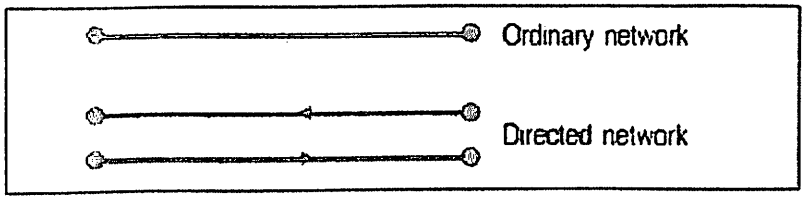
- Find shortest routes
- Produce the most efficient routes for a fleet of vehicles that must visit many locations
- Use time windows to limit when vehicles can arrive at locations
- Locate closest facilities
- Determine optimal locations for facilities by performing a location-allocation analysis
- Define service areas based on travel time or distance
- Create a network using your existing GIS data
- Generate a matrix of network travel costs from each origin to all destination

Transportation network equilibrium refers to the problem of users of a network seeking to determine their minimum cost paths between their origins and destinations (O-Ds). Network equilibrium models are used in the transportation planning field to make predictions regarding future network activity in terms of traffic volumes and travel costs, to evaluate alternative policies and to aid the decision making process in terms of future transportation plans.

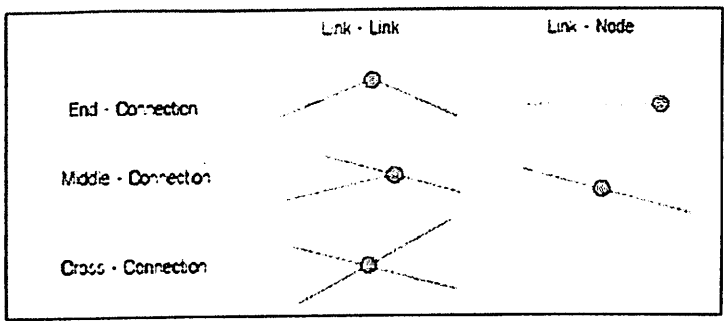
1.2 Network Topology:

One of the key properties of linear networks is network connectivity. Topology is the common term used to describe the connectivity of geometry object. In the case of network connectivity, network topology is the given term used to describe the connectivity between linear objects using link and node features. Network features are

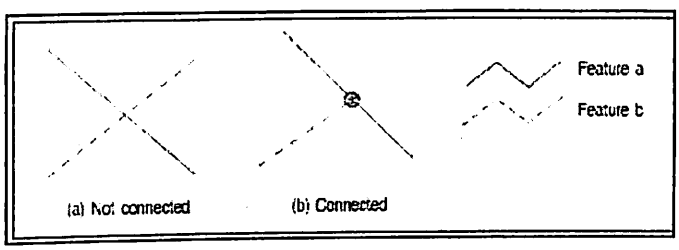
represented by links. The network features are connected at nodes which act as a connection point.



1.3 Connectivity- key to utility GIS:



An Example of an allowed connectivity type of features:



1.4 Tools of network analysis:

There are special tools available to provide graphical analysis of distribution network with schematics highlighting attribute data for every substation, connected feeders, DTs, circuit breakers, sectionalizers, auto-reclosures and capacitor placements. The network analysis tool uses advance algorithms for calculating phase imbalances, identifying low-voltage or overloaded sections, calculating section-wise loss levels and taking decisions on system optimisation through network reconfiguration, capacitor

placements and system improvement measures. However, network analysis tool feeds on real-time data. Due to crunch of trained manpower, ensuring network data updation at regular intervals is a big challenge faced by many utilities.

1.4.1 What do the tools do?

- Direct path analysis
- Optimum routing
- Closest facility analysis
- Drive time analysis
- Driving directions

1.5 Enterprise GIS & Network Analysis:

A geographic information system (GIS) is a digital computer application designed for the capture, storage, manipulation, analysis and display of geographic information. Geographic location is the element that distinguishes geographic information from all other types of information. Without location, data are termed to be non-spatial and would have little value within a GIS. Location is, thus, the basis for many benefits of GIS: the ability to map, the ability to measure distances and the ability to tie different kinds of information together because they refer to the same place.

GIS the application of geographic information science and systems to transportation problems, represents one of the most important application areas of GIS-technology today. While traditional GIS formulation's strengths are in mapping display and geodata processing, GIS requires new data structures to represent the complexities of transportation networks and to perform different network algorithms in order to fulfil its potential in the field of logistics and distribution logistics GIS is a widely accepted tool for maintaining and handling geospatial data and information. Since utility in nature involves linear network, utility GIS provides specialized means to manage linear geospatial features and their connectivity in particular. There are many kinds of public utility industries such as electricity, gas, water pipe and sewage. Utility GIS solutions can help solve several business problems like asset management, site selection, customer service and risk analysis.

The network model is interfaced with a Geographic Information System (GIS). This interface allows the user to take advantage of available sources of information on the physical components of the network, store the results of the proposed models in a GIS environment and display them in a spatial data format, and display several layers of information and create thematic maps to support planning and policy initiatives.

2 Study Area:

The city of Ahmedabad, founded in 1411 AD as a walled city on the eastern bank of the river Sabarmati, the commercial capital of Gujarat is now the seventh largest metropolis in India and the largest in the state. With a population of 6 million (2001) within an area of 466 sq.kms, the city is preparing for the emerging challenges, more importantly in terms of sustaining its contributions to the growth of Gujarat State. It

accounts for 25% of the State's urban population; 20% of the State's GDP (2001), and also has one of the largest informal sectors. Ahmedabad with its strong industrial base continues to be an attractive destination for investments. Its population is likely to rise to 11 Million by 2035. While the area is likely to increase from the present 440 sq. kms 1000 sq. krns by 2035, sustenance of this growth is possible only with the development of an efficient rapid mass transit system.

For this present study BRTS in Ahmedabad is selected for detailed analysis.

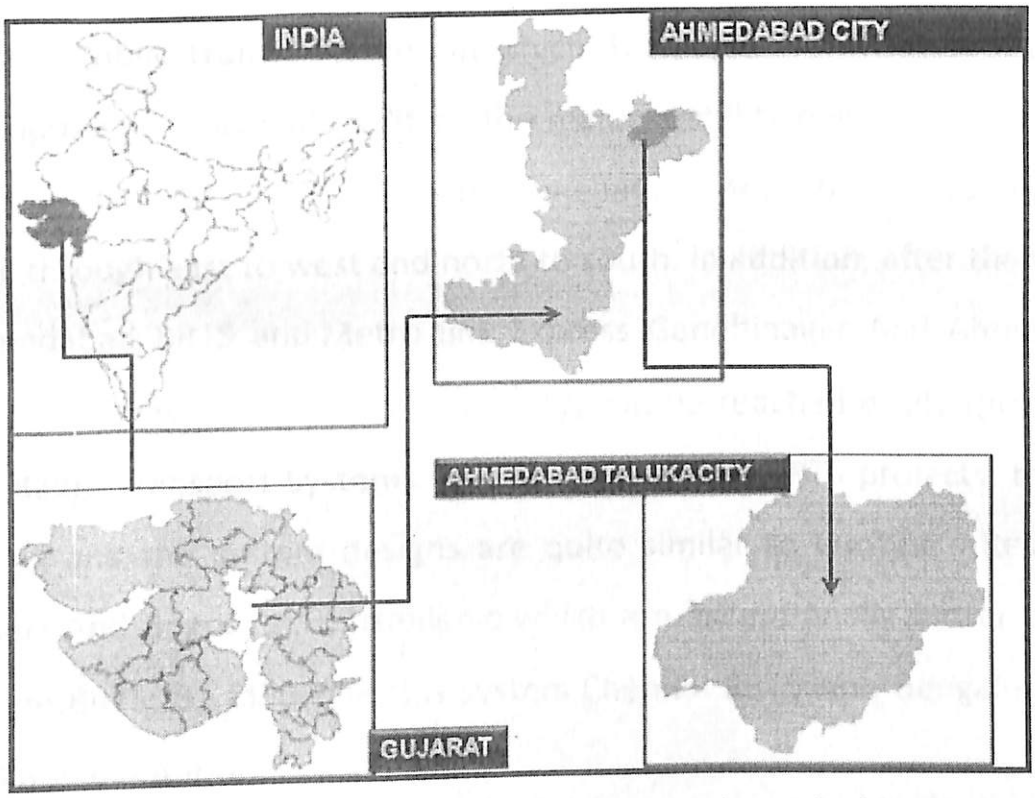


Figure-1: Location map of the study area in Ahmedabad City

The study of this project consists of Ahmedabad-Gandhinagar corridor to study and analyse the present Rapid transport system of BRTS. The location map of the study area is given figure-1. Ahmedabad is a city with present population of 72 lakhs (7.2 million). This would lead to agglomeration of surrounding settlements like Naroda and other smaller villages, which ultimately increases the area of the city,

which may become 1,000 km^2 in the year 2035. Moreover, about 1/3 of total as well as student population reside within walking distance from the proposed BRTS network. Thus, there is a growing need for greater accessibility to basic amenities and opportunities for mobility in the city.

In such a state of rapid urbanization, it is very essential to have an efficient and rapid transit system, which will sustain and accelerate the growth of the city. In order to cater this future demand, the city and State Government has initiated a Plan for Integrated Public Transit System, in which Bus Rapid Transit System (BRTS) is one of the components. This will facilitate the major mobility need of the people. In future, this system will get integrated with Ahmedabad Metro by the addition of two lines running through east to west and north to south. In addition, after the implementation of Ahmedabad BRTS and Metro link Express Gandhinagar And Ahmedabad, Gujarat International Finance Tech-City (GIFT City) can be reached easily through multimodal mix of Rapid Transport Systems. Unlike other Indian BRTS projects, this project is on full-swing and the system designs are quite similar to Curitiba's Rede Integrada de Transport And Bogota's Transmilenio which are exceptionally better than Delhi BRTS And Pune BRTS. By following this system Chennai BRTS And Bengalore BRTS are also under implementation.

Second half of the first phase of the BRTS was inaugurated on December 25, 2009, birthdate of Atal Bihari Vajpayee, former Prime Minister of India. Phase I was stretched up to Kankaria Lake, to cater eastern part of the city also. It was the first time that BRTS buses crossed river & reached Maningar, the most developed area of the city. It was inaugurated by Gujarat Chief Minister Shri Narendra Modi. Currently Ahmedabad BRTS carries more than 100,000 passengers daily. The present BRTS system

implemented in Ahmedabad is given in figure-1 and BRTS network model is given in figure-2.

2.1 Situation before Implementation of the BRTS Project:

Ahmedabad is a compact city characterised by mixed land uses, high density development and balanced street network system with well developed 5 ring and 17 radials. Total road length is about 2400 kms. There are 7 bridges to connect the eastern part of the city with west. Sixteen rail-over/under bridges enable crossing the railway lines at appropriate places.Two wheelers, both motorised and bicycles dominate the traffic on the streets of Ahmedabad. The city has 22 lakh registered vehicles of which two wheelers are about 73%. As per the household survey (CEPT, 2006), 8 lakh bicycles are in operation in the city accounting for 19% of the total trips. The share of four wheelers is still low. They constitute to about 12.5% of the total vehicles and 3% of total trips.

Figure-2: The present BRTS system implemented in Ahmedabad

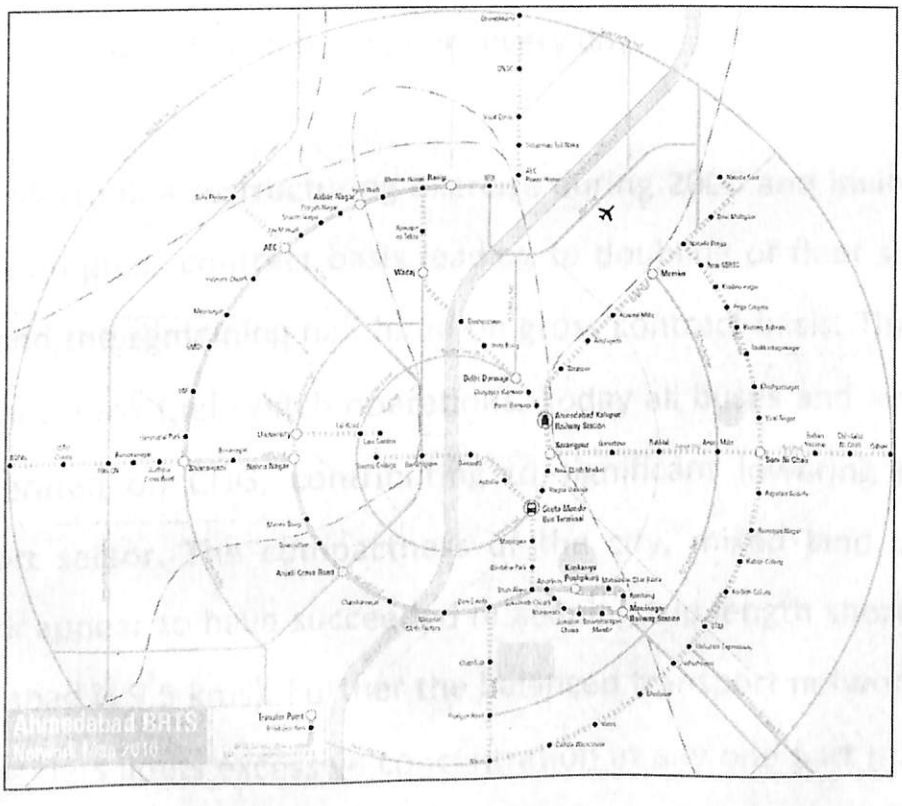


Figure-3: Model of Ahmedabad BRTS Network-2010

The culture of organised public transport operations dates back to pre-independence era. The Ahmedabad Municipal Corporation (AMC) has been running a well organised public transportation system known as Ahmedabad Municipal Transport Service (AMTS). However,

due to resource crunch and operational inefficiencies of the system, the fleet size got reduced Urban Transport Initiatives in India: Best Practices in PPP to 450 in the year 2005. As a result, significant loss in patronage was experienced. Average daily ridership in 2005 was 3.5 lakh. While the share of public transport declined, the share of Auto rickshaw increased. In the city, there were about 35000 auto rickshaws operating catering to 10% of total trips. As most of these were using adulterated fuel, air quality was affected significantly. As a result the city of Ahmedabad figured as one of the top 3 cities in the list of 88 critically polluted cities of India. AMTS with a fleet of about 1000 caters to about 8.29 lakh passengers every day.

AMC undertook a restructuring exercise during 2006 and invited private operators to operate on gross contract basis leading to doubling of fleet size, with half owned by AMTS and the remaining half hired on gross contract basis. Through concerted efforts AMC undertook fuel switch operations. Today all buses and auto rickshaws in the city are operated on CNG, contributing to significant lowering of pollution load from transport sector. The compactness of the city, mixed land use and balanced road network appear to have succeeded in keeping trip length short (average trip length in Ahmedabad is 5.5 kms). Further the balanced transport network and predominance of two wheelers limits excessive concentration at any one part making city relatively less congested. It is important to recognise that short trips and less congested streets appear to make city streets safe without compromising on mobility.

Average travel times are in the range of 15-20 minutes. The road fatalities, in the year 2009, were 202. This is comparable to those observed in the world cities of similar size. The city has also made significant gains in the air quality status. Being a part of 88 critically sensitive lists of cities as identified by the Central Pollution Control Board CPCB), topping the list in 2003, today the city has managed to reach a position where it is reported that this year CPCB is considering taking the city out of the list. While these initiatives have had slight dampening effect on the traffic, the rate of motorisation being rapid (every day 430 vehicles are added to the city vehicular register) and slow but steady increase in the share of cars will lead the city onto a grid lock unless persistent efforts to improve public transport, promotion of non-motorised vehicles and introduction of demand management measures are made. These are essential for achieving the goal of sustainable city and good quality of life.

2.2 Reason for Adoption of BRTS:

The Government of Gujarat had declared 2005 the 'Year of Urban Development' (Shaheri Vikas Varsh). During this particular year, the urban development department undertook various initiatives to resolve urban issues such as traffic management, and the introduction and enhancement of a city transport system. The Gujarat Infrastructure Development Board (GIDB), AMC and Ahmedabad Urban Development Authority (AUDA) jointly drafted a comprehensive urban mobility plan keeping in mind the needs of Ahmedabad as a mega city, and included in it, the implementation of the Bus Rapid Transit System (BRTS) and the planning of the regional rail and metro for future years.

CEPT University was assigned the work of the preparing of a Detailed Project Report (DPR) for the implementation of the BRTS project in Ahmedabad. Meanwhile, the government of India announced the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) for urban development and the AMC submitted its proposal to the government of India for the BRTS project, which was the first of its kind in the country. As approved by the ministry of Urban Transport Initiatives in India: Best Practices in PPP urban development, the AMC is now implementing the BRTS project in a phased manner. The BRTS project was approved in November 2006 and work on the project commenced in 2007. The urban mobility plan provides choices to the people in the case of their mobility, in terms of different modes such as the AMTS, BRTS and the suburban rail or metro, all of which complement each other.

2.3 Description of the Project:

The project is undertaken in 2 phases and the first stretch of the phase-1 between RTO-Pirana covering a distance of 12.5 kms which is open for public since 14th Oct, 2009. The system length will increase to 40 kms by December 2009 and to 84 kms by July 2010.A 3km long elevated BRT will become operational by the end of 2011.

2.3.1 Components of a BRT System:

- **Running Ways:**

BRTS Ahmedabad has 2 Median bus lanes of 3.65 to 3.75 m wide. Motorized Lanes, depending on row, vary between 10.75m in 60m row, 9.25m in 40m row and 7m in

others in row <30mts. NMV and Pedestrian Lane are of 2 to 2.5 m and 2 m respectively.

- **BRTS Stations:**

38m long 3m wide median bus stations, closed with necessary access controls, at level boarding-alighting, off-board ticketing system, IT enabled & Passenger Information System, security systems & pedestrian crossings & grade separated.

- **Bus Features:**

Stylised buses designed for passenger comfort, wide central doors (1.2m+ 1.2m- entry and exit), (900+/- 40 mm floor height), 90 person–capacity and clean fuel Euro-III Diesel.

2.3.2 Phase – I:

Route R.T.O. to Chandranagar(12.5 kms):

Inaugurated by honorable chief minister shri Narendra Modi on 14th Nov.'09.

- Total 18 buses are running with total 132 round trips in a day
- Operational timings: between 7:00 AM to 10:30 PM
- Peak hours are: 8:30AM to 11:30 AM and 5:00PM to 8:00PM
- Frequency of buses is 5 minutes during peak hours and rest 10 minutes
- Total revenue in 1 month: Rs. 25,11,888
- Total passengers: 5,36,841
- AVG.pax./bus/day: 962,
- Last week avg.passengers/day: 19,593 and max. was 21400 pax./day
- Avg. revenue/day: Rs.81,029
- Avg.pax/day: 17,317
- Avg.pax/round trip/day:131

Average speed of buses:

- Overall:26-29km/hr
- During peak hours:25-27 km/hr

Total km traveled by each bus:

- 10 buses:each 200 km daily,
- 8 buses:each 214 km daily.

2.3.3 Phase – II:

Route R.T.O. to Kankaria lake (18.5kms):

Operational timings: Between 6:00 AM to 11:00 PM

Peak hours are:8:30 AM-11:30 AM and 5:00 PM-8:00 PM

Frequency of buses is 4 minutes during peak hours and rest 8 & 10 minutes commercial

Speed of buses:

Overall : 26 km/hr

During peak hours:24 km/hr

2.4 Factors of Success:

The ultimate sustainability of the BRT system depends as much on its software (regulatory structure, management and business model) as on its hardware (infrastructure and rolling stock). A good institutional structure should.

- Maximise the quality of service to the end user and sustain it over the long term

- Minimise the cost of such service over a long term
- Maximise public benefit from public sector investment
- Maximise opportunities for private investment to cash in on private sector enterprise

With these core objectives, the principal components of the institutional structure are:

- Regulatory environment in which private sector operates the system with strong public oversight in the interest of the citizens
- Cost sharing using a PPP model
- Multiple operators chosen through bidding process to encourage competition but limited to such numbers that provides low cost of operations
- Remove competition for passengers on street by making payments to operator based on kilometres operated and quality of service parameters. There should be no route contracts, exclusive or competing.

3 Objectives:

i) Study of existing BRTS Network.
ii) Monitoring new routes under construction.
iii) Analysis of parameters for proposed BRTS network using remote sensing and GIS.

4 Methodology:

4.1 Data used:

1. Cartosat image: : Year-2005.
2. Google Earth Image.
3. Google Maps.

4.2 Data Analysis:

4.2.1 Geo-referencing:

There is a great deal of geographic data available in formats that can not be immediately integrated with other GIS data. In order to use these types of data in GIS it is necessary to align it with existing geographically referenced data, this process is also called georeferencing. Georeferencing is also a necessary step in the digitizing process.

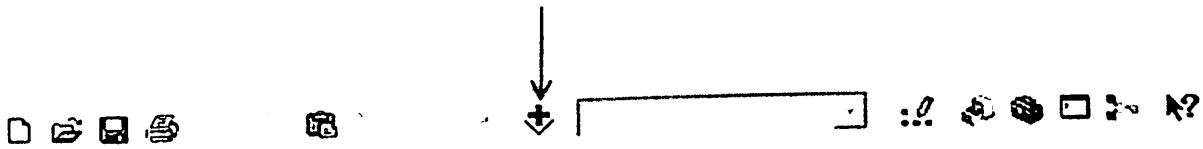
4.2.2 Tools of Georeferencing:

The primary tool we will be using is the georeferencing toolbar .The georeferencing toolbar is probably not visible when you first open ArcGIS, you can open it be clicking on view, selecting toolbars, then activating the georeferencing toolbar option.

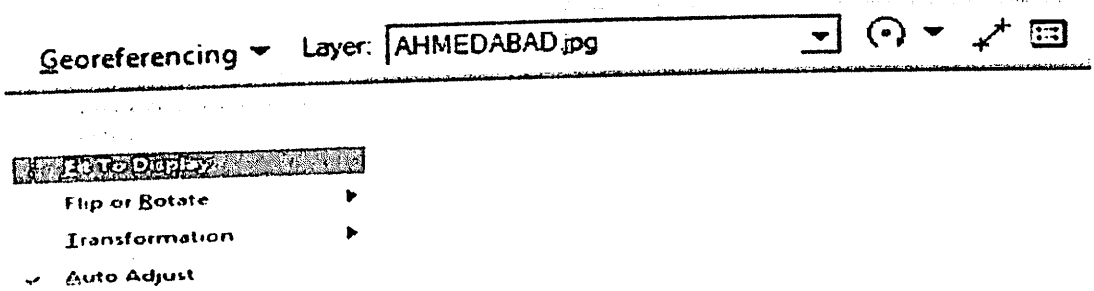
Steps:

1. Start ArcMap. 
2. Click Start button on the windows taskbar.
3. Point mouse to all programs.

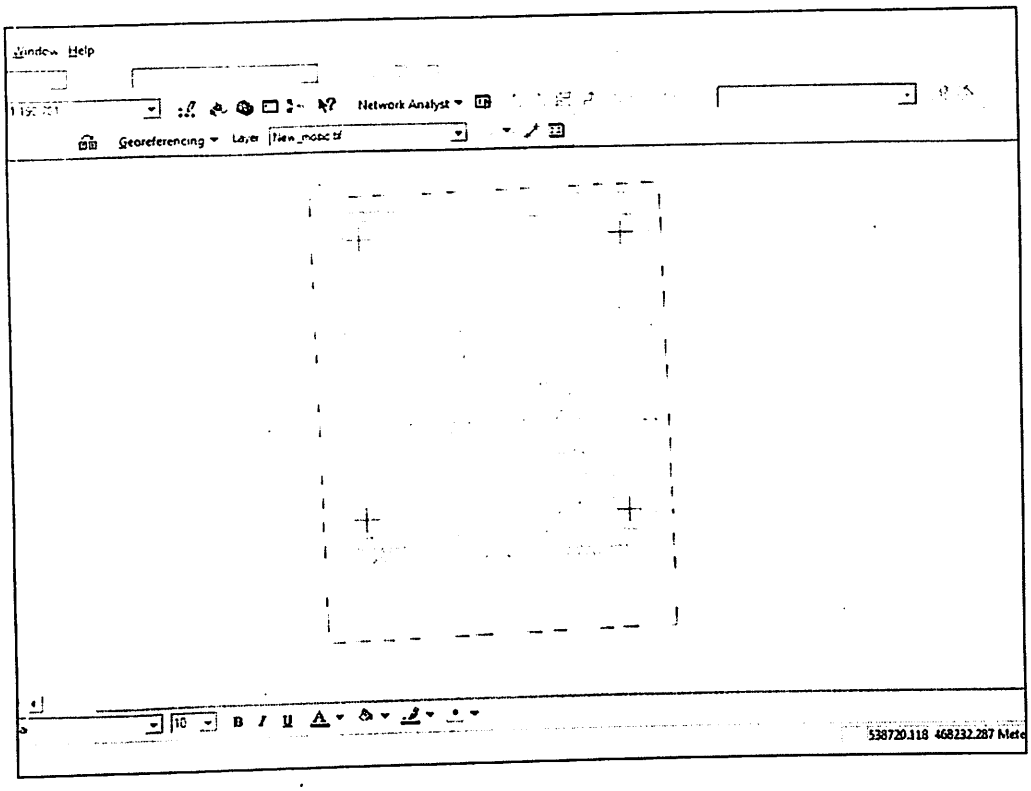
4. Point mouse to instructional,then to ArcGIS,and click ArcMap.
5. Click Add layer icon,browse your data folder to select the map.



6. Click view menu in the ArcMap,point mouse to toolbar and click Georeferencing.
7. Select reference points layer.
8. Click Georeferencing Drop-down button and then Click Fit to Display.



9. Now notice that the map is visible along with the control points.
10. Points are clearly marked in Red color on the scanned map.



11. These are same points that are stored in the reference points shape,but the landmarks on the scanned Map do not match with the points in reference points shape,because the map is not yet georeferenced.

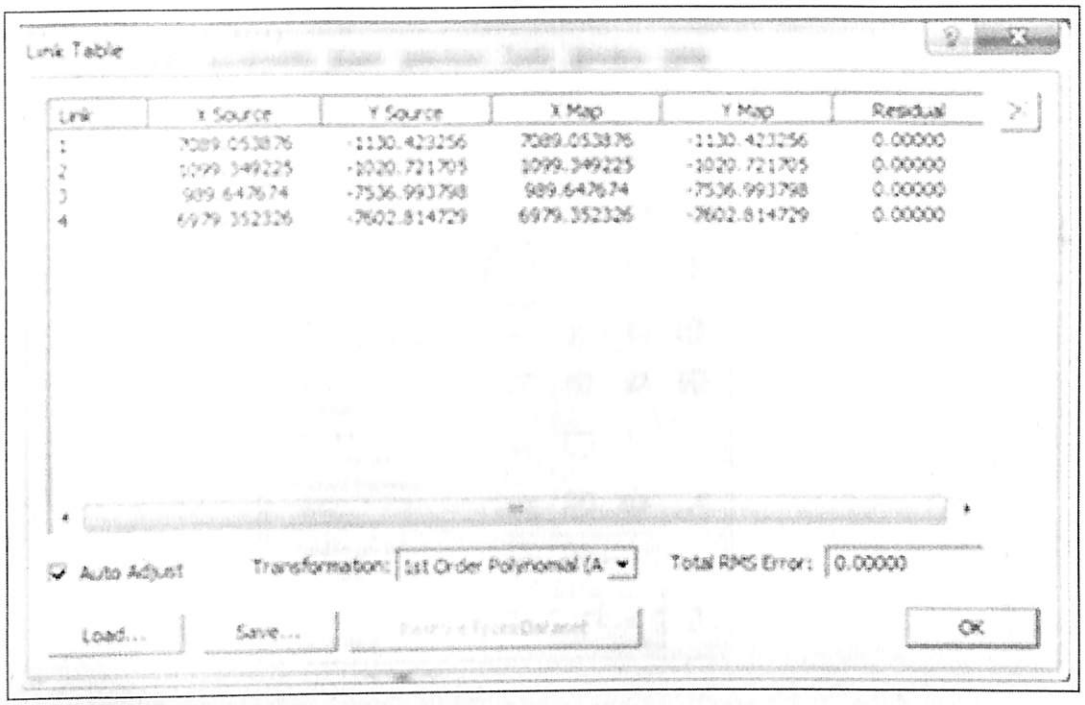
12. Next use link feature of georeferencing to match image control points with points in the reference points.

13. Click add control point icon in the Georeferencing toolbar.

14. First click the control point on the image,move mouse to the precise location of control point in reference points layer and then click again.

15. Open link table by clicking to see root mean square error and the match between the control points in the image and point layers.

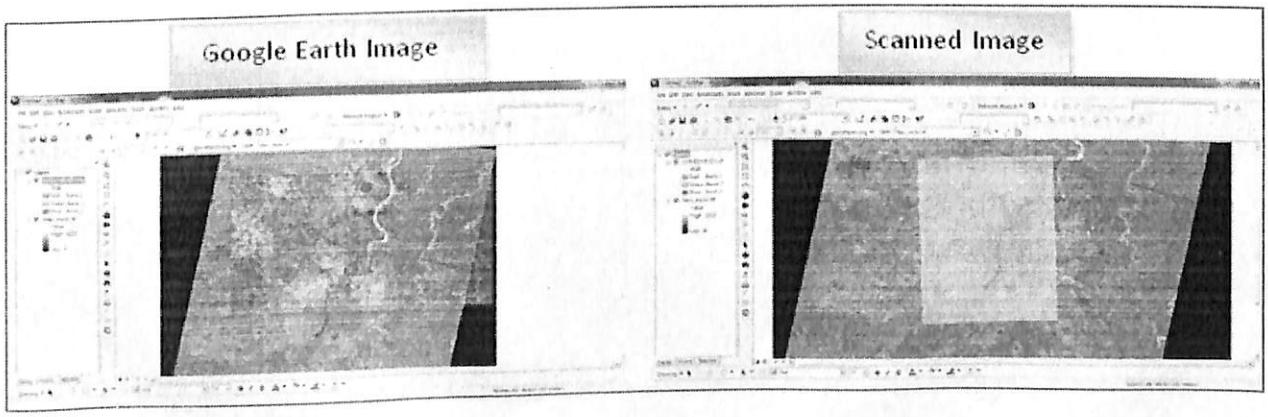
16.



17. Save these links in a file,click save button from the link table dialog box.

18. Browse data folder,type file name and then click save button.

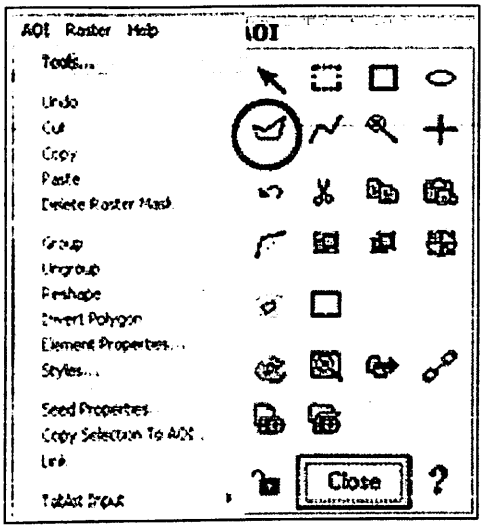
19. Close link table in the ArcMap.



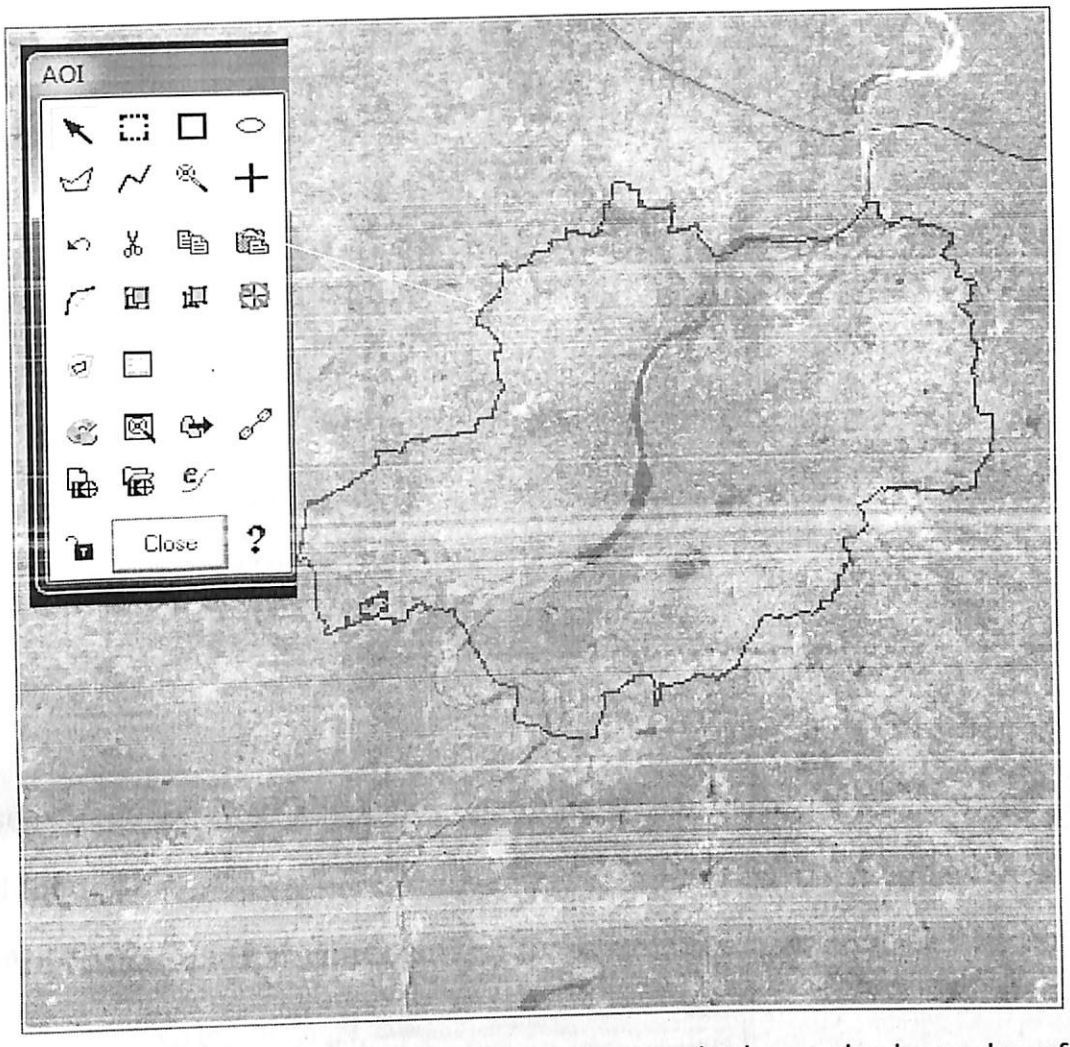
4.2.3 Create AOI(Area Of Intrest) using Erdas software:

1. Open Erdas imagine software.

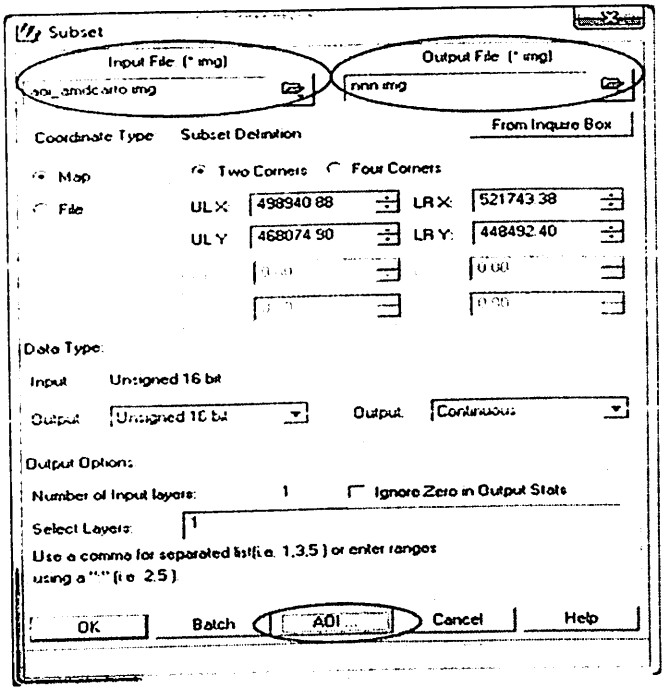
2. Open a image on which create a Aoi layer.
3. Select AOI pull-down menu.
4. select tools menu.



5. Select polygon tool. 

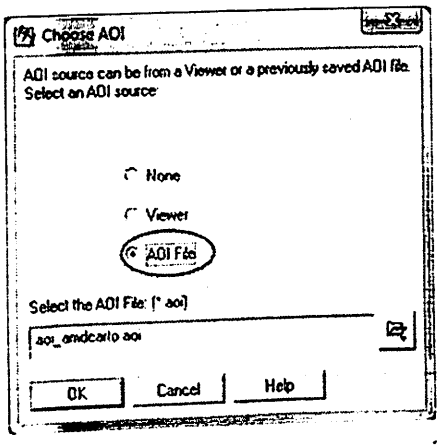


6. Point mouse on to the image and select area on which cut the boundry of the interested area.
7. For save the aoi image click on file menu.
8. Click save and choose option as "Aoi layer as".
9. Now open a window and add image.
10. Click ok.
11. Go to Data Preparation option.
12. Select Subset image.



13.In subset image window add input file and give name for output file like Ahmedabad_Aoi.

14.Select Aoi option on that window.



15.Select Aoi file option.

16.Add Aoi file on that window.

17.Select ok.

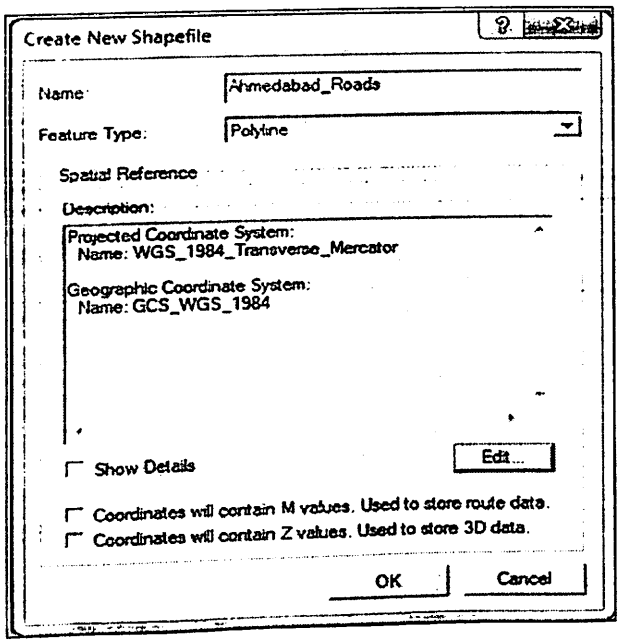
4.2.4 Digitizing of the features using ArcGIS:

Digitizing in GIS is the process of "tracing", in a geographically correct way, information from images/maps. By digitizing features, you make them available for mapping once you have added the tabular data to the attribute table.The digitizing process is started by creating new layers in ArcCatalog, and then adding features to them in ArcMap.

Steps:

Create a new shape file:

1. For creating a new shapfile Go to Arc Catalog. 
2. In catalog Window Right click on to a folder in which create a shapfile.
3. GO to► new Shapefile.

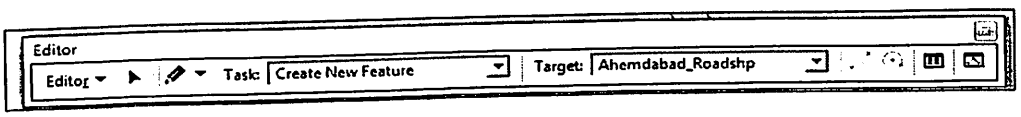


4. open the create new shapefile window.
5. Give the name for shapefile.
6. Select feature type(point,line,polygon).
7. Click on edit

8. Add coordinate system in that
9. Click ok

Digitizing with ArcGIS:

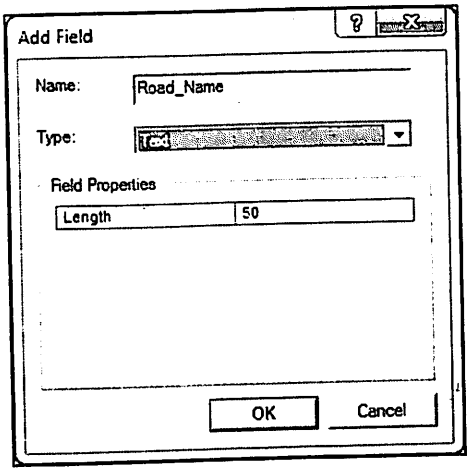
1. Turn on the Editor toolbar (View>Toolbars>Editor)
2. Click Editor>Start Editing



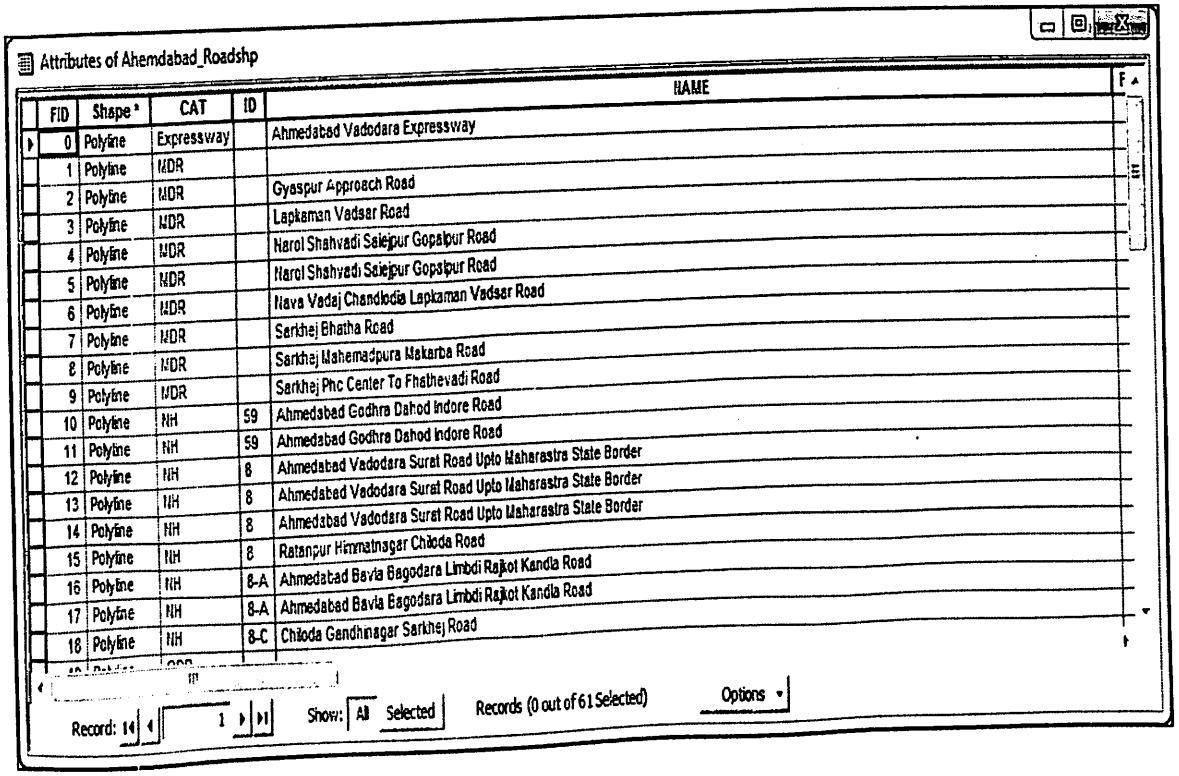
3. Select the layer you'd like to edit from the Target drop-down list
4. Select the Create New Feature task from the Task drop-down list Click the sketch tool (pencil)
5. If digitizing point features, a single left-click with the sketch tool will create a new point
6. A line or polygon feature is completed and added to the feature class by double-clicking on the last vertex or by right-clicking and choosing Finish Sketch
7. When all editing is complete, choose Editor>Stop Editing
8. when digitizing features by clicking Editor>Save Edits

Add field:

1. After a feature is added click the Attributes button to access a dialog box where you can enter the attribute values for the newly added feature
2. Open Attribute Table of the feature
3. Click on the Options button and click Add Field

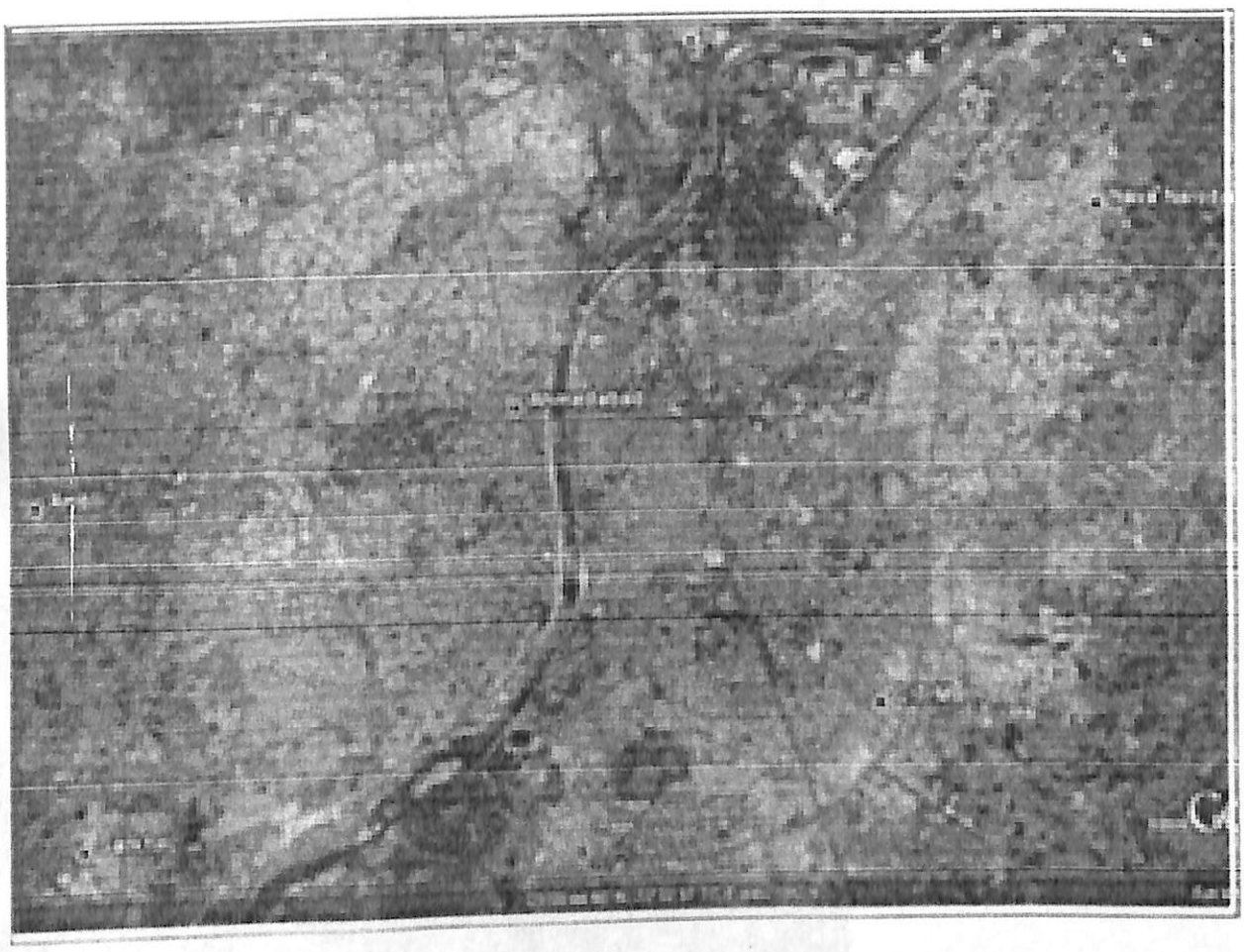


4. Give the field name
5. Select a Short Integer (choose in the Type drop-down menu) field called Wards
6. The Ward number identifier will be entered.
7. Note that you cannot create new fields while you are editing a layer
8. You can see All fields by open the Attribute Table of the feature

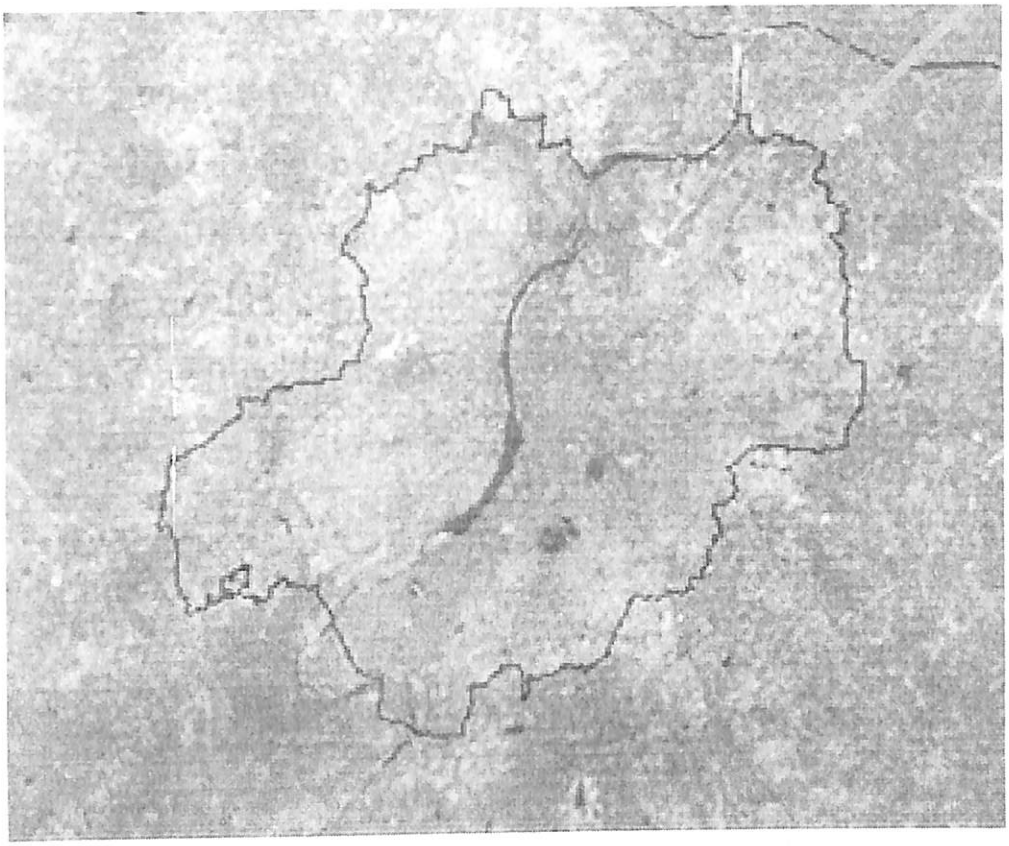


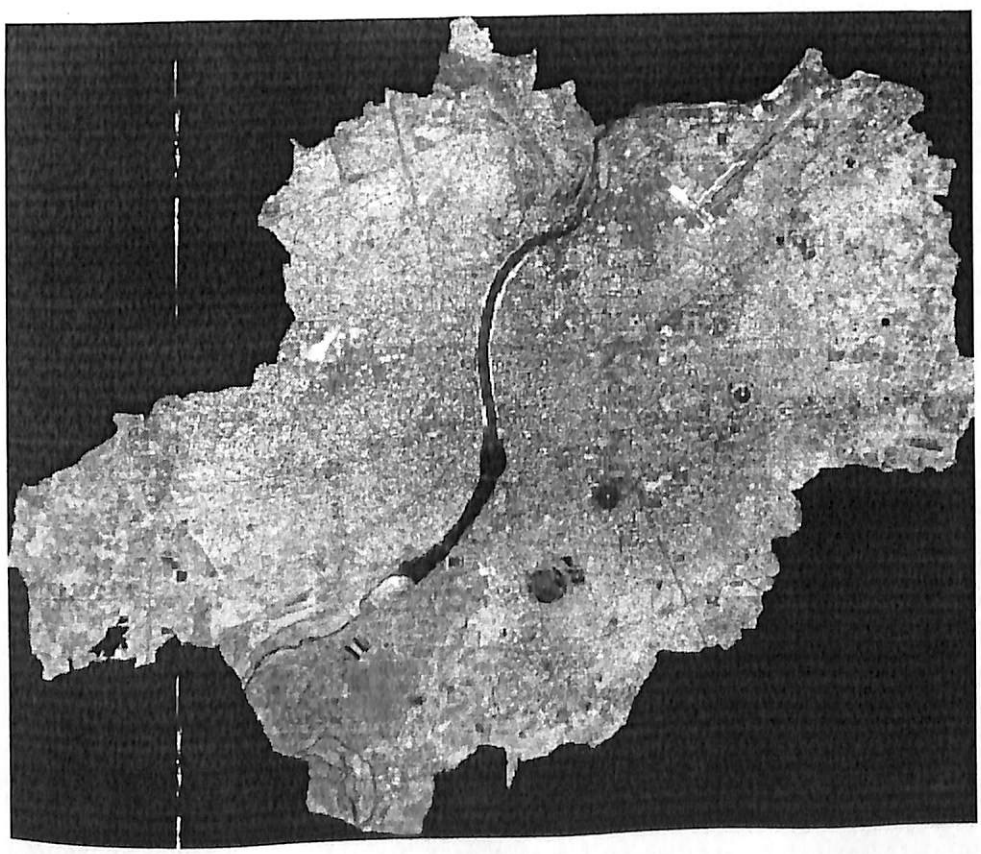
5. Result and Discussion:

Indian Remote Sensing Satellite(IRS)-P6 Cartosat pan data of 2005 covering Ahmedabad City was registered and AOI of Ahmedabad Taluka was supper imposed on satellite data. Google earth images also download from the www.Earth.google.com Website.



The satellite image of cartosat data and ahmedabad AOI is sawn in figure-4.





5.1 Interpretation of FCC Image:

Visual interpretation of FCC (False Colour Composite) print of Path: 93,Row: 91 Dated 24-FEB-2002 covering part of Ahmedabad district was attempted for mapping of Road Networks. The transparent tracing paper was superimposed on FCC print and all the networks of Ahmedabad City.

The Existing Road network in Ahmedabad City was delineated on FCC of Date 24-FEB-2002.The Interpreted map is shown in Figure-5.

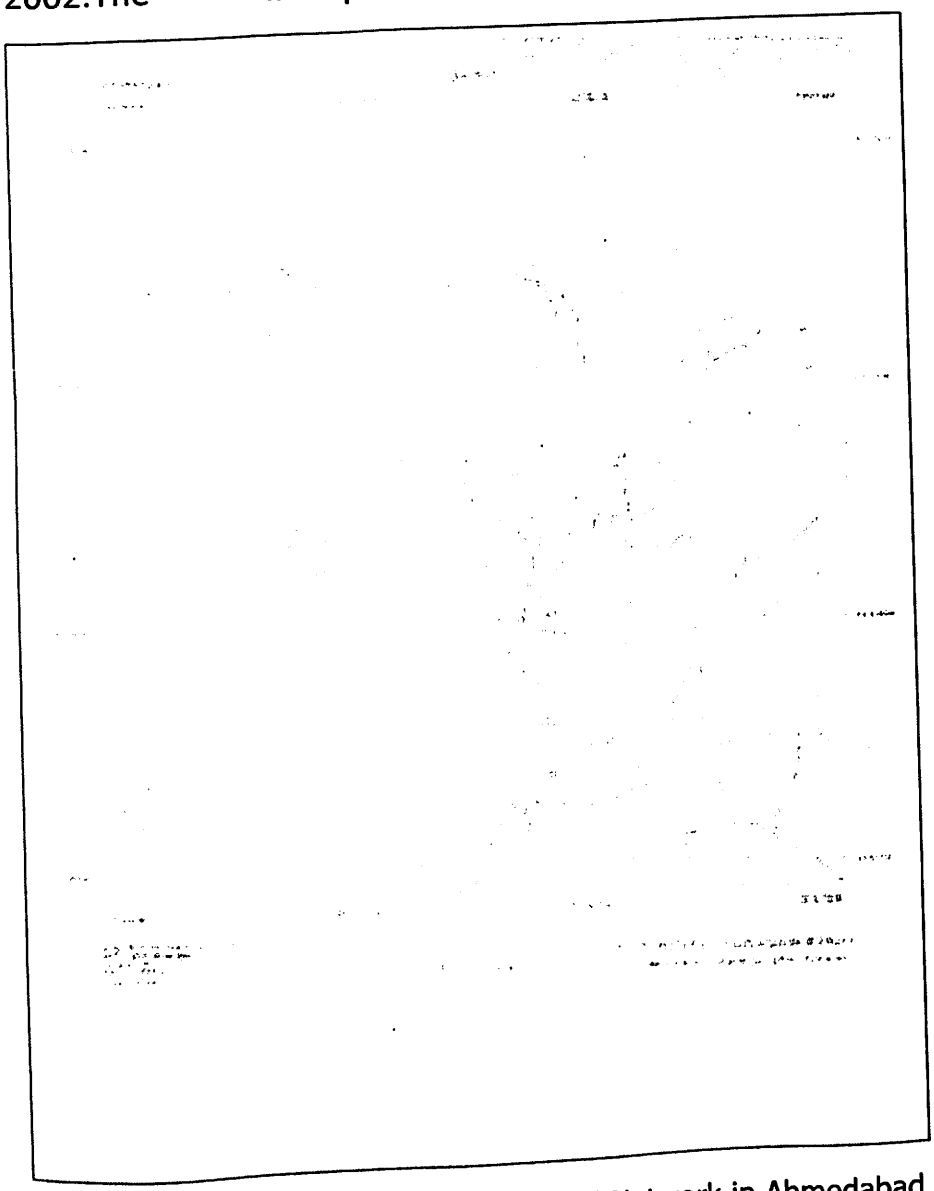


Figure-5 Scanned Image Of existing Road Network in Ahmedabad

This interpreted image registered with satellite cartosat data as well as google earth image. This registered image was used to digitize existing Road network is given in Figure-6.

5.1.1 Existing Road Network:

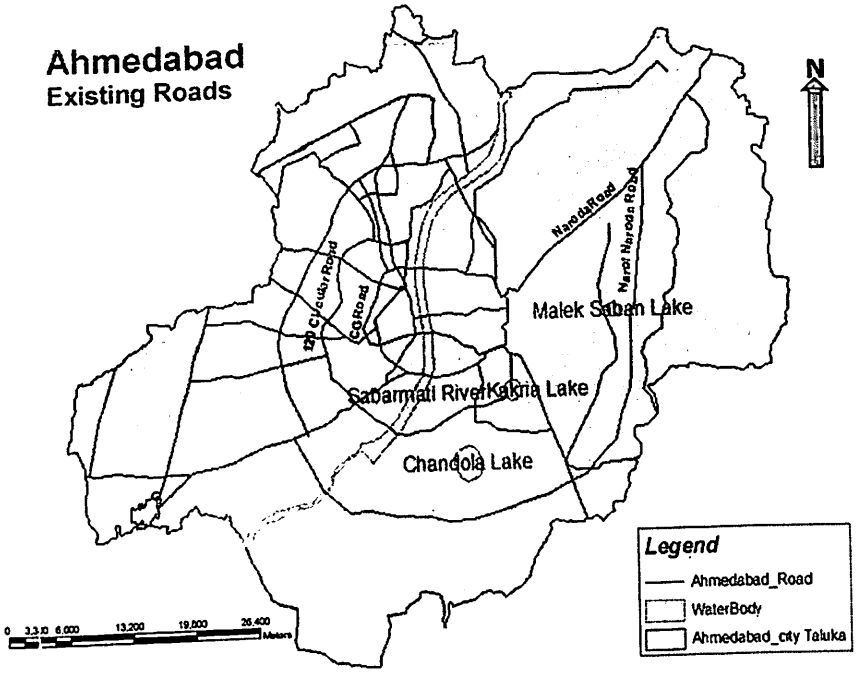


Figure-6 Existing Road Network In Ahmedabad

5.2 BRTS Present and Proposed Network:

In Gujarat state where rapid urbanization is taking place, it is very essential to have an efficient and rapid transit system, which will sustain and accelerate the growth of the city. In order to cater this future demand, the city and State Government has initiated a Plan for Integrated Public Transit System, in which Bus Rapid Transit System (BRTS) is one of the components. The completed BRTS network is given in figure-7.

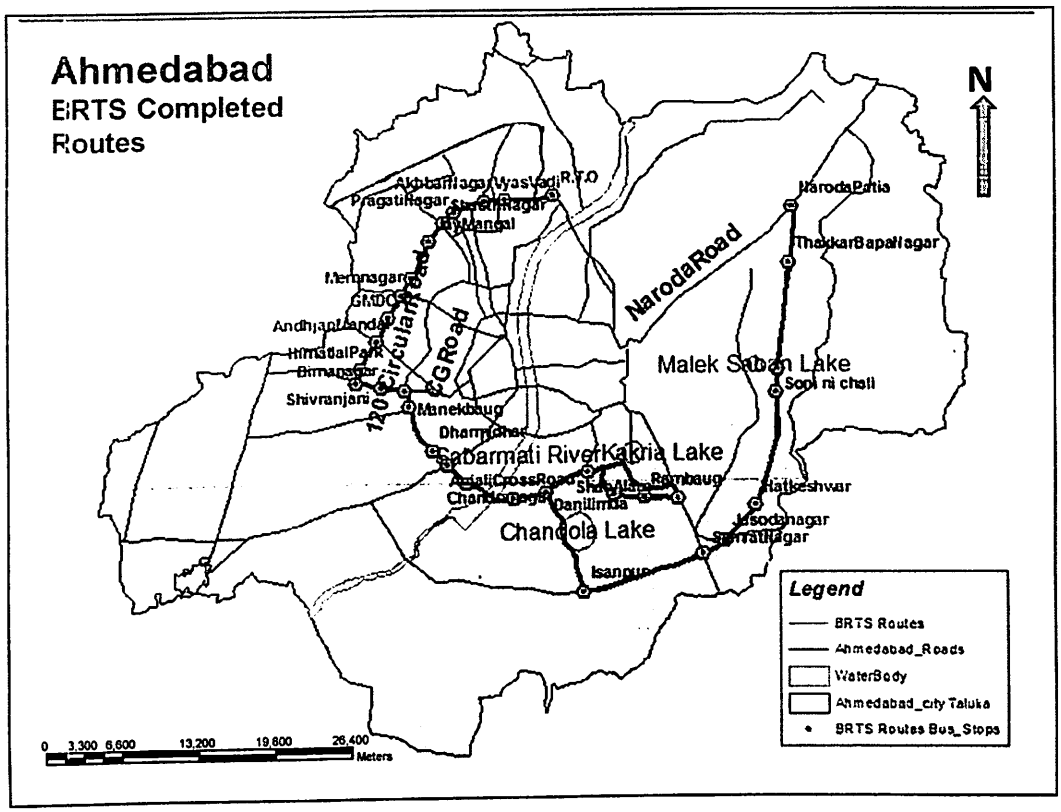


Figure-7 BRTS Completed Route Map

5.2.1 BRTS Completed Route Length:

The total length of completed BRTS Routes along with its total distance is given in Table-1. The total length of Completed BRTS Network is 37.771 kms.

Road Name	*Road Length(km)*
R.T.O-Shivranjani	7.967
Shivranjani-ShahAlam	7.915
DaniLimda-NarodaPatia	16.278
ShahAlam-Maninagar Circuler	5.611
Total	37.771

Table-1: Completed Routes of BRTS

5.3 BRTS Under Construction Route:

The Ahmedabad Municipal Corporation of new BRTS Routes to catle to the needs of expending Ahmedabad city with its increasing Population. The Roads under Construction in Ahmedabad city is given in Figure-8.

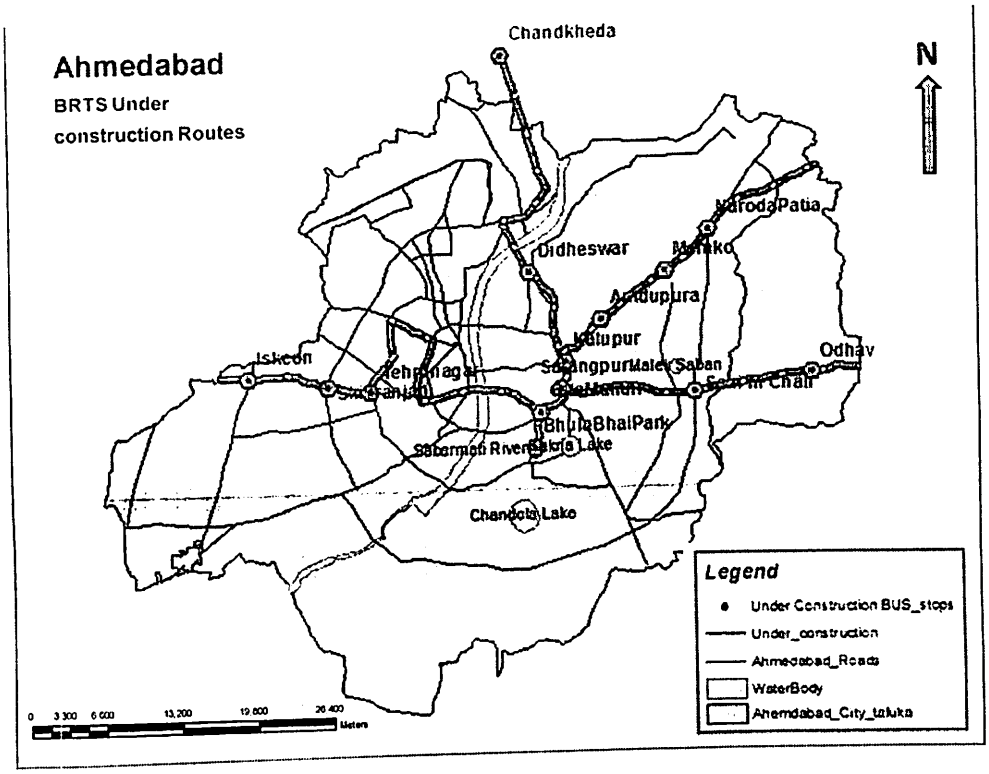


Figure-8 BRTS Under Construction Route Map

The total length of BRTS under construction is 47.809 kms (Table-2) which has 7 Roads in differant localty of the city.

5.3.1 BRTS Under Construction Route Length:

Road Name	*Road Length(km)*
R.T.O-Odhav	14.348
Kalupur-Naroda GIDC	9.963
Iskcon-Shivranjani	3.376

Nehrunagar-Sarangpur	10.916
Gitamandir-ShahAlam	1.794
Shivranjani-Naherunagar	1.324
Chandkheda-R.T.O	6.208
Total	47.809

Table-2 BRTS Under Construction

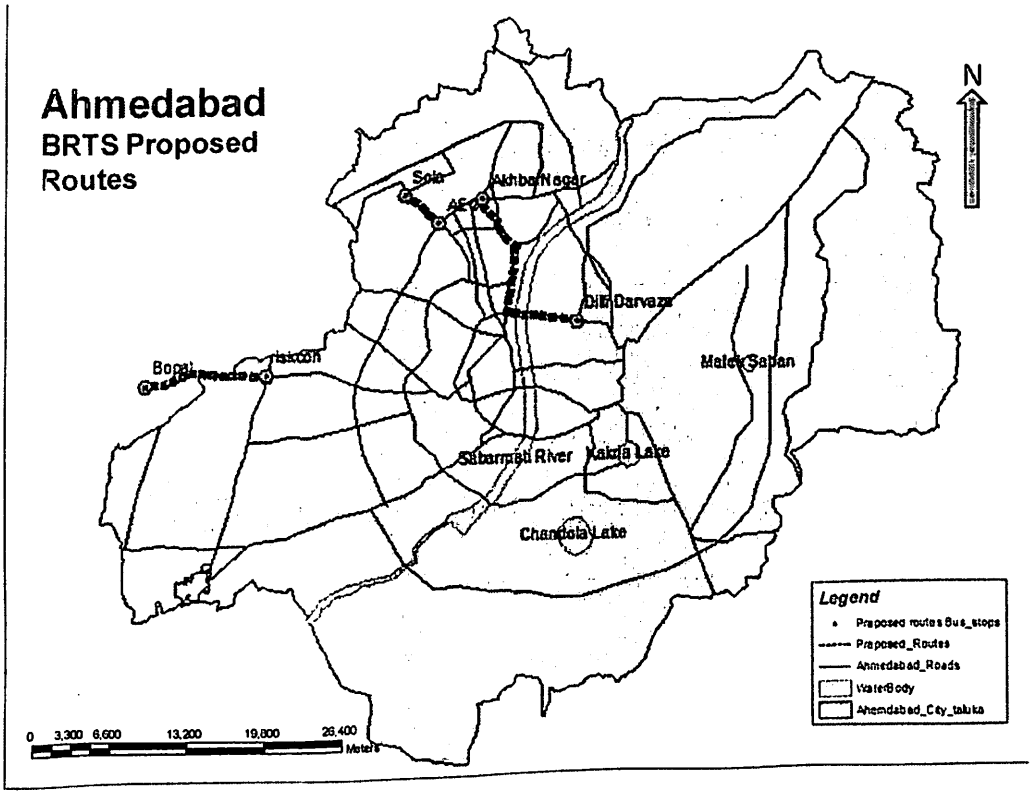
5.4 BRTS Proposed Route:

The expend the BRTS Network in the new Areas BRTS has proposed Following new BRTS Routes:

i) Akhbarnagar to Dilli Darwaza

ii) Naranpura (AEC) to Sola

iii) Iskcon CrossRoad to Shivaranjani



The proposed BRTS Routes in Ahmedabad City is given in figure-9.

The total length of proposed Route is 9.992 kms. The construction of proposed Routes is in various phases of completion. The proposed dates of completion of this Routes is Octomber-2011.

5.4.1 BRTS Proposed Route Length:

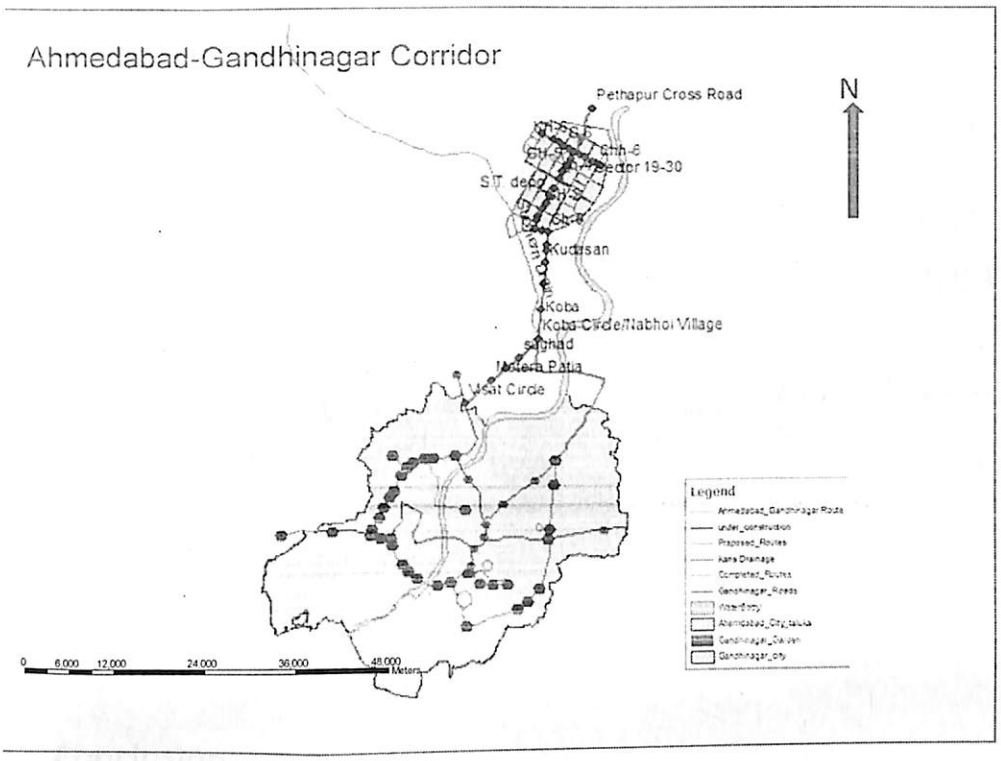
Road Name	Road Length(Km)
Sola-AEC Naranpura	1.212
Bopal-Iskcon	3.232
Akhbarnagar-DilliDarwaza	5.548
Total	9.992

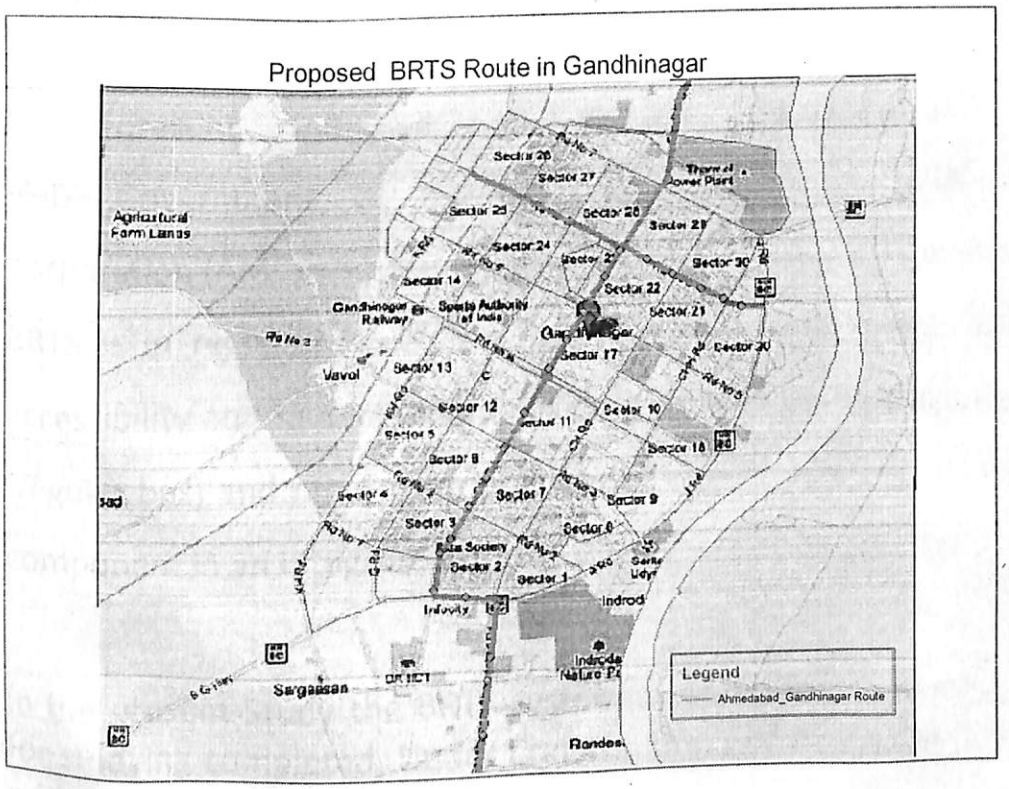
Table-3 proposed BRTS Routes

5.5 Proposed BRTS Network Connecting Ahmedabad to Gandhinagar:

The BRTS Routes will also be expended to the capital city of Gujarat,Gandhinagar. The proposed Gandhinagar Route will extend from Ring Road to Koba Circle,Koba,Raysan,Kudasan,Sargasan/GIFT City,Dholakuva to CH-0. This route will join Gandhinagar in a straight line near CH-0 Circle. It is proposed to have the BRTS Route exactly in the center of the all the sectors touching from GH-0 circle (infocity) to S.T. Bus depo , MS building , GH-6 and then taking a turn towards CHH-6 near Akshardham Temple.

This proposed Route between the major sectors of the Gandhinagr which can catle to the large volume of population in Gandhinagar. The proposed Route from Ahmedabad to gandhinagar sector is given in figure-10 and figure-11.


Ahmedabad-Gandhinagar Corridor
Pethapur Cross Road
N
Kudasan
Koba
Koba Circle/Nabhoi Village
Sighad
Motera Patia
Visat Circle
Legend
0 6,000 12,000 24,000 36,000 48,000 Meters


Proposed BRTS Route in Gandhinagar
Agricultural Farm Lands
Sector 26
Sector 27
Sector 25
Sector 28
Sector 29
Sector 24
Sector 30
Sector 14
Sector 22
Sector 21
Gandhinagar Railway
Sports Authority of India
Sector 17
Vavol
Sector 13
Sector 12
Sector 11
Sector 10
Sector 5
Sector 18
Sector 8
Sector 4
Sector 7
Sector 9
Sector 3
Sector 6
Sector 2
Sector 1
Indroda
Sargasan
Legend
Ahmedabad_Gandhinagar Route

5.5.1 Ahmedabad_Gandhinagar Corridor Route Length:

Road Name	Road Length(km)
Chandkheda to NarodaPatia	17.455
Koba Circle to Gandhinagar (CH-0)	6.929
Gandhinagar(CH-0) to S.T. Bus Stop	3.258
S.t Bus Stop to GH-4	1.332
GH-0 to Akshardham Temple	4.262
Total	33.236

6. Conclusion:

The present initiative of Gujarat Infrastructure Development Board (GIDB),Government of Gujarat, in collaboration with Ahmedabad Municipal Corporation (AMC) and Ahmedabad Urban Development Authority (AUDA), to develop BRTS is in recognition of the fact that no single mode will completely serve the accessibility and mobility needs of the city, and the bus system, both in its basic form (regular bus) and rapid form (Bus Rapid Transit System), makes it a critical and major component in an integrated transit system of any mega city.

In the present Study the BRTS system in Ahmedabad And Gandhinagar was analysed for studying completed, Under Construction and Proposed BRTS Routes using cartosat and Google images.

6.1 The major Conclusions of this Study are as follows:

1. The BRTS Network was digitized in GIS Environment and the Completed and under Construction Routes were Identified using cartosat and Google data. The total length of the Completed and proposed BRTS network was completed and proposed BRTS network was computed in GIS.

2. considering the present demand for additional BRTS Routes, some of the additional BRTS Routes were proposed best on Road Connectivity as seen from cartosat data.

3. Looking at the growth of Gandhinagar township as capital of Gujarat State, new BRTS routes also proposed connecting Ahmedabad and Gandhinagar township Within the Gandhinagar town the new proposed BRTS Route passes through exactly from central portion of the town . This proposed new BRTS Routes Connects GH-0 to S.T. Depo & finaly its ends at Akshardham.

SIGNATURE OF MENTOR

(Dr. PANKAJ.K SRIVASTAV)

REFERENCES:

http://maps.google.co.in/maps?hl=en&tab=wl

http://en.wikipedia.org/wiki/Street_furniture

www.google.com