

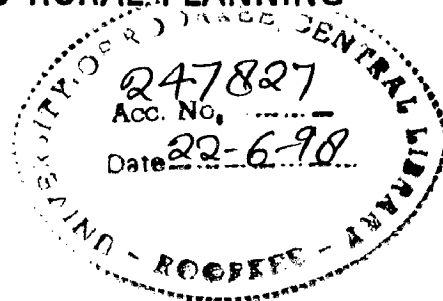
PLANNING FOR AN EFFICIENT TRANSPORTATION SYSTEM OF VIJAYAWADA TOWN

A DISSERTATION

*submitted in partial fulfilment of the
requirements for the award of the degree*

of

MASTER OF URBAN AND RURAL PLANNING



By

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JANUARY, 1997

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the dissertation entitled. "PLANNING FOR AN EFFICIENT TRANSPORTATION SYSTEM OF VIJAYAWADA TOWN". In the partial fulfillment of the requirement for award of the degree of MASTER OF URBAN AND RURAL PLANNING submitted in the Department of Architecture and Planning, University of Roorkee, Roorkee is an authentic record of my own work carried out during period from July 1996 to January 1997 under the supervision of Prof. N. K. TAYAL Department of Architecture and Planning, University of Roorkee. Roorkee.

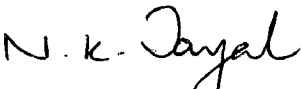
The matter embodied in this dissertation has not been submitted by me for the award of any other degree or Diploma.

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This is to certify that the above statements made by the candidate are correct to the best of my knowledge.


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(MALAJI NAGARJUNA)

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LIST OF ABBREVIATIONS

U.D.A	Urban development authority.
NH	National Highway.
V.G.T Region	Vijayawada Guntur Tenali Region.
M.G Road	Mahatma Gandhi Road.
T.S.M	Transportation System Management.

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1.0 INTRODUCTION

Transportation planning is as old as city planning or urban planning. As urban areas grown by the increase of population, number of vehicles have also increased. All this ultimately lead to transportation problem. Transportation in cities has long been a major problem, and it promises to remain one for the foreseeable future. Segregation of land users in the urban areas demanded more usage of vehicles for daily travel. This lead to more and more problems in a transportation system. Accidents, traffic jams, congested streets are normally reported traffic problems of day to day life. All such problems are posing challenges on transportation planners. On the other hand, today, we reached a situation where transportation occupies a high place in modern life. Advancement in all spheres of life has been to a large extent influenced by efficient transportation system. There is a responsibility on the shoulders of planners to evaluate measures for an efficient transportation system for an effective and efficient growth of the city.

The experience in India has been that metropolitan cities like Calcutta, Chennai(Madras), Delhi, Mumbai(Bombay) are the classical examples for that. For that matter of fact, every urban area in India is confronted with transportation problems which

seem to be destined to become more aggravated in years ahead. Growth of population and expansion of urban areas are continually increasing the passenger and freight movement. The overcrowding in trains and buses is being witnessed very commonly. This problem is more acute in towns and cities.

In Andhra Pradesh this scene is not much different. Transportation stimulates economic and social activities of the state. Transportation facilities give a direction and shape to the growth of the town or a city.

Vijayawada is the major commercial center in the region there by the traffic that passes through Vijayawada also is more. This is the main cause of more transportation problems. Firstly, in Vijayawada there is a total lack of experience. Secondly, no comprehensive transportation plans have been built up. The trip making behaviour, the relationship between population and employment, and the speed of traffic of various types on the streets etc., have not been investigated at all. Thirdly, the local authorities in-charge do not possess the skill and expertise to plan effectively and implement the same.

Efficient transportation planning plays a vital role in the proper functioning of any town or city. Therefore it is extremely necessary to envisage clearly a transportation system that articulates the inter-urban and intra-urban movement of people and goods by developing an effective transportation system.

There are many other difficulties in planning for the transportation needs of Vijayawada town. Firstly, there is a total lack of experience, in the country in devising suitable planning techniques. No comprehensive traffic studies have been made so far. Secondly, the data base for planning has not been built up. The trip making behaviour, the relationship between population and employment, the speed of traffic of various types on the streets etc., have not been investigated at all. Thirdly, the local authorities in charge of such cities do not possess the skill and expertise to plan effectively. They have been so far meeting with the situation on a purely tentative and adhoc manner and their decision are unrelated to traffic requirements assessed on any scientific basis. Finally, the modern methods of transport planning are too sophisticated and costly to be used for medium and small sized cities. There is an urgent need to simplify the whole procedure, keeping the data requirements to the barest minimum and making the solutions quick responsive.

The high rate of urbanisation in the country accompanied by an increase in the number of motor vehicles in and around urban areas, has resulted in an alarming increase in traffic congestion and in the number of road accidents. In many cities the annual increase in population is about 4 to 6 percent whereas motor vehicles have been increasing at the rate of nearly 12 percent and the increase in road accidents is about 12 to 15 percent

numerous factors have contributed to the ever increasing traffic problems and some of them are listed below.

- a. Unplanned expansion of the city and ribbon development along important roads.
- b. Rising demand for transport due to increase in population and other activities.
- c. General rise in per capita income resulting in more transportation demand.
- d. Concentration of land use in certain areas such as central business districts and office concentration areas.
- e. Mixing up of fast and slow moving traffic complexities.
- f. Encroachment upon effective road width by hawkers and retail businessmen.
- g. Heavy demand for parking and terminals.
- h. Lack of effective measures of enforcement of traffic rules and regulations.
- i. Non-existence of a specific organization of traffic rules and regulations.

1.2 LITERATURE REVIEW

The current literature on neo-traditional neighbourhood design can be divided into two general subject areas. The first area is comprised of work related to the introduction and discussion of this new planning concept. The second area is comprised of work produced mainly by the transportation profession. The following discussion provides a review of these subject areas and the major pieces of work that mark the beginning of this literature.

Peter Calthorpe, who is usually attributed with developing the transit-oriented development concept, discusses his basic approach in the pedestrian pocket book (Kelbaugh 1989), the book accomplishes two significant goals (a) explaining the social and environmental impetuses behind the pedestrian pocket concept, and (b) defining the components of a pedestrian pocket. When neotraditionalists addresses the social reasons behind their urban design practices, their speech is usually coloured by exasperation stemming from a sense that the pattern of our urban is no longer effective and should be altered Calthorpe wrote. The current round of urban growth is generating a crises of many dimensions :mounting traffic congestion increasingly unaffordable housing, receding open spaces and stressful social patterns. The truth is we are using planning strategies that are forty years old and no longer relevant to day's culture. Our household make

up has changed dramatically, the work place and work force have been transformed, real wealth has shrunk, and serious environmental concerns have surfaced.

The other useful aspect proposed by Calthorpe (1989) is a formal definition of the pedestrian pocket concept, which simply put is a "balanced, mixed-use area with in a quarter mile walking radius of a transit station". For a more detailed definition of the pedestrian pocket concept, Calthorpe (1990) offers a thorough discussion of pedestrian pocket features in a set of guidelines prepared for sacramento county. The guidelines include how to identify possible locations for new and infill transit-oriented sites, optimal site characteristics and relationship to surrounding land users, proportions and types of mixed land uses, ideal residential and commercial densities, building design and orientation, street and circular systems and parking requirements. Duany and Plater-Zyberk (1992) discusses neotraditional neighbourhood design and the motivations behind this planning movement. The author's site the antigrowth movement as an indication that americans are dissatisfied with urban development. An interesting point is made about the sad irony of the antigrowth movement. Although growth has historically represented economic, social and cultural vitality, today it is viewed by suburbanites as an unwanted evil. The author's ominously deduce that a society which no longer wants to grow and is actually taking political steps to reduce growth will soon be

a dead society.

Where does this discontent originate ? Duany and Plater-Zyberk (1992) acknowledge that the modern planned community offers everything the average American desire : "convenient work places, well-managed shopping centers, and spacious, air-conditioned houses full of the latest appliances" (page 21). The authors maintained that although "(suburbanites) are happy about the private realm they won for themselves, desperately anxious about the public realm around them" (page 21). It is this sterile, dehumanizing public realm that Americans are reacting against through the antigrowth movement. Duany and Plater-Zyberk's (1992) solution to this problem is to seek an alternative urban planning, a planning which is based on the traditional American town. Many of the components of their concept are similar to Calthrope's approach. In a loose definitions, the authors describe the principal attributes of a neotraditional development as containing "neighbourhood's of finite size and definite character which people can easily traverse on foot. Residential areas are seamlessly connected to the rest of the town, and they are not even exclusively residential. They boast corner stores, attorney's offices, coffee shops and other small establishments".

The transportation profession has perhaps had the most vocal response to neotraditional neighbourhood design. This

section reviews three areas of transportation which have been addressed in the literature thus far : traffic engineering, transportation planning and public transits. Traffic engineering Spielbug (1989) defined the major conflicts between the current traffic engineering practice and the demands being made by neotraditional subdivision design. The major points of conflict identified are street width, on-street parking, curb radii, street layout and intersection spacing. This discussion was expanded upon by Lerner-Lam et al (1992), who presented a comprehensive list of potential traffic engineering problems are shown in table 1.1.

TABLE 1.1

Potential problematic traffic engineering issues.

- 1 Basic street layout
 - 2 Alleys
 - 3 Street design speed
 - 4 Center line location
 - 5 Superelevation
 - 6 Street width
 - 7 Curb radii
 - 8 Intersection geometry
 - 9 Traffic signals
 - 10 Parking
 - 11 Side walk width and location
 - 12 Trees and landscaping
 - 13 Building setbacks
 - 14 Lighting
 - 15 Trip generation
-

Lerner-Lam et al. attempt to alert the traffic engineering profession that neotraditional neighbourhood design is inevitable due to its popularity among planning boards and other policy makers, and that profession's concern should not be whether this concept is implemented but how it will be implemented safety and

responsibility.

Perhaps the most comprehensive discussions yet of neotraditional neighbourhood design and its implications for the traffic engineer can be found in the synthesis report prepared by the institute of transport engineers (ITE Technical Communitte ,1992). This report acts as a precursor to the preparation of new guidelines for recommended traffic engineering practice in neotraditional neighbourhoods. The primary intention of this systesis report is to educate the traffic profession about the specific elements of neotraditionel design and to enhance their preparedness for dealing with new land use designs.

The literature on transportation planning is devoted to discussing the effects of this design on the transportation system. All of the major works dealing with the transportation planning aespects of effective design agree that possitive transportation impacts will result in the form of reduced automobile dependence, increased public transist accessibilty and reduced travel distances and travel time. In preliminary paper, Kulash (1990) offers an extensive discussion of the possible transportation impacts of effective design focusing on network capacity, distance and travel speeds. In terms of capacity,he maintained that new design can handle higher volumes of traffic than the contentional network because, (a)the larger streets of a space network are operating under defficiency of scale, (b)turning movements are more efficient on small

streets, (c) the increased route decisions possible and (d) uninterrupted flow is more likely to occur in a dense network of small streets because there are fewer signalized intersections. In terms of travel speeds, times and distances, Kulash claims that the neotraditional network results in lower travel speed, with travel times comparable to conventional network due to the shorter distance between origins and destinations found in a dense network.

Gordon and Peers (1991) draw similar conclusions from their preliminary studies of the transportation benefits of neotraditional design. They suggest that neotraditional design could be instrumental in the area of transportation demand management. Their analysis shows that the design of the Laguna Weet project in Sacramento country resulting in a 20% to 25% reduction in vehicle miles travelled. The authors attribute this reduced traffic to (a) trips being internalized within the community, (b) a reduction in the percent of trips made by car, and (c) residents working closer to home. Stone and Johnson (1992) offer solid evidence that many of the transportation benefits attributed to neotraditional designs may in fact be possible. Using site impact assessment techniques, the authors compare two hypothetical subdivisions and find that the neotraditional neighbourhood has 25% less vehicle delay, 20% fewer trips generated, and 30% more entry points (used to define

accessibility). Mc.Nally and Rynam (1992) found similar results using standard demand forecasting techniques to model hypothetical networks depicting conventional and neotraditional designs. Their results indicated that vehicle miles travelled in a neotraditional network decreased by approximately 10% as compared to the vehicle miles travelled resulting from an identical number of trips assigned in conventional network. Total vehicle hours travelled in the neotraditional network were approximately 27% less than in the conventional network, and average trip lengths were found to be approximately 15% shorter in the neotraditional network.

Friedman et al (1992) have completed important work in the area of determining how neotraditional design could affect trip generation and mode choice splits. Their approach was to use existing mode splits and trip generation for "traditional design" and "standard suburban " neighbourhoods. Although they state that the results of this approach cannot necessarily be directly applied to neotraditional developments, their work provides some basis for to begin to measure the impacts of different land use patterns on trip generation and mode choice. The findings indicate that for a traditional community and 38% fewer auto trips. Similarly, in a traditional community, they found that 54% of total daily trips are auto trips, and 68% are auto trips in the suburban community.

The transportation planning literature represents the beginning of an attempt to understand how assembling land uses in a different manner could affect the transportation system. More work is needed to quantify the impacts of land use patterns on the transportation system, and specifically more work will be necessary when actual neotraditional sites are completed and functioning as communities. The research is limited at this point because there is only one young neotraditional subdivision that has been completed (seaside, FL). Robinowitz et al (1991) offer a review of planning principles involved in neotraditional neighbourhood design.

Author R.Rammohan Rao (1981), in his book deals with the structure, growth and regional relationships of a starical city in the deccan plateau. Its principle emphaises is impartial. Growth aespects are examined in starical perspective. special emphaises for the social aespects is given while analysing the urban structures of the city. The social areas delineated based on social and economic variables. Which is helpful for the relationship of the city are studied with a view to delineate the city region and to analyse its structure which is very much essential for making a viable and purposeful planning frame work of the city.

In the view of the literature rivew for the significant problems of Urban transportation system. The present investigator

proposes a project for an effective transportation system of Vijayawada town.

JUSTIFICATION OF STUDY AREA :

The Vijayawada town with a population of 8,02,336 (1991 census) is one of the very prospective town in VGT region. Vijayawada is fast growing town in VGT region. Decadal growth rate of 71.20% (1981) and 47.80% (1991). The region has experienced a rapid growth in the recent years.

The Vijayawada town developed in radial pattern along four major corridors :

1. NH:5 Connecting Hyderabad with (Madras) Chennai.
2. NH:9 Connecting (Madras) Chennai with Calcutta.
3. Eluru road.
4. Road towards Machilipattanam (Bandar road or M.G.Road).

All the traffic which is not having any work with in the town is passing through the town. At present there are two special Bye-pass roads, to direct the heavy traffic, but due to the growth of the town they have now became the town roads. Vijayawada town roads are characterised by narrow roads, absence of foot path facilities, poor surface conditions, and frequent encroachments of the carriage-way due to on street parking. 1.3

1.3 AIM AND OBJECTIVES :

AIM :

Identifying the traffic problems in Vijayawada town associated with major arterial roads and by-pass roads and

planning for an Efficient transportation system of Vijayawada town.

OBJECTIVES :

- (1) To identify the major road network and circulation pattern in the town.
- (2) To assess the land use pattern and its relationship with traffic and transportation in the town.
- (3) To identify the traffic problem in terms of volume of traffic, accidents and pedestrian movements.
- (4) To project the vehicles, population occupational structure etc. for 2010.
- (5) To prepare the planning guidelines (policy & planning) for an efficient transportation system in Vijayawada town.

1.4 METHODOLOGY :

Different stages in the methodology to conduct this project are shown in a schematic diagram in Diagram No 1.1

Data collection & Analysis :

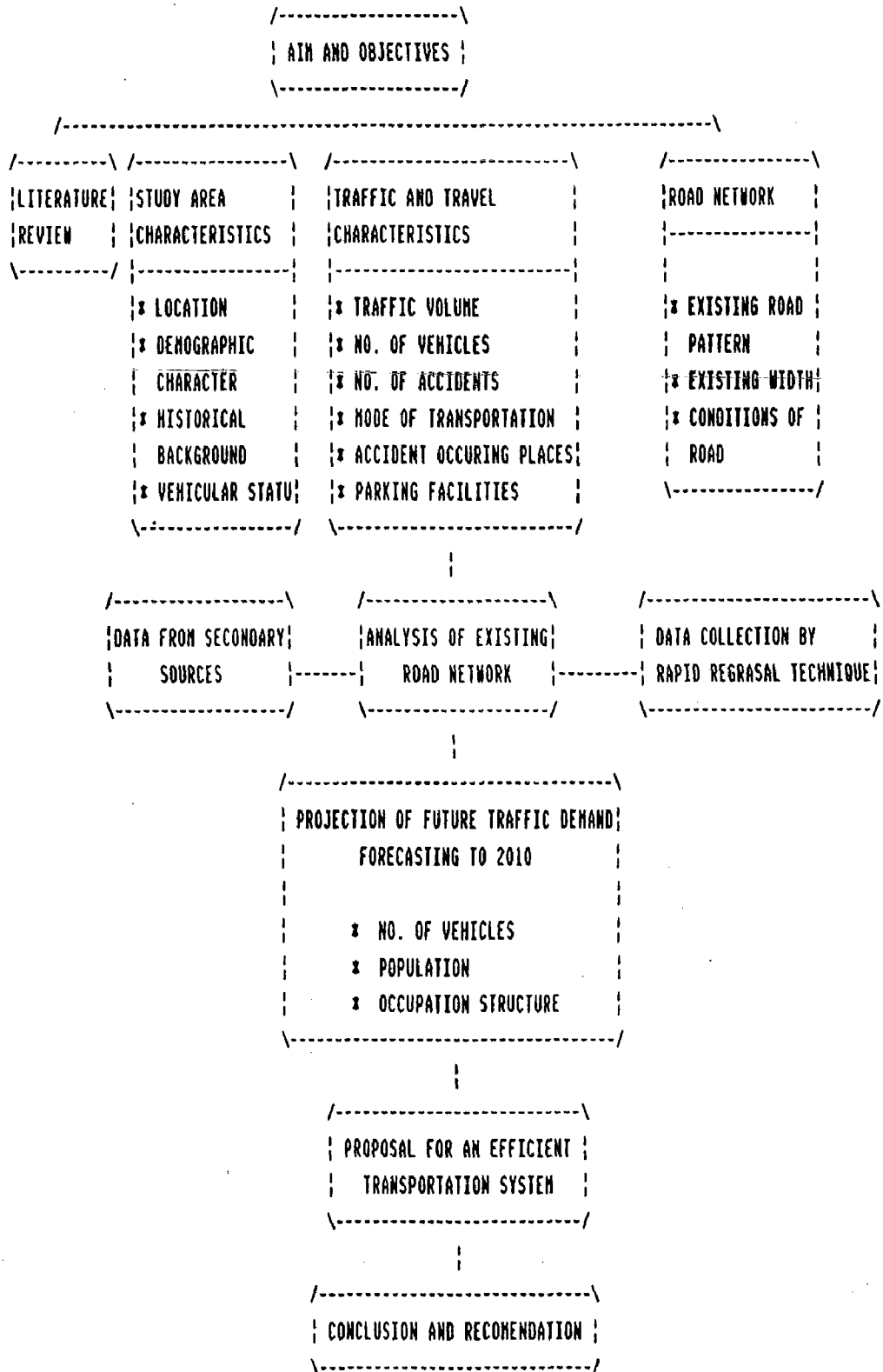
Data collection is basically done from two sources

- (i) primary sources
- (ii) secondary sources

Primary sources :

Interviews are conducted using rapid appraisal technique to asses the present problems associated with traffic.

METHODOLOGY



Secondary sources :

The main secondary sources are Master plan of Vijayawada Guntur Tenali region, and other works done in this field.

1.1.5 SCOPE AND LIMITATIONS :

SCOPE :

The main focus of the work is to identify and analyse different problems associated with major road network of Vijayawada town and to propose policy and planning guidelines for possible remedies to make the transportation system function efficiently. This proposed project also defines, characterises and describes different aspects of vehicular traffic.

LIMITATIONS :

1. Study area is limited to Vijayawada town municipal limits covering an area of about 63.17 Sq. Kms.
2. Study is limited to arterial, Sub arterial streets of urban road network (Vijayawada town).

2.0 STUDY AREA PROFILE

2.1 LOCATION :

Vijayawada is located on the Northern bank of river Krishna at a latitude 16 - 31'N and longitude 30 E. River Krishna is the second biggest of the rivers, south of Vindhyas. The area in and around Vijayawada fall within hot humid region of the country.

The city is about 70 km away from the Sea along the Coolamonda Coastal line. At present the city is having population of about 8,45,305; with an area of 63.17 sq. kms. The population of the city has been increased more than 10 times since 60 years.

2.2 HISTORICAL IMPORTANCE

The origin of the name Vijayawada dates back to the puranic legend believed to have taken place at Vijayawada, where Lord Shiva tests the power of Arjuna before granting him pasupatastra. Since 'Arjuna' is also known 'Vijaya' the city was named after him as Vijayawada.

2.2.1 BUDDHIST PERIOD

Satavahanas were ruling the area within the eastern Krishna River valley at the time when Ashoka was ruling from Patliputra. Dharanikota near Amaravati, was their capital which is 18 miles away from Guntur. The entire Krishna valley right upto Nagarjuna

konda was a most important centre for Buddhist culture. Since the river is narrower at Vijayawada, the armies of the kings used to halt at Vijayawada after crossing the river from south.

2.2.2 MEDIEVAL PERIOD

Eastern Chalukyans were in possession of the region of the present Krishna District till 1019 A.D. Even before that data of Cholas were raising in power and extended their territory upto the southern bank of the river at Vijayawada.

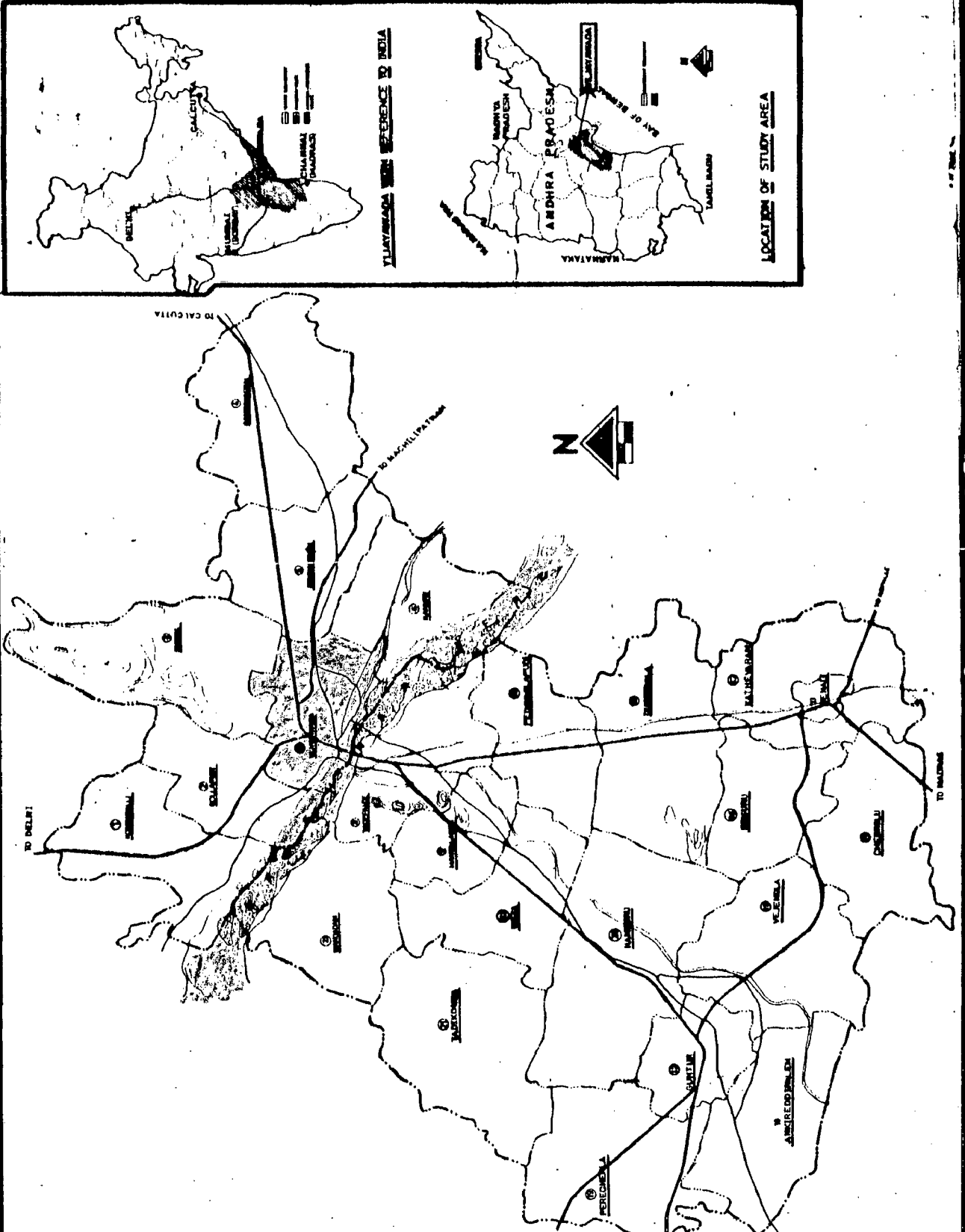
The land along the northern bank was under the rule of Chalukas and latter it was under the rule of Kakathiyas. The Kakathiyas were overthrown by the Muslim Kings in the 14th century. One can see the rock out temples at Undavalli belonging to the fifth and sixth century. A.D. Right from the olden days Vijayawada existed around the temple of lord Maqleswara. The temple which is now in the heart of the city.

On the eastern slopes of Indrakiladri Hill, and on Moghul Rajapuram hills even to this day, we can see Hindu Rock cut Shrines of the 6th and 7th centuries A.D. in a good states of preservation.

2.2.3 MUSLIM PERIOD

In 1565 A.D. the Muslims again gained possession after the Battle of Taklikota and held the country till the British occupation. Ruling from the Neighbouring hill fortress or Kondapalli. Finally in the 18th century the entire region which

V.G.T. URBAN DEVELOPMENT REGION PLANNING ZONES



formed a part of Kondapalli circars came under Nizam, who finally ceded to the British. under the Muslim rule there was no spectacular achievements except wanton quarrels among the petty Hindu chiefs who were under the Muslim rulers.

2.2.4 BRITISH PERIOD

It is during this period the town has grown significantly. Most valuable contribution of English was the construction of Krishna river. The former enabled the intensive cultivation of fertile lands covered by Krishna delta through excellent canal system emerging from Krishna barrage at Vijayawada. The later enabled and provided opportunities for the development of the economic base of the region and also attempted at the orderly growth of trade extended as far as Madras and Calcutta. The navigable canals enabled commerce to flourish in the areas.

During the British regime there was much improvement in the town and Governorpeta of Vijayawada is a fine example of the orderly growth due to the foresight of the then collectors. Communications considerably improved. Besides that they formulated building rules for regulating the development of private lands within the built up areas and rules for regulating the industries and offensive trades were also formulated. In short, it could be concluded by saying that the British government contributed great deal of orderly growth of the town. During 1888 Vijayawada was constituted as municipality.

2.2.5 POST INDEPENDENCE PERIOD

Very little is achieved after getting independence regarding the development of the town. The municipalities have shown great laxities even in making use of the existing statutes in controlling land and building developments. Even though state government do not directly take care of the matter relating to the physical planning aspects of the towns, they have undertaken and complicated various irrigation projects and in developing various systems of communications with a view to improve economic conditions of the people. The new Krishna barrage was undertaken and completed in the year 1957 with greater efficiency.

To cope with the increase in the railway traffic one more railway bridge has been constructed across the river Krishna. To enable the free flow of traffic and to facilitate the commercial traffic barrage-cum-road bridge, across Krishna river was constructed.

2.3 GROWTH OF THE CITY

2.3a PHYSICAL GROWTH :

As indicated earlier the growth of the Vijayawada is linked with transport linkages with other parts. The Railway bridge and anicut provided a fast growth of the city. The anicut bridge enabled the intensive cultivation of fertile land covered by Krishna delta through excellent canal system emerging from Krishna barrage at Vijayawada. The latter enabled and provided

the opportunities for the development of the economic base of this region and also attempted at the orderly growth of the trade within the limits of the city.

The sphere of trade extends as far as upto Madras and Calcutta. The navigatable rivers enable commerce to flourish in this area.

2.3a.1 SETTING UP OF MUNICIPALITY

During the British period there was much development and improvement in the city growth. Governorpeta of Vijayawada is a fine example of orderly growth in the city. This developed the town according to the principles of town planning. The communications were improved considerably. During 1888, Vijayawada was constituted as the Municipality.

2.3b POPULATION AND CHARACTERISTICS

The Vijayawada town had a population of only 9,000 in the year 1888. Now it reached 8.02 lakhs. The population growth of Vijawada town from 1901 to 1991 has been listed in the table 2.1.

TABLE 2.1: SHOWING POPULATION GROWTH OF VIJAWADA TOWN BETWEEN 1901 TO 1991.

YEAR	POPULATION	% GROWTH/DECADE
1901	24,224	
1911	32,867	35.7%
1921	44,159	34.4%
1931	60,457	36.8%
1941	86,184	42.6%
1951	1,61,198	87.0%
1961	2,34,360	45.4%
1971	3,17,258	35.4%
1981	5,43,008	71.20%
1991	8,02,336	47.80%

Source: census report

A graph is drawn between years and population growth which is shown in fig 2.2

LITERACY* :

The literacy rate of vijayawada town is 51.0%

POPULATION GROWTH OF VIJAYAWADA TOWN

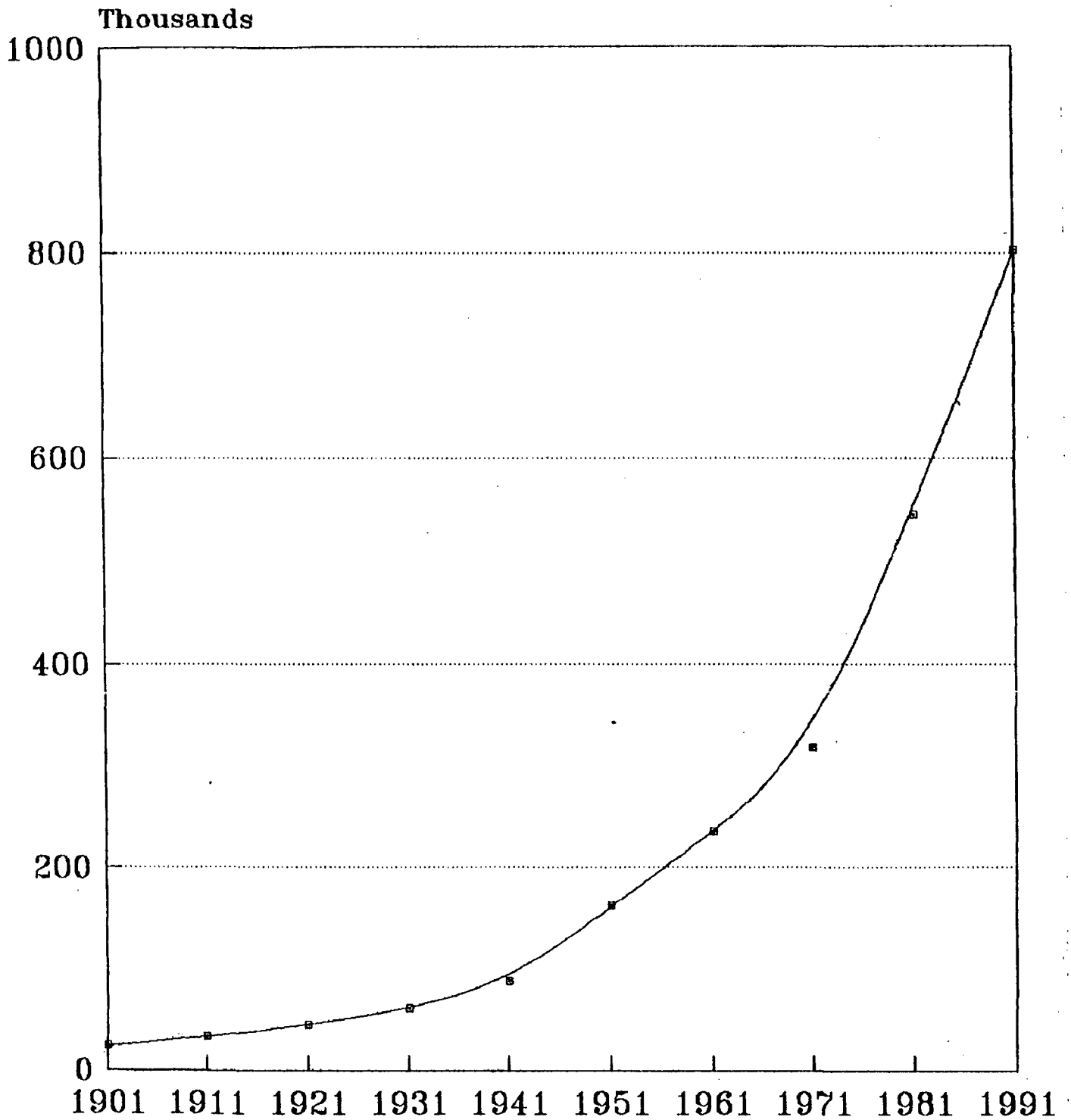


Fig. 2.1

—•— YEARS

MIGRATION* :

It is estimated that as many as 1,00,826 people have migrated to Vijayawada during the period 1971-81.

OCCUPANCY STRUCTURE* :

As per the master plan of V.G.T. region the occupational structure of Vijayawada town from 1971 to 1991 is shown in the table 2.2. It is also illustrated in fig 2.4a, 2.4b and 2.4c

Table : 2.2 Showing the occupational structure of VIJAYAWADA town

YEAR	PRIMARY SECTOR % (Agriculture)	SECONDARY SECTOR % (Industry)	TERTIARY SECTOR % (Commerce)
1971	6.45%	26.09%	67.76%
1981	11.50%	70.98%	17.52%
1991	11.64%	83.79%	4.57%

(* source : V.G.T. Master plan 2001)

FLOATING POPULATION :

It is estimated that around 80 to 90 thousand people visit Vijayawada by all means of transport daily. This is in addition to the city population¹.

(1-source: news report in Enadu Dt 22/12/96 Report)

2.4 ECONOMIC BASE OF THE CITY

2.4.1 TRADE AND COMMERCE

Vijayawada city has a large winter land comprising of delta

OCCUPATIONAL STRUCTURE 1971

OCCUPATIONAL STRUCTURE 1981

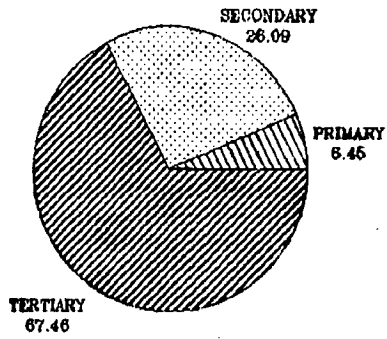


FIG 2.4a OCCUPATIONAL STRUCTURE OF THE YEAR 1971

SOURCE : V.G.T. MASTER PLAN

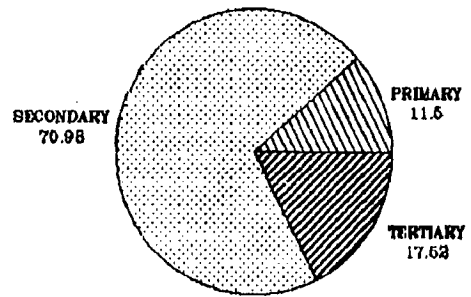


FIG 2.4b OCCUPATIONAL STRUCTURE 1981

SOURCE : MASTER PLAN V.G.T. 1981/82

OCCUPATIONAL STRUCTURE 1991

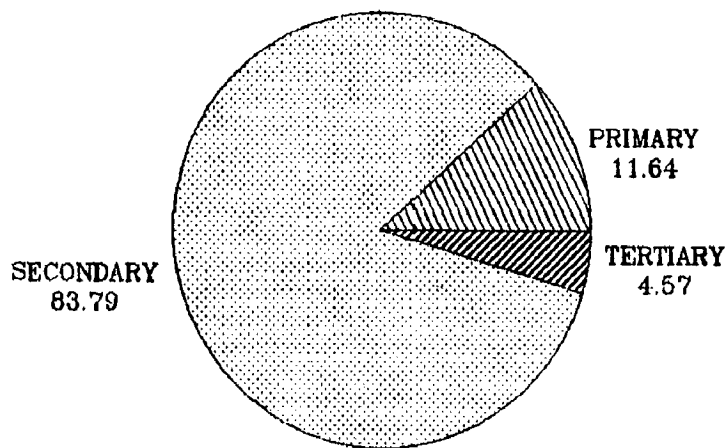


FIG 2.4c OCCUPATIONAL STRUCTURE 1991

SOURCE : V.G.T. MASTER PLAN

Fig. 2.2

of river Krishna which is blessed with vast agricultural and irrigation potential. By virtue of its unique location the city of Vijayawada provides a communication link and a trading opportunities for this winter land.

The commercial activity provides easy availability of employment particularly to the unskilled labourers who are in a constant state & migration into the city.

2.4.2 INDUSTRIES

Small scale and light industries are now gradually coming up in the city and separate industrial estate has been developed on the out skirt to take on the needs of the new entrepreneurs

small scale units	-	2,500
large or medium scale industries	-	9
no. of people employed	-	18,000

The examples of the large and medium industries are cement factory, milk project, bottling companies, pharmaceuticals, railway wagon workshop etc.

2.5 MAJOR INFRASTRUCTURAL FACILITIES

Transport : Because of the large scale commercial activity, lot of employment is provided in the transport sector also. There are thousands of heavy and light commercial vehicles apart from 1,200 automobile workshop sheds and metal based industries which provide employment to thousands of Drivers, Cleaners, Mechanics etc. because of this, the city Vijayawada is regarded as a major

automobile centre in the coastal Andhra region.

OTHER MAJOR INFRASTRUCTURAL FACILITIES :

Air Port	:	14 flights/Week
Railway Station & Junction	:	16,000 Passenge Commute daily 6,000 wagons are received or sent out/day
Colleges	:	26 Nos.
High-schools	:	25 Nos.
Radio Station	:	20 K.W. Transmitter (being upgraded to 100 K.W.)
T.V. Relay Centre	:	10 K.W. Capacity
Daily News Papers Published	:	English : 2, Vernacular : 8
Publishing Houses	:	61
Cinema Theatres	:	47
Hospitals	:	Govt. Hospital: 412 beds. Railway hospital : 200 beds. St. Anns. Hospital: 350 beds. Clinics : 200 Nos. Home for mentally retarded
Engineering Colleges	:	2 Nos
Medical Colleges	:	1 No
Bus Services	:	757 city trips/day, 715 sub urban trips
Auto Rikshawas	:	5,000

Cycle Rikshawa	:	20,000
Bridge over River Krishna	:	Irrigation Potential of 1.2 million acars
No. of Trucks	:	6,000
No. of Banks(Branches)	:	90
Estimated yearly business through banks	:	Rs. 250 crores Transaction
Telephones	:	5,000 Nos
Electric Supply	:	No. of substations 6 k.v. and 3 Nos 10 k.v. 2 under construction: 1(10kv) 25 k.v. 1 no. of service connections 60,0000
Vijayawads thermal power project	:	420 M.W. Capacity proposed extention 420 M.W.
Milk Prokucts Factory	:	Cap. 1,25,000 lit/day
Poultry	:	70,000 egg/day
Business Transacted in Fruit Market	:	Main Fruit: Mango 1,500 Wagons, 2,000 Lorries/yr.
Water supply to the city	:	18 million gallons/day

2.6 TRANSPORTATION STRUCTURE :

2.6.1 LOCATION CENTRALITY AND TRANSPORTATION

The new Krishna barrage was constructed in 1957 with a greater efficiency, and one more railway bridge was constructed across the river Krishna to cope up with the increasing demand of railway traffic. Now Vijayawada with second biggest railway platform in Asia, is a major transportation mode to the surrounding region, Now it has transportation facility to all the other parts of the country through roadways, Railway, Water ways and recently developed Airways.

During the last 60 years the population has increased more than 10 times. There was a fast growth recorded in last two decades. The Vijayawada Municipality was upgraded as Corporation in 1981 by including Bhawanipuram on the west, Patamata on the East and Gunadala on the Northern part of the city.

Because of its ideal location and availability of water and power resources, the city has got bright prospects for rapid economic development and is bound to become a metropolitan city, which can bring forth many complex problems. the city's physical growth hasn't kept pace with the demographic growth. The cause of lack of physical growth has been existence of certain physical barriers.

2.6.2 TRANSPORTATION

Because of the large scale commercial activity, lot of

employment is provided in the transport sector also. There are thousands of heavy and light commercial vehicles apart from about thousands of heavy and light commercial vehicles apart from about 1,200 automobile workshop sheds and metal brand industries which provide employment to thousands of drivers, cleaners, mechanics etc. Because of this, the city is regarded as a major automobile outer in the coastal Andhra region.

VEHICULAR STATUS :

A table showing the details of periodic statistics of transport vehicles category wise which are registered in Regional Transport office Vijayawada is shown in Table 2.3, Table 2.4 shows random statistics of the vehicles.

Bar charts are developed to illustrate growth of all the vehicles which is shown in figures from 2.5 to 2.18

TABLE 2.3: PERIODICAL STATISTICS OF TRANSPORT VEHICLES CATEGORY WISE REGISTERED IN REGIONAL TRANSPORT OFFICE : VIJAYAWADA.

YEAR	A/V	H.G.V.	M.G.V	L.G.V.	TRACTORS	TRAILER	A/R	CABS	BUSSES	MINI BUSES	M/CY -CLES	CARS	JEEPS	OTHERS	TOTAL	REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1993-94 (4/93-3/94)	355	14537	886	189	7863	7637	991	1311	1188	59	84089	7123	1161	146		
1994-95 (4/94-3/95)	416	15402	985	215	8919	8627	1177	1415	1204	98	106327	8524	1284	220		
1995-96 (4/95-3/96)	476	16606	1248	231	9378	9059	1372	1500	1218	141	119735	9415	1350	278		

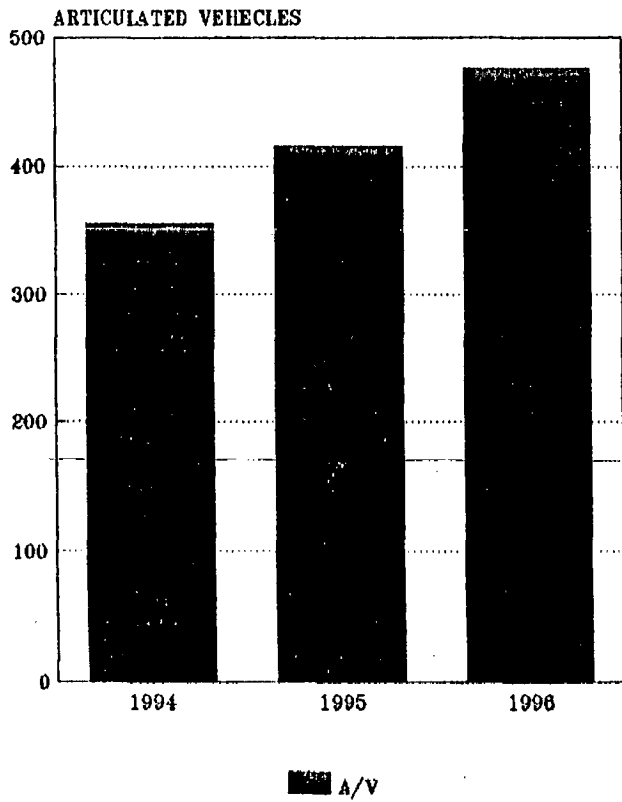
SOURCE : R.T.O. VIJAYAWADA

A/V = ARTICULATED VEHICLE.
H.G.V. = HEAVY GOODS VEHICLE.
M.G.V. = MEDIUM GOODS VEHICLE.
L.G.V = LIGHT GOODS VEHICLE.

TRACTORS =
TRAILORS.

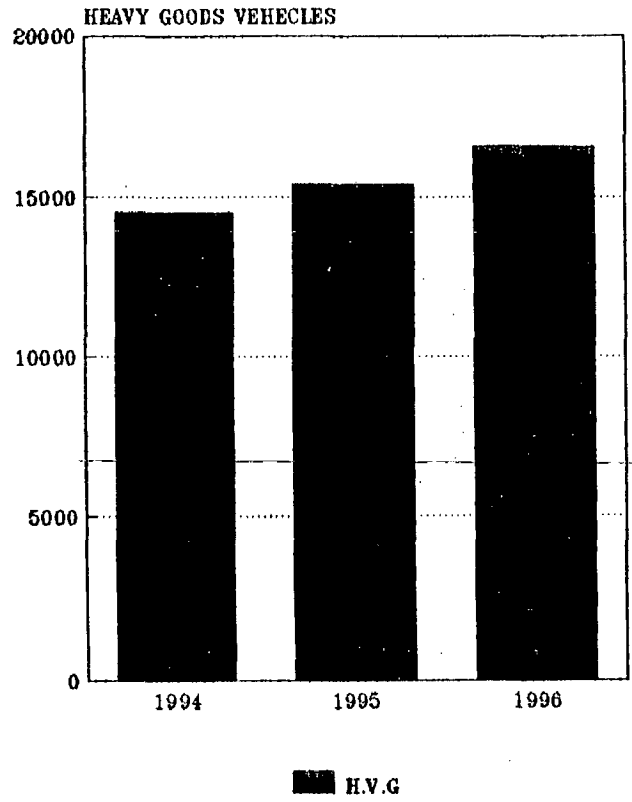
A/R = AUTO RICKSHOW
CABS = TAXI

INCREASE IN ARTICULATED VEHICLES



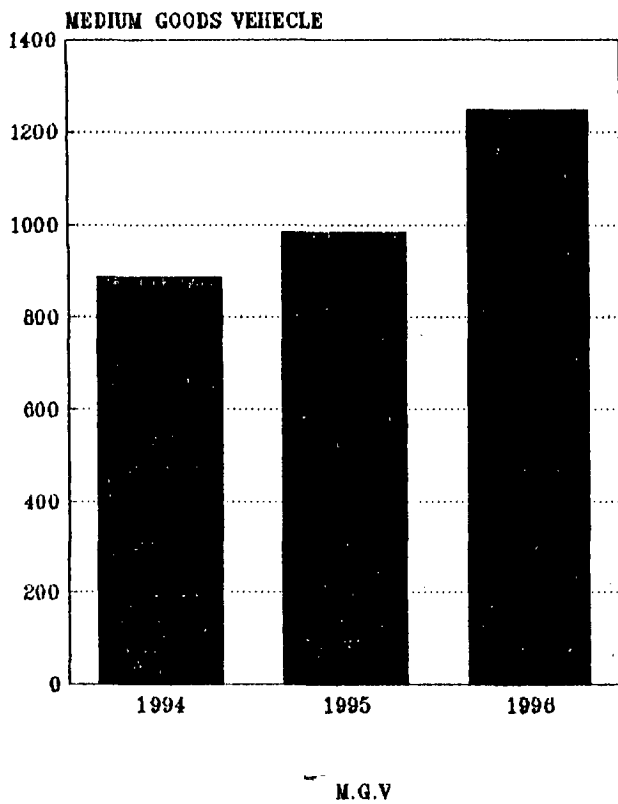
SOURCE : R.T.O. VIJAYAWADA Fig. 2.3

INCREASE IN HEAVY GOODS VEHICLES



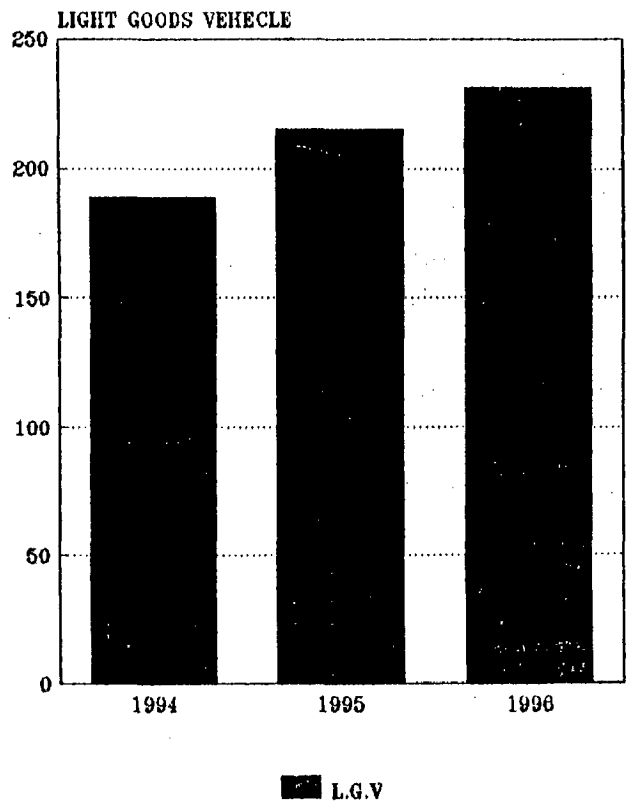
SOURCE : R.T.O. VIJAYAWADA Fig. 2.4

INCREASE IN MEDIUM GOODS VEHICLES



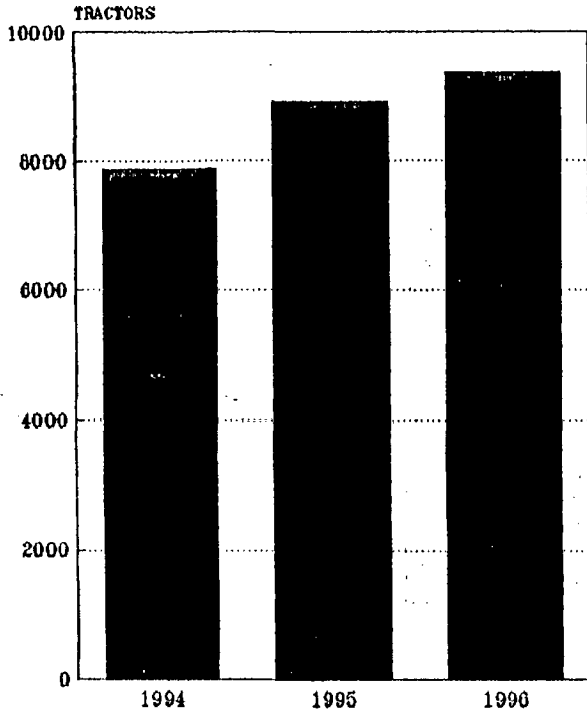
SOURCE : R.T.O. VIJAYAWADA Fig. 2.5

INCREASE IN LIGHT GOODS VEHICLES



SOURCE : R.T.O. VIJAYAWADA Fig. 2.6

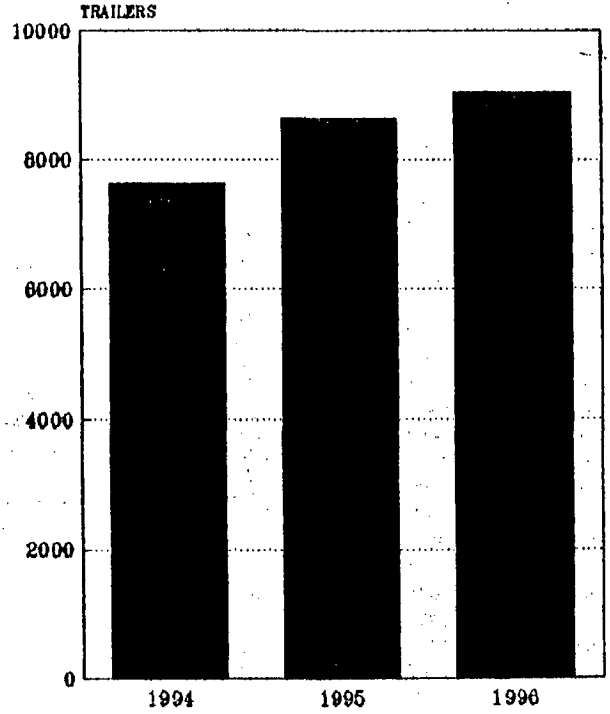
INCREASE IN TRACTORS



TRACTORS

SOURCE : R.T.O. VIJAYAWADA Fig. 2.7

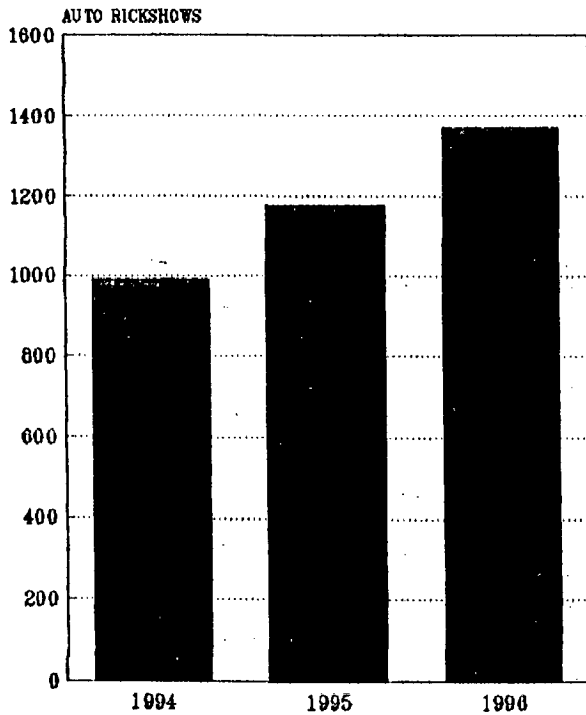
INCREASE IN TRAILERS



TRAILERS

SOURCE : R.T.O. VIJAYAWADA Fig. 2.8

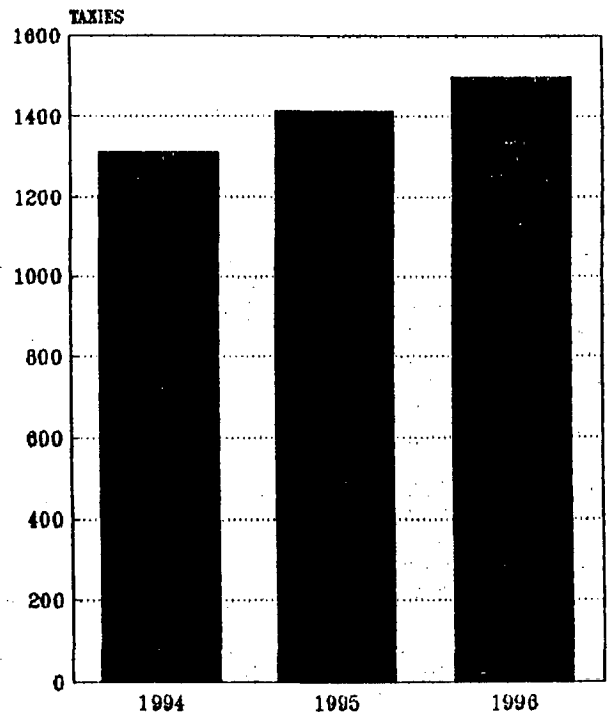
INCREASE IN AUTO RICKSHAWS



AUTO RICKSHAWS

SOURCE : R.T.O. VIJAYAWADA Fig. 2.9

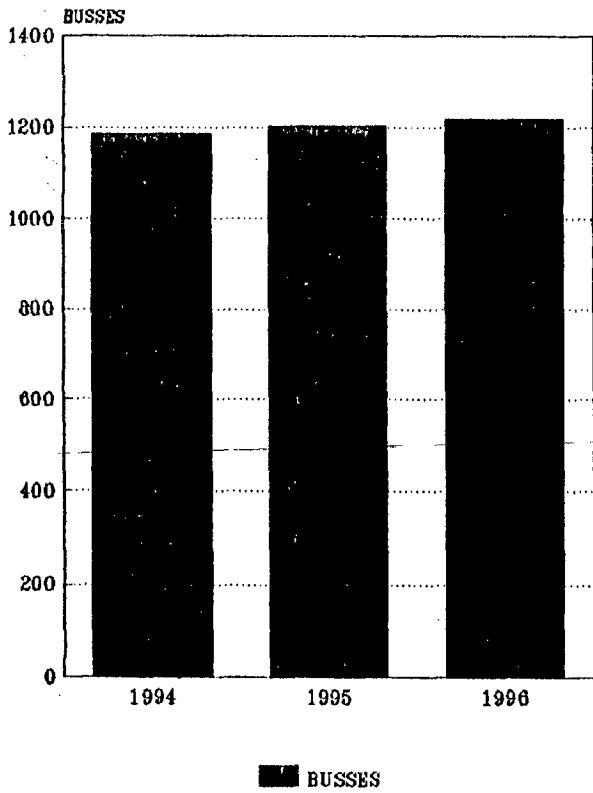
INCREASE IN TAXIES



TAXIES

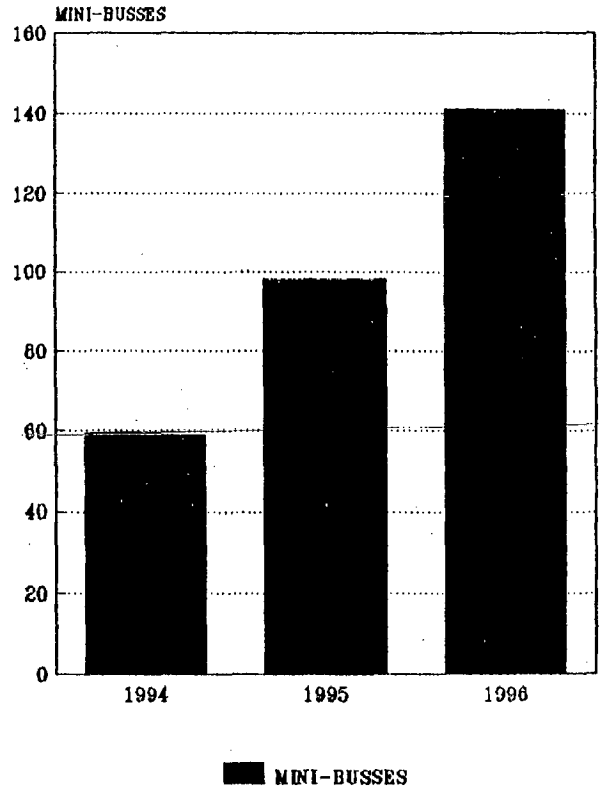
SOURCE : R.T.O. VIJAYAWADA Fig. 2.10

INCREASE IN BUSES



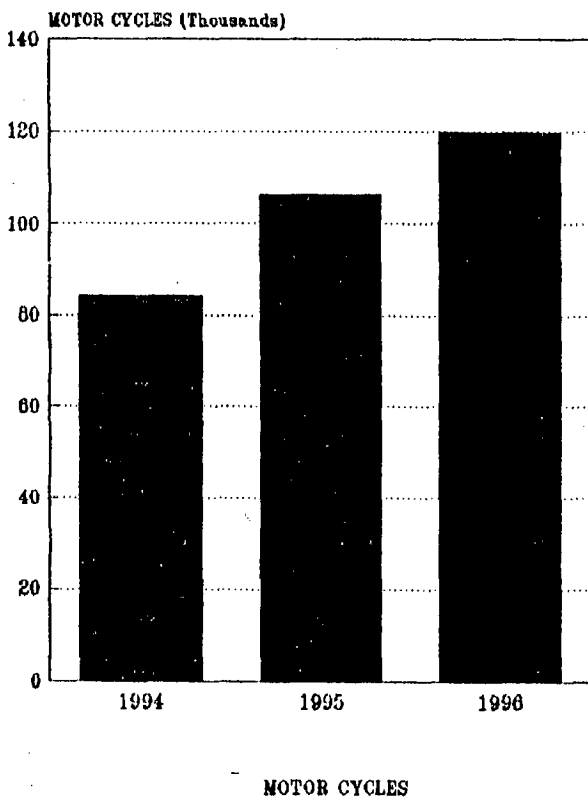
SOURCE : R.T.O. VIJAYAWADA Fig. 2.11

INCREASE IN MINI-BUSES



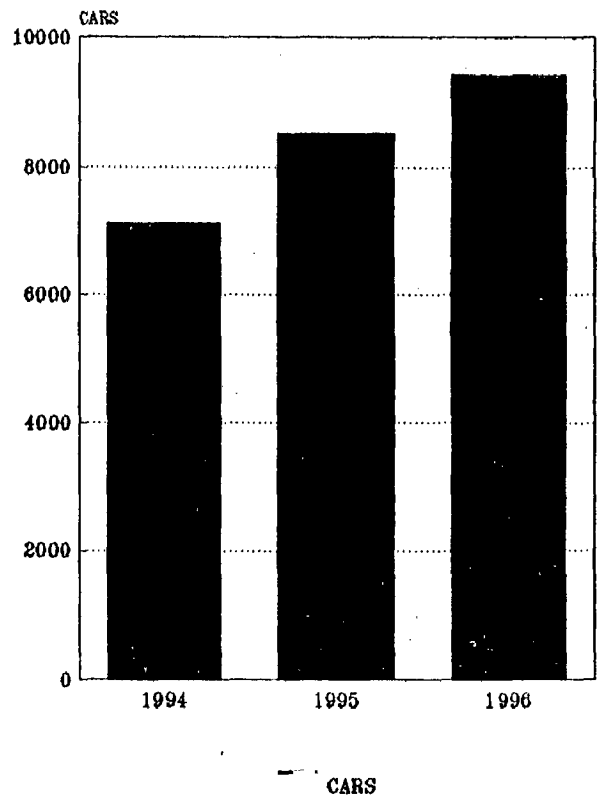
SOURCE : R.T.O. VIJAYAWADA Fig. 2.12

INCREASE IN MOTOR CYCLES



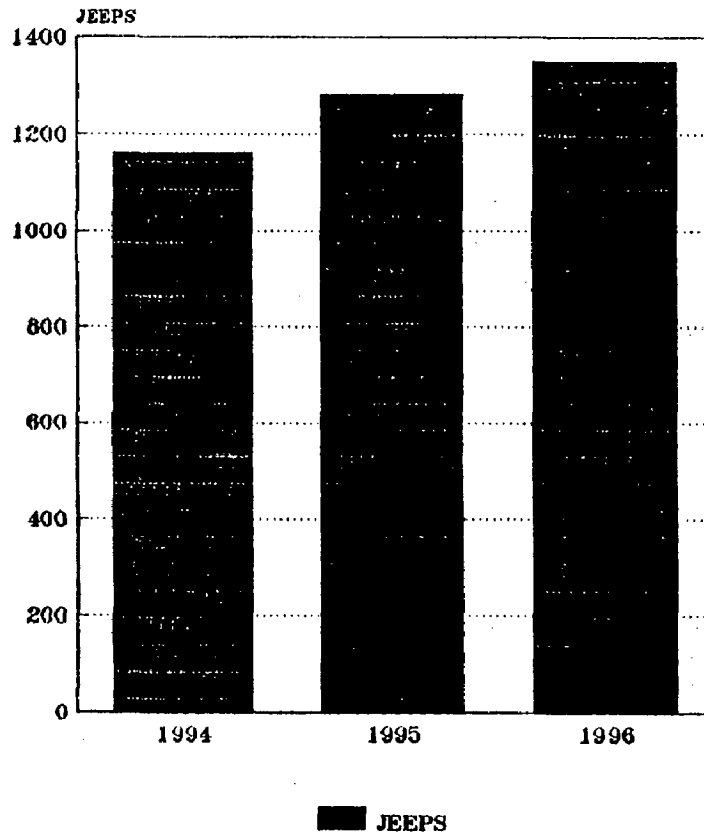
SOURCE : R.T.O. VIJAYAWADA Fig. 2.13

INCREASE IN CARS



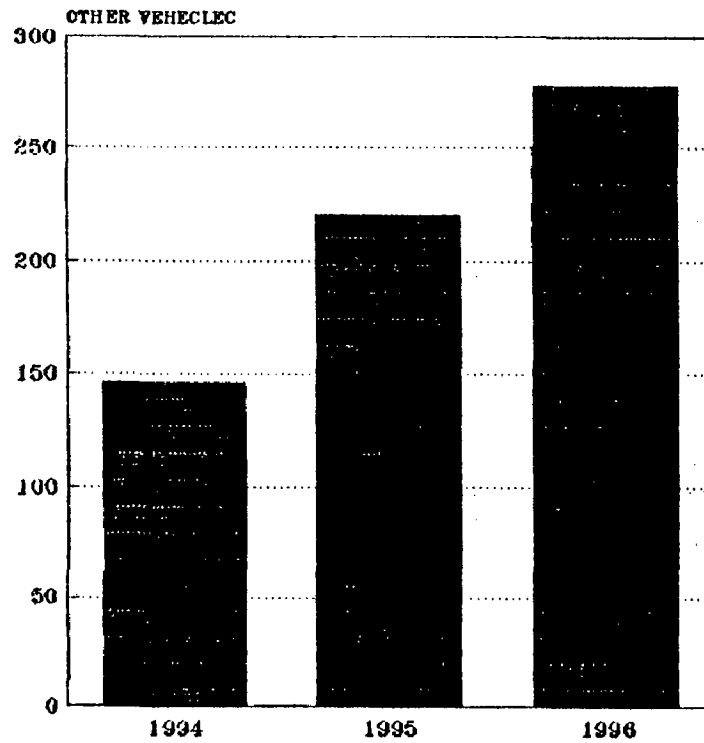
SOURCE : R.T.O. VIJAYAWADA Fig. 2.14

INCREASE IN JEEPS



SOURCE : R.T.O. VIJAYAWADA Fig. 2.15

INCREASE IN OTHER VEHECLES



SOURCE : R.T.O. VIJAYAWADA OTHER VEHECLES Fig. 2.16










VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN

EXISTING LAND USE MAP



SCALE 1:50,000

-  RESIDENTIAL USE.
-  COMMERCIAL USE.
-  INDUSTRIAL USE.
-  PUBLIC & SEMI-PUBLIC USE.
-  TRANSPORT & COMMUNIC-
-ATION USE.
-  PUBLIC UTILITIES.
-  PUBLIC OPEN SPACES.
-  HILLS & ROCKY LAND
-  WATER COURSES.

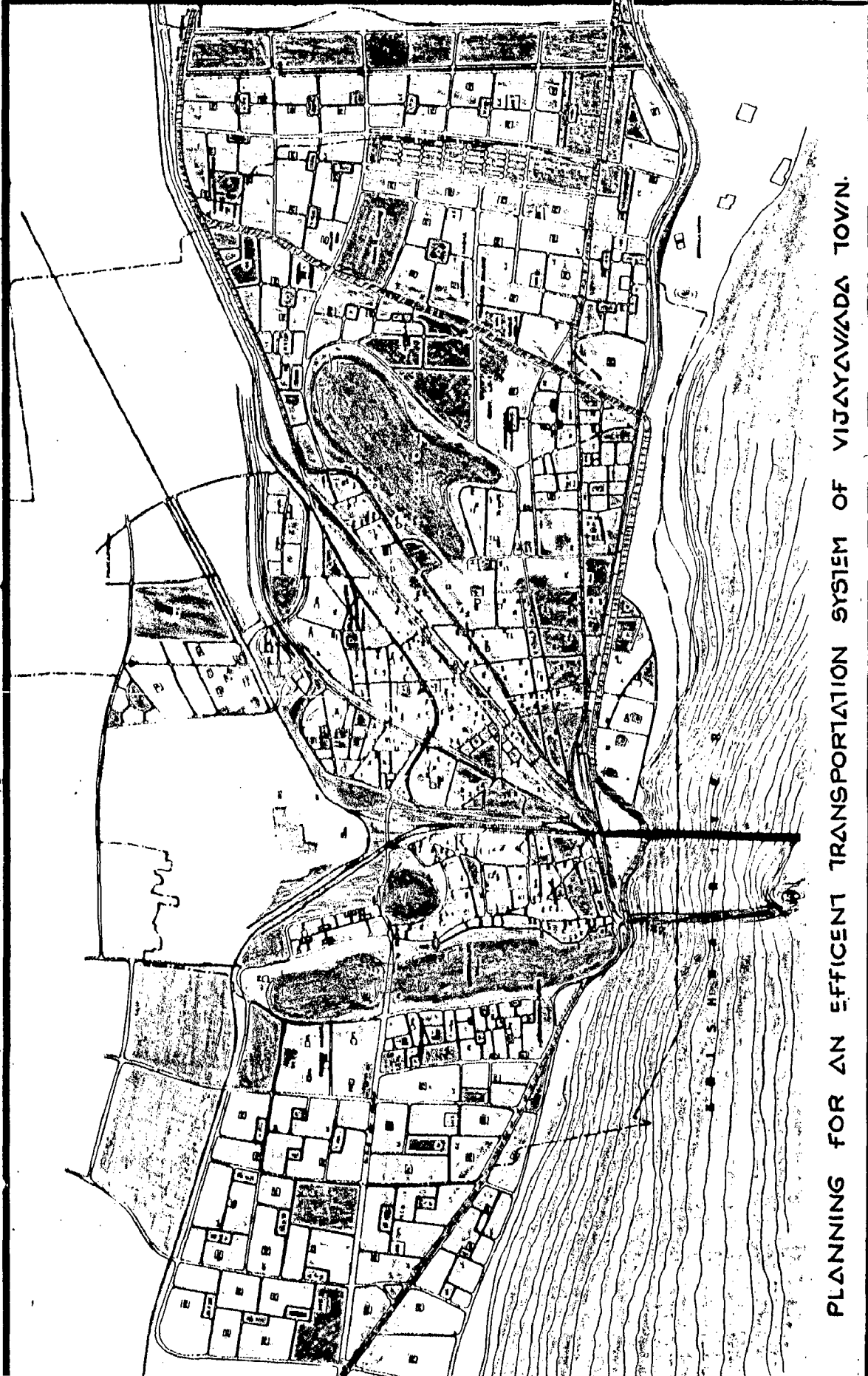
MALAJI NAGARJUNA

M. U. R. P.

DEPT. OF ARCH.

AND PLNG

U. O. R., ROORKEE



PLANNING FOR AN EFFICIENT TRANSPORTATION SYSTEM OF VIJAYAWADA TOWN.

TABLE 2.4: PERIODICAL STATISTICS OF TRANSPORT VEHICLES CATEGORY WISE REGISTERED IN REGIONAL TRANSPORT OFFICE : VIJAYAWADA.
RANDOM SAMPLING.

YEAR	A/V	H.G.V.	M.G.V	L.G.V.	TRACTORS	TRAILER	A/R	CABS	BUSES	MINI BUSES	M/CY -CLES	CARS	JEEPS	OTHERS	TOTAL	REMARKS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1993 (12/93)	1	38	3	-	32	43	17	5	-	1	502	49	6	1		
1994 (8/94)	9	68	7	-	52	44	9	5	2	3	1033	53	3	26		
1995 (4/95)	9	124	9	5	55	60	2	9	4	-	1319	85	3	1		

SOURCE : R.T.O. VIJAYAWADA

A/V = ARTICULATED VEHICLE.
H.G.V. = HEAVY GOODS VEHICLE.
M.G.V. = MEDIUM GOODS VEHICLE.
L.G.V = LIGHT GOODS VEHICLE.

TRACTORS =
TRAILORS.

A/R = AUTO RICKSHAW
CABS = TAXI

3.0 STUDY OF TRAFFIC PROBLEMS

In 1981, there were 216 class 1 cities with a population of 1 lakh and above. These included 12 cities with a population of 10 lakhs and above, 28 cities with a population of 5 to 10 lakhs and 29 cities with a population of 3 to 5 lakhs. Vijayawada town as per 1991 census report was having 8,02,336. The town center often starts on its roads to decay accompanied by unemployment, property, crime, violence and decline in traffic qualities.

The author of present investigation is proposed to plan an efficient transport system in Vijayawada. In the Vijayawada town mainly the following roads are having lot of problems with existing traffic. They are :

1. N.H. 9 Hyderabad to Madras (12 km.)
2. N.H. 5 Madras to Calcutta (5.6 km.)
3. Eluru road (8 km).
4. Bandar road (8 km).

3.1 IDENTIFICATION OF MAIN TROUBLE CAUSING ELEMENTS :

For the identification of main problems associated with the existing transportation system of Vijayawada. Due to non availability of readymade data, an attempt is made to assess the

current situation by adopting the method of rapid appraisal technique under this technique a sample of 50 people are taken and surveyed. A larger sample might give a fair idea about the current situation. But even in the sample of 50 people care is taken to include different cross sections of people. The details of that are as follows

*"10" People from Employees community of whom included officers of different ranks, teachers & lecturers and traffic police personnel.

*"10" People from business field of whom included shopkeepers, wholesale traders, transportation agencies, people associated with transportation of goods for business purposes.

*"10" people from on street population of whom included street hawkers, rickshaw walas, thela walas.

*"10" People among house wives of different localities.

*"10" People from student community. In this majority of the students are from the institution located besides the roads, more particularly by the side of NH 9 .

A questionnaire has been prepared for this purpose which is very simple to answer, are targetted to gather as much of information as possible.

the questionnair is as follows:

1)OCCUPATION

- a)official b)businesspeople c)on street d)house wives
e)students

2)Whether you own a vehicle. Yes/no

3)Frequency of its use in a week.

4)Whether you have a parking space.

5)If not owners of a vehicle then main mode of transport.

6)Average distance travelled per day.

7)Problems faced regarding traffic.

The information gathered is tabulated as follows:

TABLE 3.1 DATA OBTAINED BY RAPID APPRISAL TECHNIQUE.

CATEGORY	Has motor vehicle. yes/no	Frequency of use in a week.	Parking place yes/no	Distance travelled per day.
A 5 people 5 traffic police personel	yes-8 No-2	daily	yes-8	10-15Km on an average
B	yes-10	Daily	only 3 people could claim they have their own parking space	30-40Km per day
C	-	-	yes-nil no-10	
D	yes-2	3-4 times a week.	yes - 2	4-5Km
E	yes-8 No-2	daily	yes-8	10-15km on an average

PROBLEMS: OF CATEGORY "A"

- 1) Congested streets.
- 2) mixed traffic.
- 3) Improper location of bus shelter.
- 4) poor condition of roads.
- 5) no proper control of traffic.
- 6) On street parking.

PROBLEMS: OF CATEGORY "B"

- 1) Congested streets.
- 2) Delay in getting goods.
- 3) Heavy vehicular traffic observed in narrow streets.

PROBLEMS: OF CATEGORY "C"

- 1) Harassment by traffic police.
- 2) No proper place to conduct their business.

PROBLEMS: OF CATEGORY "D"

- 1) no safer access to children.
- 2) Congested streets.
- 3) Mixed traffic.
- 4) Location of major roads in front of schools.
- 5) On street parking.

PROBLEMS: OF CATEGORY "E"

- 1) Heavy traffic in front of the institutions.
- 2) Buses doesn't stop at bus shelters.
- 3) non following of traffic rules.
- 4) Congested streets.
- 5) Poor condition of connector and main roads.
- 6) Rash driving.

The most serious effect of increasing urbanisation in Vijayawada town is leading to congestion on the streets like, N.H. 5, N.H. 9, Eluru road, Bandar road etc. The conditions results will be concentrated traffic demand, both in time and in space. An invatable result of growth of traffic has been the increase in road accidents, (Table 3.3) which take a great tole of the human life every year. The noice in the streets and adjoining areas has been growing up to intolerable levels. In the Vijayawada town the exhaust form the vehicles pollutes the atmosphere with fumes and smell vibration of the building adjacent structures and visual interruption are some of the other ill effects.

The natural barrier which are restricting the road widening are forming the bottle necks in the main traffic corridor of the Vijayawada town. No. of inter linkages to the main roads are

more which becomes the cause for accidents in good many cases. On street parking and educational Institution situated besides the roads like in Eluru road and N.H. 9 between the Benz circle and Ramavarappadu ring road of Vijayawada town are also adds to the main causes to obstruct the traffic in Vijayawada. Unorganised junctions are also the becoming the cause of many accidents.

3.2 STUDY OF TRAFFIC ON SELECTED CORRIDORS AND THE ASSOCIATED TRAFFIC PROBLEMS.

The statistical data which shows the growth of traffic over a period of time in the past or present. So all the roads are analysed taking its designed capacity and existing volume of traffic that is being handled on the particular road. On comparing these two capacities a conclusion is made whether the traffic volumes are more or not. If they are more remedial measures will be proposed in the project proposals.

N.H. 9 : National highway between Hyderabad & Madras :

The length of this road in the municipal limits of Vijayawada town is 6 km. This road pass by the side of Indrakeeladri hill and river Krishna which are the natural barriers that are restricting the road widening. So there is a

bottle neck formed on this road. This road crosses the Krishna river through Krishna barrage which is designed for a capacity as that of a 2-lane road. But now due to the increase in no. of trips between Vijayawada and Gunture and due to the Indian oil corporation located at Tadepalli. This Barrage is not able to serve the increasing traffic (Table 3.4). And due to the commercial development that is taking place along this road are also causing accidents. This road alone is made to handle an over burdened load of 1575 PCU (V.G.T. Master plan).

N.H. 5 : National highway connecting Madras & Calcutta :

The length of this road in the municipal limits of Vijayawada town is 16 km.. This road also starts from Krishna Barrage which is only having 2 lane with. As a result this Barrage has to take the load of N.H. 5 as well as N.H. 9 in addition to the local traffic. So the major bottle neck in Vijayawada town is the Krishna Barrage. After the Krishna Barrage the N.H. 9 passes through the city taking the route via Bhaskar Rao pet, Krishna lanka and it enters the now town area at Benz circle. From there it passes through Ramavarappadu Ring and goes out of the town. This route was designed first as a bypass road. But due to the increase of the town it has now become the

internal road of the town for which it is not designed for. The problems associated with are around 3km stretch of this road had become highly accident prone due to the location of Educational institutes along this road, like the well known Layola College, Maristella Ladies College, Govt. Polytechnic, Govt. I.T.I. etc. This trend of allowing the educational institutes lead to the development of the Medical College and number of other privately run residential colleges and schools came up there, which ultimately lead to the development of residential colonies along this bypass road an internal city road. Because it is actually not as a town road, this road is now causing many problems in terms of traffic. This whole strip in between Benz circle and Ramavarappadu ring became highly accident prone area.

Eluru Road :

The length of the road in the municipal limits of Vijayawada town is 15 km. . This road passes through the C.B.D. .

Bandar Road :

This road is also known as Mahatma Gandhi Road. The length of this road with in the municipal limits of Vijayawada town is about 21 km. . This is the only 4 lane road that is there in the town. This road also converts into a 2 lane road after Benz circle. The main problem with this road is that there are so

many connections which are not enhanced properly. These interrupts the through traffic.

TABLE 3.2 THE LENGTHS OF DIFFERENT ROADS AND THEIR WIDTHS.

Road	Length	Width	No. of lanes
1.Eluru road	15 km.	50 ft.	2
2.Bandar road	21 km.	100 ft.	4
3.N.H. 5	6 km.	50 ft.	2
4.N.H. 9	16 km.	50 ft.	2

3.3 STUDY OF PROBLEMS AND THEIR CAUSES:

The causes in general for all problems associated with Vijayawada traffic & transportation can be listed below.

1. Ribbon development with shopping and commercial centers along the highways passing through the town hampers the free flow of traffic.
2. Enroachments by hawkers and timber merchants on the arterial roads with in the town results in narrowing the highways.
3. Road inter-sections with highways and other important roads in this town are not properly planned and executed.
4. Lack of parking lots within the commercial areas resulted in

curb side parking causing bottlenecks in the existing narrow streets and roads.

5. Faulty locations of bus terminals had resulted in an unavoidable movement of heavy traffic within the town and there is a need for suitable relocation.

Analysis of problems and their causes road wise :

National Highway No. 5 :

This is the road connecting Madras and Calcutta. The first bottle neck in the municipal limits of Vijayawada is the Prakasam barrage. It is only having a width of 50 only which functions as a two lane road.

This road and the Bandar road mixes and runs across the heart of the town. Due to the ribbon development of with shopping and commercial centers most of them whole sale and retail automobile shops is reducing the affective capacity of the road.

Even though this road is a four lane one due to lack of traffic sense and due to lack of firm separators the efficient capacity of the traffic is getting reduced.

There are parks, play areas, stadia publishing houses,

hospital located along the strip where it merges with Bandar road. Due to all these traffic magnets this road has developed no. of inter-sections which are not properly designed.

This road passes the town from just in front of the new bus stand which is another bottleneck. Due to the location of bus-stand the ribbon development is taking place along the road which has to be arrested. But it seems to be a difficult thing due to the unwillingness of the people to accept.

The stretch of the road between Benz circle and Ramavarrappadu ring is fully become accident prone due to the ribbon development along the stretch due to the location of major Educational institutions and Residential colonies.

National Highway No. 9 :

For this road also the major bottleneck is the Prakasham barrage. In addition to the traffic going from Hyderabad and Madras there are no. of buses that run between Vijayawada and Guntur. The peak hour traffic volume on this bridge is 1575 P.C.U. .

Another bottleneck in this route is beside the Indrakeeladri hill. This is due to the natural barriers like the hill and the road.

Eluru road :

This passes through the heart of the town. On this road due to the Encroachments by hawkers and timber merchants on the road margin is resulting in narrowing the road. There are some colleges like S.R.R. & C.V.R. Colleges and some other residential colleges are also coming up.

The problems of inter connections eventhough less when compared to M.G. Road is also hampering the traffic flow.

Bandar Road :

This is the only 4 lane road in the town. But due to the no. of intersections and ribbon development along the road is reducing the effective capacity of the road.

There are as many as 9 petrol filling stations located along this strip of around 5 km. all these are leading to the formation of bottlenecks along the road.

Many other problems were already discussed under the heading N.H.5

Tables(3.3 & 3.4) gives the accidents data and traffic on different roads.



247827

TABLE 3.3 ACCIDENTS IN VIJAYAWADA TOWN

YEAR	FATAL	MAJOR	MINOR	TOTAL
1994	96	168	176	440
1995	104	188	164	456
1996	80	108	216	404
UP TO 30/7/96				

ROADS IN VIJAYAWADA

METAL ROADS - 348.125 KM.
GRAVEL ROADS - 132.680 KM.
C.C. & BLACK TOPPED ROADS - 291.28 KM.

TABLE 3.4 DAILY OUT FLOW OF VEHICLES FROM VIJAYAWADA.

TYPE OF VEHICLES.	MADRAS ROAD.	HYDERABAD ROAD.	MACHILI-PATNAM ROAD.	ELURU ROAD.
(1)	(2)	(3)	(4)	(5)
1. LOADED BUSES	405	350	307	500
2. EMPTY BUSES	28	10	18	..
3. LOADED TRUCKS	700	608	587	607
4. EMPTY TRUCKS	357	349	78	208
5. CARS, TAXIS, VANS, JEEPS & STATION WAGGONS	1500	379	590	375
I. TOTAL FAST MOVING VEHICLES	2990	1696	1580	1690
II. TOTAL SLOW MOVING VEHICLES	7348	3648	3954	2173
TOTAL VEHI-	10338	5344	5534	3863

(Source : Vijayawada munisipal area plan)

From the above tables, it can be observed that the traffic of krishna barrage is 23,569 vehicles per day in both the directions taken together.

The percentage analysis of the data obtained by rapid appraisal technique is shown in the table below.

TABLE 3.5: DETAILS ABOUT PERCENTGE OF VEHICULAR OWNERSHIP AND PERCENTAGE OF AVAILABLE PARKING.

Vehicle owner	Parking available	Remarks
56 %	76 %	Analysis of a sample group of 50 people.

TABLE 3.6: THE P.C.U. CONVERSIONS OF DIFFERENT VEHICLES.

ITEM	P.C.U.
Car	1
Bus	3.6
Truck	2.7
Auto -rickshaw	0.6
Schooter	0.2
Tractor	3.9
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M \ Cycle	0.3
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Hand cart	2.8

Table 3.7 shows the tentative capacities of urban roads between intersections.

TABLE 3.7 TENTATIVE CAPACITIES OF URBAN ROADS BETWEEN INTERSECTIONS.

NO. OF TRAFFIC LANES AND WIDTHS	TRAFFIC FLOW	ROADS		
		WITH NO FRONTAGE ACCESS NO STANDING VEHICLES VERY LITTLE CROSS TRAFFIC	ROADS WITH FRONTAGE ACCESS BUT NO STANDING VEHICLES AND HIGH CAPACITY INTERSTING	ROADS WITH FREE FRONTAGE ACCESS PARKED VEHICLES AND HEAVY CROSS TRAFFIC
2-LANE (7-7,5M)	ONE WAY	2400	1500	1200
	TWO WAY	1500	1200	750
3-LANE (10,5)	ONE WAY	3600	2500	2000
4-LANE	ONE WAY	4800	3000	2400
	TWO WAY	4000	2500	2000
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TABLE 3.8 PRESENT VOLUME OF TRAFFIC PER HOUR ON DIFFERENT ROADS OF VIJAYAWADA TOWN.

ROADS	width in ft.	length in km.	No. of lanes	Holding P.C.U.
1.Eluru road.	50	15	2	3500
2.Bandar road or M.G. rd.	100	21	4	3495
3.N.H. 5 Mad.-Hyd.	50	-	2	3600
4.N.H. 9 Mad.-Cal.	50	-	2	4520

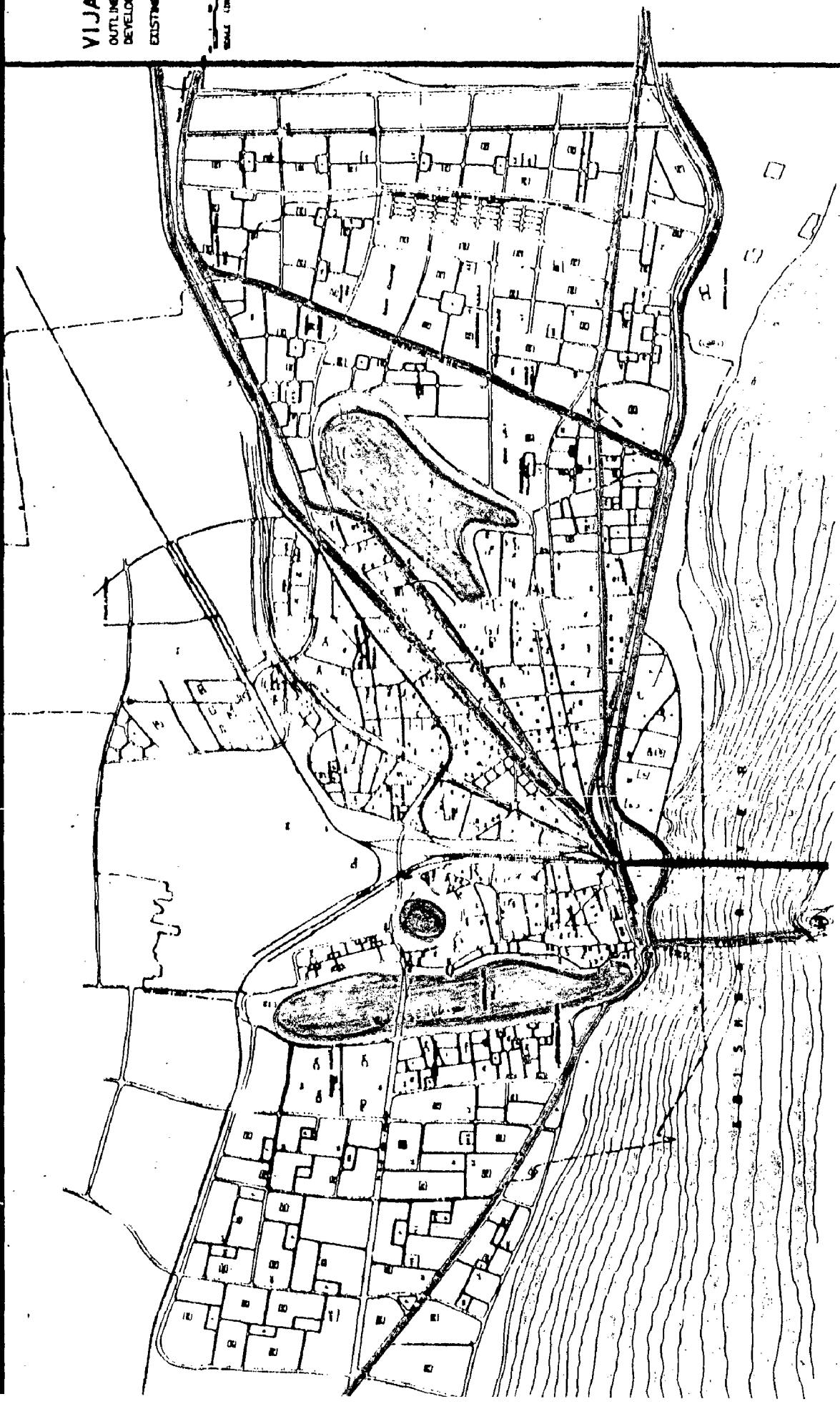
VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN

EXISTING LAND USE MAP N



SCALE 1 CM TO 1 KM



curb side parking causing bottlenecks in the existing narrow streets and roads.

5. Faulty locations of bus terminals had resulted in an unavoidable movement of heavy traffic within the town and there is a need for suitable relocation.

Analysis of problems and their causes road wise :

National Highway No. 5 :

This is the road connecting Madras and Calcutta. The first bottle neck in the municipal limits of Vijayawada is the Prakasam barrage. It is only having a width of 50 only which functions as a two lane road.

This road and the Bandar road mixes and runs across the heart of the town. Due to the ribbon development of with shopping and commercial centers most of them whole sale and retail automobile shops is reducing the affective capacity of the road.

Even though this road is a four lane one due to lack of traffic sense and due to lack of firm separators the efficient capacity of the traffic is getting reduced.

There are parks, play areas, stadia publishing houses,

hospital located along the strip where it merges with Bandar road. Due to all these traffic magnets this road has developed no. of inter-sections which are not properly designed.

This road passes the town from just in front of the new bus stand which is another bottleneck. Due to the location of bus-stand the ribbon development is taking place along the road which has to be arrested. But it seems to be a difficult thing due to the unwillingness of the people to accept.

The stretch of the road between Benz circle and Ramavarrappadu ring is fully become accident prone due to the ribbon development along the stretch due to the location of major Educational institutions and Residential colonies.

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TABLE 3.7 TENTATIVE CAPACITIES OF URBAN ROADS BETWEEN INTERSECTIONS.

NO. OF TRAFFIC LANES AND WIDTHS	TRAFFIC FLOW	CAPACITY IN PLUS PER HOUR FOR VARIOUS TRAFFIC CONDITIONS		
		ROADS WITH NO FRONTAGE ACCESS NO STANDING VEHICLES VERY LITTLE CROSS TRAFFIC	ROADS WITH FRONTAGE ACCESS BUT NO STANDING VEHICLES AND HIGH CAPACITY INTERSTING	ROADS WITH FREE FRONTAGE ACCESS PARKED VEHICLES AND HEAVY CROSS TRAFFIC
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	TWO WAY	1500	1200	750
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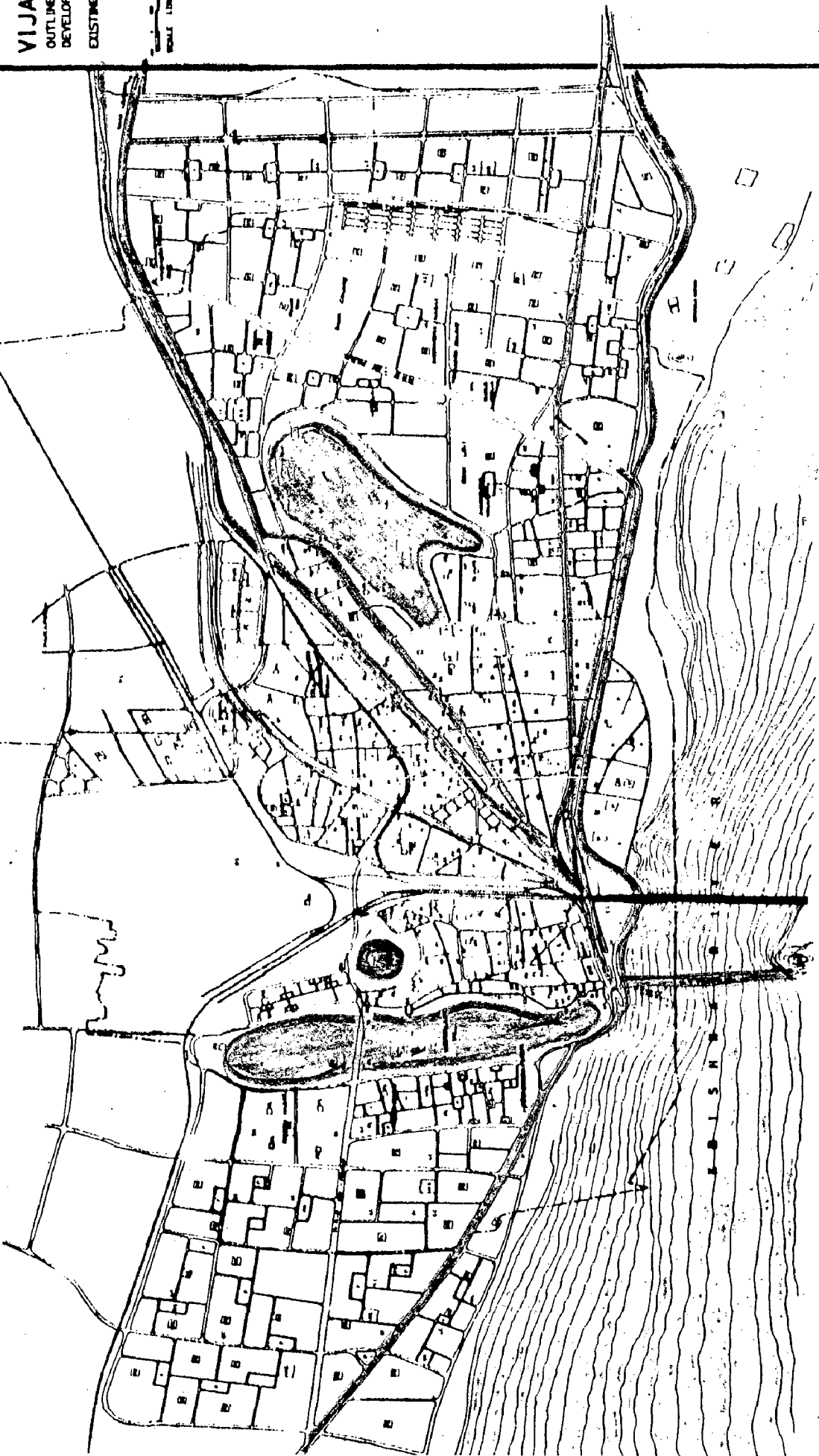
VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN

EXISTING LAND USE MAP N



SCALE 1 INCH TO 1 MILE

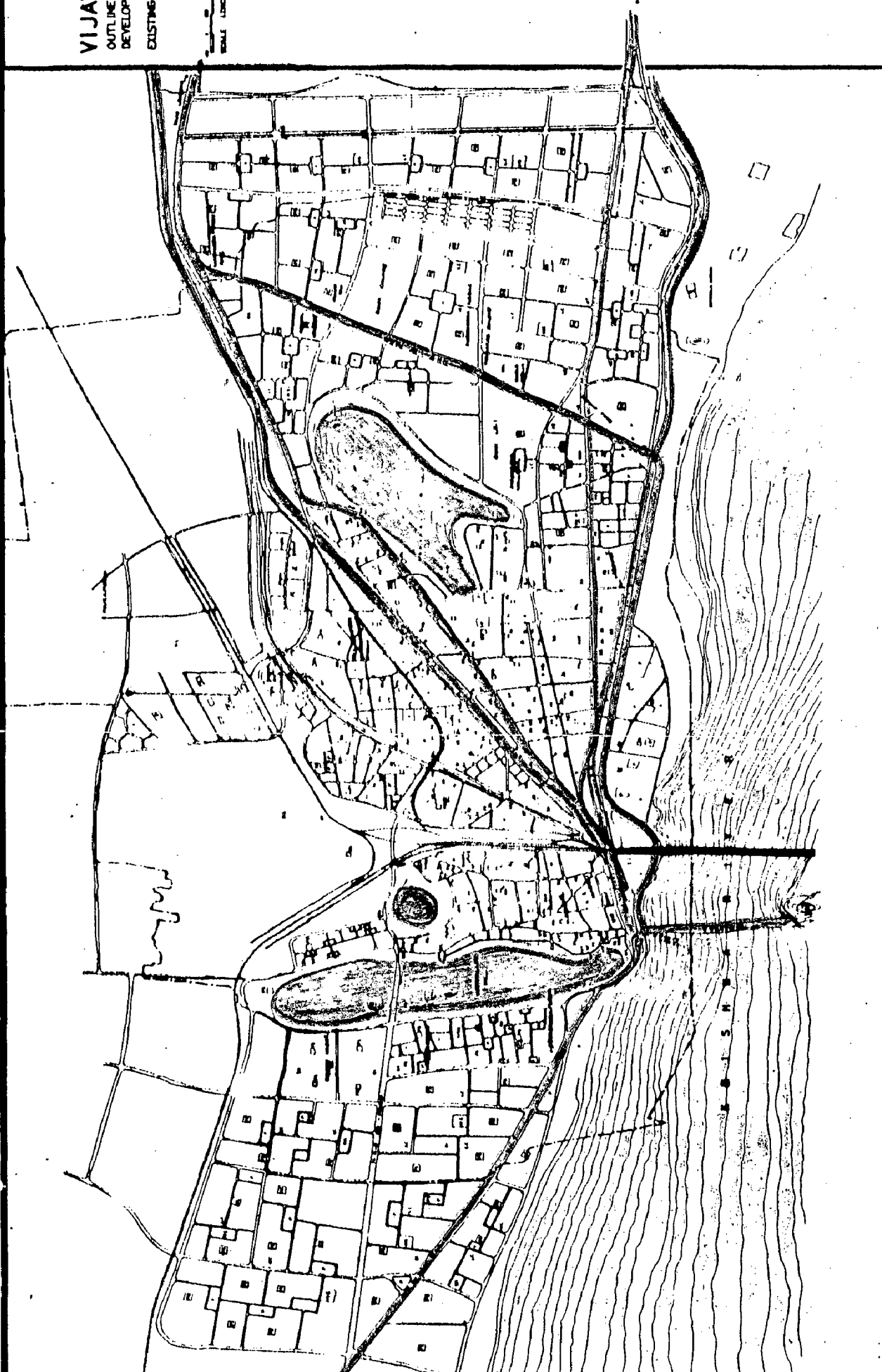


VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN
EXISTING LAND USE MAP



SCALE 1:50,000



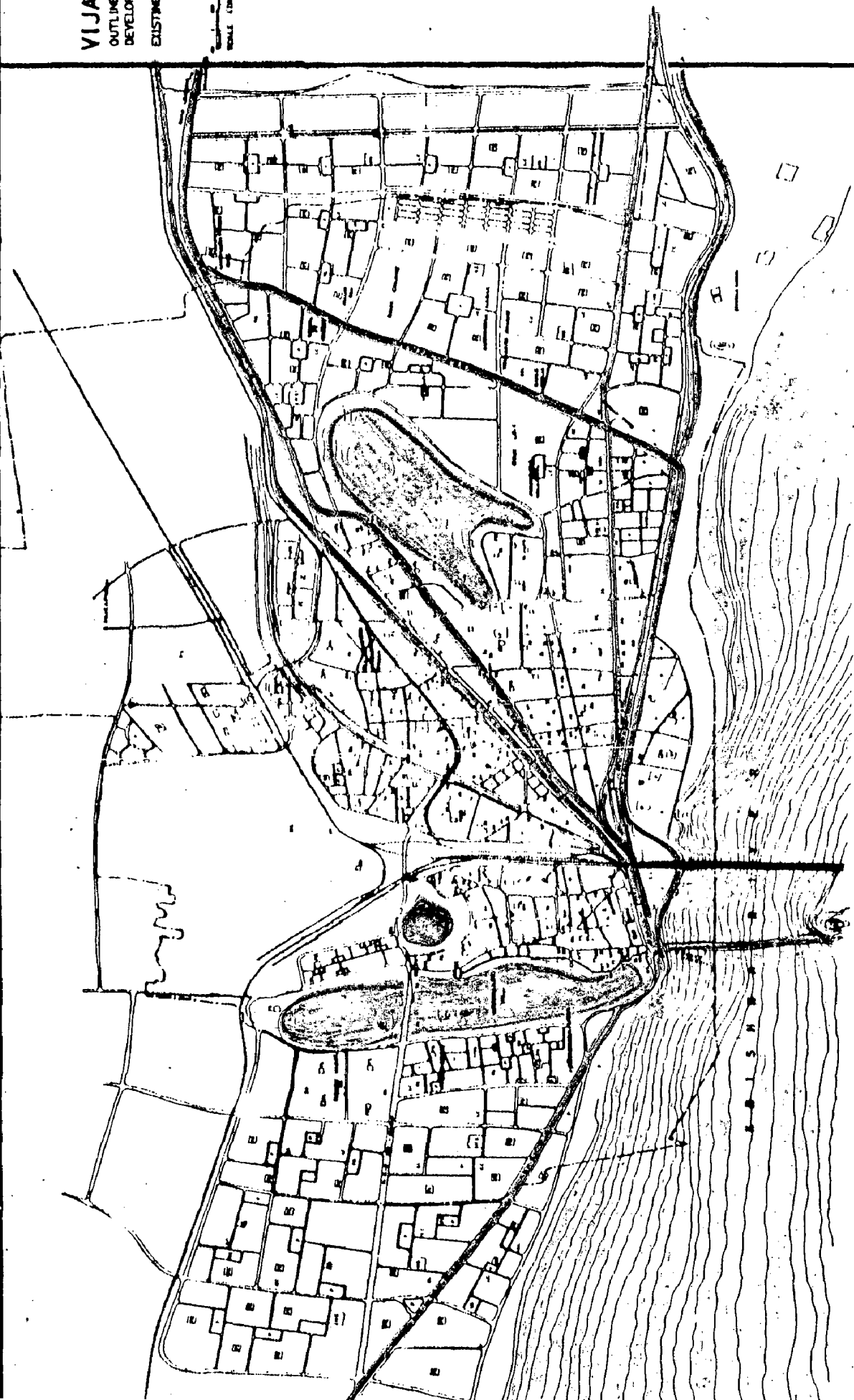
VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN

EXISTING LAND USE MAP N



SCALE 1 INCHES TO 1 MILE



CHAPTER 4

4.0 PROJECTIONS

In this project for calculating the Projections of population, Different vehecles and Work force the geometrical projection method is used.

In the Geometric Projection Method projections are doen using the following formula.

$$P_n = P_o (1+r)^n$$

where P_n = is the projection made for future
"n" years.

n = is the number of years.

r = is the growth of the quantity that
has to be projected in the recent past.

P_o is the present known value of that quantity.

4.1 POPULATION PROJECTIONS :

The population is projected using geometrical projection method for 2010 A.D. is shown in the table 4.1

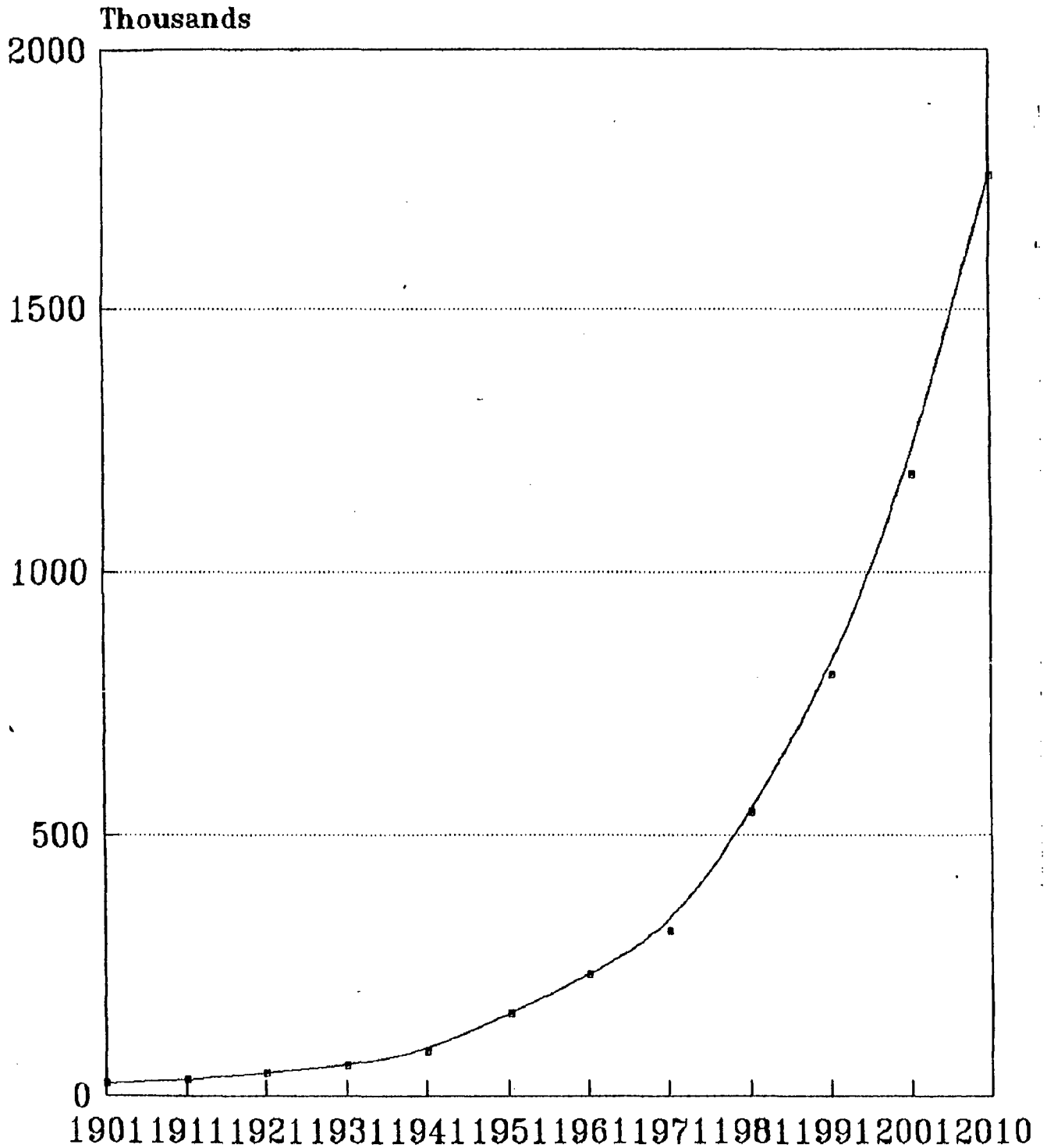
TABLE 4.1: PROJECTED POPULATIO OF VIJAYAWADA TOWN UP TO 2010 A.D.

YEAR	POPULATION	% GROWTH/DECADE
1901	24,224	
1911	32,867	35.7%
1921	44,159	34.4%
1931	60,457	36.8%
1941	86,184	42.6%
1951	1,61,198	87.0%
1961	2,34,360	45.4%
1971	3,17,258	35.4%
1981	5,43,008	71.20%
1991	8,02,336	47.80%
2001	11,85,513	48.48%
		(Average is taken)
2010	17,51,686	

Source: census report

A graph is developed with the above data which shows the rise in population of Vijayawada Town. that graph is shown in fig. No:4.1

PROJECTED POPULATION GROWTH OF VIJAYAWADA TOWN FOR 2010 A.D.



—■— YEARS

Fig. 41

4.2 PROJECTION OF VEHICLES :

Projection to find out the possible number of vehicles of different categories for the year 2010 is done. those are tabulated in table 4.2.

Graphs are also developed in the form of bar charts to show the relative increase of vehicles till 2010. the graphs are shown in figures 4.2 to 4.15.

TABLE 4.2: PROJECTED NO. OF VEHICLES CATEGORY WISE FOR 2010 OF VIJAYAMADA TOWN.

YEAR	A/V	H.G.V.	M.G.V	L.G.V.	TRACTORS	TRAILER	A/R	CABS	BUSSES	MINI BUSES	M/CYI -CLEIS	CARS	JEEPS	OTHERS
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1994	355	14537	886	189	7863	7637	991	1311	1188	59	84089	7123	1161	146
1995	416	15402	985	215	8919	8627	1177	1415	1204	98	106327	8524	1284	220
1996	476	16606	1248	231	9378	9059	1372	1500	1218	141	119735	9415	1350	278
2001	991	23182	2972	382	14595	13938	3099	2099	1296	1262	291783	18999	1970	1417
2010	4297	45178	16854	1046	35352	32996	7000	4109	1468	100932	1732762	77364	4194	36801

SOURCE : R.T.O. VIJAYAMADA

A/V = ARTICULATED VEHICLE.

H.G.V. = HEAVY GOODS VEHICLE.

M.G.V. = MEDIUM GOODS VEHICLE.

L.G.V = LIGHT GOODS VEHICLE.

TRACTORS =

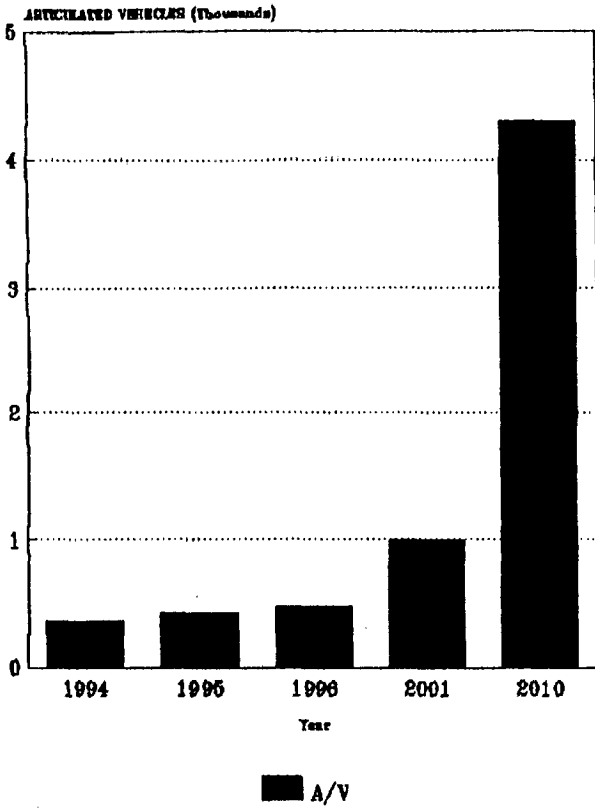
TRAILORS.

A/R = AUTO RICKSHOW

CABS = TAXI

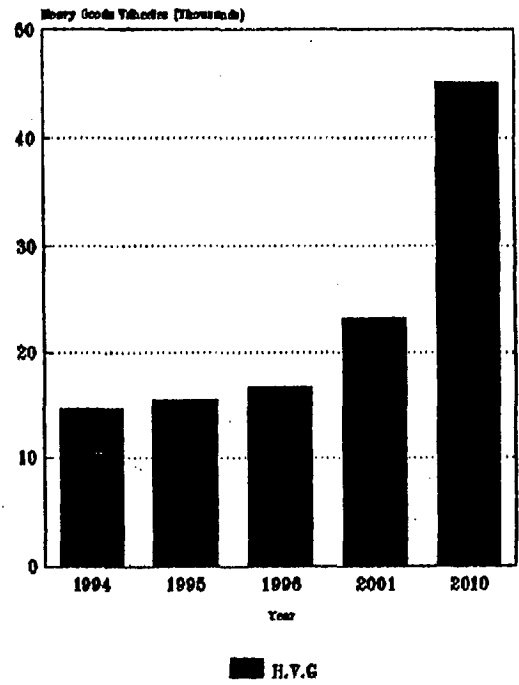
PROJECTION OF ARTICULATED VEHICLES
FOR 2010

Fig. 4.2



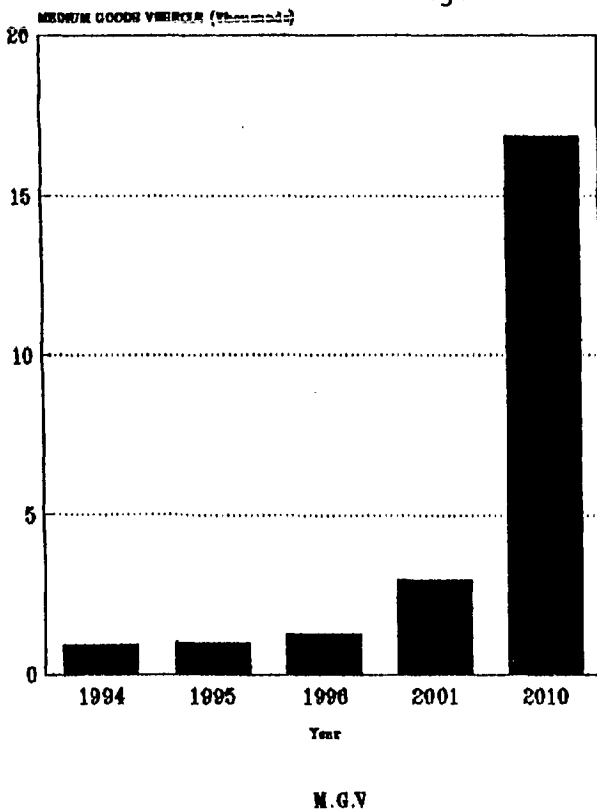
PROJECTION OF HEAVY GOODS VEHICLES
FOR 2010

Fig.4.3



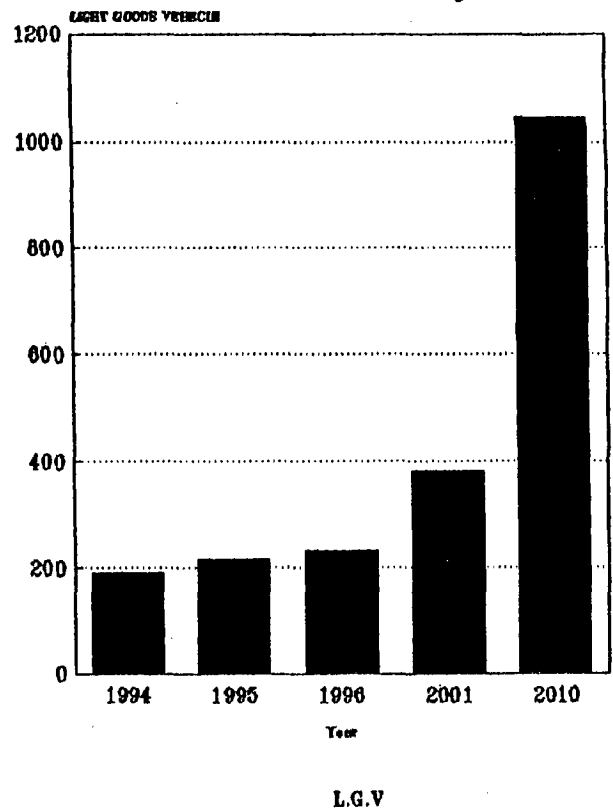
PROJECTION OF MEDIUM GOODS VEHICLES
FOR 2010

Fig.4.4



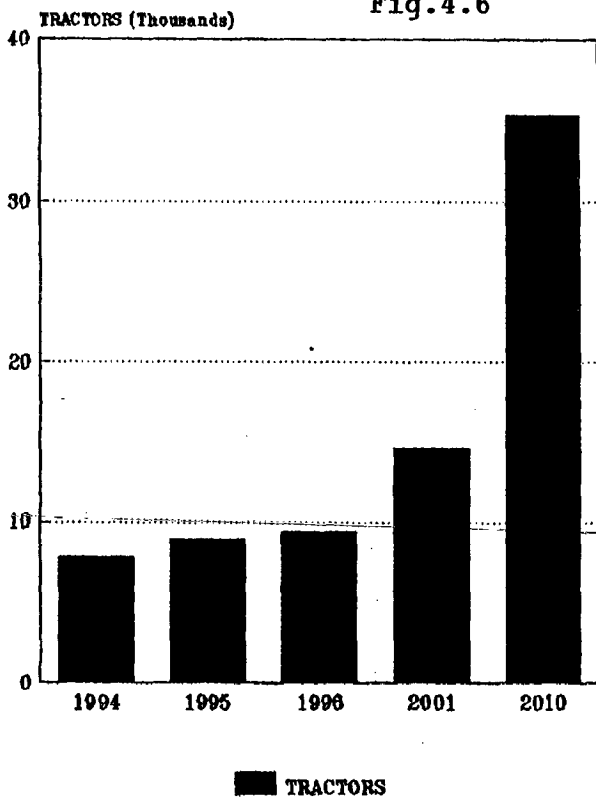
PROJECTION OF LIGHT GOODS VEHICLES
FOR 2010

Fig.4.5



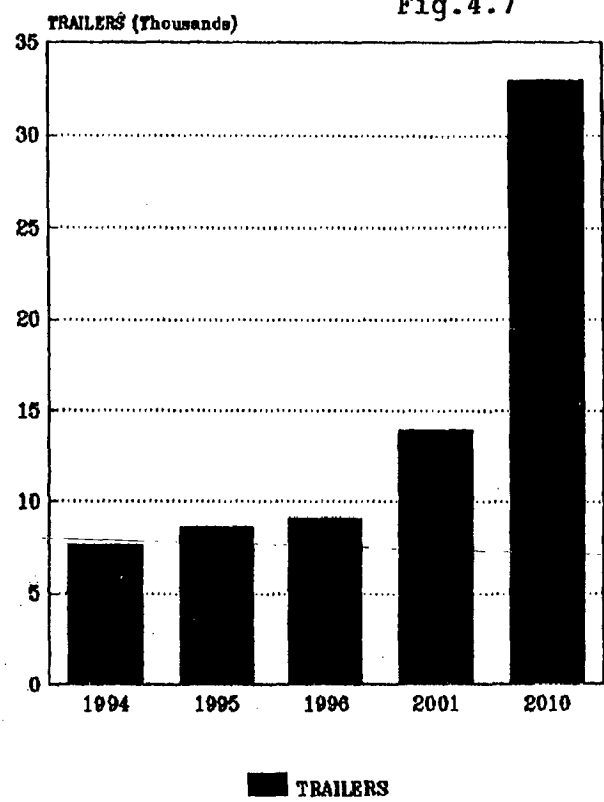
PROJECTION OF TRACTORS FOR 2010

Fig.4.6



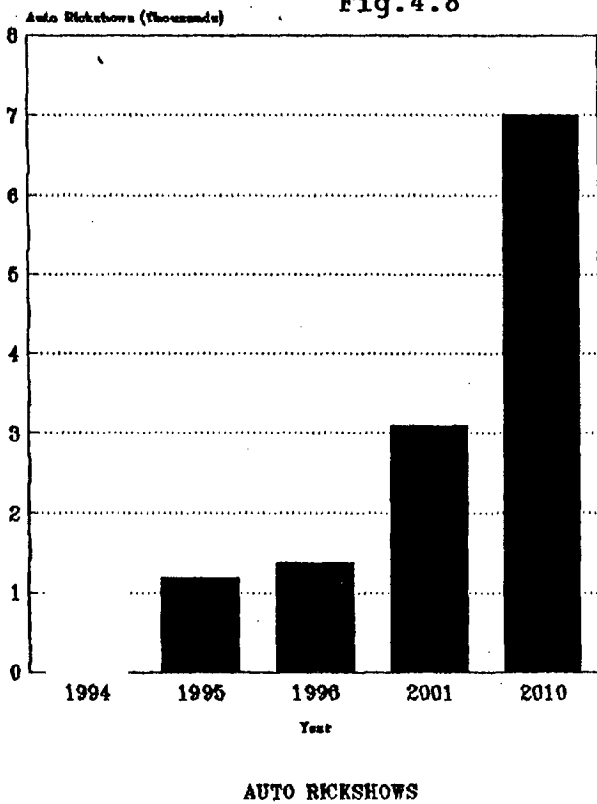
PROJECTION OF TRAILERS FOR 2010

Fig.4.7



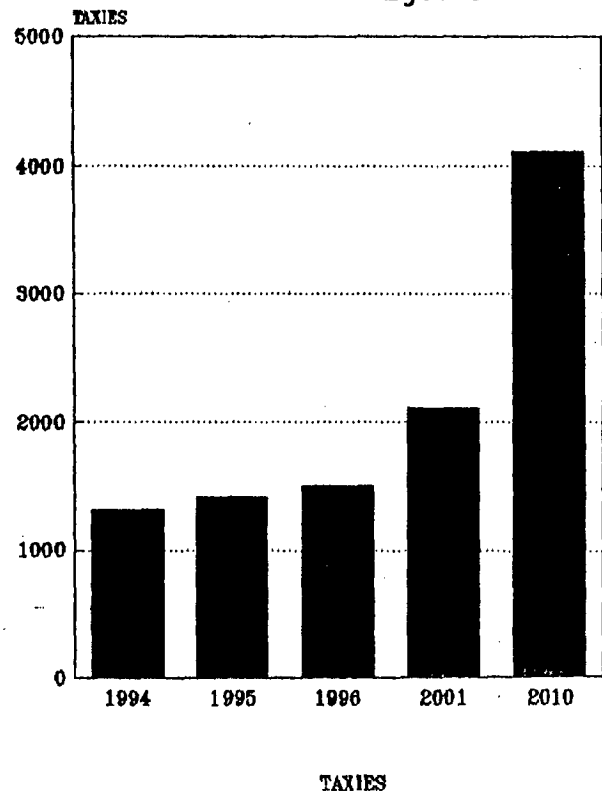
PROJECTION OF AUTO RICKSHAWS FOR 2010

Fig.4.8



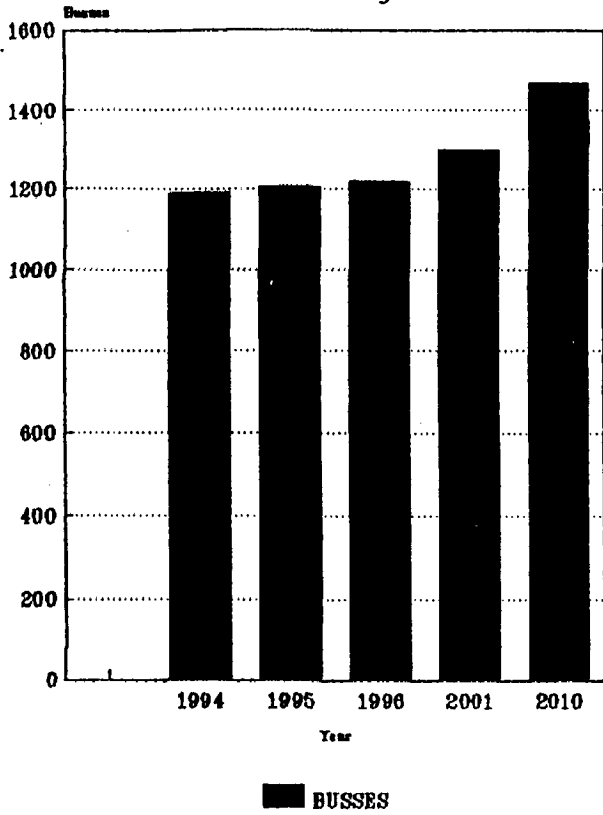
PROJECTION OF TAXIES FOR 2010

Fig.4.9



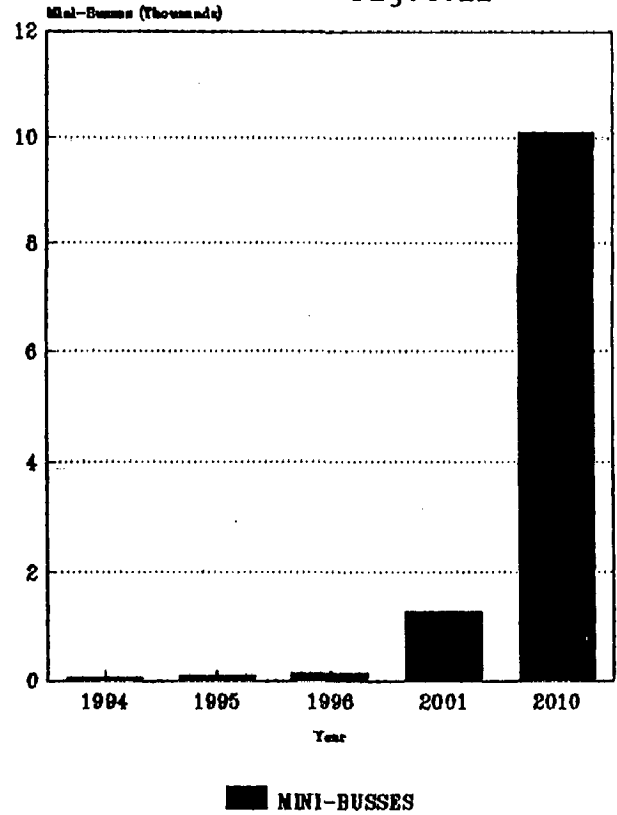
PROJECTION OF BUSES FOR 2010

Fig.4.10



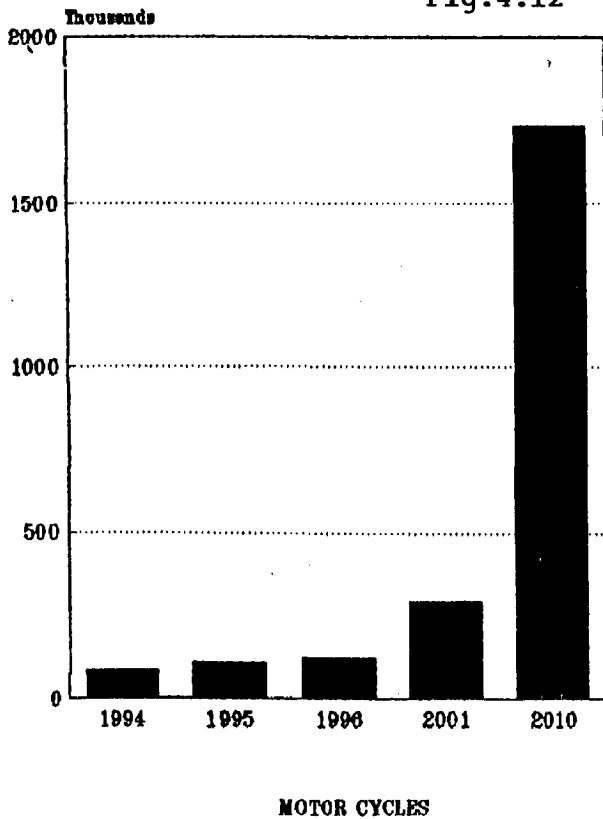
PROJECTION OF MINI-BUSES FOR 2010

Fig.4.11



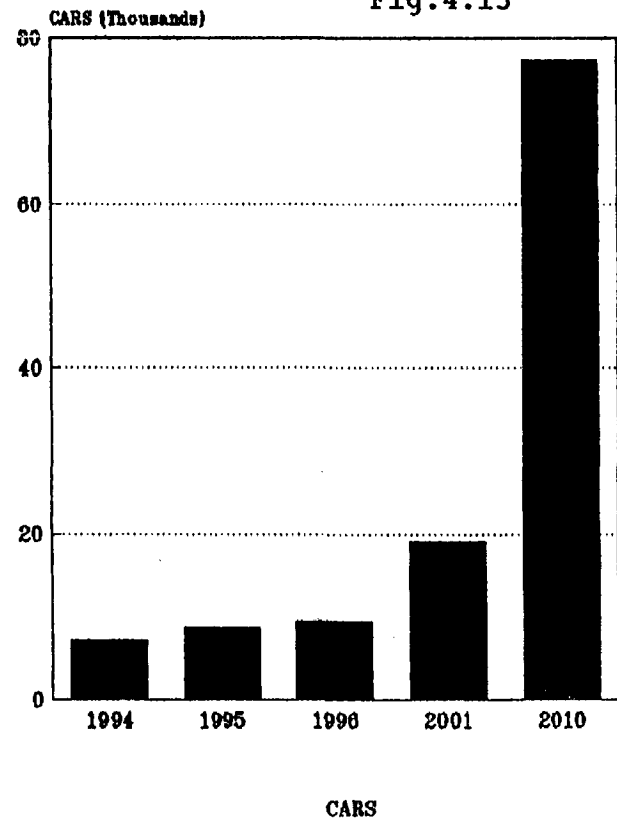
PROJECTION OF MOTOR CYCLES FOR 2010

Fig.4.12



PROJECTION OF CARS FOR 2010

Fig.4.13



PROJECTINS OF JEEPS FOR 2010

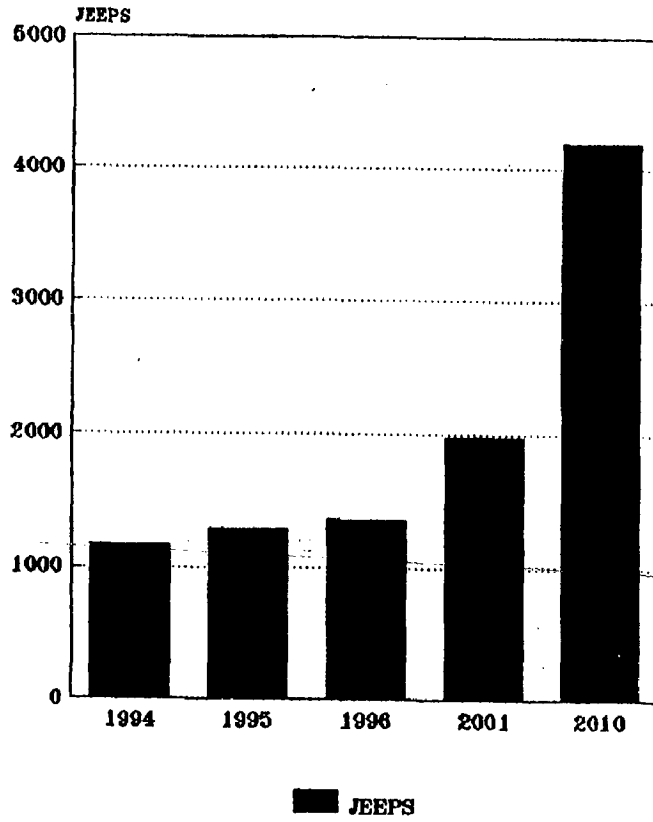


Fig.4.14

PROJECTION OF OTHER VEHECLES FOR 2010

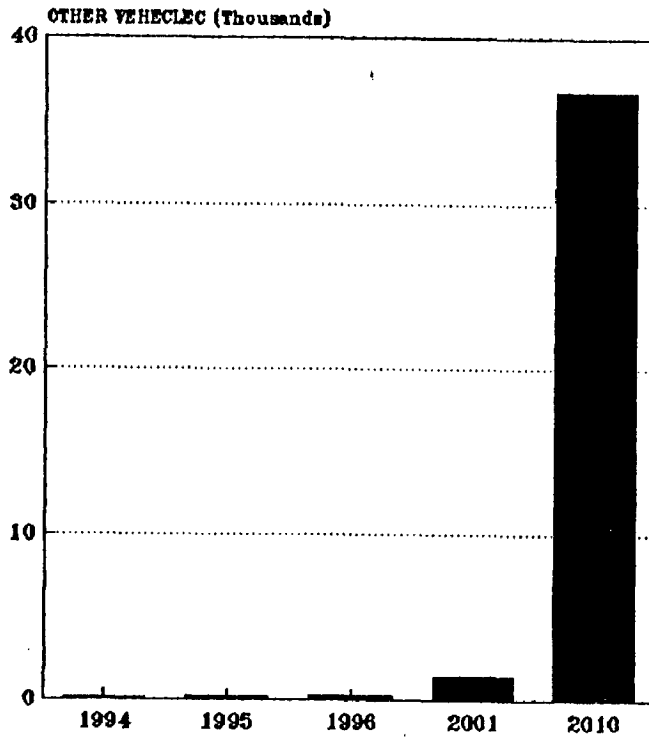


Fig.4.15
OTHER VEHECLES

OCCUPATIONAL STRUCTURE :

The occupational structure is projected for the year 2001. the same is tabulated in table 4.3. The same is also illustrated in the form of a pie diagram in fig 4.16.

TABLE : 4.3 PROJECTED OCUPATIONAL STRUCTURE OF VIJAYAWADA TOWN

YEAR	PRIMARY SECTOR % (Agriculture)	SECONDARY SECTOR % (Industry)	TERTIARY SECTOR % (Commers)
1971	6.45%	26.09%	67.76%
1981	11.50%	70.98%	17.52%
1991	11.64%	83.79%	4.57%
2001	8.39%	87.77%	3.83%

(* source : V.G.T. Master plan 2001)

OCCUPATIONAL STRUCTURE 2001

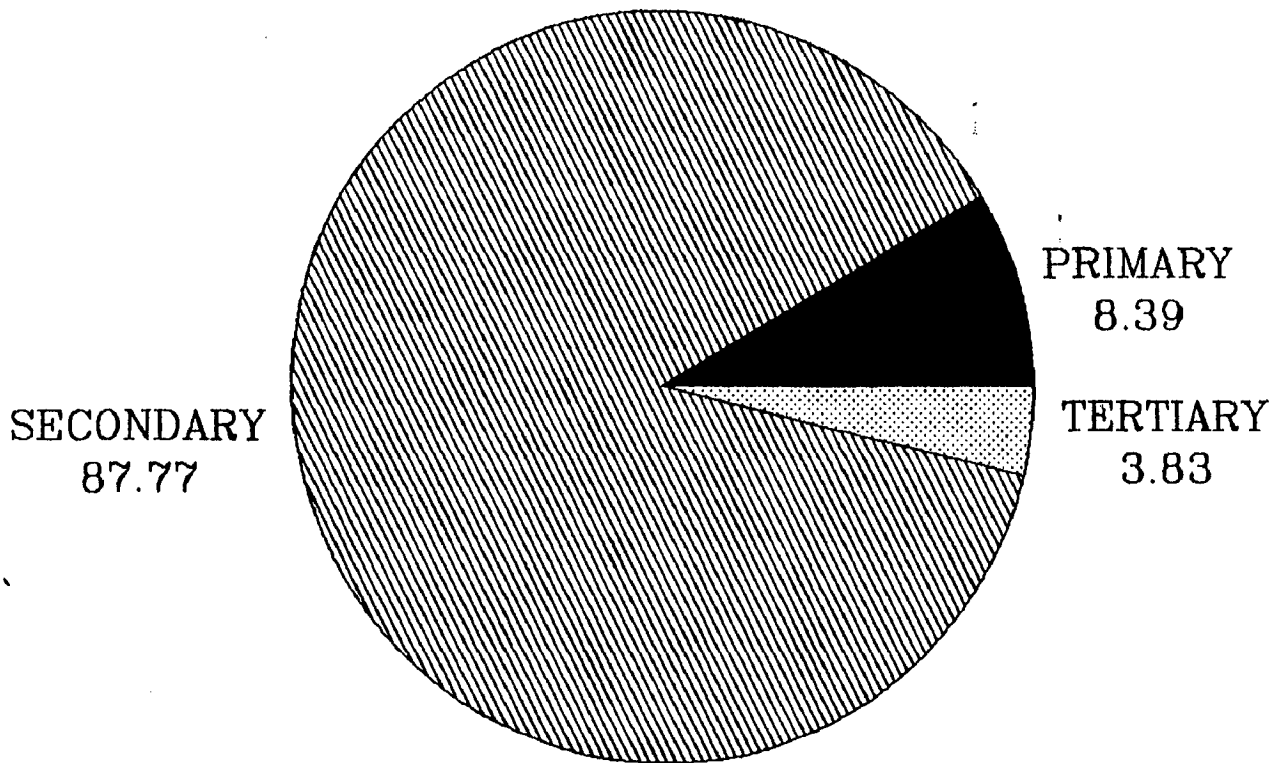


FIG 4.16 PROJECTED OCCUPATIONAL STRUCTURE

Fig.4.16

**5.0 STUDY OF PLANNING ALTERNATIVES
AND THEIR FEASIBILITY**

5.1 TYPE OF PLANS

SHORT TERM PLANS

The short-term plan would help to organise the movement of traffic on the existing network facilities to achieve the optimum utilization of existing transportation facilities, regulation of traffic and enforcement of laws. These measures should aim at the identification of congested sections and thus enable to formulate traffic management schemes to improve safety, reduce delays, eliminate existing capacity deficiencies, and obtain a balanced, continuous, measures take many forms such as marginal widening of existing streets, improvement to functions, segregation of traffic, introduction of one way street system, Pedestrianisation of congested shopping centers, provision of parking facilities and harmonisation of pedestrian movements to avoid conflict with the traffic streams. In addition to such measures, to curb the encroachment and unauthorised squatting, education in road safety should also be imparted through the institutions like traffic wardens and road safety patrol for maintaining a better discipline on roads.

LONG TERM MEASURES

This involves more capital intensive works such as fly-overs, large scale road widening and construction of new overbridge across railway lines etc. This requires a careful study for forecasting and for analysis which generates alternate plans. The long term measures are also needed to guide the development of new facilities to complement the existing ones in future by effective coordination with land-use plan with due emphasis on integration of regional traffic with the local traffic.

5.2 STUDY OF TECHNIQUE :

The emerging policy on Urban Transportation Planning issues is the newly promulgated TRANSPORTATION SYSTEM MANAGEMENT (TSM) action programme. It is now required that TSM projects be included in the TRANSPORTATION IMPROVEMENT PROGRAMME (TIP) as the short range element of the overall plan. Generally all cities 2 lakhs exceeding in population these TSM plans are compulsory while preparing comprehensive Transportation plans. The TSM considers a wide range of actions with low capital investment requirements that can improve the transportation service in the short term. It reflects the

* Steeply rising costs.

* Environmental concerns.

And make it imperative, that better and more efficient uses for existing investment in the transportation infrastructure be found before additional investment are made in costly new facilities. The new concept is therefore to make more efficient use of the highways and transit systems already in place thus reducing the need for new capital investment and for operating assistance.

The TSM on implementation provides the following advantages :

- * Fiscal economy.
- * Better balance among the various elements of Urban Transportation system.
- * Broader local and national goals of energy conservation.
- * Environmental improvement.
- * Equity for transit dependents.
- * Urban preservation.

The TSM actions recognizes the following features.

- * Characteristics of the existing Transportation system.
- * Total demand for the transportation purpose in question.
- * Geographic distribution.
- * Nature of Urban environment

- * Locally determined goals.

These TSM programs generally deals with the following action programme.

2.2 TSM ACTIONS

1. Improved Vehicular Flow

- * Improvement in signalised intersections.
- * Freeway Ramp metering
- * One way Streets
- * Removal of on-street parking
- * Traffic lanes
- * Off Street loading
- * Transit stop relocation

2. Preferential treatment of High-Occupancy vehicles.

- * Freeway Bus and carpool lanes and access ramps
- * Bus and Carpool lanes on city streets and urban arterials.
- * Bus pre-emption of Traffic signals.
- * Toll policies.

3. Reduced Peak-period Travel

- * Work rescheduling
- * Congestion Pricing
- * Peak period Truck restrictions.

4. Promotion of Non-auto or high occupancy auto use.
 - * Ridesharing
 - * Human powered Travel Modes
 - * Auto restricted zones.
5. Parking Management
 - * Parking regulations
 - * Park and ride facility
6. Transit and Paratransit service improvements
 - * Transit Marketing
 - * Security Measures
 - * Transit Shelters
 - * Transit Fare Policies and fare collection Technique.
 - * Extension of Transit with Paratransit services.
 - * Integration of Transportation services
7. Transit Management Efficiency measures.
 - * Route Evaluation
 - * Vehicle Communication and motoring techniques
 - * Maintenance Policies
 - * Evaluation of system performance

5.3 ANALYSIS OF TRAFFIC MANAGEMENT STRUCTURE IN VIJAYAWADA TOWN :

In 1983 when it is declared as an Urban Area, for the better management of traffic in Vijayawada town the whole town is divided into two circles. Each circle is looked after by a circle inspector. These two circles will be under the purview of an independent Assistant commissioner of police (traffic).

There are another two individual police station under one circle. making the total number of police stations to four. At the beginning of in 1983 each police station was equipped with 60 staff members. But there is no increase in the number from 1983. The population has nearly doubled. The similar is the case with the number of vehicles and road lengths.

There is every need to raise the capacity of controlling staff at least by adding one more Police Station of the capacity of 60 police. Thus feels one of the staff member of higher rank.

There are many intersections which are not clearly defined and properly planned. There many junctions which demand a personal vigil by police.

6.0 PROPOSALS

Proposals are made in two forms as mentioned below.

6.1 Planning proposals

6.2 Policy guidelines

6.1 PLANNING PROPOSALS

The problems of Vijayawada town have already been identified and discussed in Chapter-3 of this study. Based on various studies and the surveys conducted the efficient transportation system have been proposed as shown in the proposal map.

However the solution to the major problems as referred in Chapter-3 are as follows.

HIGH-LIGHTS OF MY PROPOSALS ARE AS FOLLOWS

6.1.1 Realignment of highways / major district roads within the study area.

6.1.1a N.H.9 within the town connecting Vijayawada and Mumbai is realigned beyond the Gollapudi bridge as shown in the proposal map.

6.1.1b Realignment of N.H.5 from Calcutta Chennai(Madras) as shown on the proposal map.

6.1.1c Realignment of Major district road to Machilipattanam are proposed to remove the traffic bottlenecks and to maintain the speed of the vehicles

- 6.1.2 A new bridge over river Krishna connecting Madras in addition to existing Prakasam Barrage has been proposed to ease the present regional traffic and to cater to the future demand of the traffic.
- 6.1.3 Proposal of green belt as shown on the proposal map is made to check the encroachment on the regional traffic corridors. It is proposed to check the development along the road and to stop the unidentified approaches to the National Highways.
- 6.1.4 Proposal of transport nagar for heavy motor vehicles to cater the present and future needs of trucks etc.
- 6.1.5 Proposal for large parking and repair terminal space along the realigned National highways so as to provide services to the vehicles on route. In addition this will also provide necessary facilities like parking, repair, road side hotels and motel etc. This will enable the vehicles to meet their requirement without entering in the town and as such the congestion on town roads will be released.
- 6.1.6 Repair rest shops and parking of MTV (tempos) close to main market center CBD.
- 6.1.7 Proposal of parking lots for mass daily commuter vehicle has been proposed as shown in the map.

a) Two parking lots at Kaleswara market area to cater the present and future parking needs.

b) The parking lots along Elure road.

c) Three parking lots to cater the parking needs of official buildings and market in No.- 5 route area.

6.1.8 Direct approach to the highways and other major roads used by heavy vehicles has been restricted. Connections has been given at specified places only to reduce the conflict points.

6.1.9 Proposal to widen the tunnel at Vidyadhara Puram so as to make this two lane in place of existing one-lane. To make the traffic flow freely.

6.1.10 It is proposed to remove the railway line as marked in the map and a road has been proposed at its place. This provides an efficient road linkage to all areas of the town. The proposal of removing the railway line has been discussed and accepted by railway authorities as only local trains are running on this portion of railway line. Which are to be shifted to the main railway track on which other trains are running.

6.1.11 Multi-storied parking has been proposed at bus-stand and railway station. This is to cater the present and future

demand of parking. The long term and short term parking of various categories of vehicle viz car, taxi auto-rickshas, shooters, rickshas , cycles etc.

6.2 POLICY GUIDE LINES :

In forming the policy guidelines the following things are considered

- (1) Minimising the cost
- (2) Environmental friendliness
- (3) More efficient way of using the existing investment.
- (4) Making existing road space more effective.

6.2.1 BROAD CLASSIFICATION OF POLICIES

- I. Making use of existing road space in a more efficient manner.
- II. Reducing automobile use in congested areas or Peak time periods.
- III. By improving transit service and transit management efficiency resulting in increased ridership reduced auto use, system efficiency.

These three groups are generally dealt in the following action program.

IMPROVEMENTS IN SIGNALIZED INTERSECTIONS

All the major intersections should be re-designed and be provided with signals.

Generally recommended signal time should be not less than 40 second. Because if cycle length is shortened below 40 seconds the pedestrian crossing time became unacceptable and hence was not desirable.

In town signal maintenance is inadequate for effective performance either a city staff technical must be adequately trained and the task assigned appropriate or the task contracted to fully qualified outside firm.

Computerisation of signal system is proposed. Because most efficient control can generally be achieved through a computerised traffic responsive control system.

ONE-WAY STREETS

One way street system is one of the powerful technique for increasing the capacity of streets as well as safety.

The advantage of one way streets are :

- i) Decreases number of conflicts at intersection and hence safety and flow capacity increases.
- ii) More efficient use of capacity to flow than 2-way operations.
- iii) However this system of one-way can be proposed only when there is a parallel route available.

Experience in other Countries have shown that by introducing one-way streets.

20% reduction in pedestrian accidents

22% reduction in travel time.

65% reduction in vehicular stops, and

40% reduction in cross town delay can be achieved.

Further signal time can be decreased from 90-50 seconds.

The following disadvantages were however observed.

- i) Increased walk to Transit Lanes
- ii) Increased vehicle Km, (Counter Producing is negative)
- iii) Business reaction-but actually improves in due course.
- iv) Pedestrians safety impended due to increased speeds.

Recommended parking policies are as follows :

- * Encourage paralleled parking for diagonal parking on both curbs. This adds an extra lane for transportation use. Even then this practice is allowed only on those roads where width is sufficient.
- * To encourage retailers, employers and hostlers to provide off street parking facilities in their premises.

TRAFFIC CHANNELISATION

Channelisation is process of directing traffic into defined paths on roadway. It can reduce or eliminate potential hazard to motorists and pedestrians and avoid confusion in traffic flow. Generally it requires islands, pavement markings or other suitable means of facilitating traffic flow to separate potential

areas of conflict. If properly designed and executed it improves safety and provides for maximum utilisation of available space. It regulates movements and speeds of vehicles and effective channelisation can increase speeds upto 15 kmph.

It is proposed to provide separators along the Bandar road where it is 4 lane road.

TRANSIT STOP RELOCATION

Basically there are five places where transit stops can be located.

- * The near side of an intersection.
- * The far side across from an intersection.
- * The far side of an intersection after left turn.
- * Mid blocks
- * Turnout.

IDENTIFICATION OF MAIN TRANSPORTATION ROUTES AND THEIR MAINTENANCE

Main transportation routes are identified which mainly serves local buses regular checks on encroachment to ensure uninterrupted flow of traffic.

VIJAYAWADA


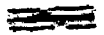

OUTLINE
DEVELOPMENT PLAN

LAND USE MAP

N



SCALE 1 INCHES TO A MILE

-  EXISTING ARTIRIAL ROAD
-  PROPOSE ROAD
-  PROPOSE BRIDGE



CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

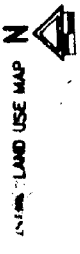
CONCLUSIONS :

In a short span of six months the investigator has tried to do as efficient work as possible and proposes future studies to be carried out for developing more effective transportation system of Vijayawada Town.

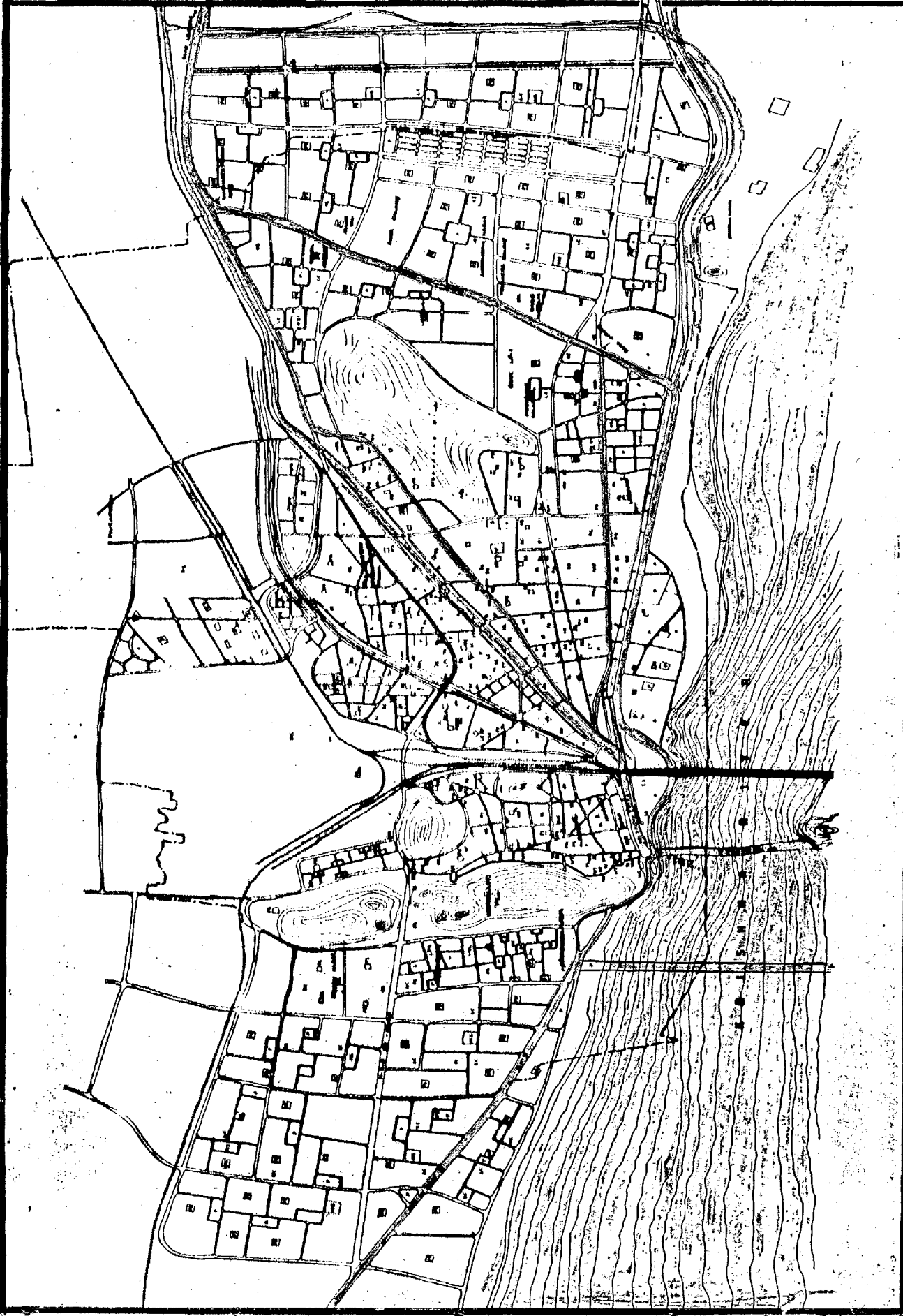
RECOMMENDATION :

Proposed policy guidelines can be implemented straight away to achieve efficiency in transportation system of Vijayawada for total relief planning proposal has to be carried out at an early date.

VIJAYAWADA
OUTLINE
DEVELOPMENT PLAN



- EXISTING ROAD
- ARTIRIAL ROAD
- PROPOSE ROAD
- PROPOSE BRIDGE



CHAPTER 7

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BIBLIOGRAPHY

- 1 Calthorpe associates and Mintier Associates (1990).
Transit-oriented development design guidelines. Prepared for
Sacramento Country Planning & Community Development,
Sacramento, CA.
- (2) Duany A. and Plater-Zyberk E. (1992) The second coming of
the American small town. Wilson Q., 16,19-51
- (3) Friedman B., Gordon S.P. and Prees, J.. (1992). The effect
of neotraditional neighbourhood design on travel
characteristics. Compendium of Technical papers, 1992
District 6 Annual Meeting, Institute Of Transportation
Engineers.
- (4) Gordon S.P. and Peers J.B. (1991) Designing a community for
TDM: The Laguna West pedestrian pocket. Present at
Transportation Research Board 70th Annual Meeting,
Washington, DC.
- (5) ITE Technical Committee 5p-8 (1992). Traffic engineering of
neo-traditional neighbourhoods: A System report. Draft
report prepared for the ITE Education Foundation Seminar:
Traffic Engineering of Neo-Traditional Neighbourhoods,
Washington, DC.
- (6) Kelbough D. (Ed) (1989). The Pedestrian Pocket Book: A New
Suburban Design Strategy. Princeton Architectural Press, New
York.
- (7) Kulash W.M. (1990). Traditional neighbourhood Development:

Will the traffic work? Presented at Eleventh International Pedestrian Conference, Bellevue, WA.

- (8) Lerner-Lam E., Celnicker S.P. Halbert G.W., Challman C. and Ryan S. (1992). Neo-traditional neighbourhood design and it's implications for traffic engineering. ITE J., 62, 17-25.
- (9) McNally M.G. and Yan S. (1992). A comparative assesment of travel charecteristics for neo draditional development. Transpn. Res. Rec., 1400.
- (10) Rabinowitz H. Z., Beimborn E. A., Mrotek C., Yan S., and Gugliotta P. (1991). The new suburb: Analysis and trends. Prepared for the Office of University Research, Urban and Transportation Administration, Washington, DC.
- (11) Spielberg, F. (1989). Traditional eighbourhood development: How will Traffic Engineers respond? ITE J., 59, 17-18.
- (12) Stone J.R. and Johnson C.A. (1992). Neotraditional Neighbourhoods: A solution of traffic congestion? In R.E. Paaswell et al. (Eds), Proceedings For Site Impact and Assesment Conference, pp. 000-000 American Society of Civil Engineers, New York.
- (13) Bruton M.J. Introduction to Transportation Planning, Hutchinson Technical Education, London 1970.
- (14) L.R. Kadiyali, Traffic Engineering and Transport Planning, Khana Publishers, New Delhi, 1991.
- (15) Ragahvachari. S, Transportation System Management, Regional

Engineering College, Warangal.

- (16) Geometric Design Standards for Urban Roads in Plain, IRC 86-1993, the Indian Road Congress, New Delhi.
- (17) Master Plan for V.G.T. Region, (2001) V.G.T. Urban Development Authority, A.P. Vijayawada.
- (18) Mitchell R. B. and Rapkin C., Urban Traffic a Function of Land-Use, Columbia University Press, New York 1954.
- (19) Hutocinson, B.G., Principles of Urban Transport System Planning M.C. Graw Hill book company, 1974.
- (20) Report on Road Development Plan for India "(1981-2001)", Ministry of Transport New Delhi, 1974.
- (21) Report on "Traffic and Transport Flows for Selected Cities in India", Central Road Research Institute, New Delhi, 1986.
- (22) Guidelines on Regulation and Control of Mixed Traffic in Urban Areas IRC 70-1977, Indian Road Congress, New Delhi.
- (23) Technique for Assessment of Travel Demand for Small and Medium cities (Case Study Gurgaon), School of Planning and Architecture, New Delhi, 1982.
- (24) J.V.L. Ravuri, Effectiveness of "Vijayawada Slum Improvement Project" (Project Report), Dept., of Housing S.P.A. New Delhi, 1994.
- (25) Y.Ramesh. Physical Growth Barriers, Vijayawada (A project report), School of Planning and Architecture, New Delhi, 1993.

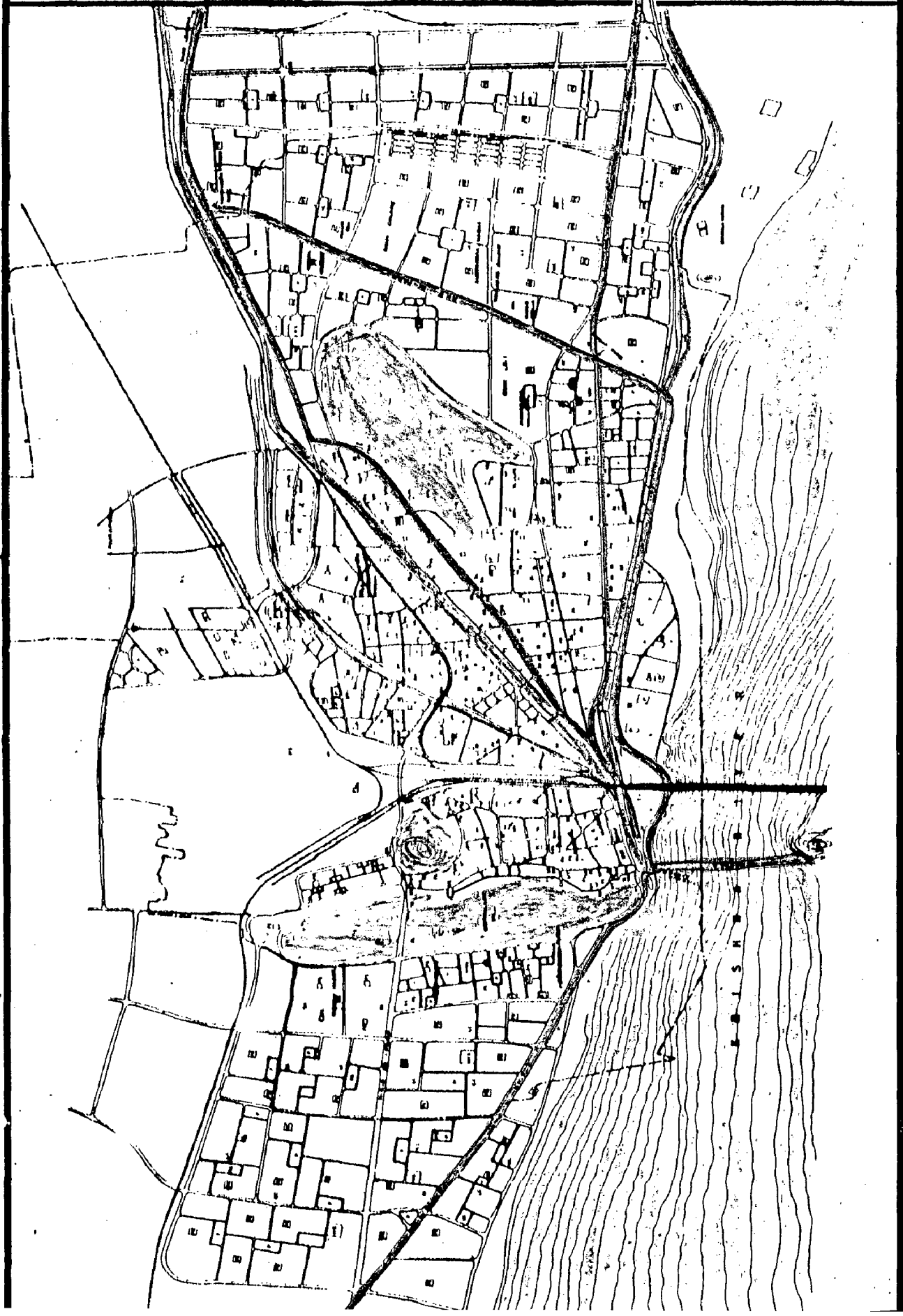
APPENDIX

VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN
EXISTING LAND USE MAP



SCALE: 1:50,000



VIJAYAWADA

OUTLINE
DEVELOPMENT PLAN

EXISTING LAND USE MAP



SCALE 1:25000

