

# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY

**A DISSERTATION**

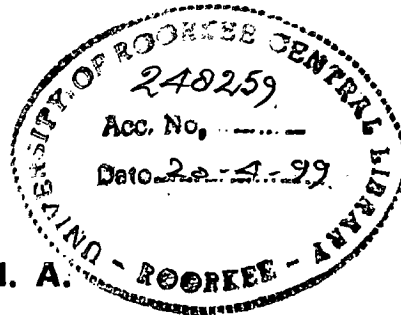
*submitted in partial fulfilment of the  
requirements for the award of the degree*

*of*

**MASTER OF URBAN AND RURAL PLANNING**

By

**SALIM. A.**



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**DECEMBER, 1998**

## CANDIDATE'S DECLARATION

I hereby certify that the work is being presented in this dissertation entitled, "**PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY**", in partial fulfillment of the requirement for the 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 from July 1998 to December 1998, under the supervision of **Dr. V. Devadas**, Assistant Professor, Department of Architecture & 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.

Date: 16 Dec, 1998



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This is certified that the above statement made by the candidate is correct to the best of my knowledge.



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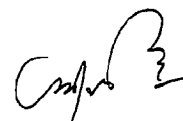
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Dated: 16 December, 1998

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(SALIM. A.)

## ABSTRACT

Development is a dynamic phenomenon, and the development of the cities are also not an exceptional one. The origin and growth of the cities taught very good lesson to the mankind to develop the cities in scientific and orderly manner. Over the centuries, several cities had grown, expanded, and some were even perished due to several factors. As a result redevelopment of urban centre concept was evolved and implemented, which pave the way for even rethinking towards modernization of old cities. Trivandrum city is also not left out from redevelopment since the city has grown from time immemorial and also it was developed in an unplanned manner.

In this present investigation and attempt is made to analyse the problems of the East Fort area of the Trivandrum city and to prepare a redevelopment plan for scientific and systematic development since the area is highly congested, over crowded, problematic, lack of infrastructure facilities, traffic jams, and also the commercial nuclei of the city. Having this redevelopment programme in mind, some plausible objectives are prepared, and conducted thorough investigation based on the objectives. A set of policy guide lines and a redevelopment plan are prepared for effective implementation of the study area for scientific development. The author fields that the plan proposal would be a panatia to solve all the problems in the study area and it would pave the way for real development.



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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Redevelopment is a process of replanning and redistribution of land, structures, physical and social infrastructure as well as conservation and rehabilitation of area which have been or are being threatened by decline and blight or are in need of preservation because of historical or cultural linkages associated with a city or a town. Uses of the old monuments, buildings, etc. would be identified so that they can be preserved meaningfully, which would be financially viable, technically feasible, and socially acceptable.

“The term urban redevelopment signifies a complex phenomenon, interfacing the human with their physical, socio economic and historical relationship. In a broader frame the term involves renewing urban life where the process of degeneration or decline is set in to motion due to a variety of factors like technological advances, industrialisation, modernisation and their cumulative impact on the urban segments.” (1).

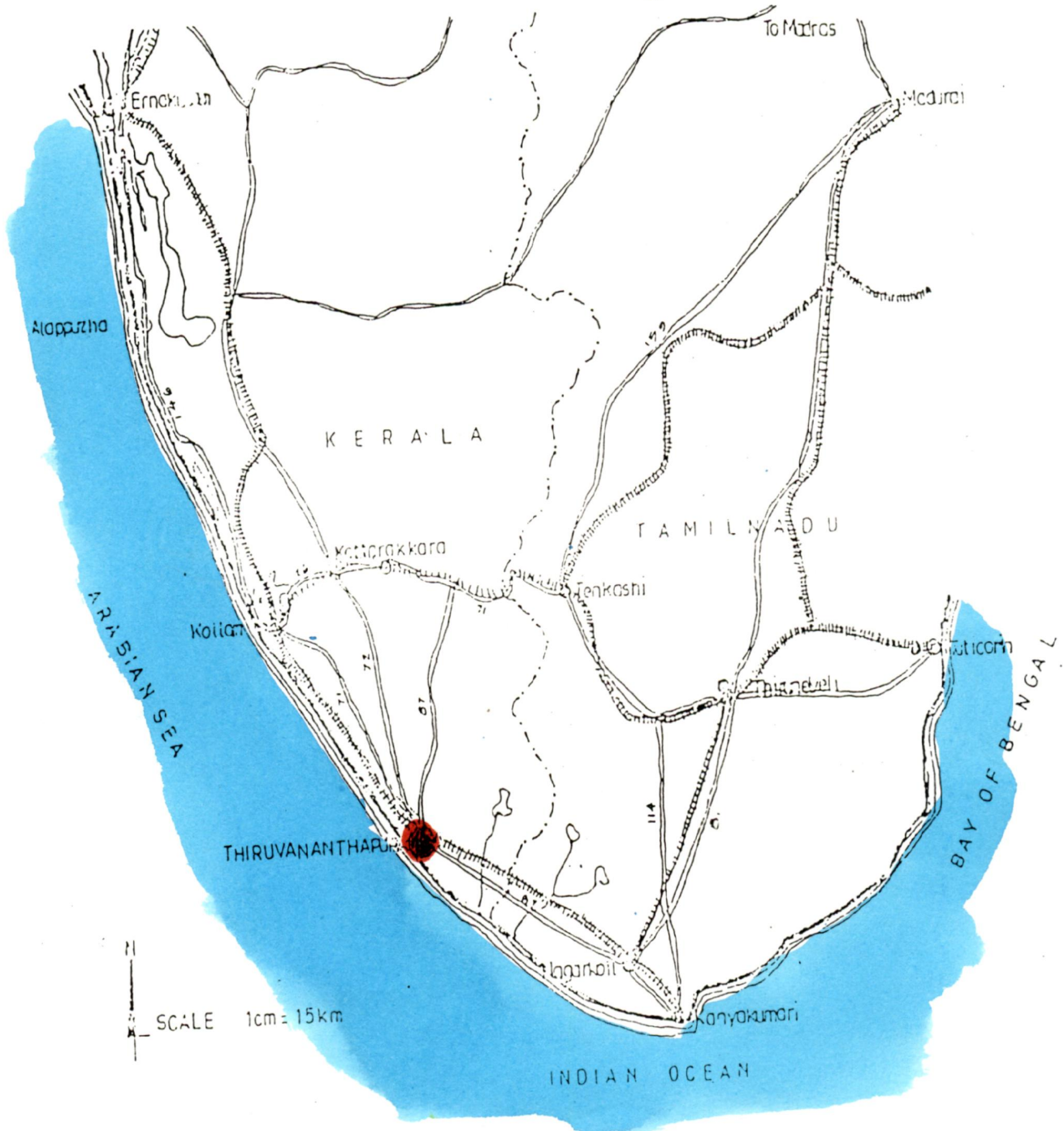
City centres are repositories of national, traditional and cultural and therefore, they must be preserved. They are like valuable piece of art and need to be handled with great care. The urban redevelopment program must give a face lift to the city centre and neighboring areas but it is very ticklish in nature as it leads too many problems especially in developing countries. In the developing countries, the population is increasing at an exorbitant rate and there is a world wide drift of migration from the rural to urban centres. There has also been a continuous increase in the use of privately owned motor transport which penetrate the areas which never meant to be used by motor vehicles. The individual's profit from development at the public's expense has led to high rise building which aggravate both the traffic and parking problems, on one hand, and changing the micro climate of the historic centre which lead to environmental degradation, and destructive vibrations on the other. To exaggerate this situation, it is seen that the development of the infrastructure facilities

does not commensurate with the demand activities which results an immense pressure in each and every front which is leading ultimately to the collapse of the urban fabric and ensuing in urban blight in the form of slums, pollution, traffic congestion, erosion of cultural & traditional values, etc. Fortunately, even in this haphazard process of urbanization, some of the historic towns have been managed to maintain their own identity to the certain extent by preserving the monuments, buildings and areas of cultural significance. Similar trend is also observed in Trivandrum city, the capital of Kerala State.

## 1.2 Trivandrum City

Trivandrum is the Administrative Capital of Kerala State and the head quarters of the Trivandrum district. The core area of the city is bounded by Vellayambalam - Vazhuthacaud - Thycaud - Kallipalam on the East, the proposed Chalai bypass on the South, West Fort - Vanchiyoor - Palayam Road on the West and Palayam - Vellayambalam road on the North. The total land area covered under this is 6.43 sq.kms, and is presented in the map no. 1,2,3&4 It enumerates that the core-area which comprises only about 8 percentage of the total land area of the city having has about 15 percentage of the total population of the city. The core area is the most important one due to the presence of numerous public, semi-public, and private establishments, and is considered as an important focal point of commercial activities.

The number of job opportunities offered by this area is more than 200 percentage of the total resident work force. In addition, the Central Railway Station and Bus Terminals, Numerous Entertainment Centres, Truck Terminals, Godowns, Major Educational Institutions, Hospitals, etc., are also located within the core area., and are presented in the map no. 3. All these establishments contribute a substantial share of traffic in this area. The core area has a mixed land-use, comprising public semi public, commercial, recreational, educational and religions uses in combination with pockets of residential uses. The major traffic generators are the Secretariat and the Accountant General's Office, which are located near Statue, Jn., the Municipal Corporation Office and Public Office, located near Palayam Jn., the Museum and Zoo are located just North of the core area. In addition to the above the commercial establishments consisting of shops, banks, cinemas and institutions like University

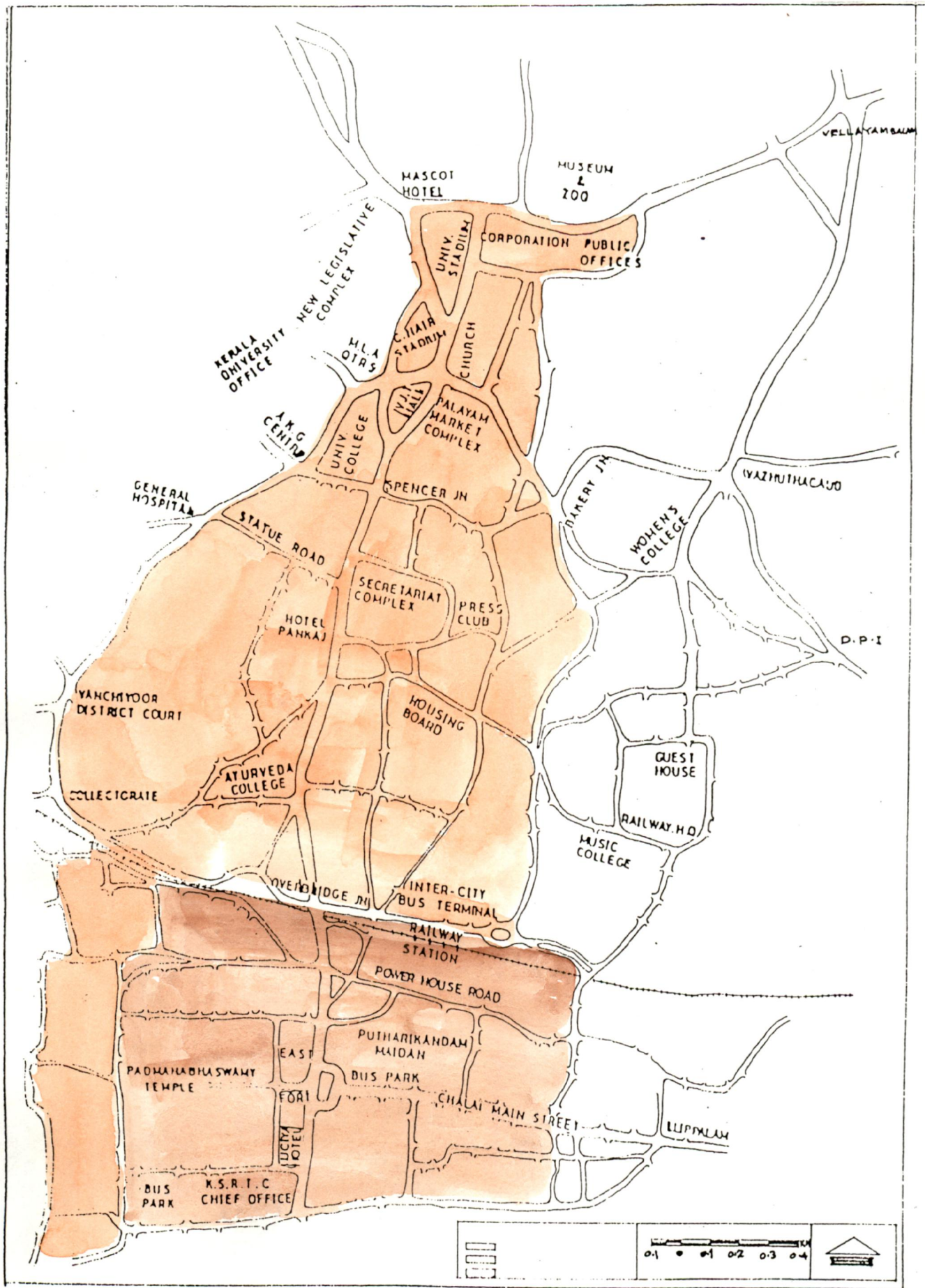


MAP 1.4 LOCATION OF THIRUVANANTHAPURAM

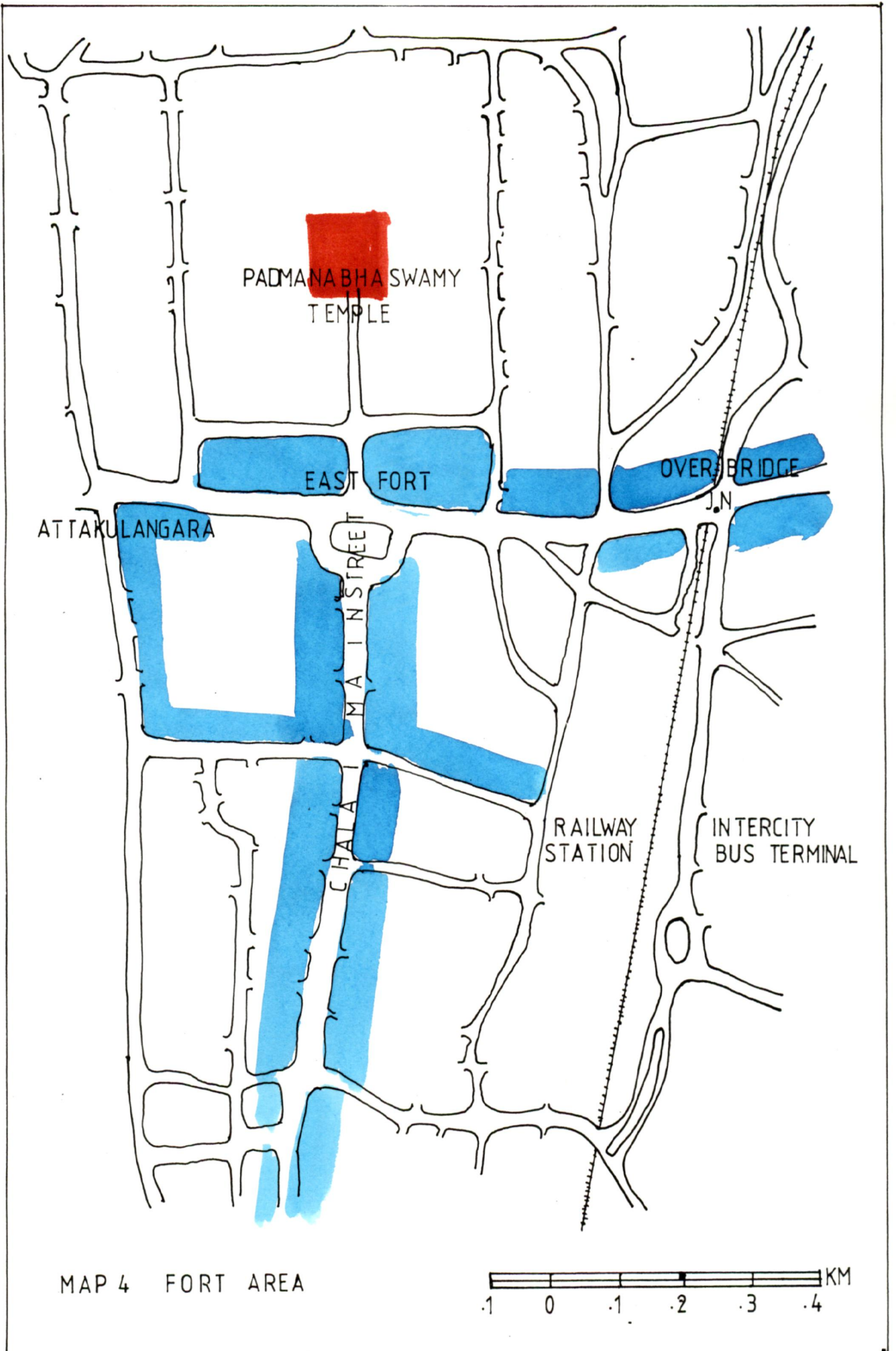








MAP 3 CORE AREA OF TRIVANDRUM CITY



College, Fine Arts College, Sanskrit College, University Library, Public Library, etc. also generate traffic. Apart from these, the three stadiums, such as Chandrasekharan Nair Stadium, University stadium near Palayam and Central Stadium behind Secretariat, and various religious centres located along the main road and also substantially contributing traffic generation and are presented in map no. 3. The core area can be further subdivided in to Palayam Area, M.G. Road and its vicinities, Railway Station Area, Chalai Area and Fort Area, each of which have its own unique characteristics. The Palayam Area is a major institutional area, which has the University College, Fine Arts college, University Library, Public Library, University Hostel, etc. In addition to this, the Palayam area has two Stadiums, Churches, Temples and Mosques. There is a market confined within the area which is now being developed as a major commercial centre by the TRIDA. This area has limited organised parking lots. The whole stretch of the main road is lined with commercial establishments like shops, banks, etc. The M.G. Road has mixed land use, such as, public, semi-public and commercial uses, which lead a considerable amount of pedestrian traffic. The major Govt. offices located in this area are employing a very large share of the working population. This is compounded by the fact that the area being the heart of the city, also act as a link between other areas and this leads to additional vehicular and pedestrian traffic. The institutions like Ayurveda College, the General Hospital and Eye Hospital, Model School, British Council Library, the Y.M.C.A. and Y.W.C.A. along with the numerous shops, business establishments, cinema halls, shopping complexes, other educational establishments, etc. are confined in this area which increase several problems like congestion, traffic, etc. The Railway Station Area is dominated by Hotels, eating houses, cinema halls apart from the railway and bus terminals. The average pedestrian traffic in this area is in the order of 85 persons/minute during the peak hours. There is no organised parking facility available in this area except in the premises of the Central Railway Station. The Chalai area is the major commercial centre of the district and hence, it attracts traffic from all over the district. The Chalai main street is highly congested due to the mixed traffic, on street parking, high and unorganised pedestrian traffic and informal shopping facilities. The Fort Area consists of narrow roads and has a mixed land use.



The numerous number of available Temples, Tourists spots, Auditoriums, Marriage halls and Shopping centres which are responsible for present day's traffic problem in the area.

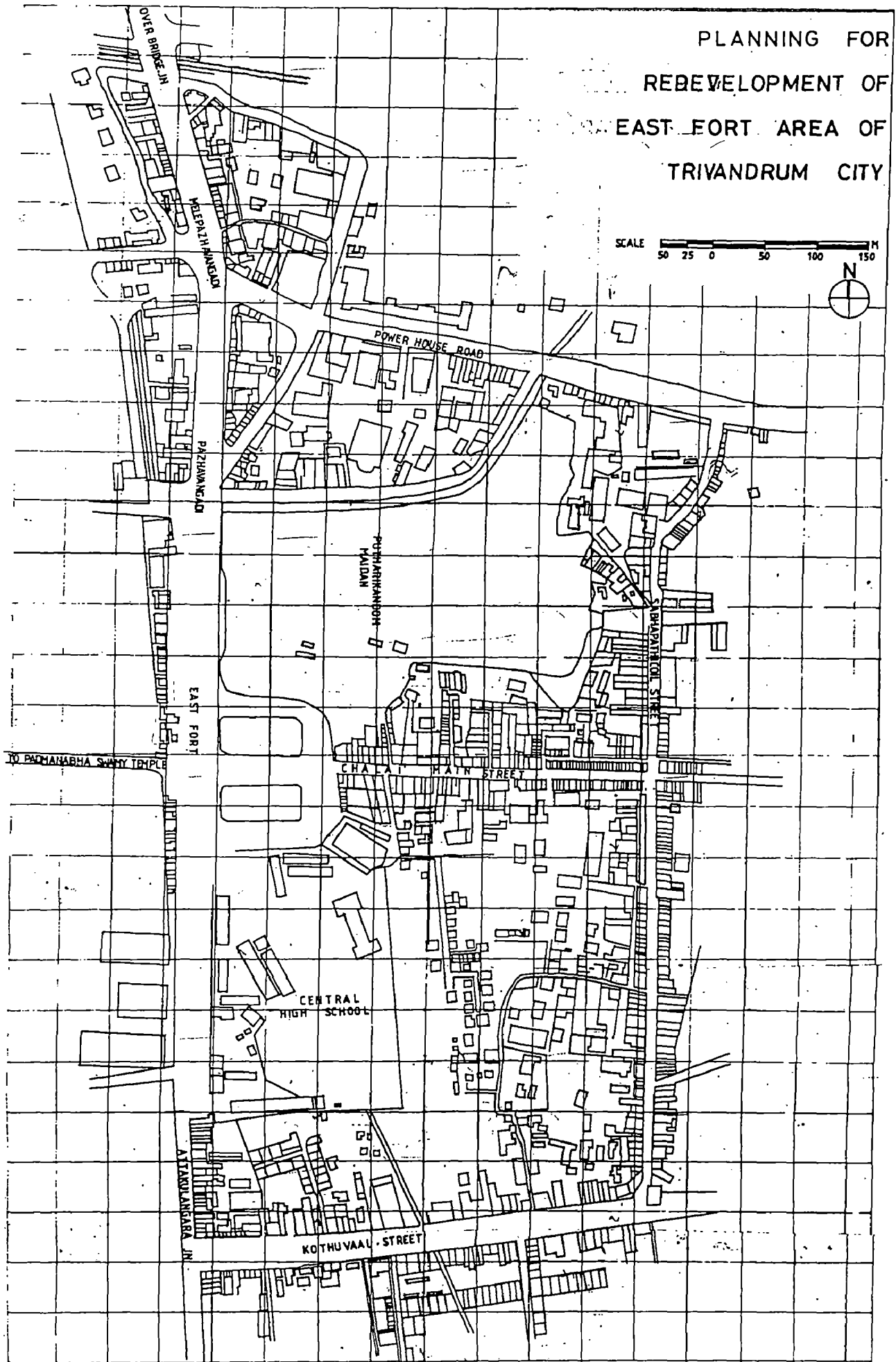
The Chalai Bazaar is developed as a shopping street along the side of the major road from East Fort gate of Sree Padmanabha Swamy Temple leading to Kanyakumari. The Temple was also a source of employment, seat of learning, justice, fairs and festivals. Outside the Fort area, the retails commercial area grew into a whole sale market. The coming of Railway Terminal during colonial period, the market gained more importance as a whole sale market of the city.

The sudden population growth and the exorbitant rate of vehicles together lead the area more congested than ever before. The area has been constantly developing over the years and the briskness of the commercial activities steadily increasing. The issues such as the new six lane railway over bridge, six lane raod widening schemes from over bridge to Pazhavangadi, the consequent displacement of shops and other establishment in this stretch, congestion and pedestrian vehicular conflict at the East Fort Bus Terminal, proposal of New Railway Terminal at the Power House roads, preservation of historical stretches, etc. stress the need for the redevelopment of this area.

A part of the core area i.e. the area begins from the Overbridge junction at North extending to the Attakkulangara junction at South. The eastern boundary is constituted by the Sabhapati Koil-Kothuvall street and the western boundary ends with the outer edge of the Fort Wall. The Southern edge is bounded by the karipettikada street. has been chosen for the present investigation. This area has more historical importance, since the city its self was developed from thid point. It has been observed that it is congested, over crowded, and has acute traffic problem, lack of infrastructure facilities, etc. Since the investigator knows the magnitude of the problems being faced in the study area in particular and its over all effects in the city in general, this area has been selected for the present investigation. This study area is shown in map no. 5.



PLANNING FOR  
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MAP 5 STUDY AREA  
9

### **1.3 REVIEW OF LITERATURE AND CASE STUDIES**

#### **1.3.1 Literature Review**

##### **1.3.1.1 Need for Urban Redevelopment**

Urban development and redevelopment is a cyclic phenomenon depicting continuous decline and renewal in physical, as well as socio economic aspect of human settlements. The migration of rural people in to major urban settlements led to rapid expansion of cities encompassing the fringe areas. The experience of rapid population growth could attract neither private nor public investment in the older area and are allowed to deteriorate.

The neglect of central areas of major cities have immense adverse effects on their physical and socio economic conditions. Most of the historic building and housing stock remained in a dilapidated conditions as the owners could not maintain them properly due to incur of lower income.

The urban redevelopment encompasses a wide range of functions, preservation of historical buildings, natural environs, utilization of old building, improvement of civic infrastructures, traffic and transportation, and development of economic functions.

There are six important factors which are highly responsible for the decline of Indian cities and are listed as follows

1. Natural calamities like famines, epidemics and floods lead to Shifting of Population there by causing decline of urban settlement.
2. Decline of empires resulted in the decline in the political status of the cities Particularly the capital cities.
3. Foreign invasions laid the disappearance of urban centres, plundered the wealth of the cities and town, leading to the collapse of the urban economy.
4. During wars the settlements were destroyed and the granaries were put on fire to cripple the economy of the rivals thereby destruction of the urban segments.
5. The decline of certain relegions, lead to distruction of religious based urban centres.

6. Economic factors which contributed to the growth of towns led to their decline with the down fall of the economy over the years.

Most of the organic Indian cities are facing these problems, mainly due to the exorbitant rate of development on one hand, and lack of available infrastructure facilities on the other.

### **1.3.2 CASE STUDIES**

There are two indian cities which have similar character have been taken for analysis.

#### **1.3.2.1 Redevelopment of Hyderabad**

The city of Hyderabad was founded by the Sultan Mohammed Quli Qutub Shah in 16<sup>th</sup> Century and now it is the Capital of Andhra Pradesh State, fifth largest metropolitan city in India. There are three distinct areas in the city, such as the old city, the new city of Hyderabad and Securandarabad. The old city was the Capital of erstwhile rulers, which comprises of palaces, tombs, minarets and royal mansions still stand out as conspicuous historical and architectural monuments. The plan of Hyderabad is presented in map no. 6.

The following were the major cause for Declination of the Old City.

##### **(i) High density of population.**

During the foundation of the city it was planned to accommodate 5 lakhs population. But over the years the population as growing and at present it has increased upto more than the double. In size, The high density population leads to over strain almost all types of services in the old city.

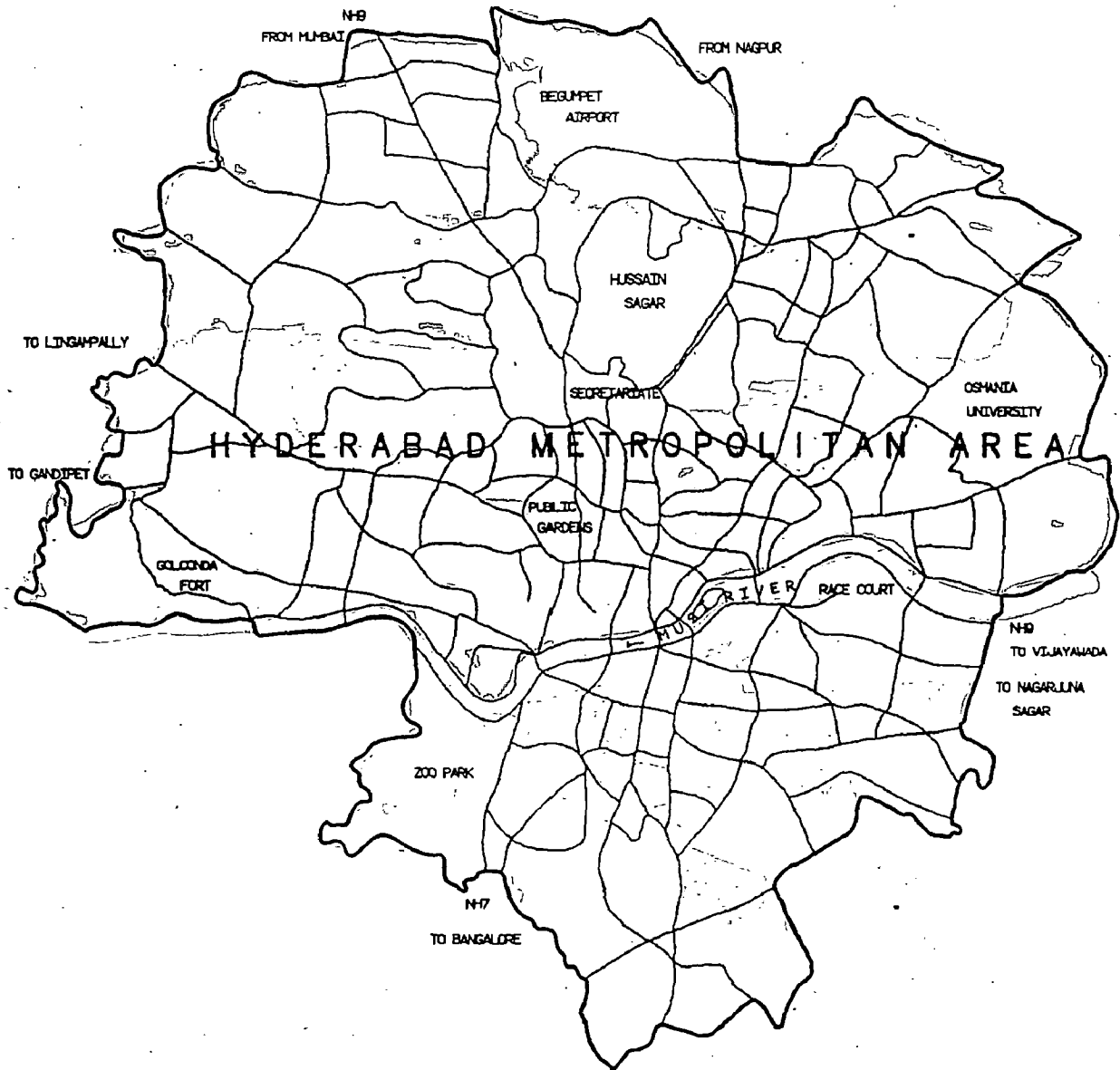
##### **(ii) Squatting on public and private land**

At present, there are 470 slums in the cities. Of which 173 old and 23 new slums. Over the years the land value has increased many folds in the entire city whcih pushed the poor section to squat on the Government land. It has been observed that the socio-economic conditions of the people is also very bleak.

##### **(iii) Inadequate Transportation**

The road system in the old city was designed decades ago is not adequate to cater to the present day traffic. The roads were very narrow, and there was no offstreet parking facilities. Which leads to traffic jam and congestion. There was no proper pedestrian

CASE STUDY\_HYDERABAD



MAP 6 HYDERABAD CITY

crossings and the conditions of the roads were also very poor. The major traffic problems in the city were as follows.

- a) Narrow roads and congestion.
- b) Encroachment on the roads.
- c) High density of population.
- d) Location of big business centres.
- e) Non-observance of traffic regulations.
- f) Lack of By-pass and parallel roads.
- g) Stray animals on the roads.
- h) Closure of Railway Level Crossings.
- i) Unauthorised road cuttings/digging by public.
- j) Location of Cinema Theatres.
- k) Lack of terminal space for R.T.C. buses.
- l) Erection of unauthorised speed breakers.

**(iv) Out - dated Water Supply And Sewerage System**

The existing sewerage system was designed in 1931 for an estimated population of 4.6 lakhs. But, the system isn't adequate to cater the needs of the growing population. The storm-water drains on the Southern side of the Musi River discharges the water into it, and causing pollution.

**(v) Inadequate Power Supply**

A large number of areas which did not have electricity, and the available power supply is also of low voltage. There was no street-lights in the old streets.

**(vi) Incompatible Land Use**

The residential areas scattered and mixed with commerce, industries, public use, etc. The building constructed at the time of erstwhile rules were not being maintained properly. Operation of Rent Control Act resulted in the decline of revenue earning capacity of the properties.

## **) Lack of Health And Educational Facilities**

There is a gross inadequacy of health facilities. The location of educational institutions and hospitals outside the old cities has caused increase in traffic due to the migration of people outside the city for availing these facilities.

## **i) Declining of Economy and Employment**

The shifting of public offices, strained the civic amenities, the sporadic communal riots, the affluent people left the old city lead to unemployment for the unskilled labour.

### **2.1.1 Quli Qutub Shah Urban Development Authority**

Quli Qutub Shah Urban Development Authority was set-up for the redevelopment of old city which is the first Authority in the country. They have taken the redevelopment of the old city as an integral part of the overall plan for the development of Hyderabad Metropolitan Area.

The following programmes were implemented for the redevelopment of the old city. They are as follows:

#### **Development of Water Supply Network**

The water supply in the old city was reckoned as the foremost burning problem. The Authority has taken up the extension of water supply in 111 locations in the old city, a ground level water tank has been constructed, nearly 230 tube-wells were also dugged in the old city which reduce the water scarcity to the larger extent.

#### **Widening of Narrow lanes and Roads.**

This includes improvement of road condition, providing bituminous surfacing, filling of pot holes, and paving with Shahabad stones.

#### **Development of Communication Network.**

This include development of new road in the interior areas so as to get free access to the main streets.

**(iv) Utilization of Open Areas for Green Belts.**

The unorganised open spaces and vacant lands were converted to green belts areas by planting large number of shade trees.

**(v) Provision of Street-Lighting.**

The programme to provide street-lighting in the newly widen roads, National Highways and State Highways were also implemented.

**(vi) Improvement of Sewerage System And Low Cost Sanitation.**

The Sewerage system in the old city is over strained and there is a tendency among the public to connect the septic tank to storm water drains. The Authorities launched several programmes in the regent such as construction of sewer lines, providing domestic connections, conversion of dry latrines into wet ones etc.

**(vii) Augmenting Health Facilities**

The Authority has set-up three hospitals in the periphery of the old city with all special services.

**(viii) Improving Educational Facilities**

The Authority set-up on polytechnic, Urdu Medium Residential School and Hostel for Girl Students, etc for improving the educational facilities of the old city.

**(ix) Recreation Facilities**

The Authority has launched a massive tree plantation programme in the old city, which include avenue plantation. They developed 31 parks and 18 playgrounds, and constructed a modern Stadium having the capacity of 7,500 in the old city.

**(x) Housing Schemes.**

Two housing schemes were started to provide accommodation for 600 E.W.S. families with the help of HUDCO.

**(xi) Construction of Shoppe Lines**

The Authority constructed 29 shops and 47 cubicles in the Charminar area abutting the Unani Hospital, parking of taxis, autos, and cycle-rickshaws were also provided.

**(xii) Preservation of Historic Monuments**

Historic monuments are the link between the past and the present, and stretch into the future. A massive renovation and beautification programme of Qutub Shahi Tomb was implemented which include repairing of tombs, landscaping provision of amenities for tourist, provision of water supply, construction of fountains, compound walls, construction of canals, lighting of pathways flood-lighting of Tombs, etc.

**1.3.2.2 Redevelopment of Walled City of Ahmedabad**

The city of Ahmedabad was founded in 1411 AD and planned according to the ancient Indio Aryan Tradition of a royal Capital, having wall within wall concept. All major roads lead from the city gates, to the citadel which enclosed the royal Palace.

The walled city is being sandwiched by the educational institution in the west and major industrial concerns in the east experiences heavy east west movement. Which producers congestion at inter sections.

The redevelopment schemes were formulated with a view to create better environment in and around the old city area. The total area of the walled city is about 5.937 sq. km. Ahmedabad is well connected with railways and roadways to other part of the country.





Rapid increase in population and natural growth has resulted in the metropolitan explosion and along with heavy concentration of activities in the walled city area strained all components of urban infrastructure.

River Sabarmati divides the main city area of Ahmedabad into two parts i.e. Eastern Ahmedabad and western Ahmedabad, of which the latter is comparatively better planned. The physical development of the eastern city is absolutely in haphazard condition. All major shopping and trade activities, cinema theatres, hotels, schools, colleges, mosques, and temples are located within the walled city. The walled city is densely populated with residential and commercial developments. Heavy concentration of retail shopping centres, and wholesale market along the major roads within the walled city produces congestion and conflict. Major Transport Terminals which are located within and around the walled city also produce high traffic volume.

The major problems of the walled city are as follows.

1. Heavy concentration of population, and economic activities and recreational centres.
2. The roads are narrow, congested and not meant for motor movements.
3. Concentration of retail and wholesale commercial activities along the major roads produces congestion and disturbs the traffic flow.
4. Mixed traffic and inadequate parking facilities

The following were the major thrust areas proposed for the redevelopment of the city.

1. Traffic operation plan
2. Architectural control and civic services
3. Upgradation of services.

A traffic volume survey for about 59 intersections and 47 roads with points was carried out and arrived at the following conclusion.

1. Right of way and carriage way of the street may be increased, wherever possible. The streets for one-way movement of vehicles and for the use of specific types of vehicles were identified.
2. Facilities for pedestrian, and parking areas to be identified.

3. The bus terminal should be relocated and bus bays should be developed.

### **Architectural Control and Civic Services**

The major recommendations made in the proposal are listed in the sequel. They are

1. The buildings having architectural and archaeological important are required to be enlisted and specific policy should be formulated to regenerate the value of old civic life.
2. Bring down the F.S.I. from 3 to 1.5 to reduce the stress of constructions of multistoried buildings in the historic areas should be declared as heritage zones.

### **Upgradation of Services**

The proposal are to pedestrians certain heavy pedestrians movement zone. The beauty of the old street pattern with improvement may help to increase the satisfaction of the inhabitant. Drinking water, public toilets, are the other proposals. The conversion of historic monuments in to recreational centres and creating open spaces around them so that the old monuments can be preserved more lively, which should be economically feasible, technically viable and socially acceptable.

Finally they phased out the whole schemes of redevelopment in to 6 phases according to the preferences and priorities.

#### **1.3.2.3 Inference from the Literature Survey and Case Studies**

The urban redevelopment programme covers a wide range of function, such as, preservation of historical building and natural environs, utilization of old buildings and monuments for economic purposes, improvement of civic infrastructure, traffic an transportation and development of economic functions. The lack of infrastructure facilities and exorbitant rate of development in the old organic cities are the main cause of deterioration. The common component of decline of old historical cities is are as follows.

1. High density of population
2. Squatting of public and private land
3. Inadequate transportation
4. Outdated water supply and sewerage system.
5. Inadequate power supply

6. Incompatible land use
7. Lack of civic facilities
8. Decline of economy

The case studies of Hyderabad and Ahmedabad reveal that in the process of redevelopment of the old city the following thrust must be given for (i) Preservation of historical areas and monuments (ii) Traffic and Transportation Planning (iii) Relocation of certain activities and (iv) Upgradation of services and improving civic facilities.

## **1.4 RESEARCH DESIGN**

### **1.4.1 Objectives**

The following objectives have been framed for this present investigation by keeping the theme of the investigation in mind. They are :

1. To assess the existing urban fabric of the study area, its cultural significance and its compactability.
2. To identify the major parameters which control the system and their feasibility.
3. To assess the current development plan and its feasibility.
4. To evolve an optimal redevelopment plan, and a set of policy guidelines.

### **1.4.2 Scope**

The present investigation has ample scope. Some of them are listed in the sequel. They are :

1. It would pave the way for understanding the magnitude of the problem faced in the city.
2. It would identify the parameters which are highly responsible for day to day's problems.
3. Arriving at plausible decision to evolve a redevelopment plan and a set of policy guidelines for the development of the East Fort Area.
4. It would become a model commercial centre in the city.
5. It brings knowledge to preserve the heritage of the city.

6. If the proposed recommendations are implemented it would pave the way for solving the existing problems on one hand, and show the path for scientific development on the other.

### **1.4.3 Methods**

#### **1. Stratification**

At the outset, the study area has been divided into four sectors for the convenience of the present investigation. They are :

- (i) Area included the complete stretch of land from the overbridge junction to the Melepazhavangadi junction.
- (ii) The land lies between the Melepazhavangadi junction and Pazhavangadi junction.
- (iii) The area spread between the Pazhavangadi junction and the East Fort which include the Chalai Bazaar.
- (iv) The area stretches between the East Fort junction and Attakkulangara junction.

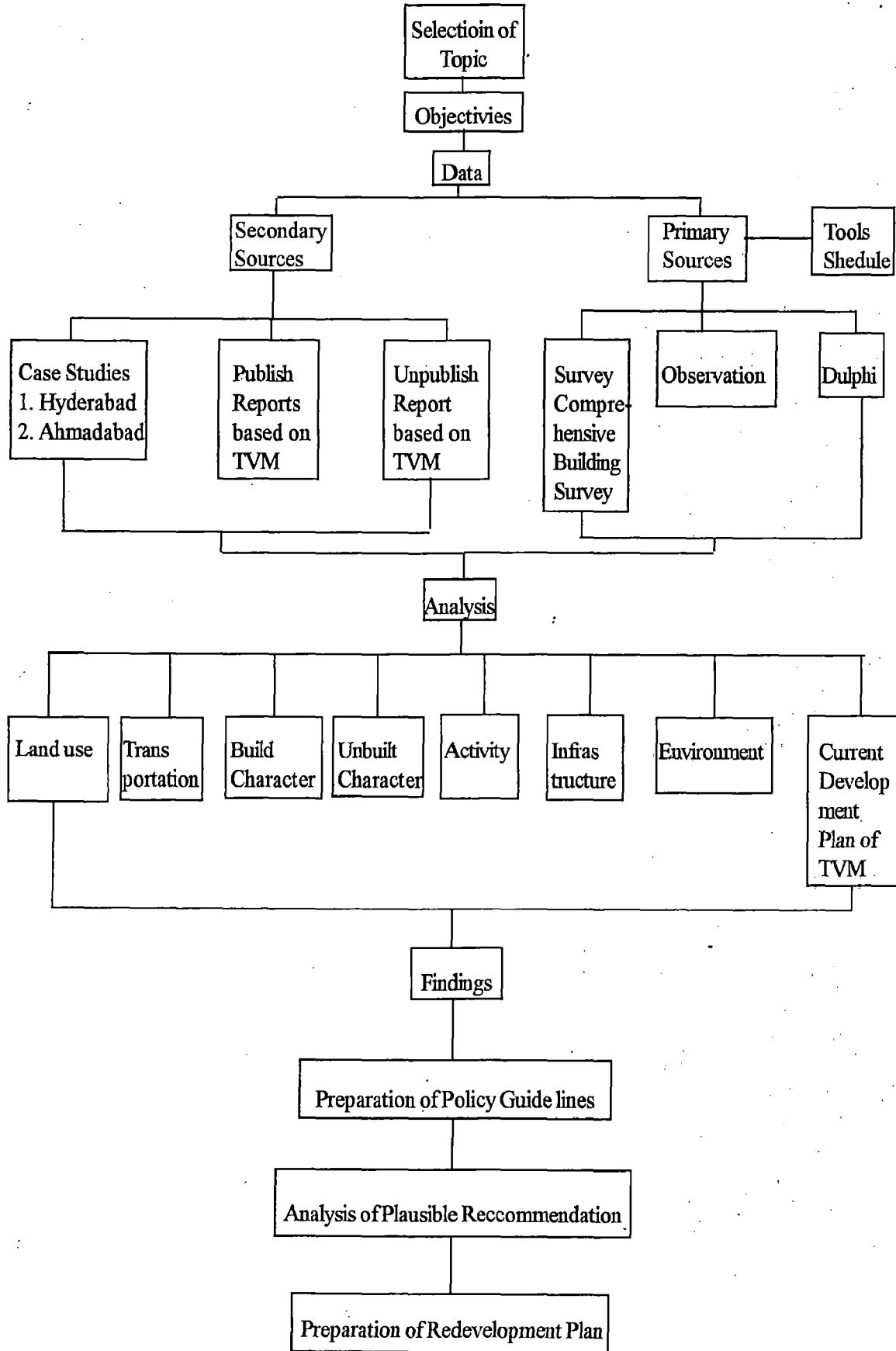
2. The following research methods, such as, Survey methods, observation method and Delphi method are employed for the present investigation.

#### **1.4.4 Steps**

The present investigation has the following steps.

1. Studying the historical background of the city and its generic growth.
2. Understanding the image of Trivandrum city in its present context.
3. Analysing of the study area on the basis of the following major parameters which control the system.
  - a) Landuse
  - b) transportation
  - c) Built
  - d) Unbuilt
  - e) Activity
  - f) Infrastructure
  - g) Environment

# METHODOLOGY



4. Making the sieve analysis of above parameters and understanding their potentials and constraints.
5. Formulating the area level proposal based on policies.
6. Designing proposal for bulk control and physical form.
7. Developing a detailed design proposal for selective pockets.
8. Preparing implementation strategies including planning.

#### **1.4.5 Data**

There are two types of data involve in this present investigation. They are

1. Secondary data : It has been obtained from relevant published literature and unpublished documents which are available from authentic sources.
2. Primary data : It has been obtained through surveys, group discussions, etc.

#### **1.4.6 Tools**

The following tools are used to conduct the investigation. They are:

1. Schedules: Schedules were constructed on the basis of the theme of the present investigation and are pretested in the study area and hence they are used.

#### **1.4.7 Analysis**

The data have been would be analysed with the help of optimal statistical tools and techniques for arriving at plausible decision.

#### **1.4.8 Recommendations**

A set-of redevelopment plan have been evolved and a set-up policy guideline were prepared on the basis of the finding of the investigations. These are recommended for implementation in the study area for scientific development.

#### **1.4.9 Limitations**

The study confined only the overbridge to Attakulangara stretch including Chalai Bazaar, Power House Road and Sabhapati Koil street. Hence, the recommendations would be made in the policy guidelines would be useful only to the study area.

## CHAPTER - 2

### STUDY AREA PROFILE

#### 2.1 Location

Trivandrum is located at south end of the Kerala State and lies in 8° 25' N latitude and 76 55'E longitude, and is presented in map No.1. It is surrounded by the Kanyakumari District of Tamil Nadu in the South, Thirunelveli district of Tamil Nadu in the East, Kollam district of Kerala state in the North and the silvery cost of Arabian sea in the West. The Trivandrum city is confined in Trivandrum District of Kerala State.

#### 2.2 Historical Background

Trivandrum city has been developed around the Sree Padmanabha Swamy Temple, patronised by the royal family. The name Trivandrum is the Anglicised form of Thiru anantha puram, meaning the town of Thiru Anantha. Being the seat of family deity of the Venad Kings, Trivandrum enjoyed many privileges. Later in the second half of the 18th century, King Dhrama Raja shifted his capital from Padmanabhapuram to Trivandrum. The temple cum palace complex form the base for all cultural and socio economic development of the city. Outside the fort area, the retail commercial area grew into a whole sale market. During the colonial period the market gained more important as a whole sale market of the city and the neighboring districts.

#### 2.3 Physical aspects

It has heavy rainfall, high humidity, and a fairly uniform temperature throughout the year. December to February the area experience a bright clear sky and the average temperature ranging between 23.3 C and 30.6 C. The average rainfall of the district is 2122 mm/year, which is much lesser than the state average of 3232 mm/year. The temperature of the District is characterised by hills and valleys and it has slop from east to west. The River Karamana moves through the Eastern side of the city and flows towards the Arabian Sea. There are four water lagoons in the city, such as, Akkulam Kayal, Veli Akkulam Kayal, Edayar Lake and Vellayani Kayal.



## **2.4 Growth Trends and Physical Developments of the City**

Trivandrum city is the administrative capital of the state and has many specialised institutions serving the entire state and also function as the headquarters of Trivandrum District. Physical development of the city area lies along with the major transportation corridors, as in the case of other parts of the state. Recreational centres, parks, theatres and other cultural centres are located within the study area. A vast development is witnessed in the recent years, and the city has been extending towards the suburban areas, such as, Veli, Sangumugham, Papanamcode and Kazha Kuttom. Further, developments are mainly confined towards the Northern part of the city. Several institutions, such as, Engineering College, University Campus at Kariavattom, Technopark, etc. act as magnets which attract further development. The rest of the city experiences lesser development compared to the Northern part of the city, and it is given in table 1. Trivandrum Development Authority was formed mainly for preparation and implementation of development schemes for the development of the city which comprises Trivandrum Corporation and the neighboring 15 Panchayats, such as, Kazhakuttom, Attipra, Sreekariyam, Ulloor, Vattiyoorkavu, Kudapparnakunnu, Kadakompally, Thiruvallom, nganoor, Vizhinjam, Kalliyoor, Nemam, Pallichal, Vilappil, and Vilavorkal. It has total area of 296.17 sq.km, while the corporation covers only 74.93 sq.km, and is presented in map 8.

## **2.5 Population Density**

Higher density of population is found in the city centre and the coastal belts, i.e., 10,000 persons per sq.km whereas it is ranging from 2500-5000 per sq.km in the neighboring panchayat areas. Higher growth rate of population has been observed in the neighboring panchayats of the city. The population density of the city is presented in Table 2.

## **2.6 Literacy**

In general, Kerala enjoys higher rate of literacy and the high literacy is found about 80% in the city, but some coastal pockets where fishermen folks are dominant

have only about 50% literacy. It clearly indicates that these fishermen folks never give much attention to education.

## **2.7 Employment**

In the Corporation area, more than 75% of the people engaged in non-agricultural activities, except the fishermen folks. In most of the panchayats more than 75% of the population engage nonagricultural activities except Kalliyoor, Pallichal, Vilappil and Vilavoorkal, Panchayats.

## **2.8 Land Use**

The land use pattern in the study area is different from other part of the city. The existing land use pattern of the city is presented Fig. 1.

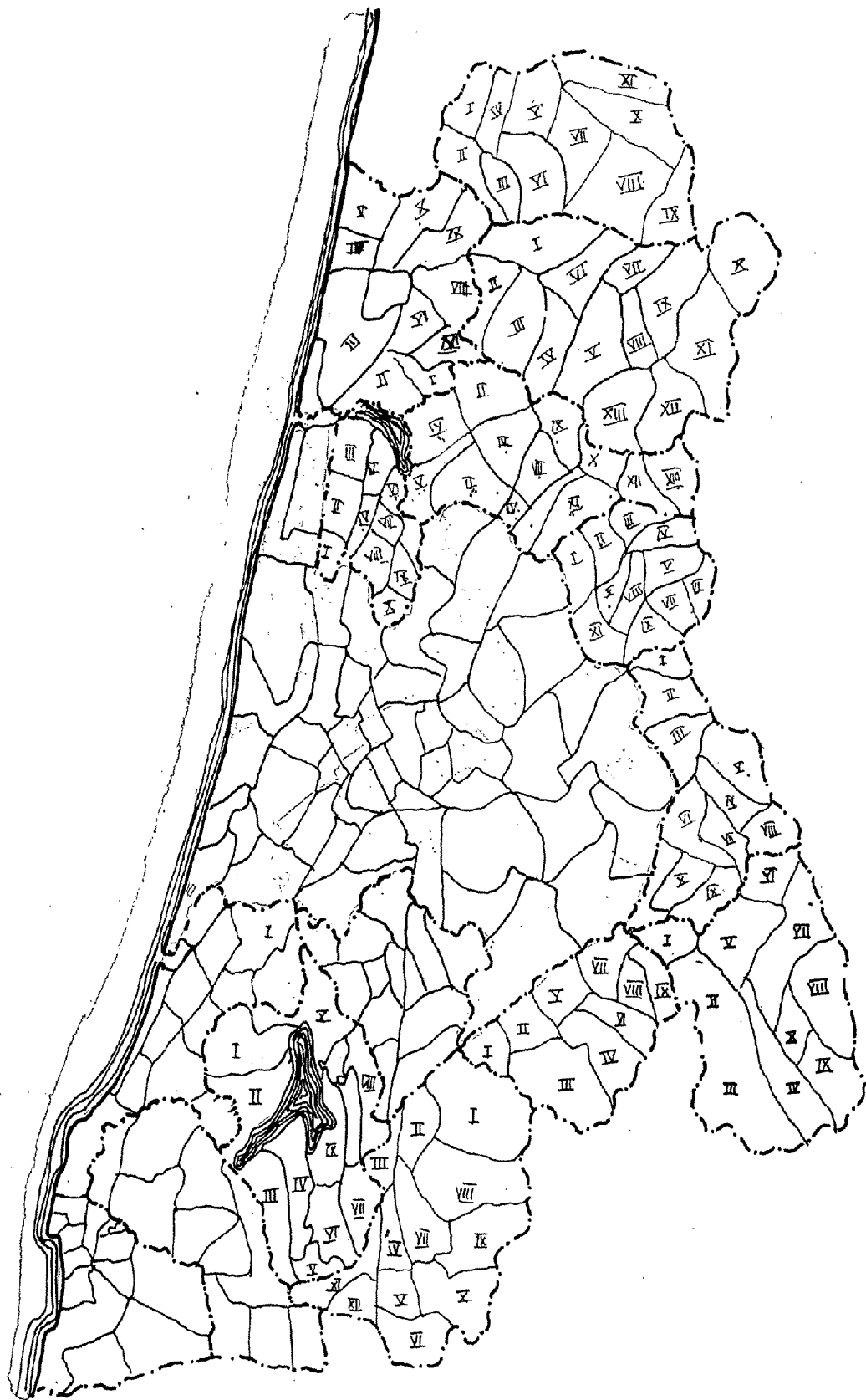
## **2.9 Land Value and Topography**

Trivandrum has an undulating terrain beneath which is a hard ratum, suitable for any type of construction activities. Land prices in the city has drastically increased in the recent years, and it has been doubled at present compared to the year 1993. Besides M.G.Road, the land price varies from Rs. 3-4 lakhs per cent (1 cent 40 m<sup>2</sup>). It has been observed that the City centre has the highest land value up to Rs. 4-5 lakhs per cent. Land has become the scarce commodity in the core area.

## **2.10 Infrastructure**

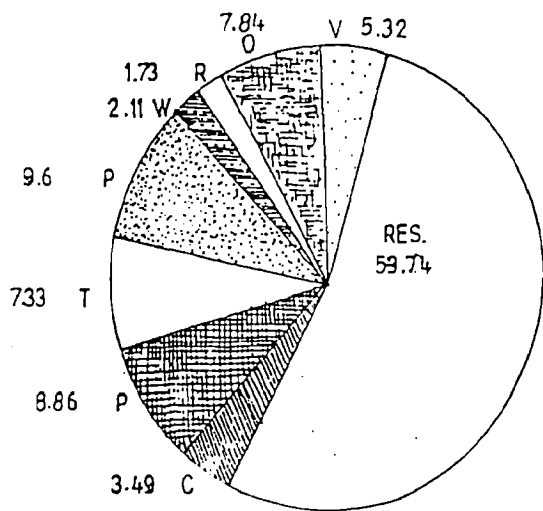
### **2.10.1 Water**

The water distribution system in the city laid in the pre-independence period and the system adopted for distribution is branching out one. It provides 24 hours supply with low pressure. Distribution reservoirs are located at Peroorkada and Thirumala each having a capacity of 80 lakh litres and a 70 lakh litre capacity overhead tank respectively exists at the observatory hills. The distribution system is also divided into the same 4 zones as the CWSS, i.e., Peroorkada, Thirumala, Central zone and the low level zone. The distribution system laid in almost all parts of the city was designed to benefit a population of 6.4 lakhs expected in 1991 (1991 population reached only 5.2 lakhs).

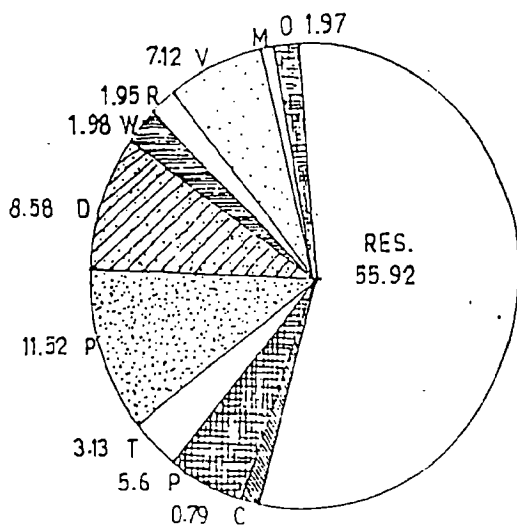


MAP 8

TRIDA AREA



TRIVANDRUM CORPORATION



TRIDA

LEGEND

- RESIDENTIAL
- C COMMERCIAL & INDUSTRIAL
- P PUBLIC & SEMIPUBLIC
- T TRANSPORTATION
- P PADDY FIELD
- D DRY CULTIVATION
- W WATER COURSE AREA
- R RESTRICTED AREA
- V VACANT LAND
- M MARSHY LAND + QUARRIES
- O OPEN SPACE & PARKS

Table 1

## Decadal growth rate of population

|                        | 1961-71 | 1971-81 | 1981-91 |
|------------------------|---------|---------|---------|
| Trivandrum Corporation | +70.81  | +17.93  | +8.47   |
| Kadakampally           | +6.09   | +36.01  | +19.17  |
| Attipra                | +12.32  | +28.31  | +22.36  |
| Kazhakuttam            | +44.94  | +23.51  | +18.37  |
| Sreekariyam            | +31.34  | +22.41  | +21.70  |
| Ulloor                 | +38.55  | +25.86  | +22.80  |
| Kudappanakunnu         | +41.55  | +35.23  | +23.66  |
| Vattiyoorkavu          | +14.47  | +37.23  | +38.78  |
| Villappil              |         |         | +22.18  |
| Vilavoorkal            | +31.41  | +23.55  | +23.41  |
| Nemom                  | +27.35  | +28.79  | +25.89  |
| Pallichal              | +30.28  | +15.64  | +24.95  |
| Kalliyoor              | +38.91  | +20.95  | +17.29  |
| Thiruvallam            | +29.37  | +24.96  | +8.15   |
| Vanganoor              | +7.46   | +21.96  | +10.62  |
| Vizhinjam              | +21.24  | +28.68  | +13.68  |

Source : Census of India.

TABLE 2 : NUMBER OF HOUSEHOLDS PER SQ.KM.

|         | TRIVANCRUM CORPORATION |       | KADAKKANPALLY | ATTIPRA | KAZHAKUTTAM | SREEKARIYAN | ULLOOR | KUDAPPARA-KURIHU | VATTIYOORKA-VU | VILAPPIL | VILAVOORKAL | NEHON | PALLICHAL | KALLIYOOR | THIRUVALLAN | VENGANNOOR | VIZHINJAH |        |
|---------|------------------------|-------|---------------|---------|-------------|-------------|--------|------------------|----------------|----------|-------------|-------|-----------|-----------|-------------|------------|-----------|--------|
| WARD 1  | 635.91                 | WD 26 | 2880.5        | 703.1   | 245.1       | 249.8       | 630.4  | 739.7            | 1033.76        | 1259.9   | 545.9       | 434.5 | 605.8     | 208.4     | 309.1       | 549.7      | 492.4     | 356.9  |
| WARD 2  | 1109.86                | WD 27 | 2510.26       | 388.4   | 1602.2      | 684.2       | 533.7  | 665.9            | 792.4          | 526.0    | 245.8       | 417.7 | 623.9     | 562.9     | 350.2       | 828.9      | 561.5     | 1273.2 |
| WARD 3  | 1298.09                | WD 28 | 3775.0        | 475.6   | 315.2       | 525.6       | 344.1  | 389.3            | 793.9          | 688.0    | 273.5       | 214.7 | 1207.0    | 308.2     | 380.9       | 938.9      | 475.3     | 2995.1 |
| WARD 4  | 1463.24                | WD 29 | 3726.92       | 529.6   | 490.2       | 530.6       | 554.5  | 609.8            | 1175.0         | 626.8    | 267.7       | 493.8 | 634.2     | 417.2     | 363.8       | 544.8      | 842.4     | 1426.7 |
| WARD 5  | 1314.86                | WD 30 | 2933.87       | 581.4   | 507.6       | 258.7       | 295.1  | 770.1            | 778.9          | 1306.2   | 196.5       | 389.9 | 831.3     | 359.9     | 583.9       | 471.8      | 845.3     | 1068.4 |
| WARD 6  | 1820.99                | WD 31 | 2034.57       | 456.2   | 502.9       | 288.8       | 355.2  | 857.1            | 880.4          | 561.2    | 409.1       | 648.2 | 642.7     | 514.2     | 394.5       | 1506.2     | 716.9     | 826.8  |
| WARD 7  | 648.28                 | WD 32 | 442.57        | 997.1   | 265.4       | 364.9       | 514.7  | 701.2            | 868.3          | 600.5    | 238.9       | 395.2 | 823.3     | 486.5     | 471.9       | 1577.0     | 430.9     | 3619.5 |
| WARD 8  | 714.43                 | WD 33 | 1036.43       | 563.0   | 333.5       | 233.7       | 455.4  | 605.0            | 1022.1         | 713.8    | 259.7       | 544.9 | 689.8     | 339.1     | 510.9       | 582.3      | 645.0     | 568.0  |
| WARD 9  | 1304.31                | WD 34 | 104929        | 1087.2  | 901.4       | 273.4       | 275.9  | 590.6            | 1217.1         | 480.2    | 641.5       | 503.5 | 1289.1    | 323.8     | 537.2       | 916.9      | 786.1     | 302.9  |
| WARD 10 | 817.07                 | WD 35 | 950.32        | 801.1   | 226.0       | 236.7       | 326.1  | 519.4            | 843.8          | 555.1    | 443.8       |       | 1425.8    | 394.6     | 248.3       | 468.9      | 695.2     | 308.0  |
| WARD 11 | 1318.18                | WD 36 | 1632.56       |         | 340.7       | 321.8       | 315.5  | 470.5            | 963.1          | 1377.5   |             |       | 498.9     | 535.7     | 498.5       | 934.5      | 668.9     | 391.3  |
| WARD 12 | 1877.67                | WD 37 | 2167.95       |         |             |             |        | 365.7            | 603.7          |          |             |       | 496.3     | 576.9     |             | 461.7      |           | 352.3  |
| WARD 13 | 1429.68                | WD 38 | 1530.0        |         |             |             |        | 336.0            | 551.5          |          |             |       | 726.9     |           |             |            |           | 978.5  |
| WARD 14 | 1299.22                | WD 39 | 2648.44       |         |             |             |        |                  | 446.4          |          |             |       |           |           |             |            |           | 847.6  |
| WARD 15 | 1415.97                | WD 40 | 3044.44       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 16 | 1840.37                | WD 41 | 15527.76      |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 17 | 1390.34                | WD 42 | 2205.54       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 18 | 773.68                 | WD 43 | 2561.0        |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 19 | 2238.76                | WD 44 | 748.91        |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 20 | 2329.46                | WD 45 | 1710.22       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 21 | 2130.97                | WD 46 | 1817.12       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 22 | 2645.0                 | WD 47 | 3245.83       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 23 | 2998.08                | WD 48 | 1013.89       |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 24 | 2444.16                | WD 49 | 989.05        |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |
| WARD 25 | 1232.69                | WD 50 | 974.82        |         |             |             |        |                  |                |          |             |       |           |           |             |            |           |        |

### **2.10.2 Electricity**

The city has been experiencing deficiency in power supply and electricity is available to only 76% of the total households. There are 767 out of 1000 persons of the city lives in electrified houses. This is higher than the figure of other metropolitan cities of the state. Despite governments policy of giving one light point connection free of cost to low income households still the city is witnessed that 233 households out of every thousand have not possess electric connection.

### **2.10.3 Sewerage**

Individual connections from the buildings are taken into the sewers and send to Kuriathy treatment plant, and the treated sewerage is taken into the sewage form located at Valiyathura. The Valiyathura plant was established during the princely period, and still it works satisfactorily.

### **2.10.4 Garbage Disposal**

Trivandrum city generates about 450 tonnes of garbage per day. At present, there is no organised system of collection and disposal of garbage from residences and a very few neighborhoods are served with community bins. Awareness should be brought among the public to use proper methods of disposing garbage, and the hazards of logging of surface drains, stagnation of water, etc. The city corporation has a proposal to start a scheme worth of Rs. 4 crore biological treatment plant to convert garbage into Farm yard manure (FYM).

### **2.10.5 Education and Research Institutions**

The city has been blessed with good higher education facilities and research institutions. As a result, larger number of people from the neighboring district of Tamilnadu State and the surrounding areas migrated to the city for enjoying these facilities. As in the rest of the state, primary and secondary Education institutions are situated all over the city, suburb and even in the rural areas. The public as well as the private sector have taken an equal interest in the field of education.

### **2.10.6 Health**

The city is known for the availability of sophisticated medical facilities. Medical College, Sree Chitra Medical Centre, Regional Cancer Centre etc., are the main hospitals and regional referral centres of medical care. map 9. shows the location of major hospitals available in the city and in the suburbs. Majority of the medical institutions/hospitals are concentrated in and around the Medical College Hospitals. Apart from alopathy, Trivandrum also has the Ayurveda College, Homeo College, Nature cure centres, Yoga and massage centres, etc.

### **2.10.7 Telecommunication**

Telecommunication system proves to be one of the most important network systems for the proper functioning of any city. Kerala state has a good communication network. Though the number of post offices in Kerala state during 1994-95 remained the same as that of the previous year, the state average of population served by one post office increased to 6138 persons as against 5774 persons during the proceeding year. Conforming to this, Trivandrum also has a good network of telecommunication system.

### **2.10.8 Fire**

The city has two fire stations, of which one is located at Chengalchoola in the core area, and the other is at Chackai.

### **2.10.9 Cremation/Burial Grounds.**

The city has two cremation grounds, one at Karamana and the other at Thycaud. Of which, one has electric cremation facility. Though the law prohibits cremation in house premises, such practices are still taking place. The city has many burial grounds, which are attached with religious institutions, some are located even in the core area. These also serve as green/open spaces for the city.

### **2.10.10 Recreation Areas/Open Spaces**

The city has several open spaces and recreational facilities within the reachable limit. The important recreational spaces and open spaces available in the city are given in the table 3. The table enumerates that the city has about 165 acres of land which is used





as recreational and open spaces. It has been divided that almost all those areas are equally used by the people of the city and the neighboring areas. Besides these, privately owned open spaces are also available in city which are used by the selected haves.

**Table 3 : Open Spaces in the City**

| Sl.No. | Name                        | Area in acres |
|--------|-----------------------------|---------------|
| 1.     | Poojapura junction          | 3.25          |
| 2.     | Putharikandom and East Fort | 5.68          |
| 3.     | Museum and Zoo              | 46.87         |
| 4.     | Kanaka Kunnu Palace         | 21.04         |
| 5.     | Observatory Hills           | 23.00         |
| 6.     | Water Works Complex         | 16.00         |
| 7.     | South Street Maidan         | 2.14          |
| 8.     | Beach                       | 10.00         |
| 9.     | Boat Club                   | 10.00         |
| 10.    | Other Parks                 | 2.00          |
| 11.    | Stadium                     | 25.00         |
|        | Total                       | 165.0         |

Source : Department of Town Planning

### 2.11 Housing

Housing becomes one of the major problems in almost all the developing countries and India is also not an exceptional one. Though Kerala state has higher literacy rates, and better economic condition compare to some other states of India, still it is not free from housing problems. There are about 26 percentage of the total houses in Kerala are constructed by using grass, leaves, reeds or bamboo. The shortage of pucca or semi pucca houses estimated as 823060 as per 1991 census. In TRIDA area, the number of residential houses are 2208788 and the number of

households are 216211, of which 34.61 percentage of houses have kutcha roof, 31.6 per centage have semi pucca roof, and 28.54 percentage have pucca roof. Trivandrum has more quantity of rental housing compare to other two metropolitan cities of Kerala, state, i.e. (16.3% of the total houses). This may be due to the fact that the city function as a capital of the state, and also large number of population coming from all over the state and neighboring district of other state of India.

### **2.12 Households**

The Trivandrum city Corporation has been divided into 50 wards for developmental administration purposes. The ward numbers like 41 and 42 have the highest concentration of households. The ward numbers like 20, 29, 40, 47 having high density of population and the ward 32 has the lowest density.

### **2.13 Other Natural Resources**

Other natural resources like water, soil, flora, metals, minerals, etc. are all affected badly by the indiscriminate construction activities. The amount of these natural resources are depleting day by day on one hand, and the demand of these is increasing on the other. The increased construction activities lead to flood, drought, lowering of water table, etc. There should be a balance between these two activities to minimise the crises in the system. Alternative technology which involve cost effectiveness should be developed, and extended to the individuals, society, nation and the ecosystem.

### **2.14 Transportation**

The city is well connected to the region and other parts of the country by road, rail and air. The intra-city travel is mainly depends on road-based, while rail and air based modes are cater to long distance and inter city transport.

#### **2.14.1 Road Network**

The city has a partial ring and radial type of road network. The major radial roads are the National Highway - 47(N.H.-47), Main Central Road (M.C. Road), Trivandrum - Shencortah Road (T.S. Road), Kattakada Road and Kovalam - Poovar Road. These are the major arterials of the city. The other urban links have largely been developed as extensions to these inter city links. A well defined hierarchy of roads is

totally absent. The topography of the city is characterized by highly undulating terrain. Since the road network follows this terrain, they have very steep grades in many places and poor geometry. The present network also suffers from lack of access control, pedestrian facilities and segregation of traffic. The intermixing of local and through traffic results in unsafe travel conditions and low speeds along the network. The centralised system of public transport movement also creates problems of congestion along the main routes. Most of the junctions lack proper signaling systems and are highly accident prone. The total road length of the city is 574.491 kms. The agencies such as State Public Works Department and the Municipal Corporation are responsible for maintenance of these roads. The P.W.D. maintains 234.497 kms. (40.82%) of road length and the rest is under the jurisdiction of the Corporation and has been presented in table 4.

**Table 4: Road Network by Jurisdiction**

| Sl.No        | Category             | Length (Kms).  | Percentage    |
|--------------|----------------------|----------------|---------------|
| 1.           | National Highways    | 9.60           | 1.67          |
| 2.           | N.H. Bypass (Const.) | 2.960          | 0.52          |
| 3.           | State Highways       | 9.90           | 1.72          |
| 4.           | State P.W.D          | 221.031        | 36.91         |
| 5.           | Corporation          | 340.000        | 59.18         |
| <b>Total</b> |                      | <b>574.491</b> | <b>100.00</b> |

Source: Kerala Urban Development Project Report

Eventhough there is no clear hierarchy of roads, the network can be broadly classified into arterial, sub-arterial and collector roads and local streets. The functional classification of roads (Ref. Table. 5) has been made in accordance with the definition of "hierarchy", in the Trivandrum Development Plan.

**Table 5 : Road Network - Functional Distribution**

| Sl.No. | Category           | Length(Kms)    | Percentage |
|--------|--------------------|----------------|------------|
| 1.     | arterial Roads     | 47.67          | 8.30       |
| 2.     | Sub-arterial Roads | 54.982         | 9.57       |
| 3      | Collector Roads    | 144.567        | 25.16      |
| 4      | Local Roads        | 327.271        | 56.97      |
|        | <b>Total</b>       | <b>574.491</b> | <b>100</b> |

Source : Kerala Urban Development Project Report

A major portion of the city level network has right of way between 10 and 12 m. The heterogeneity of the traffic reduces the road capacity considerably. This, coupled with frequent intersections and crossing of pedestrians, reduces the journey speed to a level of 10-15 kmph during peak hours. The existing onstreet parking system further reduces the width and the capacity, as well as the speed of transit.

#### **2.14.2 Vehicular Population, Accidents and Traffic Violations**

The vehicular population of the district has increased from 8103 in 1990 to 97697 in 1991. Among the different vehicle types, two wheelers show an alarming high growth rate of 16 percent, while heavy vehicle show lesser growth rate. These reflected in the growth of traffic volume on the roads, which is around 8%, thus leading to congestion and subsequent reduction of speeds on the network. Lack of footpaths for the movement of pedestrians in the city has resulted in many fatal accidents which is about 64 percent of the total accidents during 1990-91 and this has been presented in Table 6.

**Table 6. : Distribution of Fatal Accidents in 1990-91 in Trivandrum City.**

| Sl.No. | Vehicle/Victim | Pedestrian | Cyclist   | 2-wheeler passenger | 3-wheeler passenger | Others   | Total     |
|--------|----------------|------------|-----------|---------------------|---------------------|----------|-----------|
| 1.     | Truck          | 7          | 4         | 4                   | 1                   | 1        | 17        |
| 2.     | Bus            | 8          | 7         | 3                   | 0                   | 1        | 19        |
| 3.     | Car            | 4          | 0         | 0                   | 0                   | 0        | 4         |
| 4.     | 3-Wheeler      | 7          | 0         | 0                   | 0                   | 0        | 7         |
| 5.     | 2-Wheeler      | 15         | 0         | 1                   | 0                   | 0        | 16        |
| 6.     | Others         | 1          | 0         | 1                   | 0                   | 1        | 3         |
|        | <b>Total</b>   | <b>42</b>  | <b>11</b> | <b>9</b>            | <b>1</b>            | <b>3</b> | <b>66</b> |

Source : Kerala Urban Development Project Report

Access control is very minimal in the city level network. There are many uncontrolled junctions are found in the city. At many locations, visibility is obstructed by both authorised and unauthorised constructions and advertisement boards. Warning and prohibitory signs are absent or poorly located in the city. All these factors lead to distraction and confusion among the road users ultimately resulting in accidents. The accidents indicate a strong need for improvement of junction geometric and traffic control at the junctions. Trend of motor vehicle accidents in the city is shown in Table 7, and it reveals that the accident rate is increasing constantly.

**Table 7 : Trend of Motor Vehicle Accidents in Trivandrum City.**

| Year | Non-Fatal | Fatal | Total |
|------|-----------|-------|-------|
| 1987 | 816       | 61    | 877   |
| 1988 | 712       | 56    | 768   |
| 1989 | 917       | 46    | 963   |
| 1990 | 763       | 27    | 790   |
| 1991 | 852       | 66    | 918   |

Source : Kerala Urban Development Project Report

### **2.14.3 Major Traffic Problems in the study area**

The major traffic problems encountered in the study area are presented as follows :

1. High traffic volumes with respect to road capacity.
2. Intermixing of slow and fast moving through and local traffic.
3. Lack of facilities for pedestrian movement.
4. Insufficient off-street parking.
5. Improperly located bus stands, and absence of bus bays and bus shelters along with the major roads.
6. Improper location of bus terminals.
7. Uncontrolled and poorly designed junctions.
8. Single access to railway station.
9. Non-existent or inconspicuous road signs and markings.
10. Poor street lighting.
11. Unsatisfactory enforcement of building rules and zoning regulations.
12. Unplanned positioning of telephone and electric poles on the roads which are obstructing the available carriageways.

### **2.15 Rail Transport**

Trivandrum railway line is a broad gauge and the city possesses 4 railway stations. Thampanoor, Pettah, Veli and Kazhakuttom and a goods yard at Kochuveli. Details of the rail traffic volume in the city region are presented in Table 8.

### **2.16 Air Transport**

The International airport of the city which occupies 190 hectares of land is situated on the western side of the city at Shangumugham.

### **2.17 Water Transport**

A system of backwaters and canals connect from Trivandrum to the northern part of the state upto Hosdurg. Though the water ways is the cheapest mode of transport,

T A B L E . 8  
D E T A I L S O F R A I L T R A F F I C I N T H E C I T Y R E G I O N

| Sl. No. | Name of Railway station    | Distance from Central Railway station | Passenger Trains (No.) | Goods Train (No.) | Average daily traffic           |                                |  | Volume of goods in-coming per day (Quintals) |
|---------|----------------------------|---------------------------------------|------------------------|-------------------|---------------------------------|--------------------------------|--|--|
|         |                            |                                       |                        |                   | Average daily passengers coming | Average daily passengers going | Volume of goods out-going per day (Quintals) |  |
| 1.      | Thiruvananthapuram central | 0                                     | 21                     | -                 | 8583                            | 8351                           | 334  |  |
| 2.      | Pettah                     | 2                                     | 15                     | -                 | 2040                            | 540                            | 260  |  |
| 3.      | Kochuvelli                 | 6                                     | 6                      | 4                 | 334                             | 341                            | 203  |  |
| 4.      | Velli                      | 8                                     | 6                      | -                 | 110                             | 115                            | -  |  |
| 5.      | Kazhakkuttom               | 12                                    | 7                      | 4                 | 460                             | 520                            | 6834   |  |
| 6.      | Nemom                      | 7                                     | 2                      | -                 | 150                             | 165                            | 19   |  |
| 7.      | Goods Yard at Kochuvelli   | -                                     | -                      | -                 | -                               | 712                            | 7681   |  |

SOURCE: DEPARTMENT OF SOUTHERN RAILWAYS



it is yet to be exploited. The Trivandrum shervalai canal passes through the Western part of the city.

### **2.18 Environment**

The rapid growth of population, industrialisation, increase in the number of motor vehicles, burning solid waste in air, dumping a raw wastes, besides the streets, roads etc, run-off fertilisers, pesticides in agricultural lands, thermal pollution, etc., cause various environmental pollution in the city. As a result the city is experiencing several kinds of diseases.

### **2.19 Economy**

The economy of the Trivandrum city is much depend on its administration, since Trivandrum is developed as an administrative city. Majority of its population depend on tertiary sector of the economy.

### **2.20 Industries**

The total area used for industrial purpose is 123.84 hectare of land. Most of the large and medium scale industries are located close to the two industrial estates, such as Veli and Pappanamcode, and a number of electronic industries owned by the Keltron and the Technopark also confined in the city.

**CHAPTER 3**  
**ANALYSIS & FINDINGS**

**3.1 ANALYSIS**

The study area has been divided into 4 segments according to their characteristics and analysed with the help of comprehensive building survey schedule and traffic volume surveys, observation and Delphi method and a land use plan is prepared. The following major problems observed and are given as under

1. Incompatible and un scientific landuse
2. Unorganised transportation and traffic movements
3. Deterioration of built character
4. Mismanagement of un built open spaces
5. Concentration of large number of activities
6. Shortage of infrastructural facilities
7. Deterioration of Environment

**3.1.1 LAND USE**

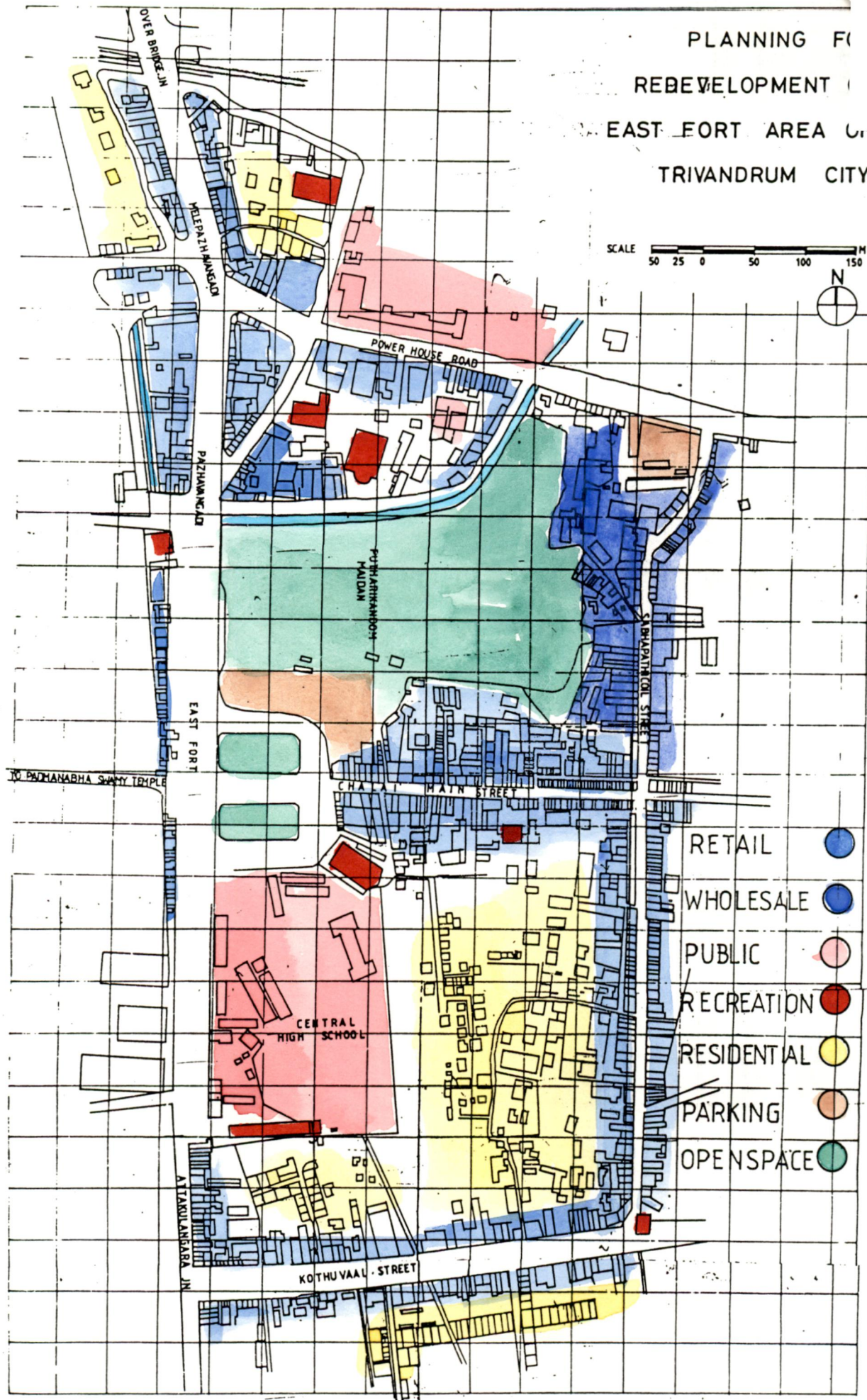
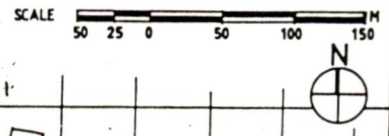
The details of land landuse pattern of the study area is shown in Table.9 & map 10-15.

**TABLE. 9 EXISTING LAND USE**

| Sl.No. | Land Use               | Area in Hectares | % of Total Area |
|--------|------------------------|------------------|-----------------|
| 1.     | Residential            | 10.00            | 14.08           |
| 2.     | Retail Commercial      | 25.00            | 35.21           |
| 3.     | Whole Sale Commercial  | 6.50             | 9.15            |
| 4.     | Public                 | 10.00            | 14.08           |
| 5.     | Semi-Public            | 1.00             | 1.40            |
| 6.     | Parks/Open Spaces      | 7.00             | 9.85            |
| 7.     | Recreation             | 1.50             | 2.11            |
| 8.     | Bus Terminal & Garages | 1.25             | 1.76            |
| 9.     | Roads                  | 8.50             | 11.97           |
| 10     | Water Body             | 0.25             | 0.39            |
|        | <b>Total</b>           | <b>71.00</b>     | <b>100.00</b>   |

Source. Primary Survey.

PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY



- RETAIL ●
- WHOLESALE ●
- PUBLIC ●
- RECREATION ●
- RESIDENTIAL ●
- PARKING ●
- OPENSOURCE ●

MAP 10 LANDUSE GROUND FLOOR



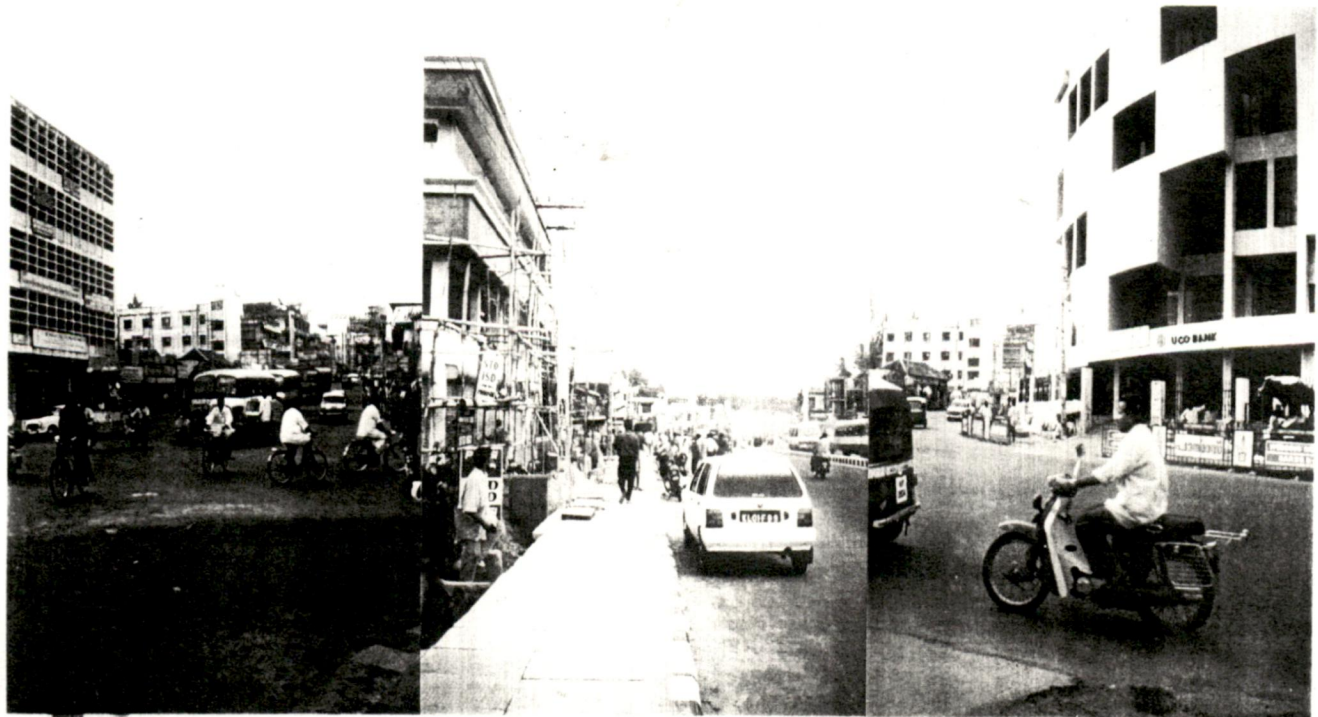
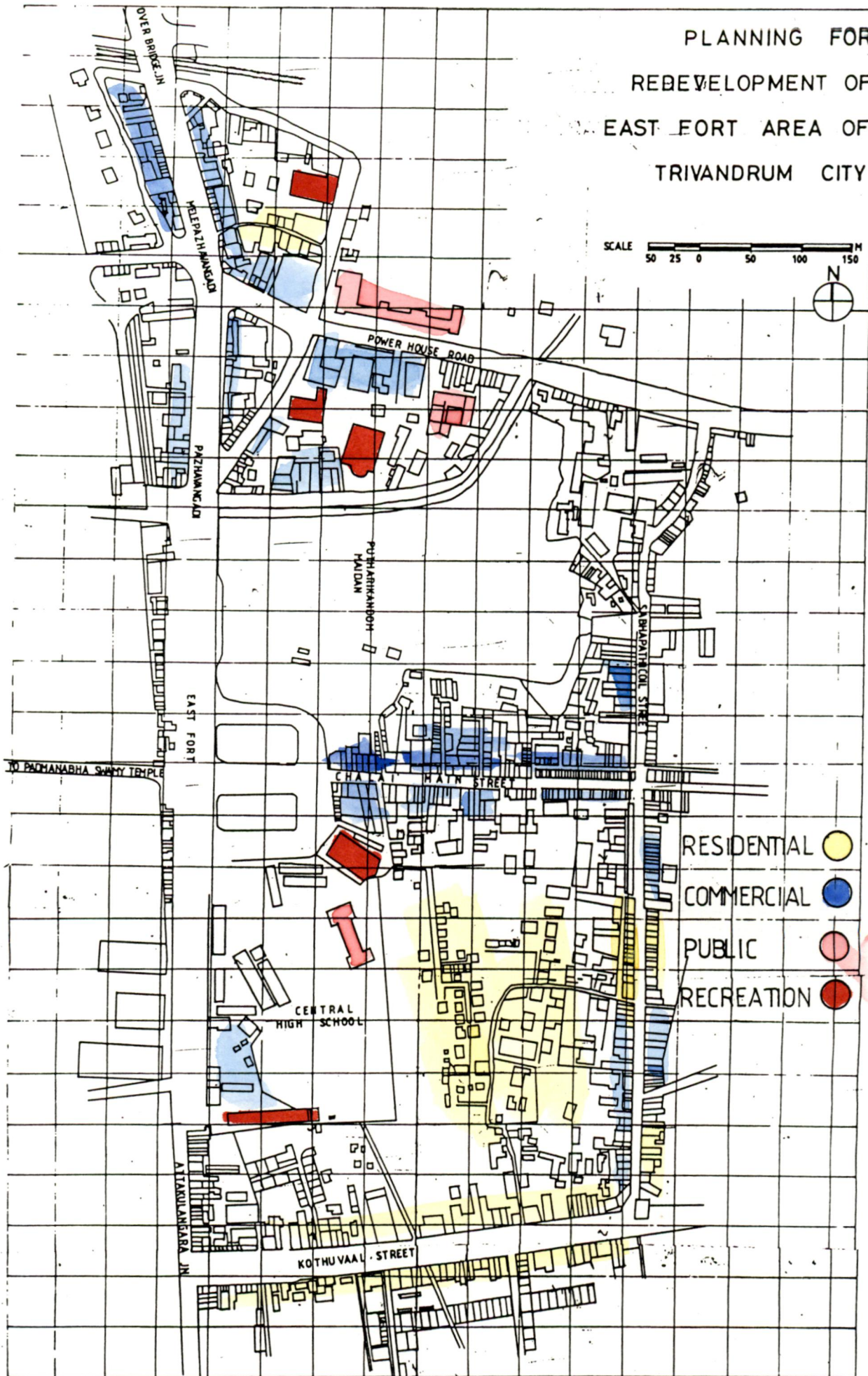


PLATE 1 OVER BRIDGE TO PAZHAVANGA DI



PLANNING FOR  
REBEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY

SCALE 50 25 0 50 100 150 M



MAP 11 LANDUSE FIRST FLOOR



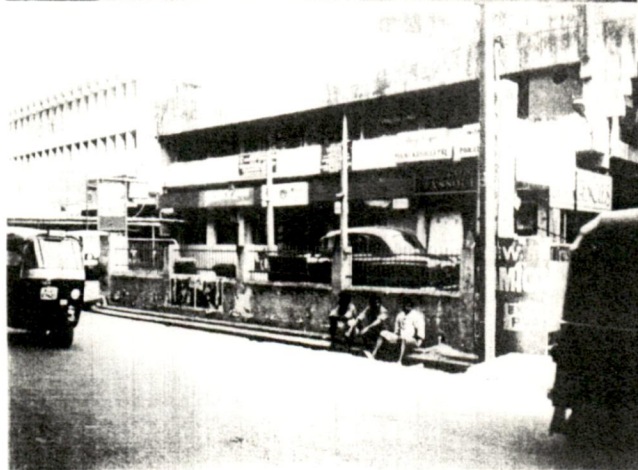
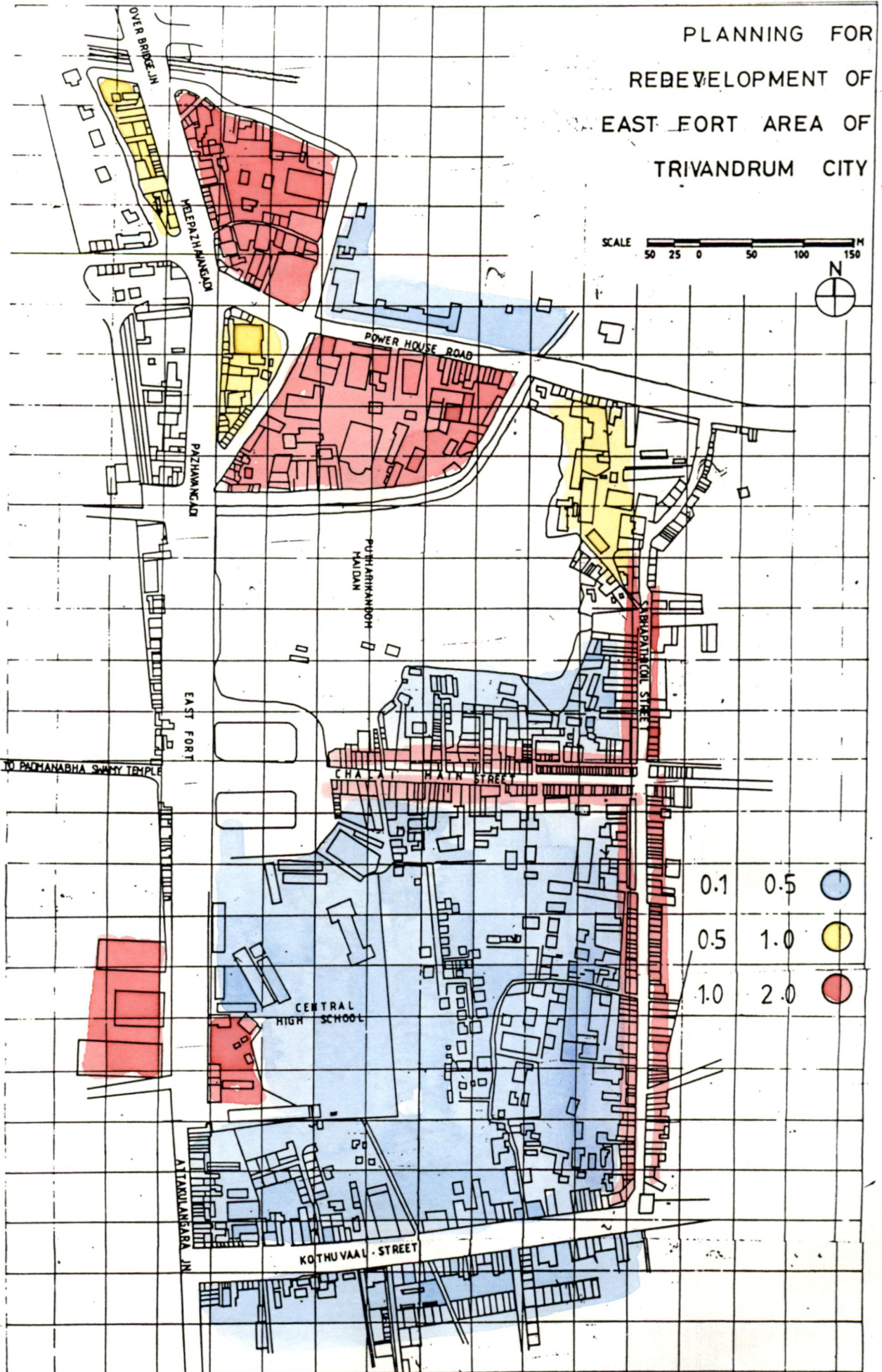


PLATE 2 POWER HOUSE ROAD 46



# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY



|     |     |  |
|-----|-----|--|
| 0.1 | 0.5 |  |
| 0.5 | 1.0 |  |
| 1.0 | 2.0 |  |



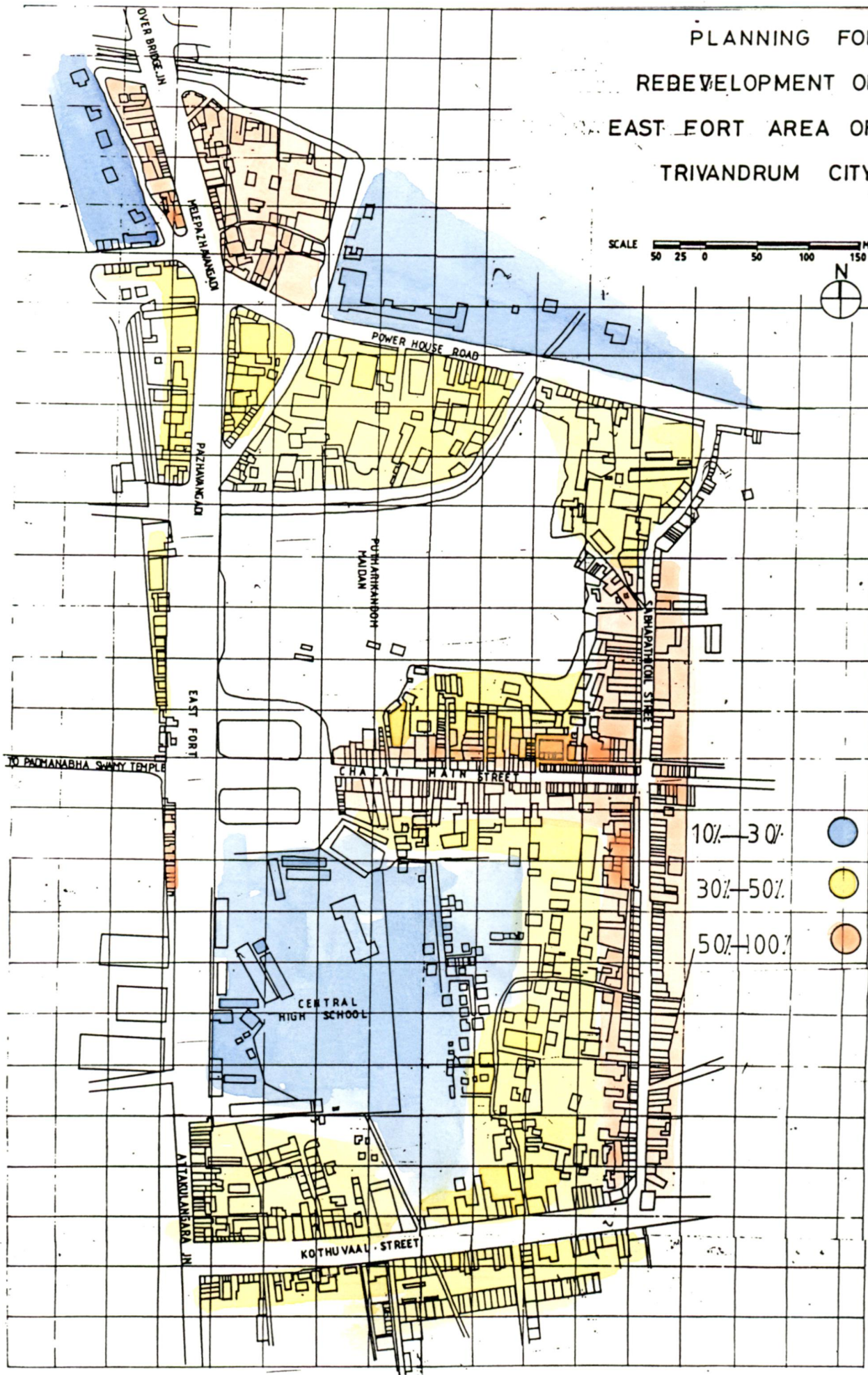


PLATE 3 EAST FORT AREA



# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY

SCALE 50 25 0 50 100 150 M



- 10%—30% ●
- 30%—50% ●
- 50%—100% ●





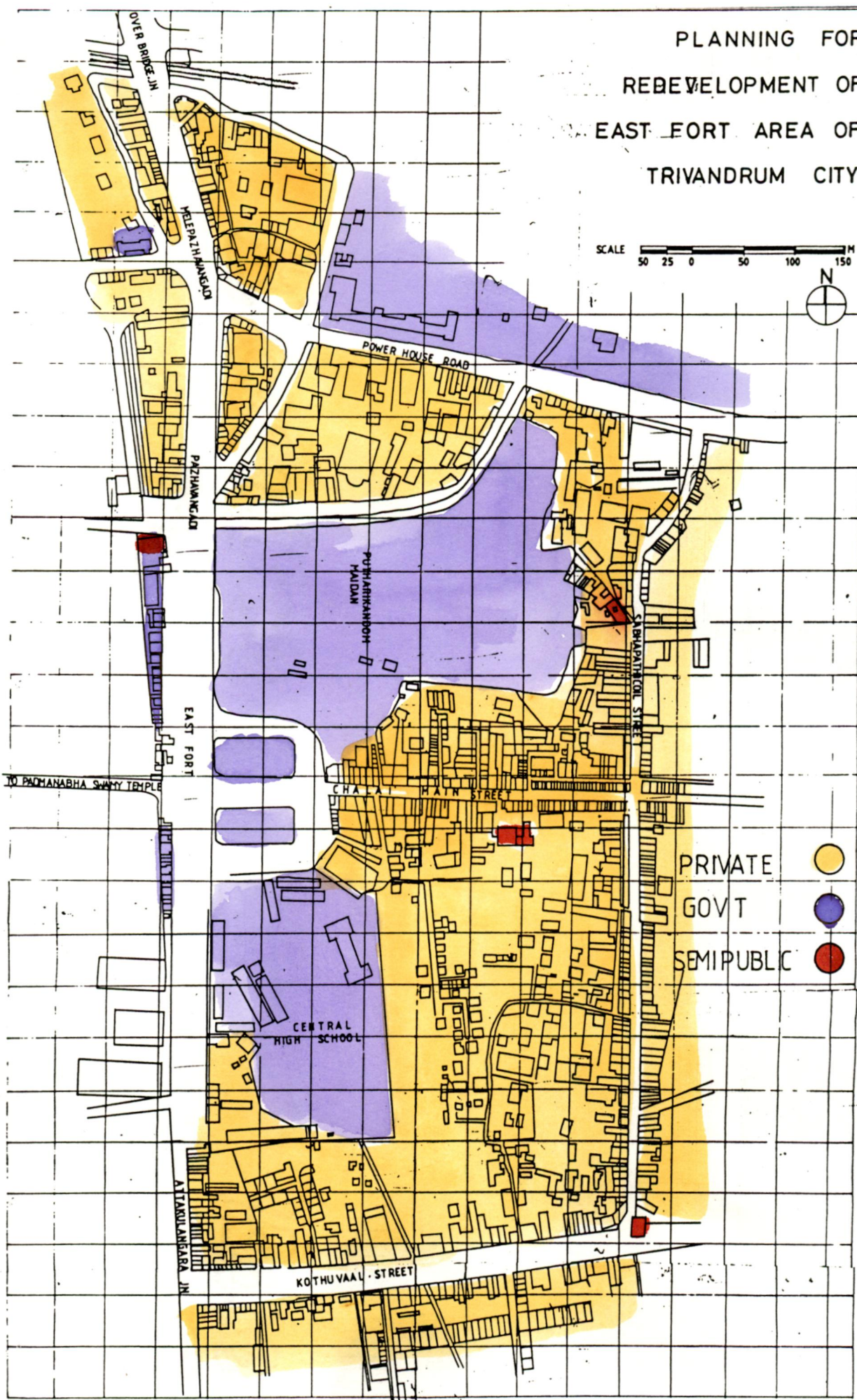
PLATE 4 CHALAI MAIN STREET




248259





PLANNING FOR  
REBEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY



PRIVATE   
GOVT   
SEMI PUBLIC 

MAP 14 LAND OWNERSHIP  
51



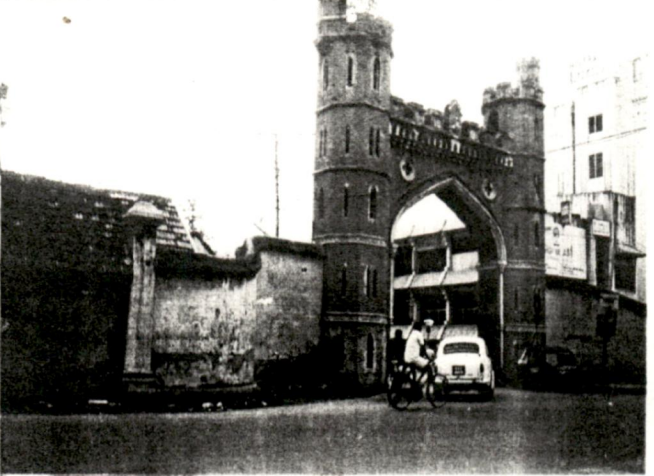
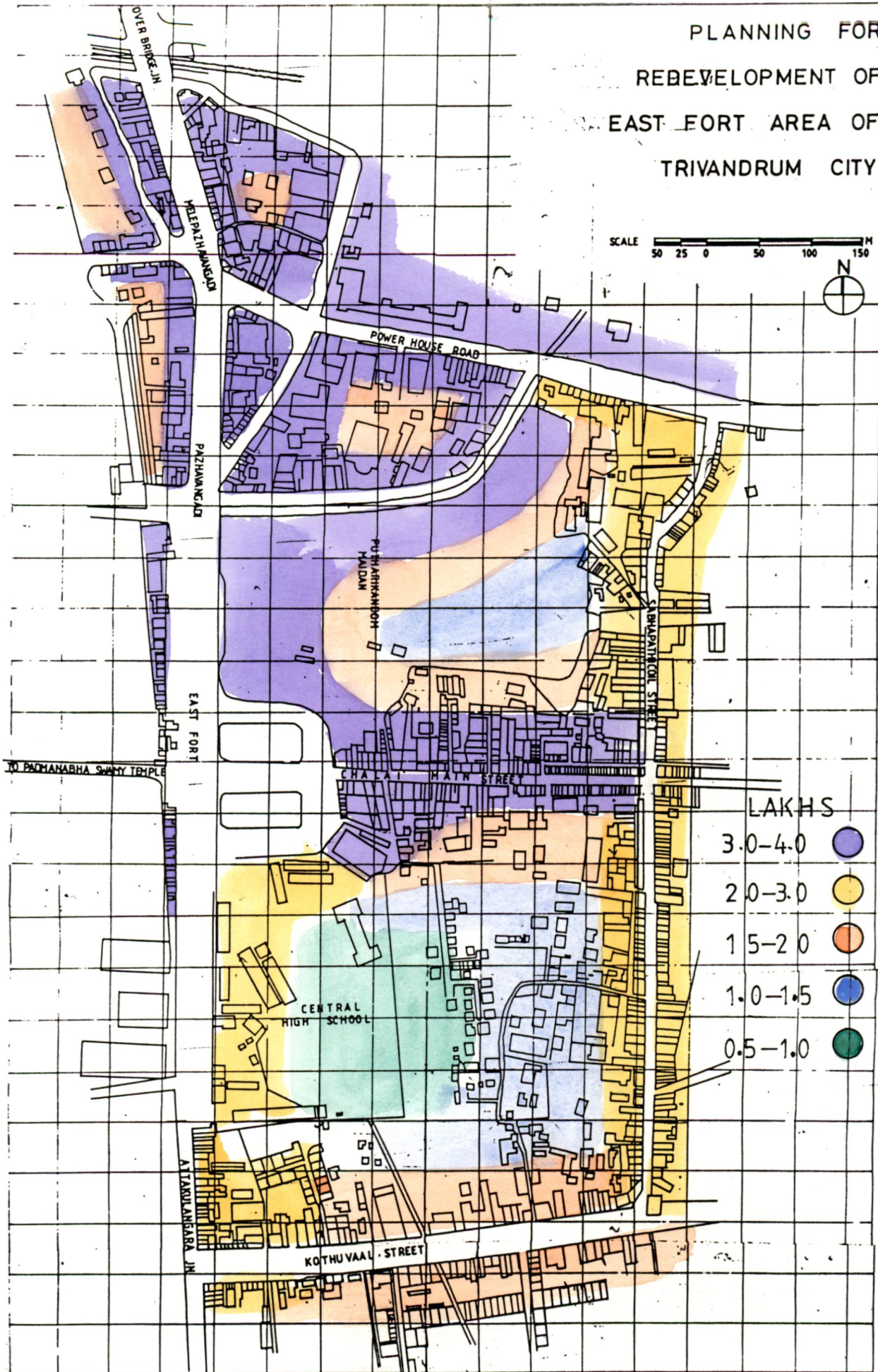


PLATE 5 EAST FORT ATTAKULANGARA



# PLANNING FOR REBEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY



MAP 15 LAND VALUES



The table illustrate that the land under residential use share only 14.08% of the total area which is far below the planning standards. The density of residential building units is also very less compared to the land value and housing demand. So stress must be given for accommodating greater number of building units within accommodative capacity of the study area without affecting the existing infrastructural facilities.

The percentage of land under retail commercial use is about 35.21 of the total area i.e., the commercial area spread over 25 hectares of land in the study area lies along the major corridors and Chalai Bazaar Street. The accessibility to the interior shops are not much adequate.

The share of whole sale commercial area is about 9.15 percentage of the total area which is the most problematic zone in the study area due to its location heavy vehicle are parked on the road for unloading during day hours irrespective of the narrowness of the road, which create congestion, pedestrians-vehicular conflict, etc. So the whole sale market would be preferably change to near by spacious locations.

Land under public use covers about 14 percent which includes Attakulangara School area and Government Offices. Power Houses Office, and the land used under Railways. The land under semi-public use is about one hectare which includes the location of Temples and Mosque in the study area, which need more space for parking of vehicles and gathering of people at worshipping time.

Parks and open spaces covers 9.85 percentage of the total area i.e., nearly 7 hectares of land used under this category, which is one of the major advantages of the study area. The Putharikandom Maidan, Pattom Thanupillai Park and Gandhi Park forms the open spaces. These open spaces attract huge amount of crowd during festivals, exhibitions and political demonstration.

There are 6 Cinema Theatres in the study area which are considered as the centres of recreation. They all together covers an area of 1.5 hectares forms 2.11 percentate of the total area. The parking provisions are not adequate to satisfying the need. So, adequate amount of space has to be provided around these Theatres for parking.

Considering the importance of transportation the area presently used for this purpose forms only 1.76 percentage of the total area which is not sufficient for the

growing demand. The existing City Bus Terminal create more problem in this area and produce traffic congestion and[s1] vehicular-pedestrian conflict. So it is better to shift this terminal to some other places which should be located outside the study area, so that the existing traffic problem can be solved to the maximum extend and the space can be used for parking.

The percentage of road in the study area forms 11.97 percentage of the total area which seems to be adequate with the standards but the presence of new six lane road from Over bridge to Pazhavangadi cover a major portion of it. New roads have to be developed so that the interior open spaces can be utilised economically and hence, the stress on the edge can be reduced.

The share of water body in the study area is only 0.35 percent of the total area i.e.0.25 hectares. This drainage lane is used practically as the dumping yard of waste materials which generate pollution and produce mosquitoes. So it is better to cover the drainage lane with openings at appropriate locations.

For the in-depth study, the area has been divided into four sections each of these having their own unique characteristics and are analysed separately as under.

#### **3.1.1.1 Over bridge Junction to Melepazhavangadi**

High density business establishments can be seen on the periphery with a mixed land use at the interiors - small shops and residences. The new widening of the road seriously affected the buildings on either sides, and some of the buildings as a whole was removed. The plots which are remaining after the widening need special sanction for reconstruction's due to the existing building byelaws which insist front setback of 3 meters even after the widening. The shops which are replaced have to be accommodated with in the reasonable distance limits. The Proposed Railway Terminal would increase the pressure in this area, and the commercial character would also mixed with special residential land use, such as, lodges, apartments, hotels, motels,etc. The same change could also be predicted along the periphery of the power house road. The other sections already packed with commercial establishments.



#### **3.1.1.2 Melepazhavangadi to Pazhavangadi**

This is a commercial zone with high density of commercial establishments. This stretch is also affected by the road widening and some of the buildings have been demolished and some others were seriously damaged. As a result the plots sizes have become so small since more than half part of the plots have been taken away for road construction and hence the left over land become not suitable to new constructions due to the existing building byelaws. Once the new railway terminal comes, the potentiality of the land would increase.

#### **3.1.1.3. Pazhavangadi - Chalai - East Fort**

This is a mixed land use region, which include commerce, transportation, and its related activities and religious activities, whole sale commerce, and recreation. A huge quantity of public land is available in this region, which can be used more effectively, and economically.

#### **3.1.1.4 East Fort - Attakulangara Stretch**

This particular area has a mixed land use, residential, educational and commerce. Majority of the land in this area is privately owned. The new Attakulangara bypass connect Chalai market, and which will change the land use more to commercial.

### **3.1.2 Transportation**

The major traffic problems of the study area is as follows.

#### **3.1.2.1 High Traffic Volume and Physical Barriers**

The peak hour traffic volume on the main roads in the study area, their carriageways width and volume to capacity (v/c) ratios are given in Table 10. If the growth rate of vehicles enumerates 8 percentage per annum remains the same, the traffic on these roads would exceed a v/c ratio of 2.0 by the year 2001. This would result in traffic snarls and very low speeds and inturn increase the unit vehicle operating costs considerably, i.e., almost twice the costs under normal traffic.



**Table 10 : V/C Ratios of Important Corridors**

| Sl.No | Road Stretch                          | Peak Hour Volume (PCU) | C/W Width (M) | Capacity (PCU perHour) . | V/C Ratio |
|-------|---------------------------------------|------------------------|---------------|--------------------------|-----------|
| 1.    | Choorakkattupalayam-Aryasala          | 1095                   | 5.17          | 1750                     | 0.63      |
| 2.    | Choorakkattupalayam-Mele Pazhavangadi | 2063                   | 5.53          | 1750                     | 1.18      |
| 3.    | Pazhavangadi-West Fort                | 728                    | 7.69          | 2500                     | 0.29      |
| 4.    | East Fort-Attakulangara               | 3315                   | 8.73          | 3000                     | 1.11      |
| 5.    | Ayurveda College- Over bridge         | 2553                   | 11.12         | 3500                     | 0.73      |
| 6     | Overbridge-Mele Pazhavangadi          | 2855                   | 6.29          | 2000                     | 1.42      |

Source: CES (Centre for Environmental Studies) Survey, 1991

### 3.1.2.2 Intermixing of Traffics

The studyarea. has a high percentage of slow moving traffic through the city has a rolling terrain. Bicycles form 12 to 15percentage of the total traffic in many stretches. The movement of trucks and other heavy freight vehicles are banned during day-hours along majority of the roads in the studyarea. However, on some roads, especially in the M.G. Road, it has been observed that heavy movement of buses. . The M.G. Road and its stretches are presented in map 2. The intermixing of slow moving traffic with the fast moving traffic, coupled with high traffic volumes in comparison with road capacity, has been resulting in an increasing number of accidents.

### 3.1.2.3 Lack of Pedestrian Facilities

One of the major problems affecting the traffic flow in the study area is lack of proper facilities for the movement of pedestrians. Many of the roads in the study area,. are devoid of foot paths which has resulted in the intermingling of pedestrian traffic with fast moving vehicular traffic. There are high number of fatal accident found in this area, of these 68percentage are found pedestrians. This reduces the effective capacity of a road section by 25 to 30percentage, thereby reducing speed by 10-15 kmph at peak hours. The main affected areas of pedestrian vehicular conflicts are

Chalai Market, Station Road, M.G. Road, Palayam Junction and are presented in map 16.

#### **3.1.2.4 Insufficient Off-street Parking**

Generally vehicles are parked on street except for a few locations, where off street parking is provided, and are presented in map 17, and parking reduces the available carriageway width and increases congestion on the road. Chalai street and M.G. road are severely affected by these activities. Parking spaces provided for services like taxis and autorickshaws are also insufficient. Presently parkings near major junctions, is a common feature for facilitating easy picking up of passengers such parking intervenes with turning traffic creates hazardous traffic conditions.

#### **3.1.2.5 Bus Terminals, Bus Stands and Bus Bays**

Intra city bus terminal is located in the heart of the study area. which causes major traffic problems. It generates not only vehicular traffic, but also large volumes of passenger traffic, which needs to be dispersed. The location of Intra City Bus Terrain is shown in Map. No.17. The Intra City bus terminal handles nearly 720 buses on an average per day, with around 60 buses in the peak hours. The access to the bus terminal is passing through the station road, which has a heavy volume of traffic both vehicular and pedestrian. Many of the roads in the studyarea. In spite of having high volumes of bus traffic, the bus stands, lacks adequate bus bays and bus shelters. As a result, many spots, passengers spill over on the main carriageways, while waiting for buses. Whenever the buses stop to lift or drop passengers, the carriageways are also blocked and the whole traffic come to a stand still due to the absence of bus shelters.

#### **3.1.2.6 Road Geometric, Intersections and Signals**

Road geometric in Trivandrum have been influenced by its topography and land use. Many roads have sharp curves and steep gradients due to rolling terrain. There are frequent intersections along with major roads, with poor design and insufficient turning radii, causing considerable reductions in speed of travel leading to congestion. At various junctions. the grades of various arms of the intersections differ appreciably and adversely affecting the capacities. Many of these junctions are highly accident prone.



None of these intersections have working signals. As a result the uncontrolled junctions become the major bottlenecks for the smooth flow of traffic during the peak hours.

#### **3.1.2.7 Access to Railway Station**

The railway line running East - West across the city, has only one entry to the Railway Station in the North. Therefore, all the roads which lead towards the Railway Station are bound to cross any one of these three Overbridges in the study area.

#### **3.1.2.8 Road Signs and Markings**

Inadequate traffic signs and marking on the roads and the curvilinear nature of the road network do not allow a proper sense of direction and orientation to the visitor of the city. Many road signs are not properly located or obstructed by other objects. This leads to confusion among drivers since many streets and stretches are one-ways and very few have destination boards.

#### **3.1.2.9 Street Lighting**

Poor road geometrics, presence of pot holes and rough patches coupled with lack of proper illumination of the road, particularly at intersections, pose serious threat to the safe and smooth flow of traffic. The study area has grossly inadequate lighting arrangements and local experience suggest that several of the fatal accidents have occurred due to poor visibility particularly at intersections and curves.

#### **3.1.2.10 Enforcement of Building Byelaws**

Building byelaws, especially those relating to the provision of off-street parking spaces is not followed during the planning and construction of buildings which results in on-street parking, creating congestion, etc. on the roads.

#### **3.1.2.11 Service Poles on the Carriageway**

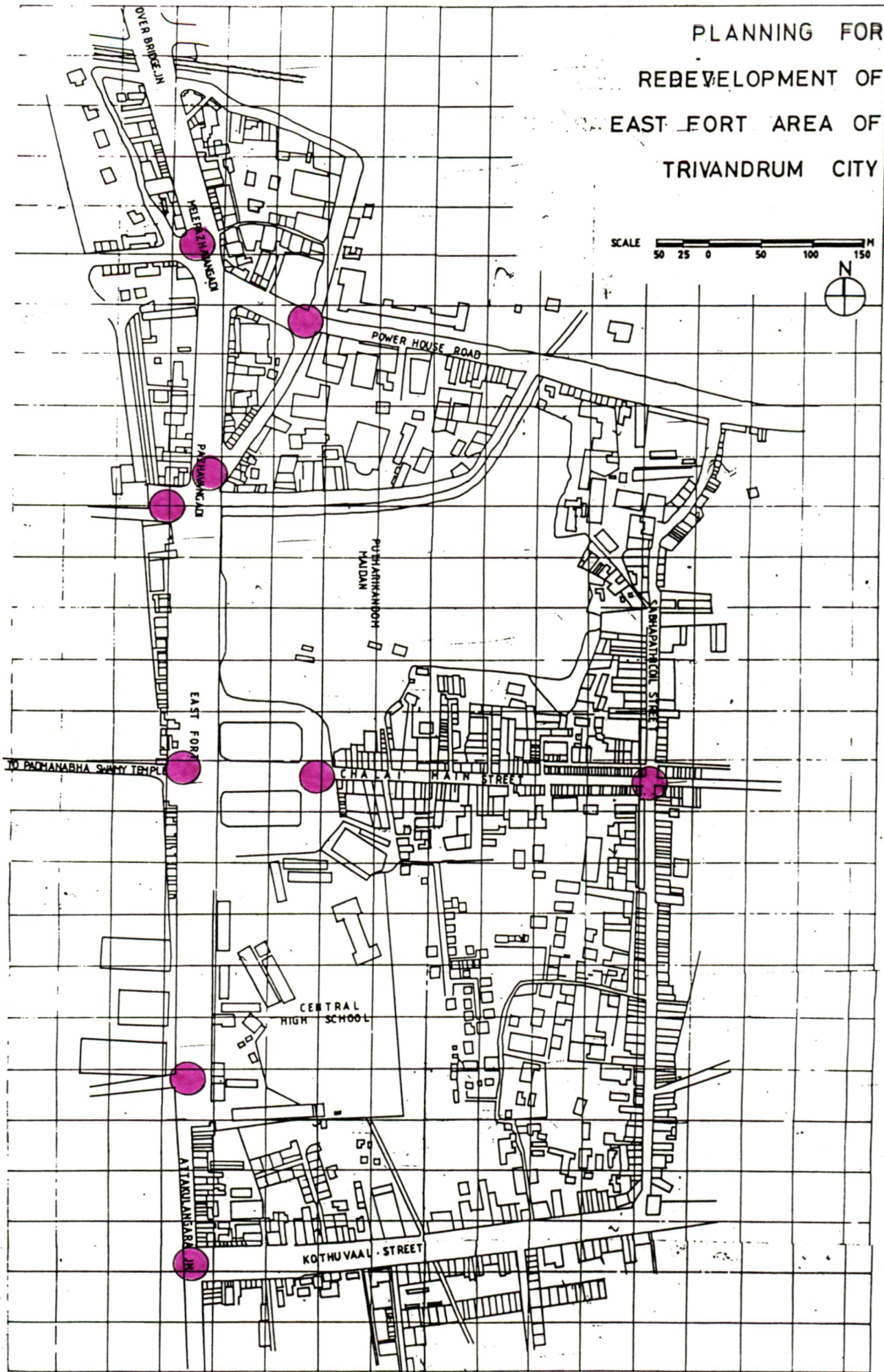
Many of the telephone and electric poles have not been shifted from the widened carriageway, especially on the M.G. Road which reduces the effective width of the carriageway.

#### **3.1.2.12 M.G. Road Stretch - Overbridge to Attakulangara**

The main traffic flow is to and fro movement of vehicles from Palayam and Thampanoor. There are uncontrolled pedestrian crossings resulting pedestrian - vehicular conflict in this area. There is a sudden influx of traffic at the beginning and end

PLANNING FOR  
REBEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY

SCALE 50 25 0 50 100 150 M

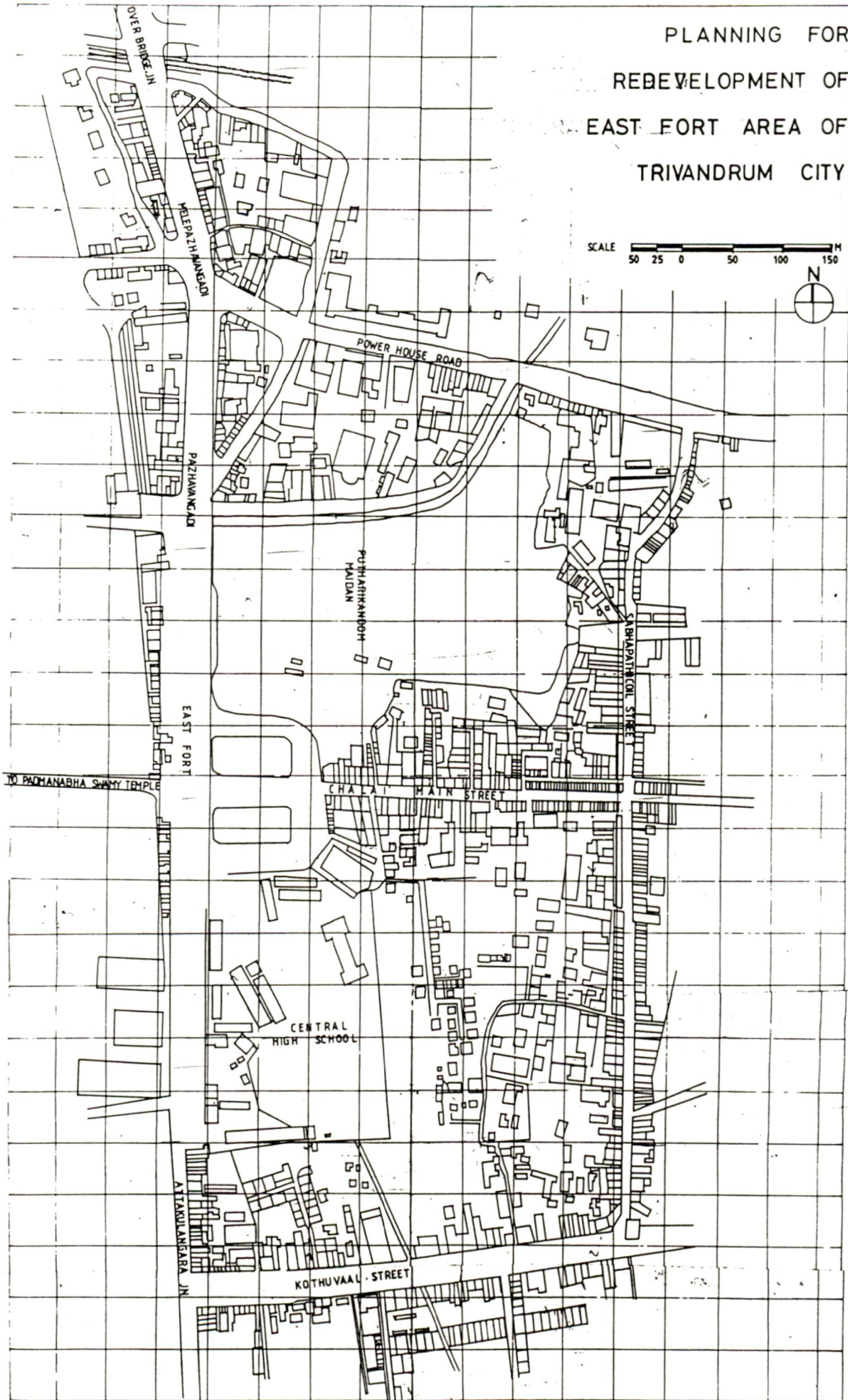


MAP 16

PEDESTRIAN — VEHICULAR CONFLICT POINTS



PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY



MAP 17 LOCATION OF PARKING AREAS

of film shows at the recreational centres.(Theatre nodes). The available parking provisions are not adequate to fulfill the growing demand. Parking of two wheelers at pazhavangadi near the Temple, reduces the carriage way, speed, of vehicles which increase the conflict. There is a high vehicular conflict at the Fort gate junction. Hawkers occupied the foot path and shelters which lead to unwanted traffic jam. The absence of proper Bus bays in the Putharikandom side, also lead passengers are unloaded on to the roads.

#### **3.1.2.13 The Chalai Bazaar Mouth**

The Chalai Bazaar which is the prominent market area in the Trivandrum city. Its mouth is highly congested, with loading, unloading, and the waiting commuters for Bus. On street parking is a dominant phenomenon in this area which reduces the carriage way and speed. Larger number of pedestrian - vehicular conflict is witnessed in this stretch, and this area is characterized by a high degree of pedestrian movement. The available traffic signages are also absolutely inadequate. The traffic generated from the Padmanabha theatre increases the congestion and conflict in the study area. The roads and the available smaller size of foot paths have been poorly maintained.

#### **3.1.2.14 Power House Road**

On street parking of heavy vehicles reduces the carriage way. The Parthas theatre junction is highly congested due to the shape of road way. There is no grade separation for pedestrians to the central theatre road. Off street parking is abundant in this area which results absolute traffic congestion.

#### **3.1.2.15 Ajantha Theatre Road**

Ajantha theatre road has been observed as highly congested and, very narrow. Which create sudden influx of traffic and conflict.

#### **3.1.2.16 Sabhapati Coil Street**

Loading and unloading of trucks produces congestion. Narrow street with bottle neck are the characteristic feature of this road. High conflict between pedestrian and vehicular movement is also noticed, where it meet the main chalai street.



### **3.1.2.17 Chalai Bazaar Street**

The one way traffic and the haphazard parking reduce the carriage way. There is a continuous flow of pedestrians in to the street. The hawker encroach into the road during the festival period. As a results larger number of modes increases with conflict. There is a high volume of traffic also observed compared to road capacity in this area.

### **3.1.2.18 Analysis of Parking Demand**

The parking demand of vehicles at various locations at different times have been analysed and shown in Fig.2. It clearly indicates that the existing parking facilities are not satisfactory with the growing demand. Recent surveys by the NAT PAC shows that the vehicles in the city growing at the rate 8 percentate per annum. The present peak hour demand at the Kripa Theatre lane is about 18 E.C.S: ( Equavellent Car space). This area needs parking spaces for 2 wheeler, Cycles, Cars, Autos, etc. The projected demand at this location is about 27 E.C.S. At the Parthas Junction, the parking demand is slightly higher due to the influx of commercial establishment and recreational centres. The total peak hour demand is observed as 40 E.C.S, This will include 2 wheelers, Cycles, and Cars. The estimated demand would be at the order of 60 E.C.S.

The power house road needs more space for parking because most of the Authorized Parking Lots are located on either sides of the roads. The total parking demand observed at the four points is found as nearly 240 E.C.S. Once the new railway terminal comes, the demand would be far higher than the present. So separate space has to be identified for Parking heavy vehicles, cars, Tempos, Tractors and two wheelers. The parking demand in and around the chalai main Bazaar Streets indicates that there should be a great stress for parking of vehicles which are coming for shopping as well as recreation. There are at present 5 parking lots in the vicinity. The total observed demand is about 170 E.C.S. Two wheelers, Cars, Cycles, etc are the major component of vehicles in this area. The parking demand reduces towards the Attakulangara Junctions. There are 3 parking lots available in this area are located at Central High School Junction, Sreebala Theatre Junction and Attakulangara junctions. The total peak hour demand is observed as 28 E.C.S all together.

# PARKING DEMAND AT DIFFERENT LOCATIONS IN E.C.S.

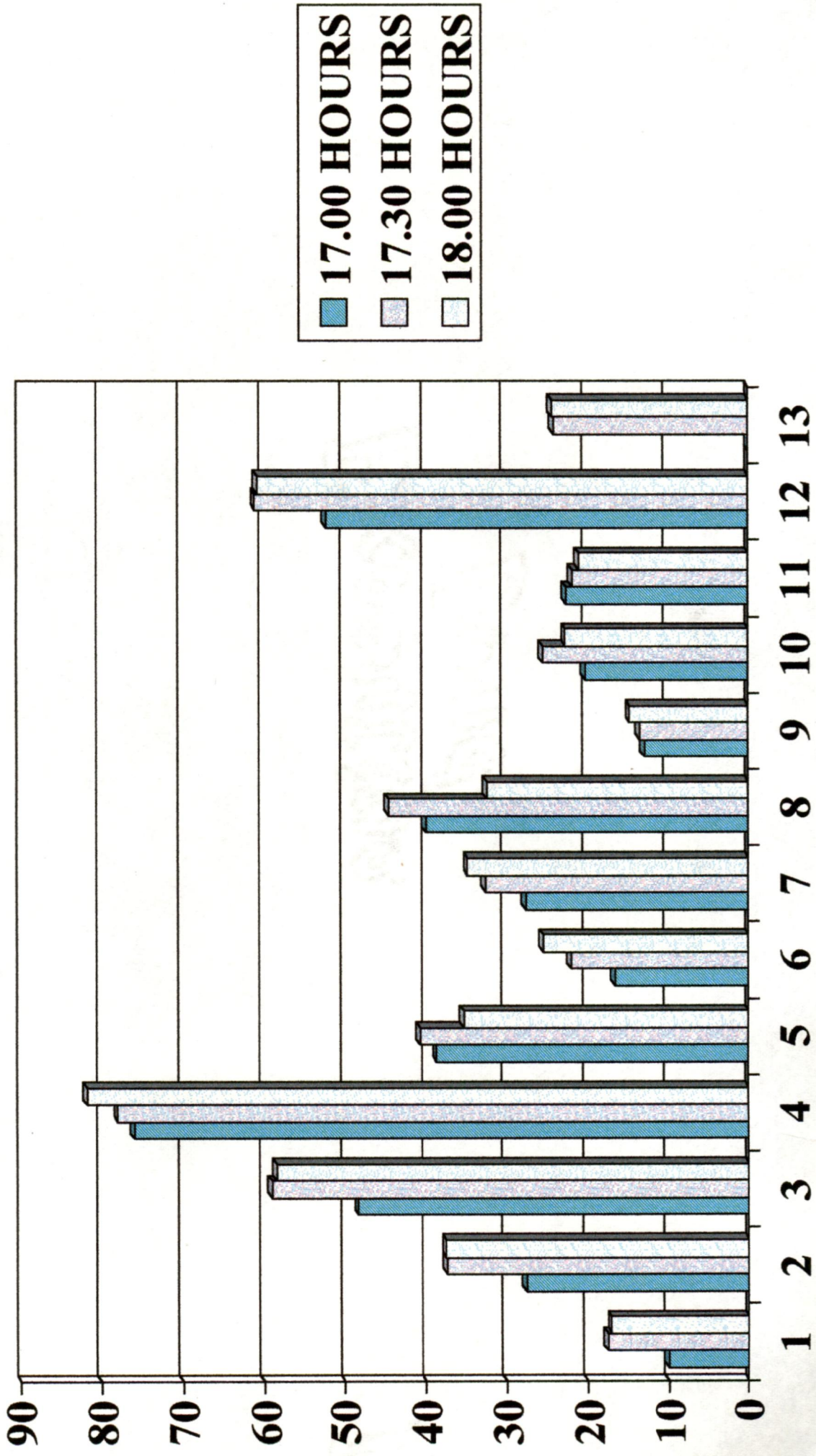


FIG 2



The total observed parking demand in the whole stretch of the study area is about 445 E.C.S, and the estimated demand would be 667 E.C.S., which needs an area of 12000 square meters.

#### **3.1.2.19 Surfacing**

The study area is dominated by bituminous surface roads and sandy maidans. The condition of the roads are in better form except Kothuvall street, which is undergoing road widening at present.

#### **3.1.2.20 Vegetation**

In general vegetation is scarce in this area. But Power house road, Central School, park area etc are having certain quantity of vegetation.

#### **3.1.2.21 Drainage**

The Amayizhanjan Thodu on the Central Theatre road, cutting across the Thakaraparambu road is the only open drainage available in this study area. The drains available besides roads are mostly open leading to bad odour and produces flooding. Maintenance of these are very poor.

#### **3.1.2.22 Street Furniture and Hardware**

Electric and telephone lines are inter-mixed in all inner streets, which reduces the effective width of the carriage way. The traffic sign boards are placed haphazardly throughout the study area. Advertisement boards which are kept within the sides of the roads are mainly blocking the view of interior open spaces. Which causes generation of accidents.

#### **3.1.3 Built Character**

The character of the built form in the four areas were analyzed on the following criteria, and are clearly shown in map 18-24 and figure 3-11.

1. General character i.e. traditional and modern
2. Age of buildings
3. Condition of buildings
4. Roof forms
5. Type of structures
6. Plan forms

7. Material of construction

8. Colour and texture.

### **3.1.3.1 Over Bridge to Melepazhavangadi**

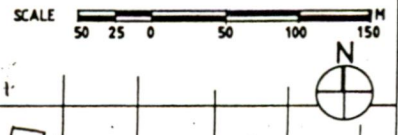
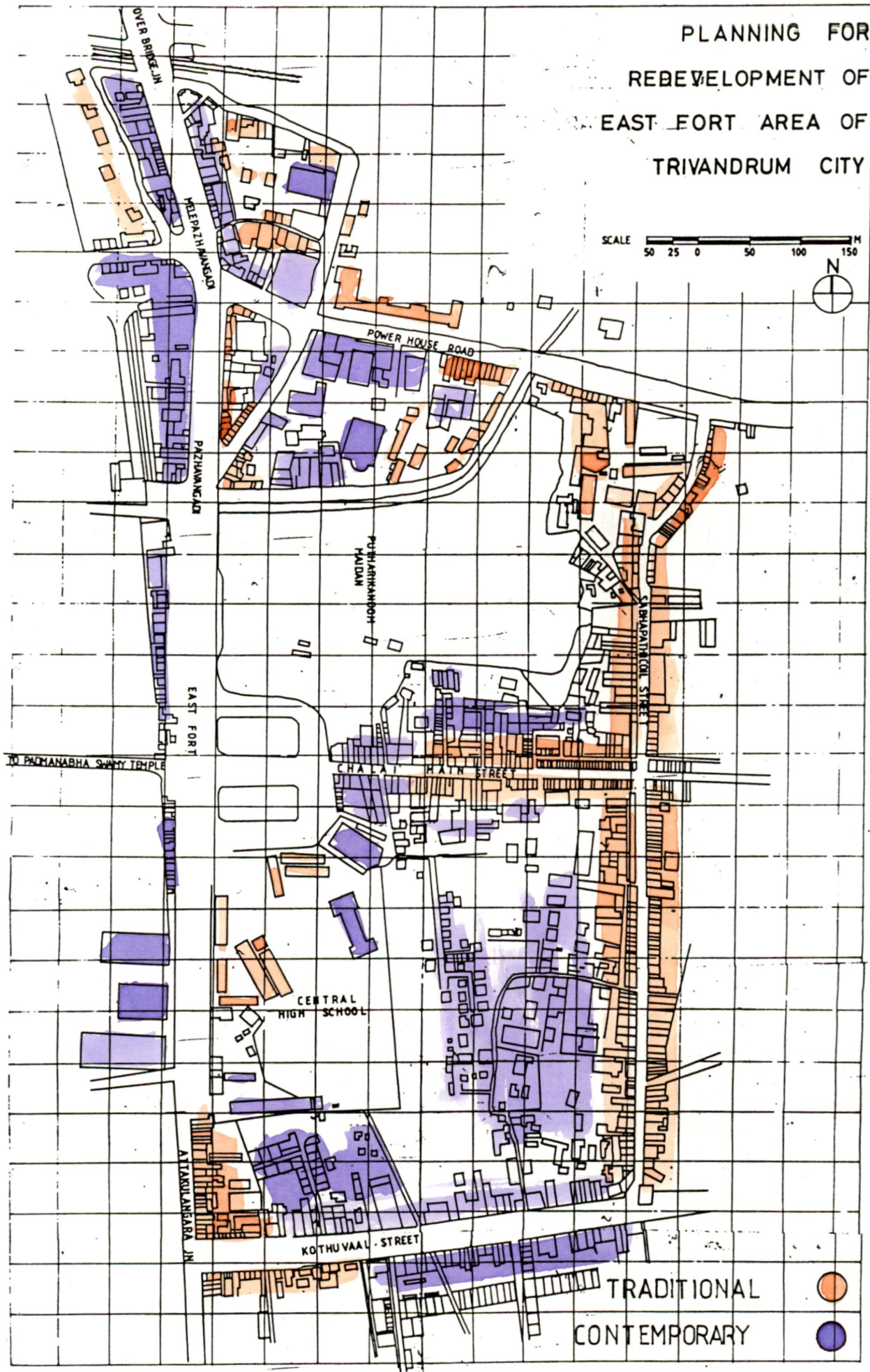
This stretch is severely affected by the road widening and most of the building were lost their identity and facade treatments. There are nearly 50 building in this stretch. Of which 21 having are traditional character, and the rest of them belong to contemporary styles. Buildings of age group less than 15 years covers 12 percent 15-20 years 24 percent, 25-50 years 44 percent, and the rest belong more than 50 years of old. The analysis of building condition enumerates that 54 percent of them are in good, 26 percent are moderate, and the remaining belong to bad conditions. Of the total building 52 percent are single storied, 28 percent are double storied, 8 percent three storied and the rest are indentified as multy storied. The analysis of the solid void ratio indicates that about 40 percent of the buildings have solid void ratio less than 25, 16 percent of the building are between 25 and 50, 10 percent are between 50 and 75, and the remaining 34 percent having 90. The survey also reveals that 56 percent of the building in the stretch belong to rectangular plan forms, 14 percent in square plan forms and the remaining belongs to other plan forms. The sloping roof cover 52 percent and flat roof covers 48 percent of the total building . As regards to the roof material tiles covers 30 percent and R.C.C. by 50 percent and the remaining by G.I sheets and others. It is also observed that most of the building are of smooth texture and are painted with light colour finishes.



### **3.1.3.2 Melepazhavangadi to Pazhavangadi**

As similar from the Over Bridge to Melepazavangadi, this stretch is also damaged during the road widening. The buildings on either sides of the road lost their importance in terms of their goodwill as well as of their character. There are all together 74 buildings in this stretch available at present and of which 21 are traditional in character and the remaining 53 are of contemporary in nature. Of these, 30 percent belongs to the age group of 0 - 15 years, 31 percent between 15 and 24 years, 25 percent between 25 and 50 years and the remaining are beyond 50 years. Among the total building, 47 percent graded as good, 39 percent as moderate and the rest is bad. About 51 percent of the building in this stretch having single storied, 40 percent double storied, 7 percent three



# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY



TRADITIONAL   
CONTEMPORARY 

MAP 18 TYPE OF BUILDINGS (CHARACTER)  
67



# BUILDINGS CHARACTERISTICS

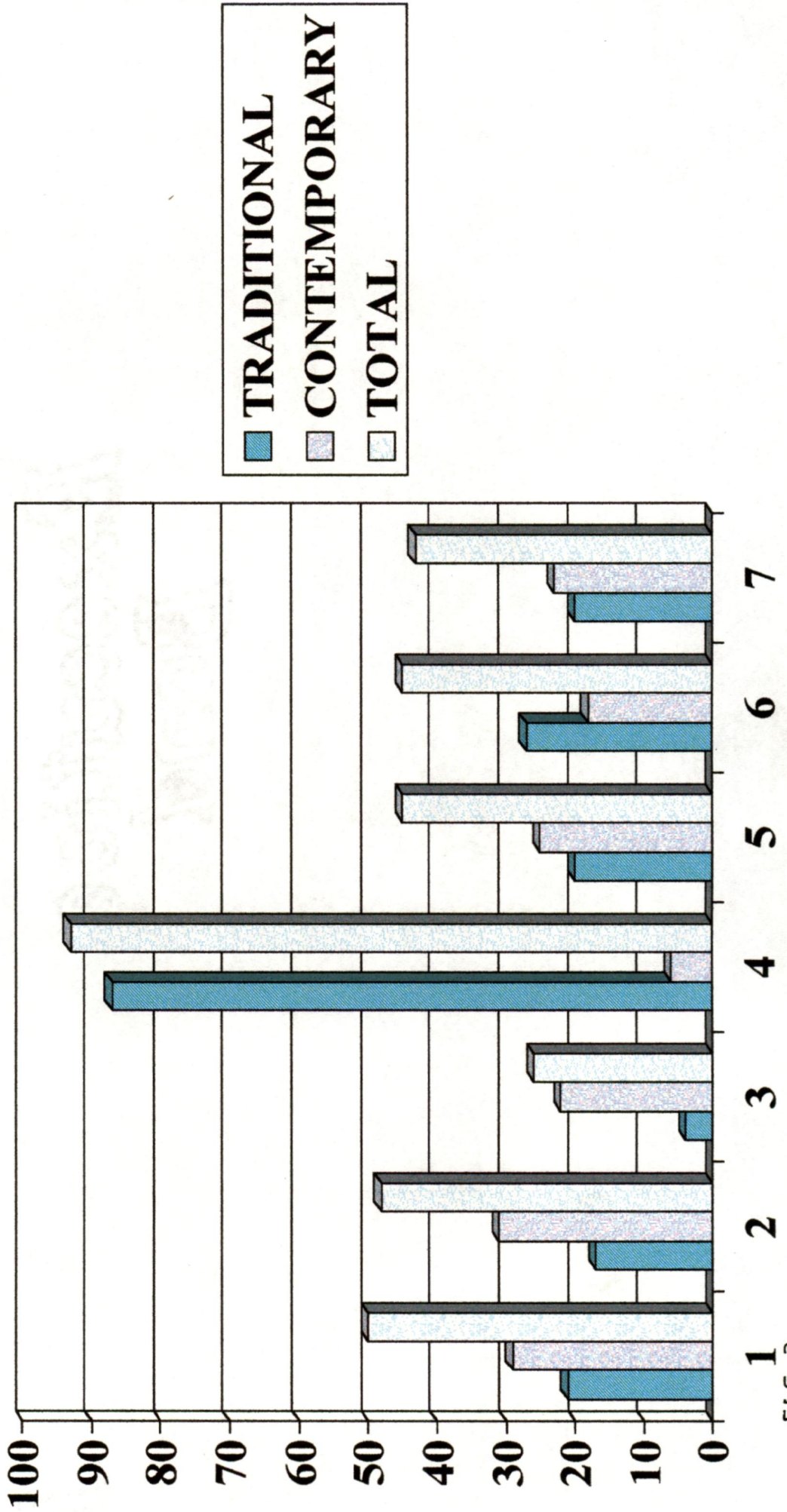
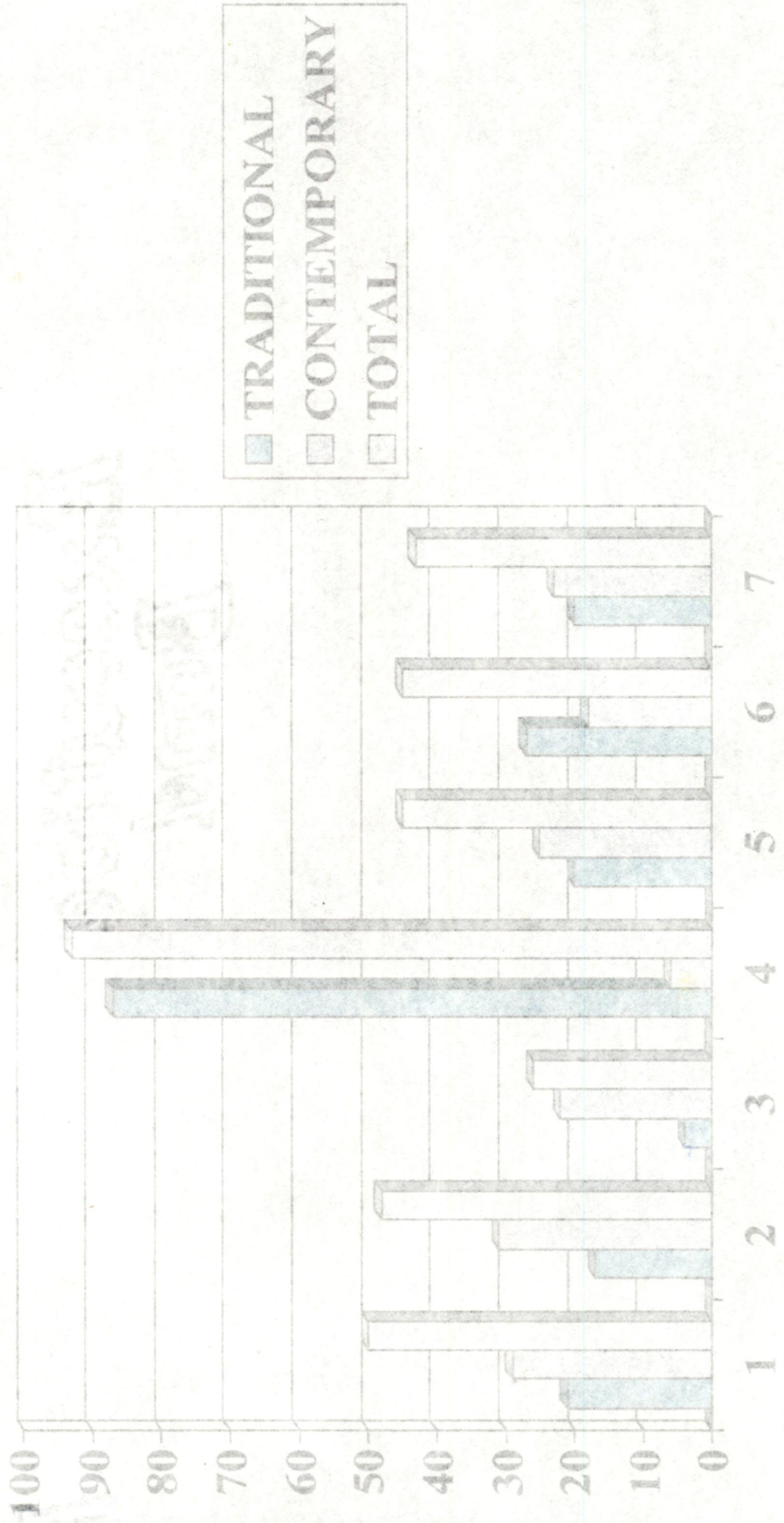


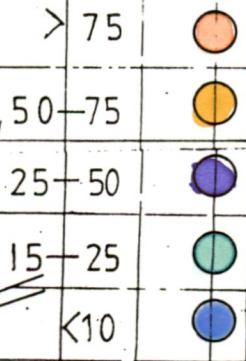
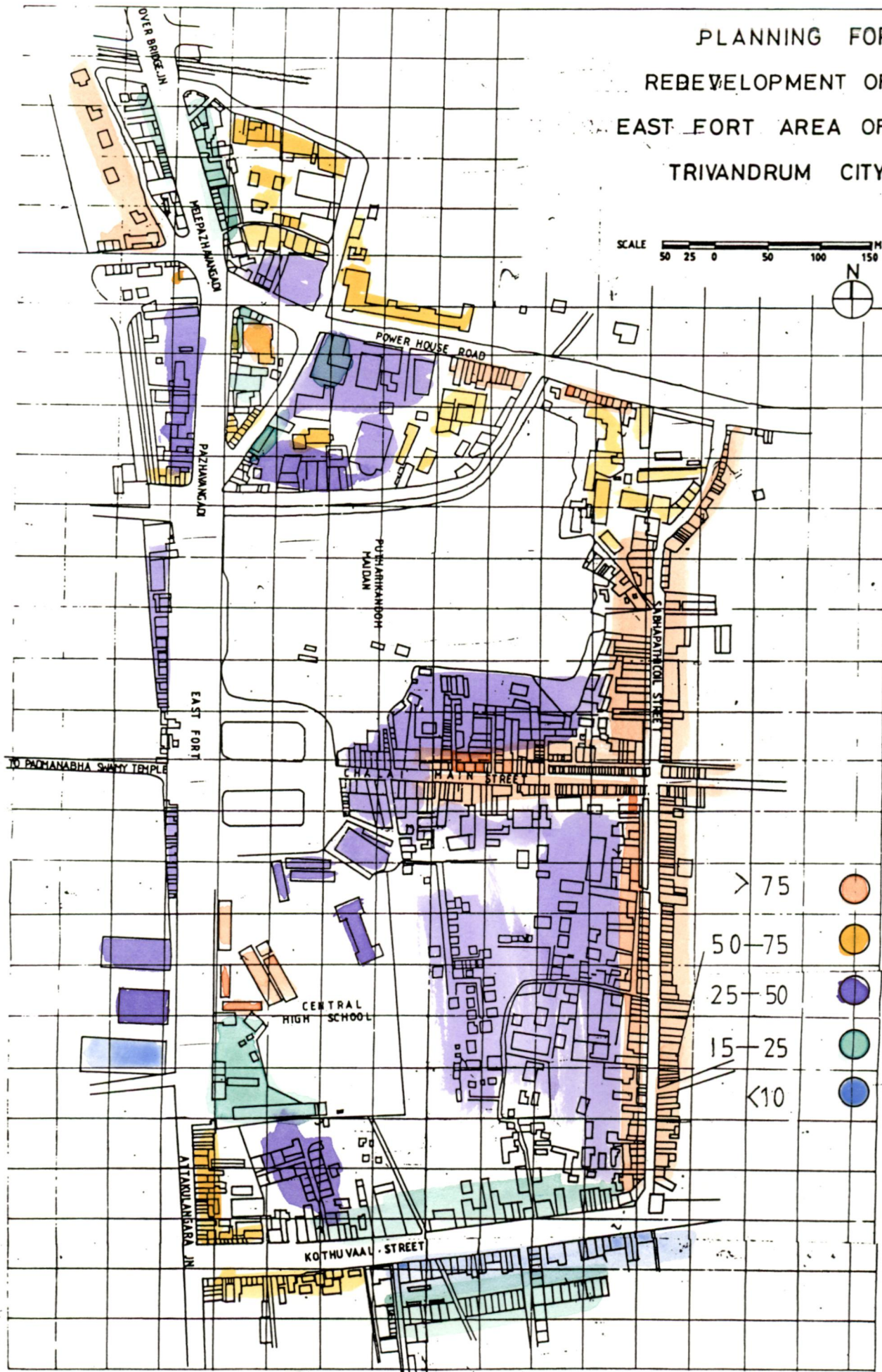
FIG 3

# BUILDINGS CHARACTERISTICS





# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY



MAP 19 AGE OF BUILDINGS  
69

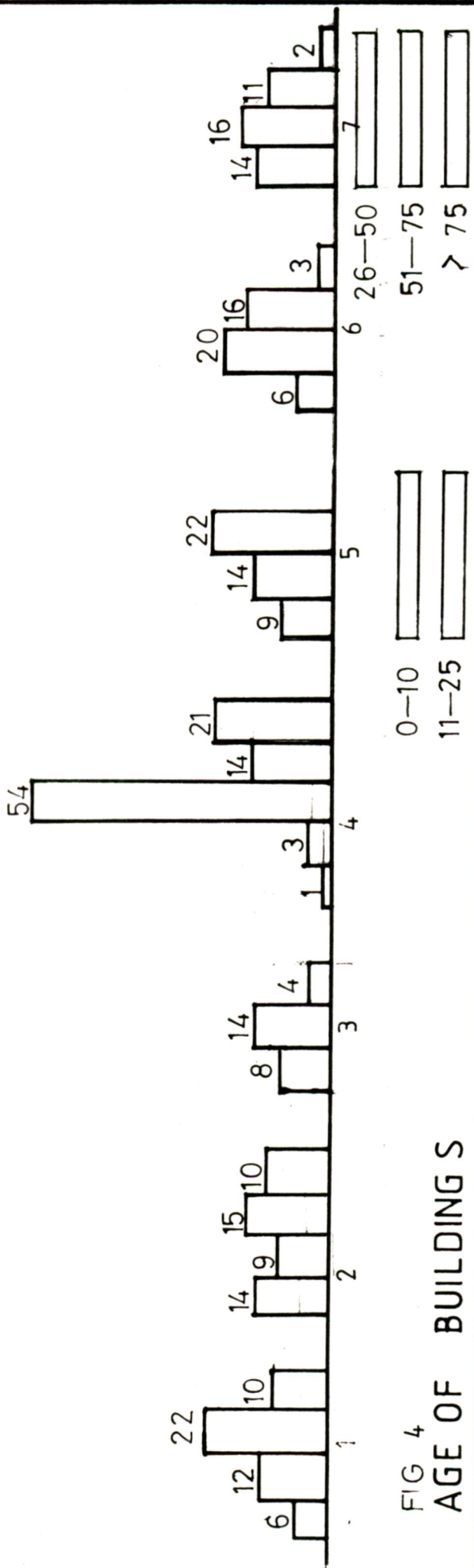
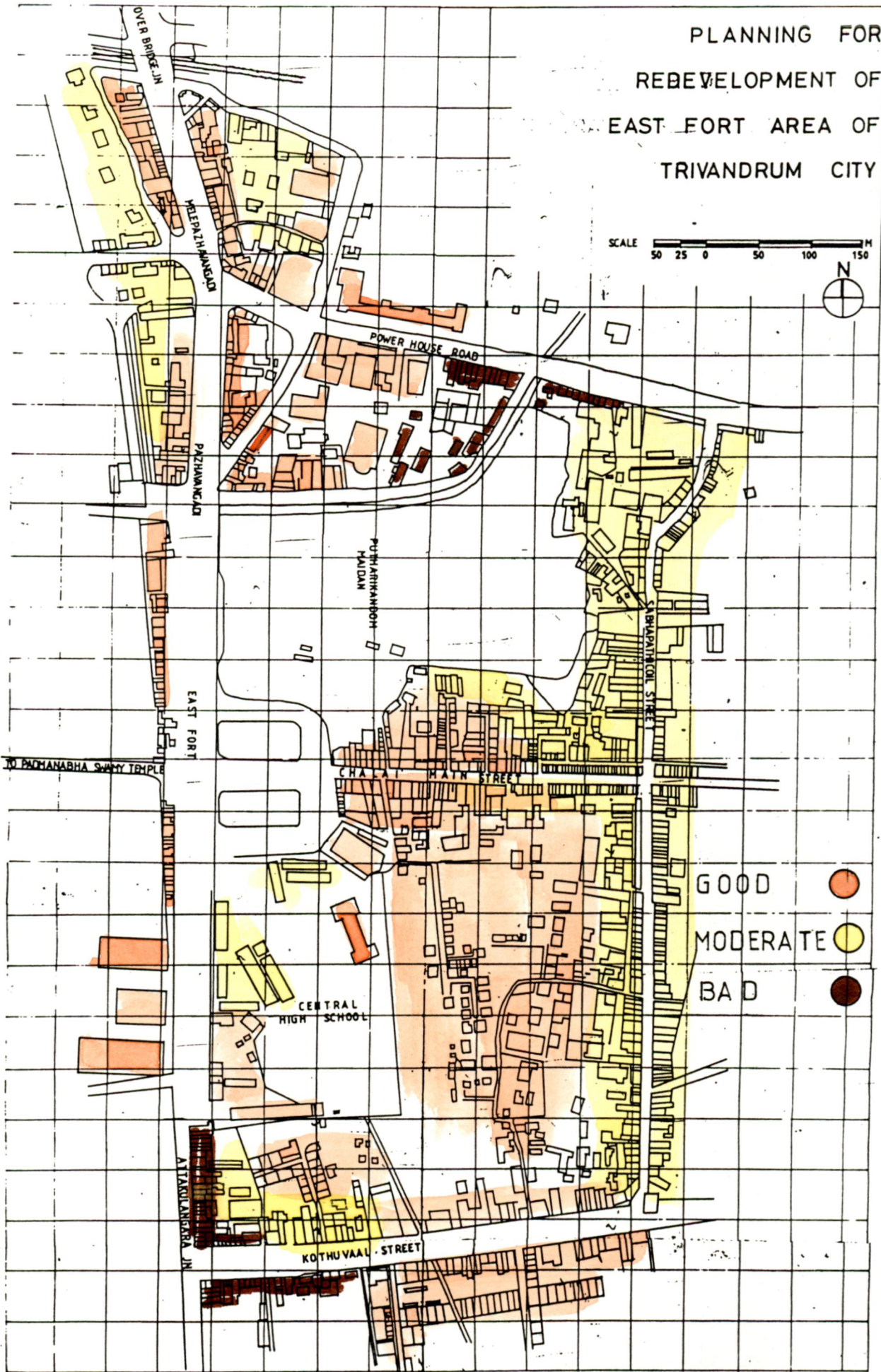


FIG 4  
AGE OF BUILDING S



PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY



MAP 20 CONDITION OF BUILDINGS



# CONDITION OF BUILDINGS

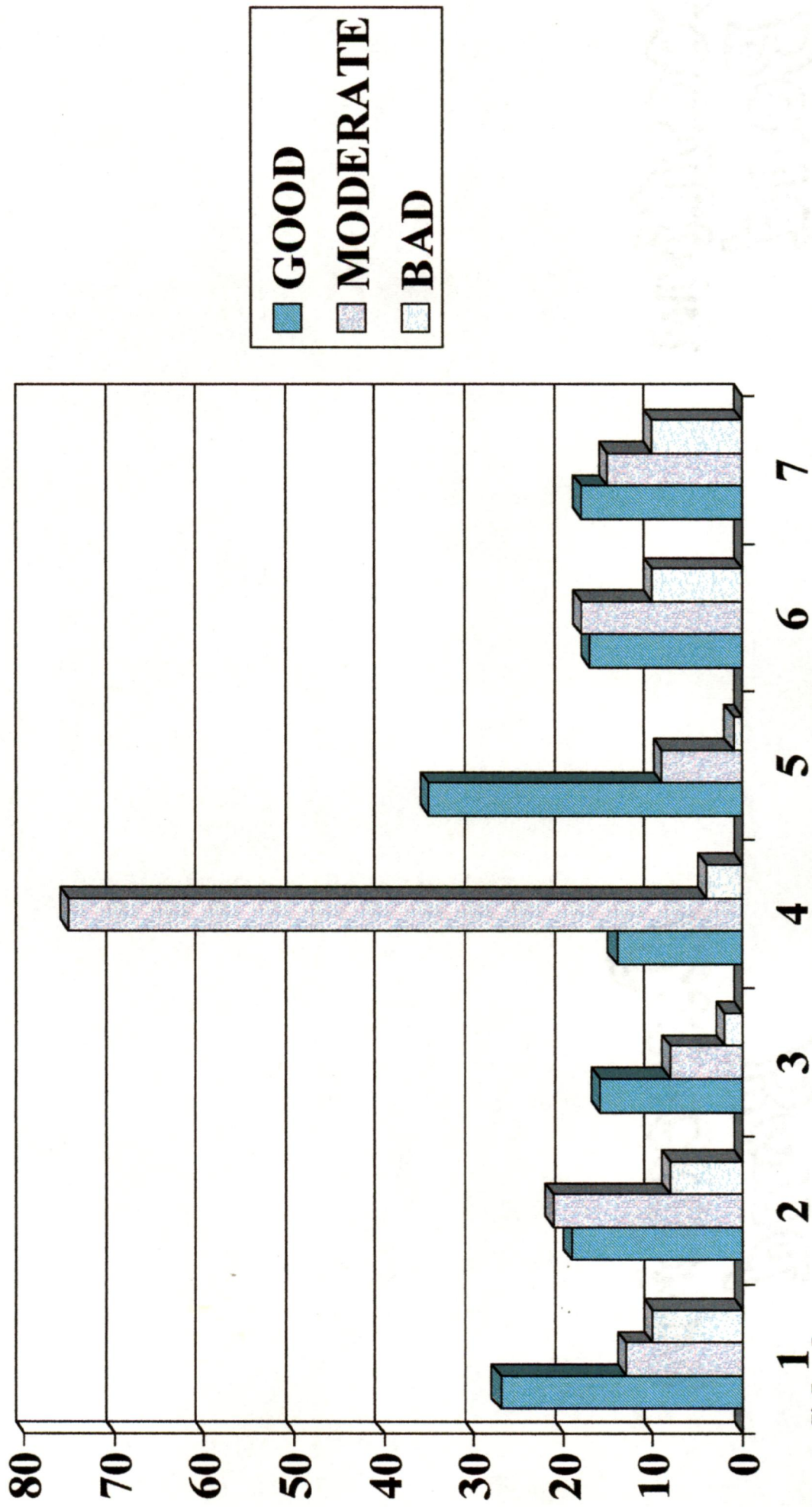
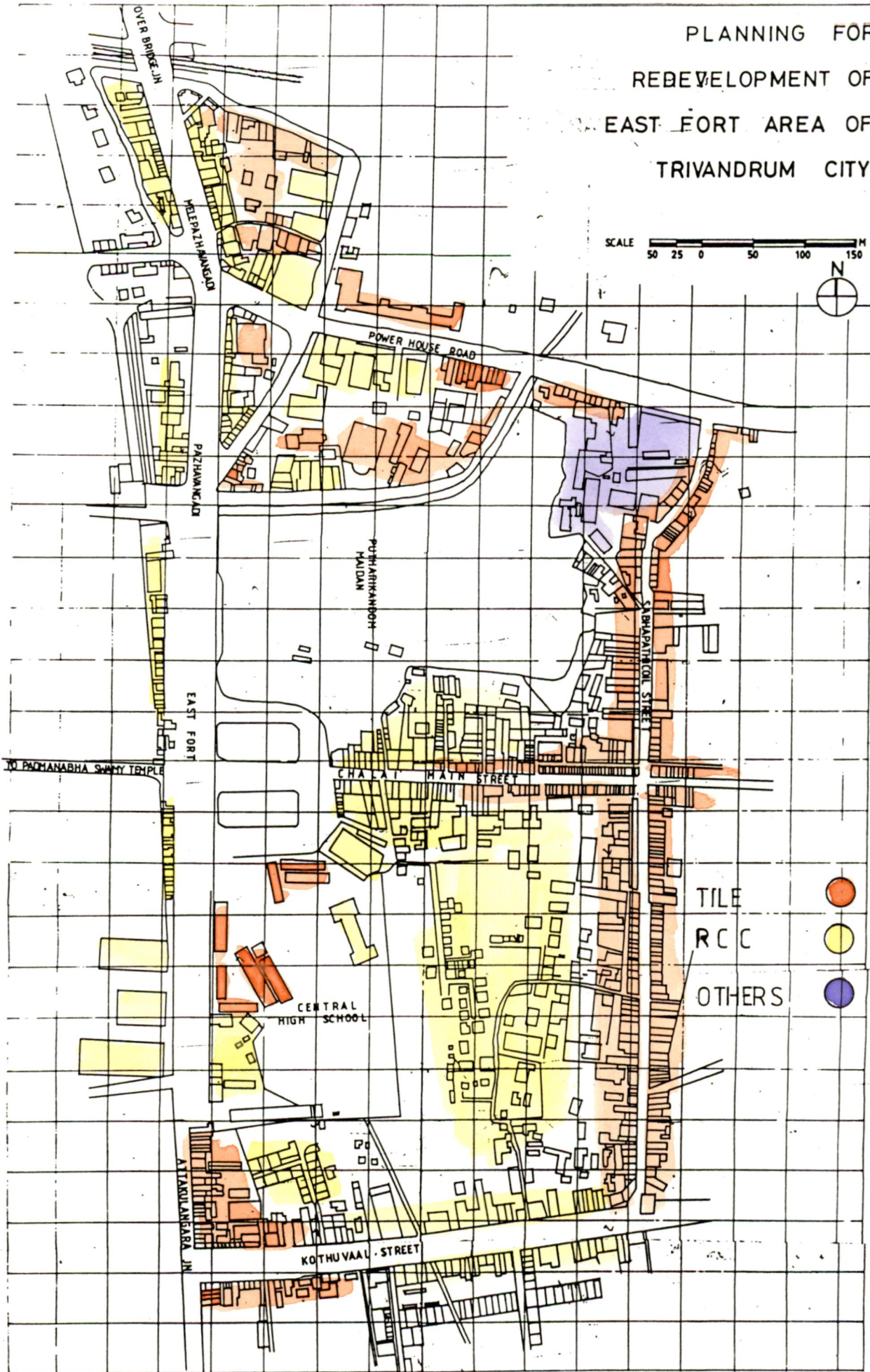


FIG 5

PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY

SCALE 50 25 0 50 100 150 M



- TILE
- RCC
- OTHERS

MAP 21 ROOF FORM OF BUILDINGS



# ROOF FORM OF BUILDINGS

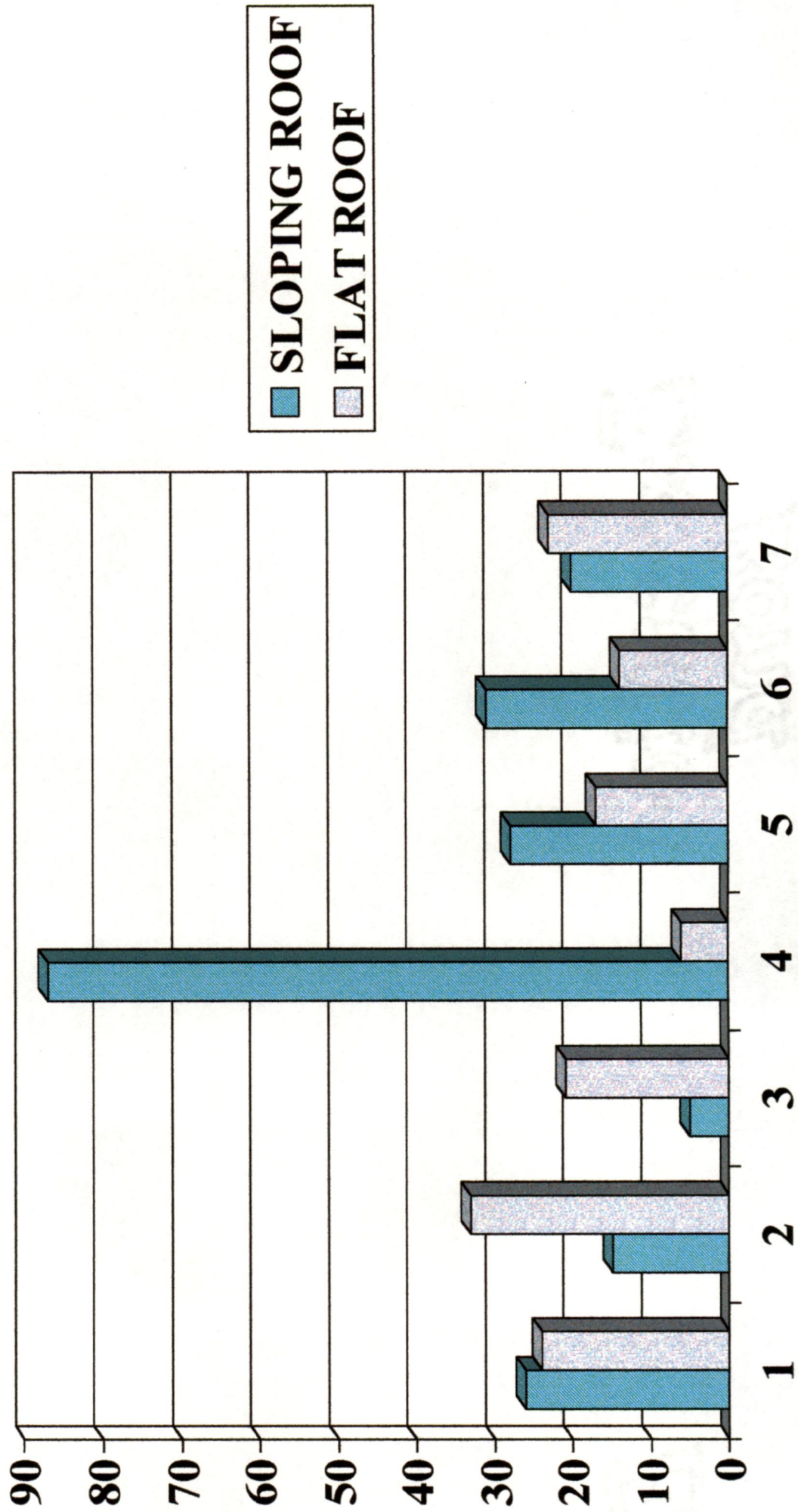


FIG 6

# ROOF FORM OF BUILDINGS

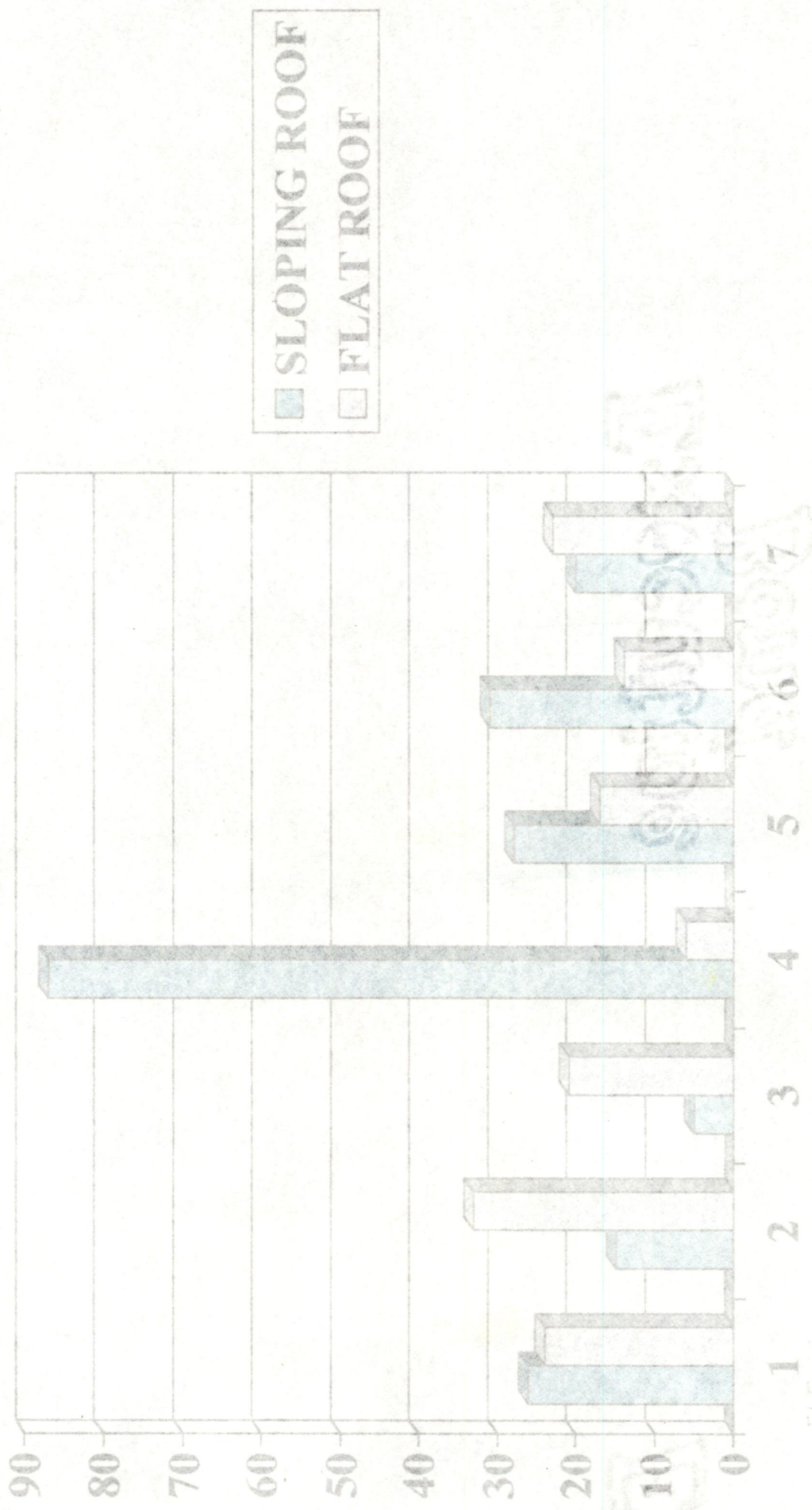
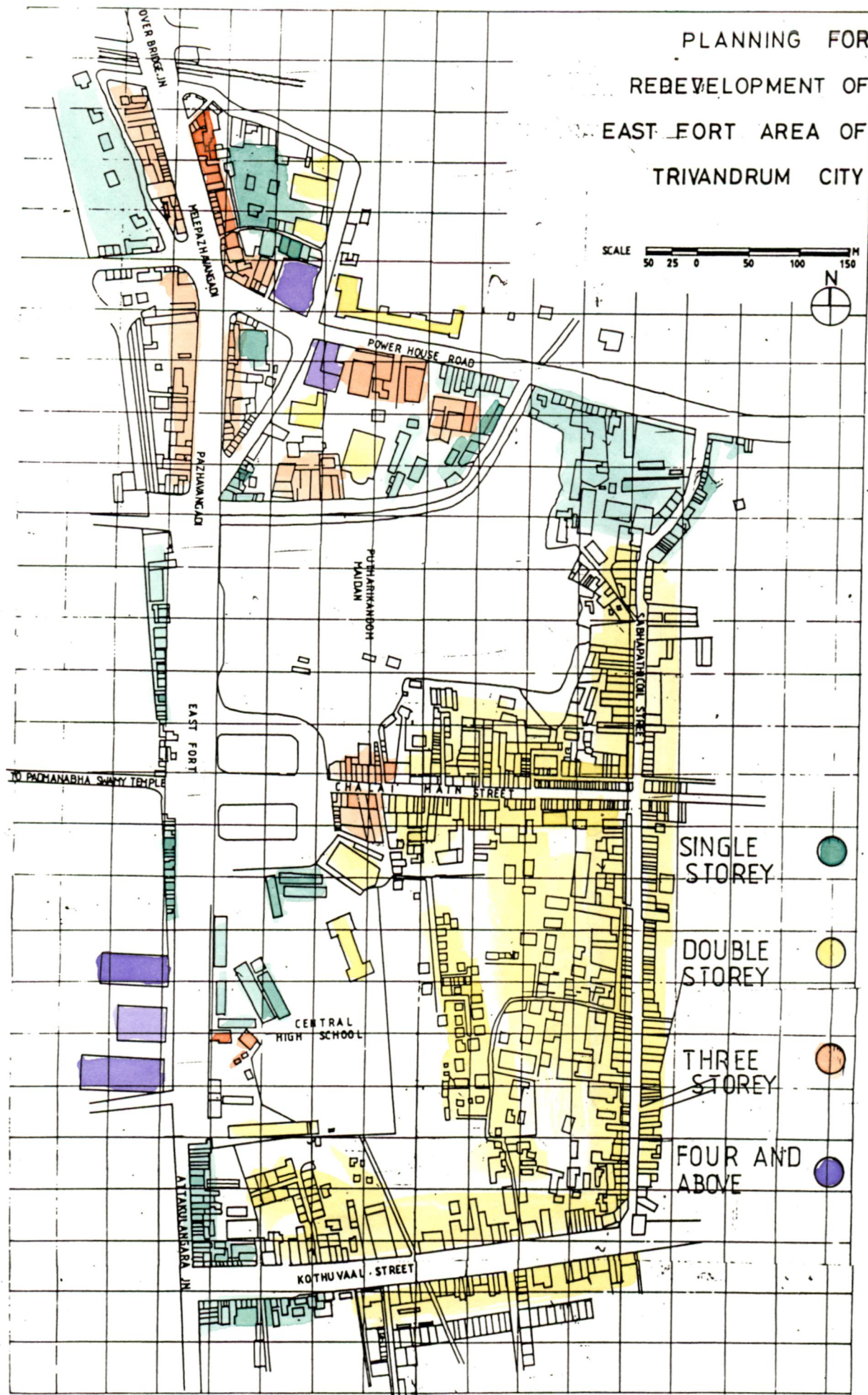


FIG. 6



PLANNING FOR  
REBEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY

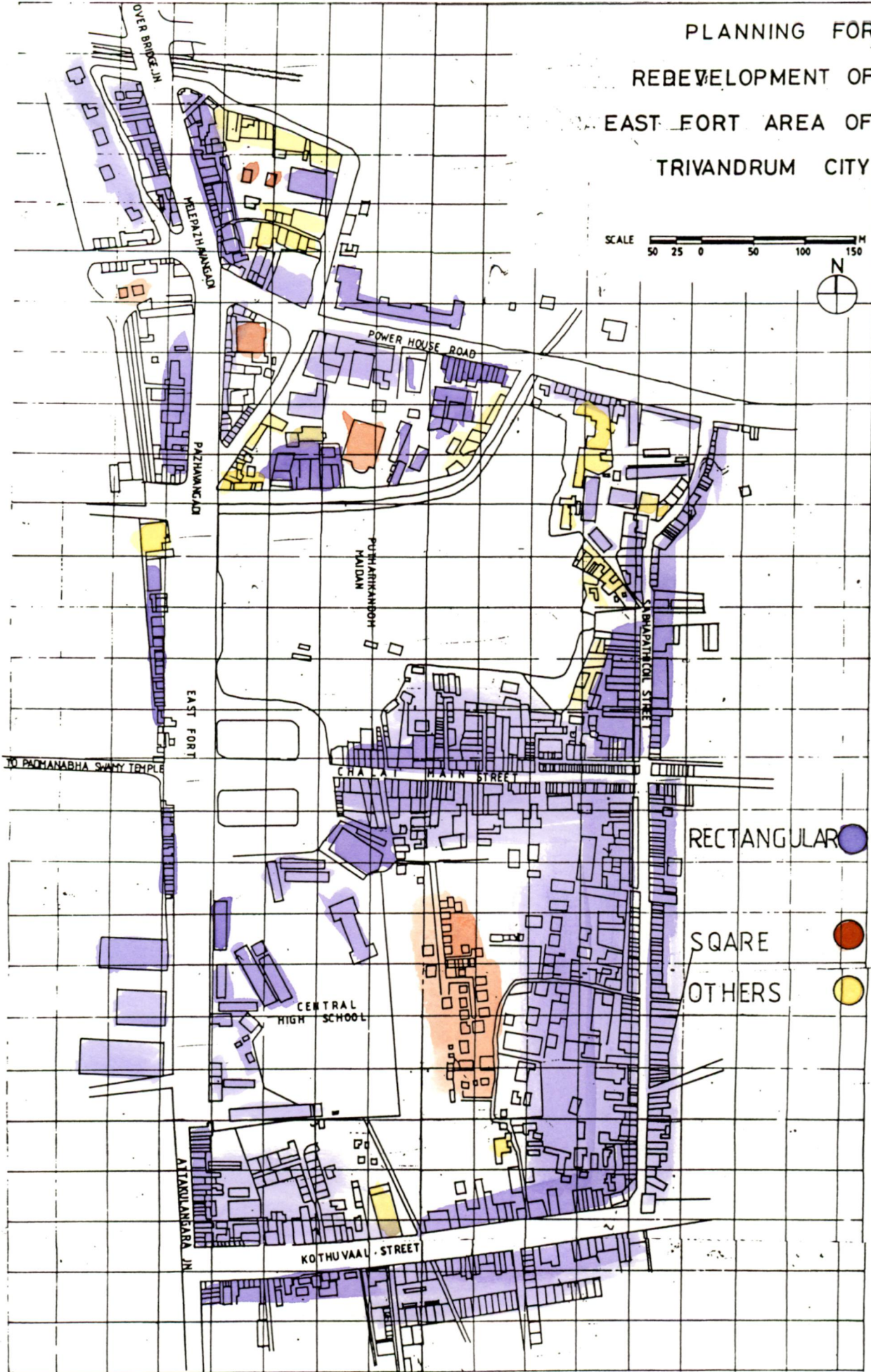
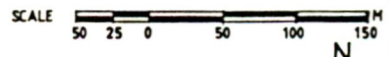


- SINGLE STOREY 
- DOUBLE STOREY 
- THREE STOREY 
- FOUR AND ABOVE 

MAP 22 HEIGHT OF STRUCTURES  
75



# PLANNING FOR REDEVELOPMENT OF EAST FORT AREA OF TRIVANDRUM CITY



- RECTANGULAR ■
- SQUARE ■
- OTHERS ■

MAP 23 PLAN FORM OF BUILDING

# PLAN FORM OF BUILDINGS

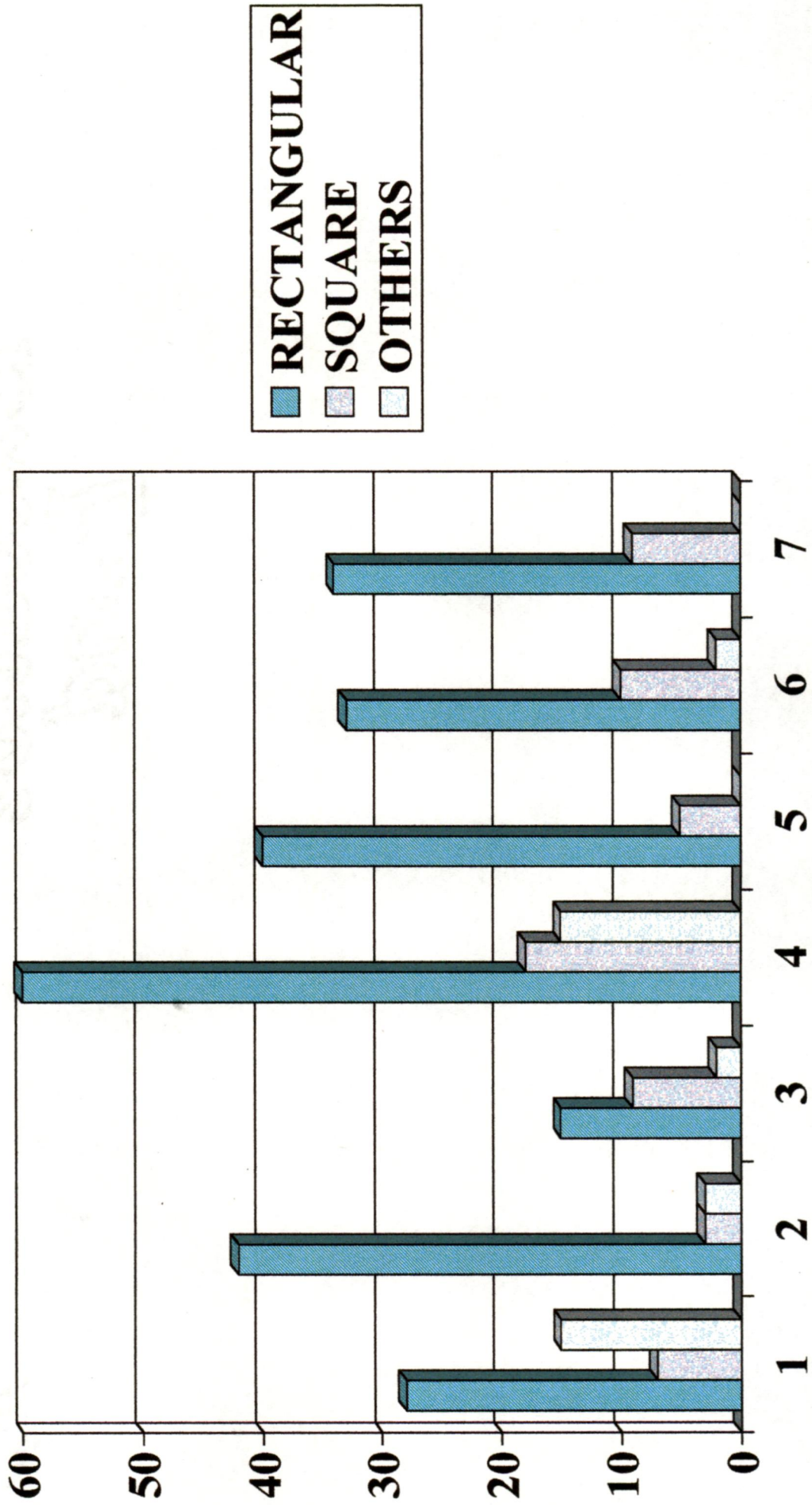
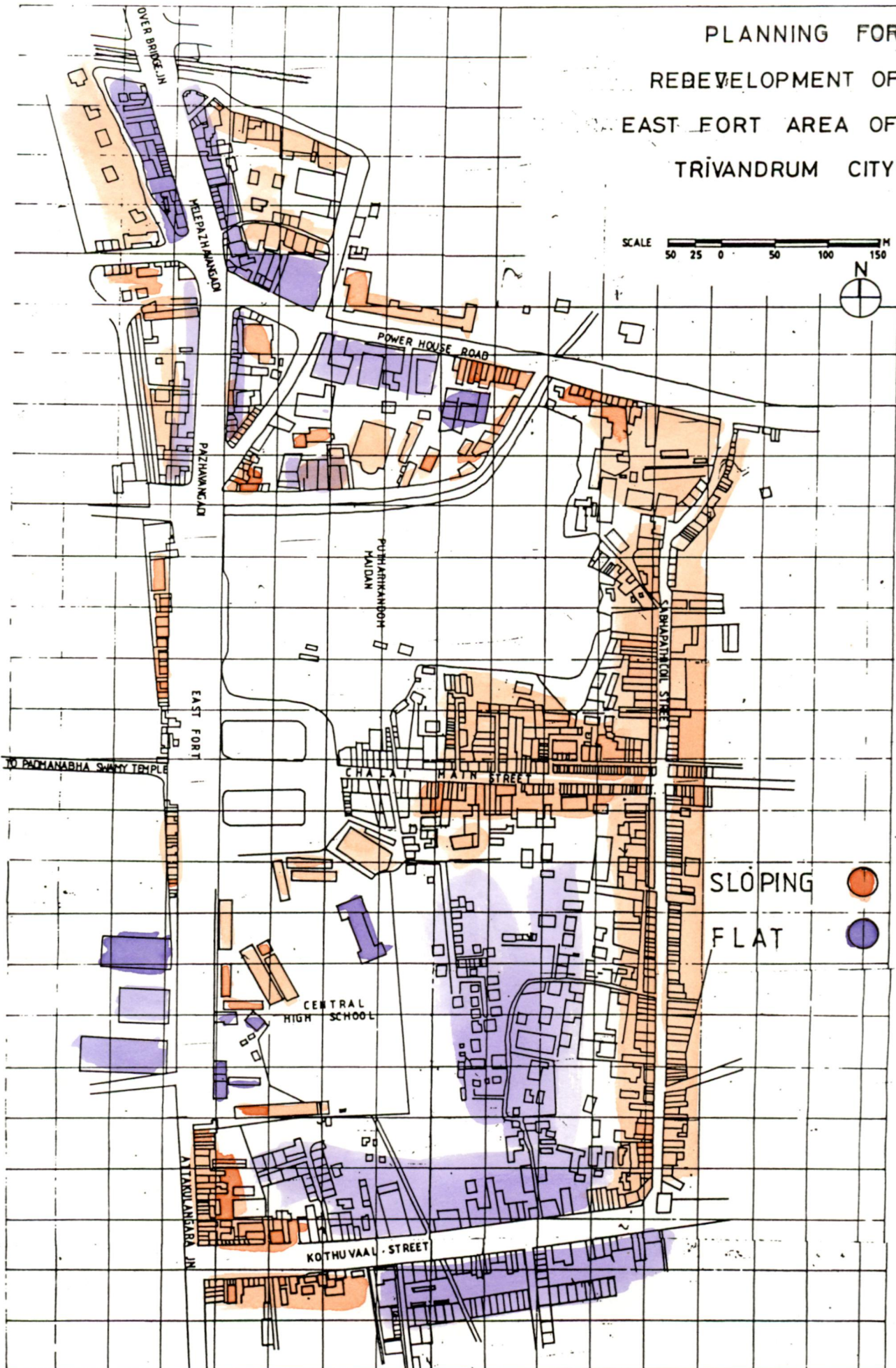


FIG 7



PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY

SCALE 50 25 0 50 100 150 M



SLOPING ○  
FLAT ○

MAP 24 ROOF FORM OF BUILDINGS



# ROOF MATERIAL

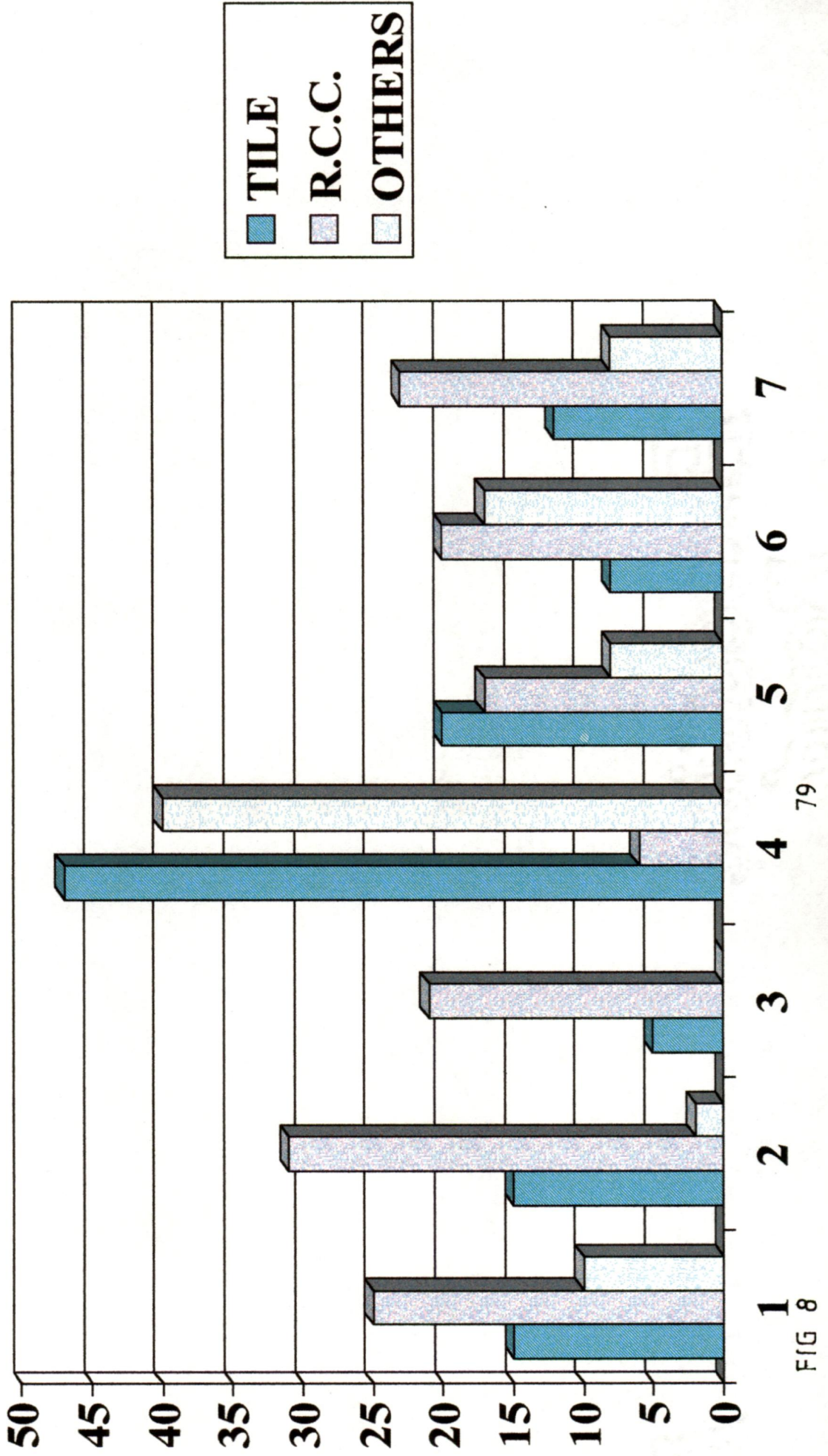


FIG 8

# SOLID VOID

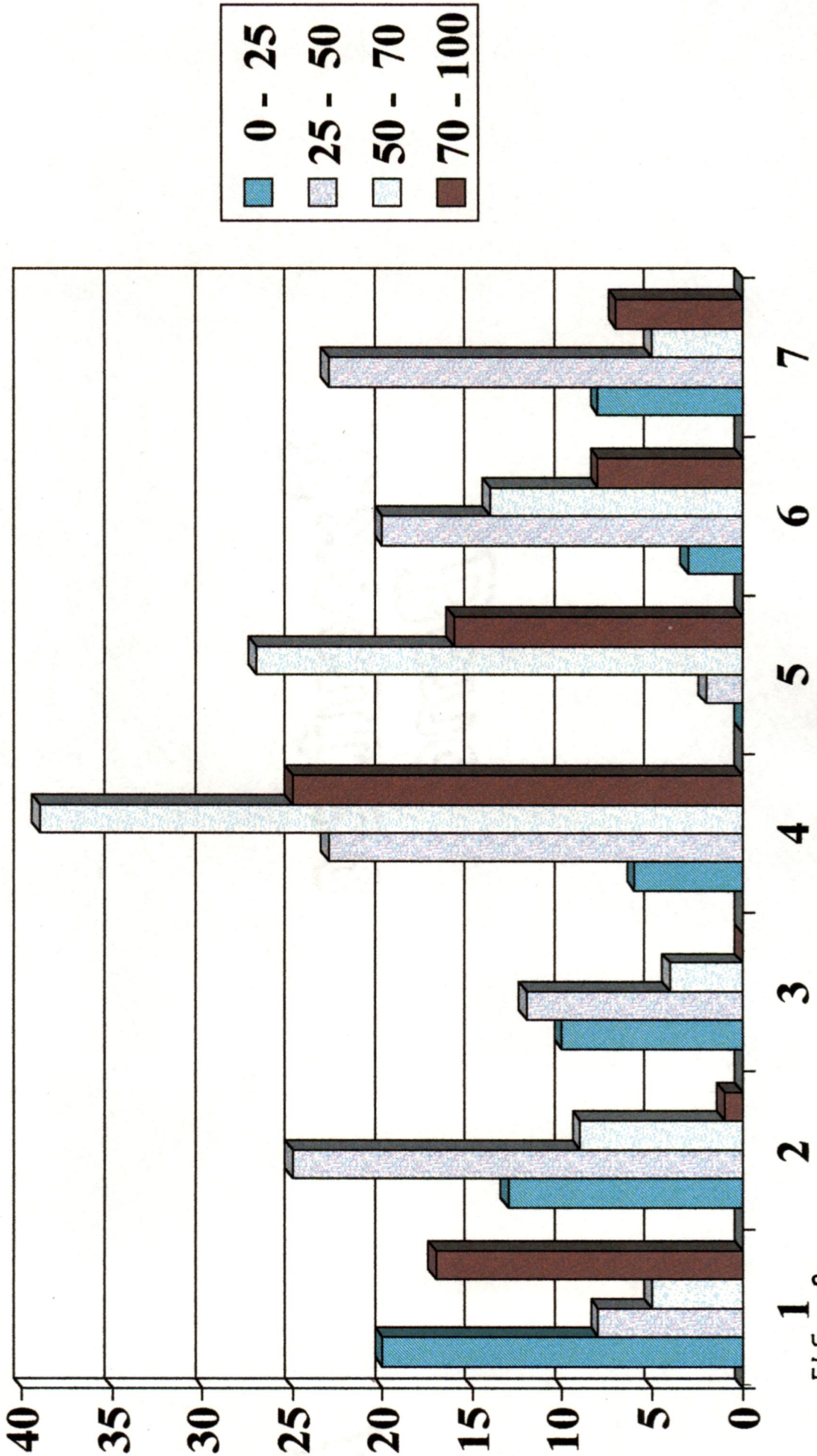


FIG 1 9



# TEXTURE OF THE BUILDINGS

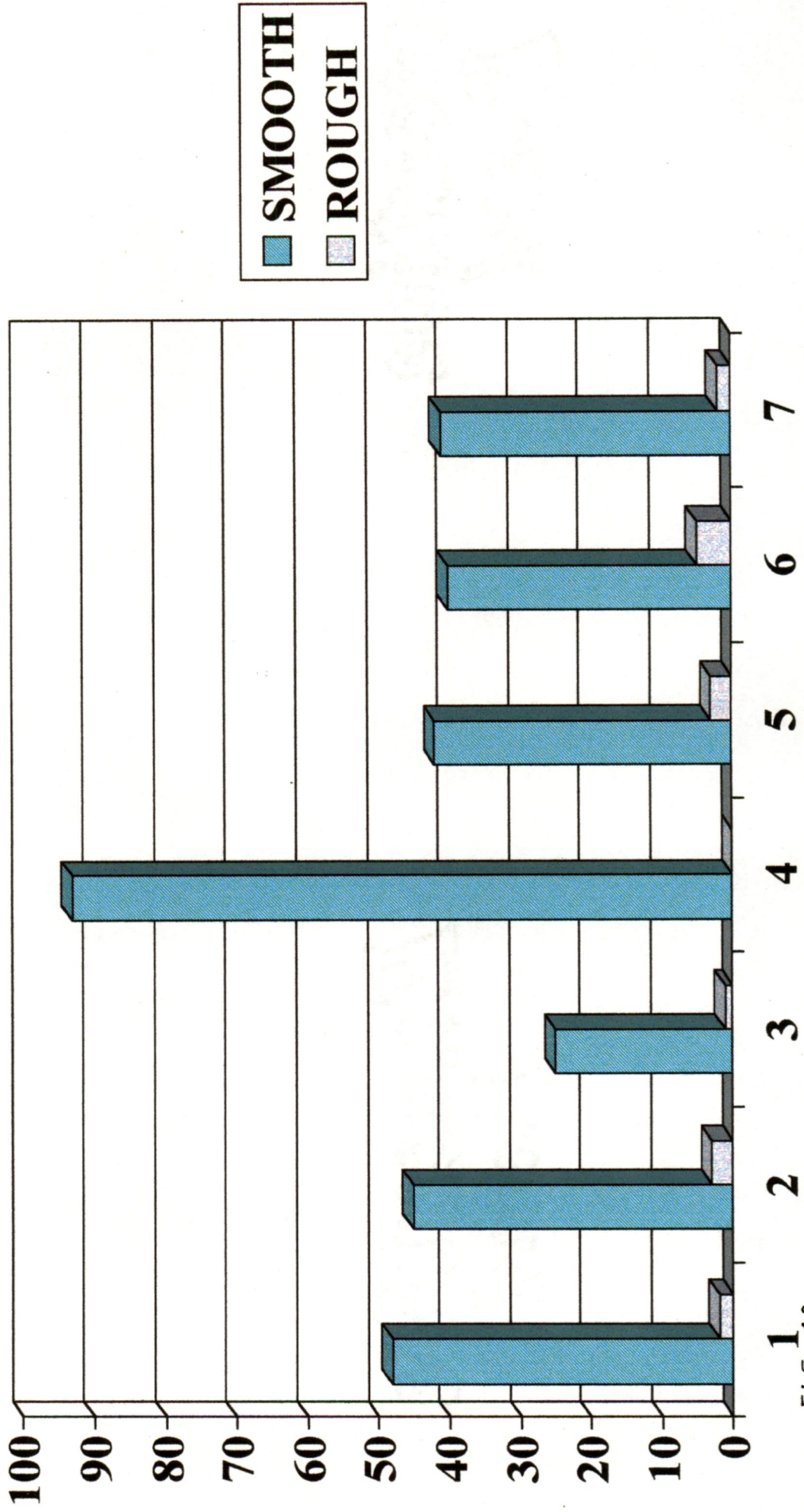


FIG 10

# COLOUR OF BUILDINGS

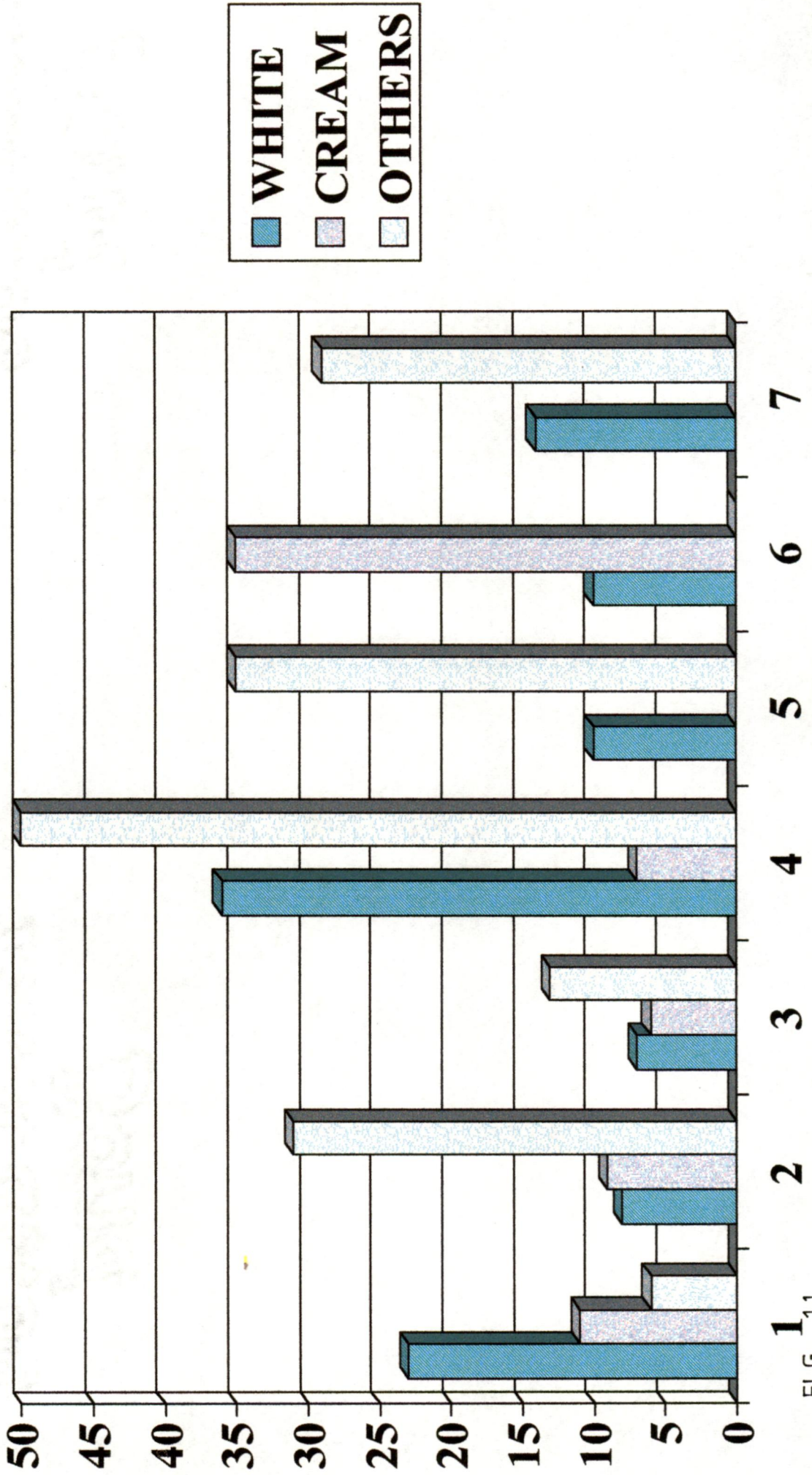


FIG 1<sub>11</sub>



storied and the rest of them are of multi storied. The tallest building in the study area lies in this stretch. More than 31 percent of the building are having solid void ratio less than 25, 50 percent in between 25 and 50, 17 percent are in between 50 and 75 and the remaining more than 90. The amount of rectangular plan forms in this stretch are accounted as 63 percent and square plan forms buildings as 16 percent. Nearly 27 percent the buildings are having sloping roof, 73 percent are having flat roof. As regard to roof material 73 percent covered by R.C.C. and the rest of them by tiles. Majority of the building in the stretch have smooth texture and painted with light colours.

### **3.1.3.3 Pazhavangadi to East Fort**

This stretch may be considered as the oldest one in the entire study area which was developed as the first commercial street in Trivandrum City. The total number of building in this stretch are about 138. Of which the traditional building covers more than 78 percent. About 80 percent of the buildings belong to the age group of 50 - 100 years. The percent of buildings accounted as good cover only 35 percent of the total building, about 60 percent belongs to moderate, and the are rest grouped as bad ones. The percent of single storied building is about 45 percent and the rest 54.3 percent are of double storied. It has been observed that there is only one three storied building available in this stretch. In comparison with the rest of the area, the solid void ratio is maximum and the buildings are packed compactly. It has been also observed that more than 73 percent of the building are of rectangular in plan forms, and 84 percent are having sloping roof, As regard to the roof material about 49 percent of the building are constructed by using tile roof, and about 35 percentage with G.I. Sheet roof and the rest are with R.C.C.. More than 95 percent of the building are having smooth texture and are painted with light colours.

### **3.1.3.4 East Fort to Attakulangara**

There is a sudden shift of traditional to modern buildings in this stretch. The percentage of new buildings which are replaced by the old one is much greater in number compared to the rest of the study area. Nearly 40 percent of the buildings were constructed within 15 years period. The modern buildings in this stretch which are coming up are having 3 and more floors. As in the rest of the study area 76 percent



of the buildings having rectangular plans. The share of smooth surfaced building accounted nearly 92 percent of the total buildings, and about 70 percent of the building are painted with light colours.

### **3.1.4 Unbuilt Character**

The open spaces in the study area covers more than 75 percent of total area. They are as follows :

1. Puthari Kandom maidan and private open spaces.
2. Railway yard and the connected private open spaces
3. Gandhi park and Pattom Thanupillai park.
4. Central Schools open spaces.

These open spaces can be broadly classified into

- (a) Organized functional,
- (b) Organized non-functional
- (c) Unorganized functional and
- (d) Unused open spaces.

The Puthari Kandom maidan is the organized functional area used for public gatherings, fairs and exhibitions. The Gandhi park and the Pattom Thanupillai parks are do not function properly irrespective of the location. The tarred area between these two parks function as a space for political and public gatherings, act as unorganized functional area. The rear end of the Puthari Kandom maidan do not properly used, forms a dead space and acts as pocket for all anti social activities and this may be graded as unused open spaces. The location of the open spaces and recreational centre are shown in map 25.

### **3.1.5. Activities**

#### **3.1.5.1 Religious Activity**

There are two religious activity generators in the study area - Padmanabha Swami Temple and Pazhavangadi Temple. These two temples form an integral part of the study area and its importance increase, day by day and lead congestion at peak hours.

### **3.1.5.2 Recreational Activity**

There are six theatre in the study area and are listed as under:

1. Kripa theatre
2. Ajantha theatre
3. Central theatre
4. Sree Padmanabha theatre
5. Sree Bala theatre
6. Parthas theatre

These theatres are functioning as main source of recreational centres but non of these theatres have adequate parking facilities and are abutting to the streets. The fairs at Putharikandom maidan during festivals adds more recreational activity in this area. The two parks do not serve the actual purpose, having no maintenance, and are located at the busiest points.

### **3.1.5.3 Educational Activity**

The traffic generators in the study area are the Fort High School, S.M.V. School and the Central School, Of this, two of them are located just out side of the study area, and their influence are felt only on peak hours, which is recorded as 9-10 A.M. and 3.30 - 5.00 P.M.

### **3.1.5.4 Transportation Activity**

The location of the Intra City Bus Terminal in the study area and the concentration of commercial activities make transportation, the most dominant activity. Lack of pedestrian paths, uncontrolled traffic flow, mixing of heavy vehicles with Light Motor Vehicle, etc, produce maximum pedestrian - vehicular conflict.

### **3.1.5.5 Commercial Activity**

The whole sale market is concentrated on the Sabhpathi Coil street and the retail shops are spreaded all over the study area, which include window shopping, floating shopping and specific shopping.

#### **3.1.5.6 Tourist Activity**

The prominent tourist activity in the study area are mainly generated by Sree Padmanabha Swamy Temple, Chalai market and the transit point to Kovalam Beach.

#### **3.1.5.7 Political Activity**

Political rallies, political demonstrations, meetings etc. are the usual phenomenon in the mouth of the two parks, which cause noise pollution, congestion, traffic blocks, etc.

#### **3.1.5.8 Seasonal Activity**

During Onam, - the festival of Kerala larger number of hawkers occupy the streets, and roads etc produces traffic congestion and arrest the free pedestrian flow. At the time of Attukal pongala - festival of the Temple which located just out side the study area, the entire roads of the study area and the open spaces used to become filled with ladies comes from all over South India. During Sabarimala pilgrimage, the area around the Sree Padmanabha Swamy temple is found to be overflowing with pilgrims, mostly from South India.

#### **3.1.5.9 Cultural Activity**

The cultural centres are located in the periphery of the study area and their effects are reflected in the study area.

### **3.1.6 Infrastructure**

The infrastructure can be broadly classified into physical infrastructure, and social infrastructure.

Physical infrastructure include water, power, sewerage, drainage, and solid waste disposal.

#### **3.1.6.1 Water**

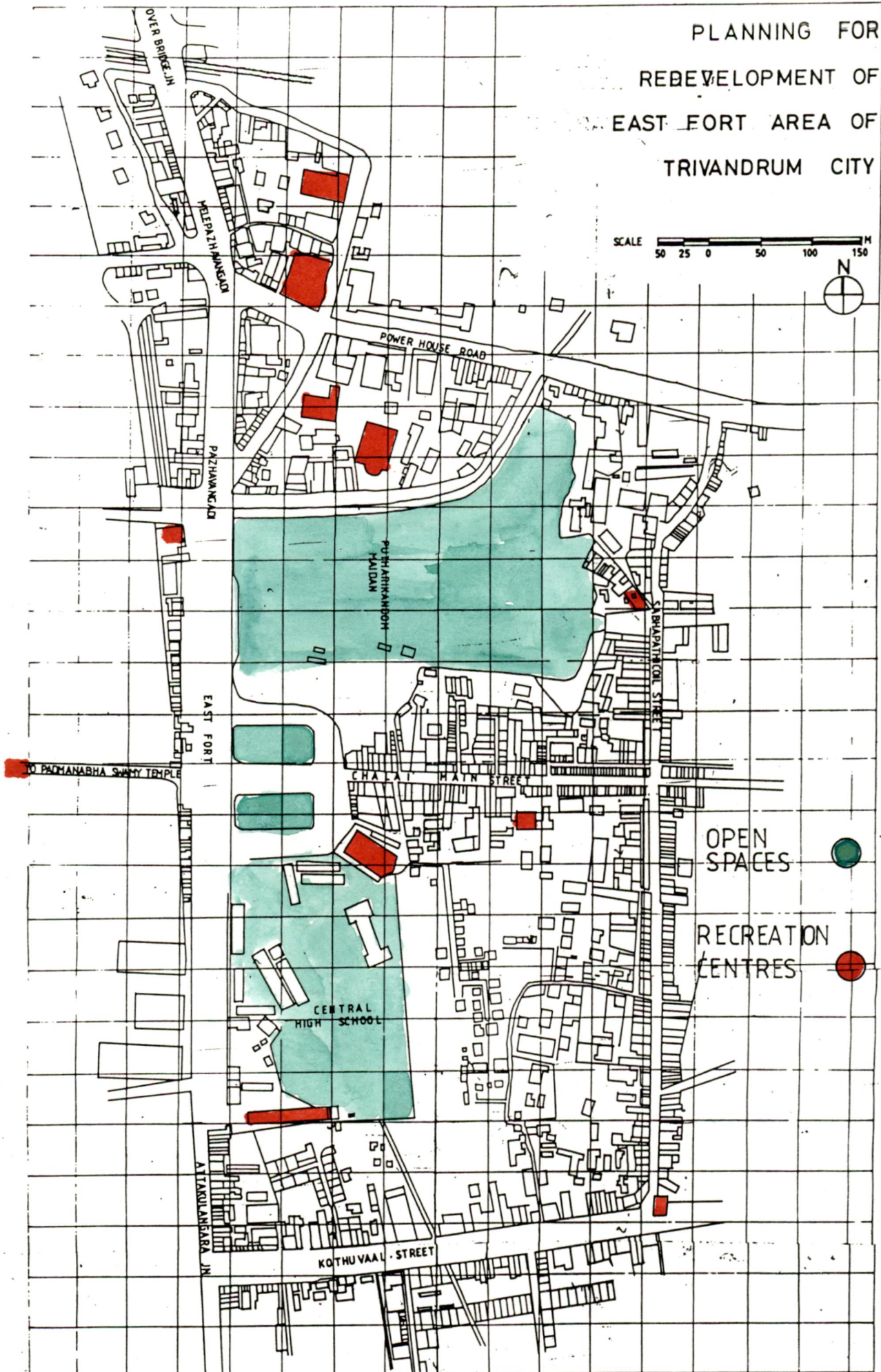
Kerala water Authority is supplying the water is in the study area. The available supply is only at lower pressure.

#### **3.1.6.2 Power**

Power supply is severely affecting the day to day working of the study area. Load shedding is a common phenomenon during the monsoon as well; eventhough major portion of the power is produced from the hydel powers. The capacity of the existing



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MAP 25 OPEN SPACES AND RECREATIONAL CENTRES

transmission lines are very less to cope up with the demand. The production of power is not adequate with the growing demand.

### **3.1.6.3 Sewerage**

At present the sewerage system in th study area is working satisfactorly.

### **3.1.6.4 Drainage**

Drainage is one of the major problem faced in the study area because the major portion of it lies in the low laying area of the city. The existing drainage lane have only limited capacity to old the drain water and storm water.

### **3.1.6.5 Solid waste disposal**

The major portion of the solid waste produced in the city is from the study area itself because of the location of the whole sale market. In addition to this a lot of non combustable. Solid waste are producing day by day by the construction and related activities.

### **3.1.6.6 Social Infrastructure**

Social infrastructure such as, Education, Health, Recreation, open spesces and communication etc are adequate for the growing demand of the study area.

### **3.1.7 Environment**

Flooding, solid waste pollution, air pollution, etc, noise pollution etc are affecting the overall environment of the study area. Flooding is an important factor which affect the overall functioning of the system because most part of the study area lies in the low laying area of the city.

## **3.2 Findings**

The cultural, historical and architectural values of the city is degrading day by day due to the sudden influx of population, high growth rate of motor vehicle, concentration of commercial activities and change in land use, and above all sky rocketing of land value.

### **3.2.1 Land Uses**

The major land uses in the study area are quite indifferent from other part of the city and the following activities such as retails shopping, whole sale market, recreational, religious, transportation, education and residential are prevelant. The land use the land use

under residential activity is very less compare to the rest of the activities. Commercial building are located on either side of the main street, while the residences are located at the interiors. Considerable quantity of vacant land is available at the interiors with out having much accessibility. If the interior spaces are open up, and the precious land is used for better economic activities, and thereby, the pressure on the edges of the roads can be reduced. The percentage of land under private ownership's accounted about 52 percentage and the government sector is about 32 percentage. The Semi-public and the remaining areas covered by water bodies, roads and parking lots.

The land value of the study area varies from 50,000 to 5 lacks, percent depending upon the accessibility to the plot, commercial potentiality and its location. More than 75 percent of the buildings having F.A.R. from 0.1 to 0.5, 5 percentage of the buildings having 0.5 to 1 percentage and the remaining ranging between 1 and 2. This clearly indicates that the posh commercial area is not utilised properly according to the market values and its potential. During Onam the so called Puthari Kadam Madan is used for exhibitions which attract huge gatherings. The two parks available with in the locacity are mainly used by the political parties for public addresses, and demonstration because the area attract large number of commuting population. Since they are located in the central place and adjacent to the bus stand.

### **3.2.2 Transportation**

The major traffic problem observed during the analysis are as follows.

1. The carriage way width and the road width are very less compared to the traffic flow and pedestrian movement.
2. The geometric and alignment of the roads are very poor
3. Pedestrian path is absent in most part of the streets
4. Pedestrian crossing are not fully developed and having no protection and signages.
5. The available parking lots are insufficient
6. The chalai Bazaar street is found to be over flowing with the pedestrian
7. Pedestrian vehicular conflict is visible in many of the junctions and streets.
8. Traffic signages are not adequate.



- 9 Existing Truck terminal create more problem in the congested whole sale market area of Sabapati Coil street.
- 10 The service poles on the carriage way reduce the road width and obstruct the pedestrian movement

**Table 11: Traffic Volume in P.C.U.**

| Sl.No. | Junction/Stretch | Volume in P.C.U. |         |         |
|--------|------------------|------------------|---------|---------|
|        |                  | Time             |         |         |
|        |                  | 16.30 Hr         | 17.30Hr | 18.30Hr |
| 1.     | Over bridge      | 3250             | 10800   | 6400    |
| 2.     | Thakara parambu  | 460              | 1775    | 800     |
| 3.     | Power House Road | 1600             | 2650    | 1600    |
| 4.     | Pazhavagadi      | 2860             | 7800    | 3415    |
| 5.     | East Fort        | 2430             | 4250    | 3860    |
| 6.     | Attakulangara    | 964              | 1508    | 1215    |
| 7.     | Manacaud         | 2132             | 4412    | 4084    |

Source: Primary Survey

### 3.2.3 Built character

It has been observed that most of the existing traditional low rise buildings are being transferred by high rise ones. The land value is increasing at sky rocketing rate. The traditional built character is loosing day by day. The buildings of the Sabapati coil street and Chalai main street bears some traditional character having no front set back and side yards. The entire stretch is occupied by the double storied buildings. Most of the buildings in the study area bears smooth texture and light colour finishes.

The growth rate of modern buildings in the study area is not prepositional to the rest of the city which shows the tendency of decay. Sloping roof features are predominant in this area.

### **3.2.4 Unbuilt Character**

The existing open spaces and parks are not maintained properly. They need more attention and reorganisation. The amount of vegetation is available in the study area less compared to the neighboring areas.

### **3.2.5 Activities**

Religious activity is increasing day by day due to the increasing population, and tourism activity. The retail commercial activities are also creating more stress on the study area in different angles. The presence of theaters stress the need for developing infrastructural and civic facilities. The presence of Intra city Bus Terminal, Truck Terminal, and the whole sale market make the transportation' as one of the major activities in the study area.

### **3.3.6 Infrastructure**

Education, health, and communication facilities are satisfactory to the growing needs of the study area. Water supply, electricity, sewerage, drainage and garbage disposal etc. needs immediate attention for providing better living environment of people in the study area. Since the area is much congeted, over crowded and a centre of major commercial and recreation. It is highly essential to have a fire station.

### **3.3.7 Environment**

All type of pollution, such as land pollution, water pollution, air pollution, noise pollution are prevelent in the system. Though environmental degradation is observed. The intensity of the pollution is much less compared to other metropoliton cities of Inida.

**CHAPTER - 4**  
**APPRAISAL OF CURRENT DEVELOPMENT PLAN**  
**OF TRIVANDRUM CITY**

The current development plan of Trivandrum city was made by the Trivandrum Development Authority in 1986 which envisages judicious use of land, protection of natural resources, supply of basic amenities to the inhabitants, and their maintenance, efficient transportation network system, coordinated development of industrial and commercial sector, protection of existing open spaces, green belts is paddy fields, and development of a new Maidan along the side of the new National Highway by pass apart from the existing Puthari Kandan Maidan.

Apart from the above major proposals it has been made to convert zoological zoo and its neighborhoods into a regional park. The available water bodies, such as Veli, Akkulam, Edayar Island and Shankumugham Beech area are recommended to develop as major tourist centres. The proposal of two ring roads to connect the important roads encircling around the city. Another proposal is the construction of an additional Bus Terminal at Ulloor in addition to the existing terminal at Thampanoor for arresting the inter district traffic. The expansion of the city Bus Terminal at Peroorkada, Vikas Bhavan and Pappanam code are the other major proposals for decentralizing the intra district traffic. The shifting of the existing East fort Bus Terminal to Ambalathara and the constructions of truck terminal at Kuriyathi and Sree Varaham.

The master plan aims at widening of many of the existing roads to accommodate the future traffic volume. Trivandrum Development Authority is the nodal agency which control the development and construction activities, and implementing schemes according to the guide lines of the master plan. The major projects which are being handled by the TRIDA are (1) Palyam area development schemes and (2) Development of two ring roads.- the outer ring road which connects the National Highway at Ulloor, and passes through Paruthippara, Ambalammukku, Peroorkada,



VattiyoorKavu, KundamanKadavu, Thirumala, Pappanamcode, and ending at Tiruvallam. The inner ring road connect the new National Highway by pass, Poonthi road, KumaraPuram, Pottakuzhi, Pattom, Kuruvn Konam, Kawdiar, Vazhuthakaude, Thycaud, Attakulangara and ending at the new by pass which touches the southern boundary of the study area.

Each of the area in core area have different prescribed floor area ratios (F.A.R's) and the details are presented in Table

**Table 12: Development Controls**

| Area      | F.A.R. | Coverge | Setback | Parking                                    |
|-----------|--------|---------|---------|--|
| Palayam   | 2.0    | 40%     | 3m      | Min. 18 sq.m. for 100 sq.m. of carpet area |
| M.G. Road | 2.5    | -do-    | -do-    | -do-                                       |
| Chalai    | 2.0    | -do-    | -do-    | -do-                                       |
| Fort      | 2.0    | -do-    | -do-    | -do-                                       |

Source: Town Planning Department, Trivandrum

### LIMITATIONS

The schemes envisaged by the Master plan of 1966 are not yet completed due to the following reasons:

1. There were no proper Agency to implement and monitor the development activities in those days, and hence the Trivandrum Development Authority wan setup in 1984, which controls and monitor the development activities in the Trivandrum corporation and the near by 15 panchayat covering area of 278.17 square kilometers.

2. All the development activities needs land, which is so a scarce in Trivandrum city. A major portion of which owned by the Private Sector. The value of land in the open market is much more higher than that of the value decided by the Government for the acquisition. As a result the process of land acquisition got lagged for several years and most of the cases are still pending in Civil Courts.

3. Finance is another major parameter for the development activities. The fund allocated for development activities were very less at the initial stage of the prepositional and increases in the subsequent years and the time of implementation lead to financial crunch to local bodies, and hence they could not cop up with their schemes.

4. It has not been evaluated periodically according to the growing needs of the inhabitant of the city.

## CHAPTER 5

### POLICY GUIDE LINES AND PREPARATION OF REDEVELOPMENT PALN

#### 5.1 REDEVELOPMENT CONCEPT

The integration of existing urban fabric with the growing needs by the way of better utilisation of the resources available, which would be technically feasible, economically viable and socially acceptable. Conservation of valuable historic built areas, streets, interventions at needy areas for reducing the stress of the people, creation of visual axis and visual index for facade treatments of the built structures. Controlling height and bulk of the buildings in terms of streets width and its location imposing F:A.R, and coverage for specific areas. Decentralization of certain activities those create more problems and are not directly link with the other activities, such as, whole sale market, intra city bus terminal, etc. Economic utilization of interior vacant land, and there by reducing the pressure of the activities in the main streets. Restricting the movements of heavy vehicles in peak hours in certain busiest streets and provision of adequate parking facilities for vehicles at appropriate location would reduce the congestion and traffic jams. Widening and developing new streets at possible areas with out affecting the existing infrastructure facilities for judicious use of the scarce resourse like land . Development of existing open spaces for more active and human friendly activities by implementing proper planing, and schemes.

#### 5.2 Policy Guide Lines for Redevelopment

After the seive analysis of the various control , parameters and their constrains, certain inferences are drawns and on the basis of that inferences, a set of policy guide line is proposed for future development of the study area. This guide line envisages separate entities for land use, transportation, built, un built activities infrastructure and environment.



### 5.2.1 Land Use

Proper land use is considered as one of the major parameters for the guided development of the study area. There are four proposals recommended for proper land use given as under :

#### 1. Controlling the improper development

This will include decentralizing the activities, strict enforcement of building rules, provision of flexible F.A.R. and F.S.I. for different locations. Imposition of betterment tax and levy from the developers, specifying the type of commerce in each area.

#### 2. Land Pooling and Readjustment

It has been revealed from the comprehensive building survey that most of the plots are irregular in shape and the interior vacant spaces have no access. If land pooling and readjustment is done systematically, most of the interior valuable vacant land can be utilized economically.

#### 3. Imposition of Mixed Land Use

The mixed land use enhances activities round the clock and keeps the area lively and their by discouraging the anti social activities at the late hours. Considering the land value it is essential to propose mixed land use for the economic use in the study area .

#### 4. Rehabilitation of the displaced shop owners

Adequate space has to be identified for the rehabilitation of the shoppers who might be displaced by the plan proposal. This gives a feeling of security to the shop owners, that even if they may be removed from the present location as the part of the re-development activities, he is entitled get rehabilitation at the appropriate location.

### 5.2.2 Transportation

The traffic problems in the study area can be solved by improving the existing traffic facilities. This can be achieved by the application of traffic control measures, installation of signals and the related traffic control devices. It is necessary to prevent cross traffic at the inter-sections as much as possible. Proper control of turning movements at junctions, should be imposed which would reduce considerably the prevailing traffic on one hand and increase the road capacity on the other. Installations of

traffic control devices in the form of signs, signals, road markings and traffic islands, etc. The traffic signs in the proper location would also reduce the traffic jam and pave the way for smooth movements. which would be easily recognisable during the day and night, and the markings should be bright enough , to help the motorist because his attention is generally concentrated on the road ahead. The marking are in the forms of wide strip in the white to indicate pedestrian crossings, and the information like speed limit, vehicle, lanes, road centre, turning movements, etc. The vehicular and pedestrian movements have to be properly integrated by providing signals at suitable points for ensuring safe pedestrians crossings. The congestion on roads due to cross traffic movement can be reduced by directional controls in the form of one way traffic. The road width is governed by number of lanes and a well aligned and surfaced road can easily carry about 500 vehicle/hour. the width of foot paths are important in shopping streets to prevent shoppers and pedestrians spilling on to the carriage way. Carriage ways for opposite streams of traffic are to be separated to ensure speed ,safety,etc. by providing physical barriers in the form of hedges, concrete blocks, and should have break at suitable points to allow change of directions to the traffic. The width of roads have to be increased at the turnings which ever it is required. Providing vehicle free zones, in the busiest shopping street, at peak hours, and providing adequate parking lot near to these shopping street,etc. would help to enter in to the streets without facing any problems. Adequate parking facilities should be provided at appropriate locations for the vehicles. The total parking demand in the study area has to be divided according to the demand and suitable parking lots has to be demarcated. On street parking should be avoided as much as possible, which generally affect the traffic flow and the business related activities.

### **5.2.3 Built Character**

Flexible F A R should be proposed for the development activities The height of the buildings should be governed by the width of the abutting street. Considering the width of the newly widened road, building of 3-story height can be allowed to construct on the entire overbridge Attakulangara stretch. High rise building can be proposed at the interiors for maintaining the eastasy.

The character and activity of the Chalai main street and the Saphapati coil street have to be maintained. In this stretch the building height should be restricted to 2 floor and on the periphery the height may increase with the depth of the plot from the street. Sloping roof features and light and smooth finished buildings are dominant in the study area. Hence it should be conserved and maintained for new construction. Provision of bonus floors has to be implemented if the ground floor of the new building is set for parking.

#### **5.2.4 Unbuilt Character**

The existing open spaces, Puttarikandom maidan and the two parks near the East Fort gate has to be maintained properly and make more active during day hours. A 3 m wide pedestrian path has to be laid down around the Puttarikandom maidan, so that the people can walk freely around the park and enjoy the scenic beauty of the city irrespective of the crowds in the street. The pedestrian path has to be properly paved and hedges has to be planted on either side which gives a sense of protection and security. Lighting has to be provided on the pathway for increasing the security and arresting of pedestrian conflict efficiency, The Putharikandom maidan has to be developed as a city centre recreational open space. Adequate parking facilities has to be provided to the public so that they can directly park the vehicle and enter into the park.

#### **5.2.5 Activities**

It has been observed that some of the existing activities can be shifted to nearby areas, and thereby the pressure in certain stretches can be removed. Shifting whole sale market area into Balarampuram for near to the new NH bypass would be more suitable than the present locations. The whole sale market unwantedly create traffic congestion by parking of loaded truck and lorries on the streets. Once the whole sale market is shifted, it is not necessary to have a truck terminal in this area. The development plan of Trivandrum envisages, the construction of two truck terminals at Kuriyathi and at Sreevaraham. Once the new railway terminal is established the present land use in and around the present truck terminal and Saphapathi Coil street would be changed, and would be of mixed land use with hotel, lodging, and commercial establishments. The retail commercial activity of the Chalai bazaar has to be retained as such. Separate



space has to be developed for rehabilitating the hawkers, thereby, the pressure on the roads can be reduced.

#### **5.2.5.1 Transportation**

The existing intra city bus terminal has to be shifted to Ambalathara, so that the present terminal area can be used as parking space for vehicle coming to the Chalai bazaar which would reduce the pedestrian vehicular conflict at the Chalai bazar. Off street parking space has to be developed in all the structures by conforming the demand and the stress of the commercial activities.

#### **5.2.5.2 Residential Activities**

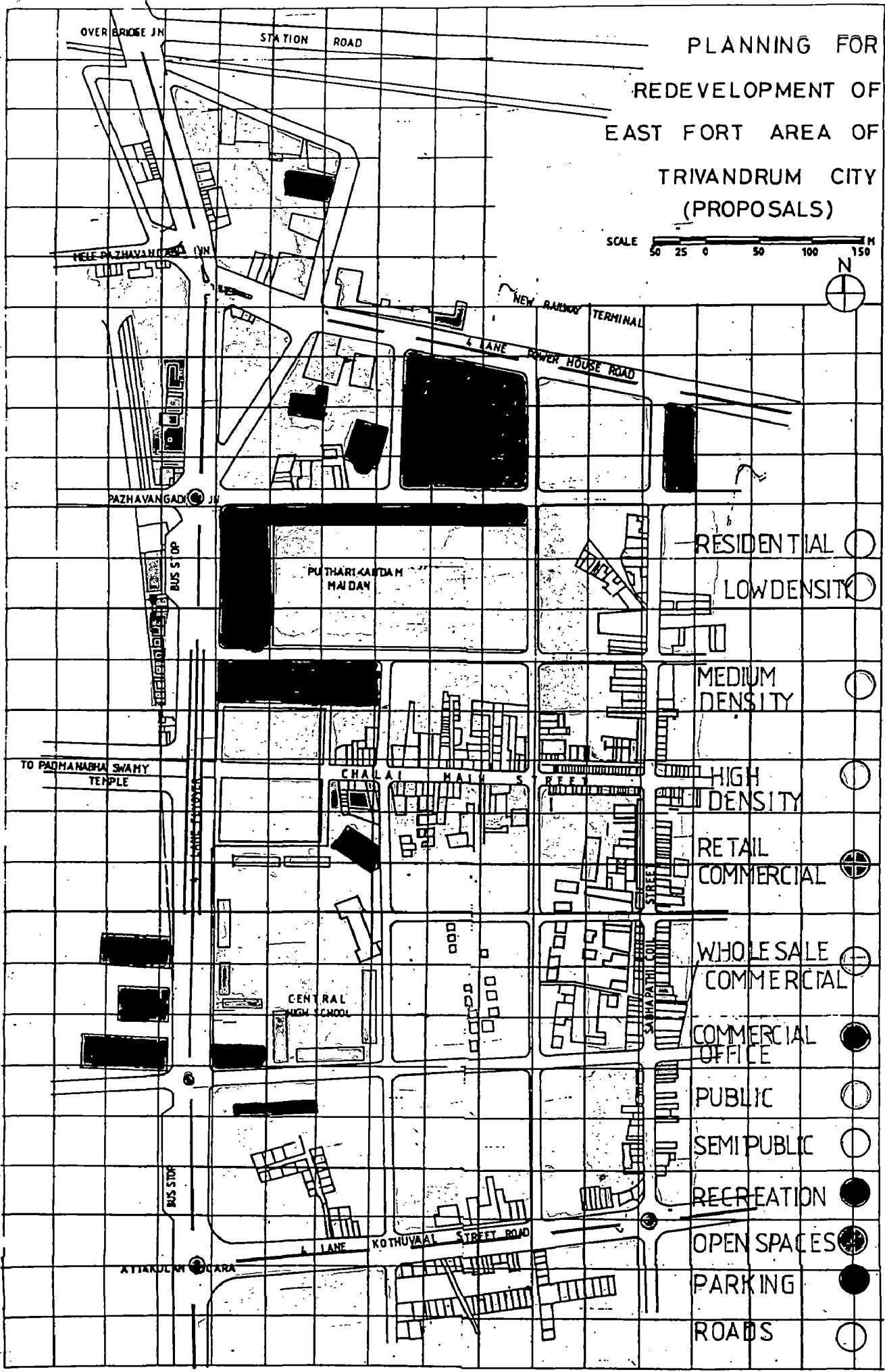
It has been observed that the residential land use is far less than the normal one, because the area is mainly developed as the commercial area. The interior part of the stretch mainly covered by residences and are being converted to business establishment because of its high potential. Regulation has to be set to limit the conversion, so that the pressure can be reduced. The residential activity is mainly concentrated on the Southern side of the study area. Once the interior area are opened up, the vacant lands can be efficiently used for construction of commercial, residential and apartments.

### **5.3 Preparation of Redevelopment Plan**

The existing land use pattern were analyzed in detail and the major activity and their importance relating to the study area including their influence. This shows that certain activities have to be strengthened, certain activity have to be controlled and certain others have to be relocated. On the basis of these a redevelopment plan is prepared for the development of the study area.

#### **5.3.1 Land Use**

The major land use of the study area are, Retail commercial, Whole sale commercial, Open spaces and Recreational centres, Residential, Public and semi public, Parking lots, Terminals and Roads. On the basis of this land use a proposed land use plan is prepared and it is presented a map no.26. and table no. 11.



MAP 26- PROPOSED LAND USE PLAN

AREA IN HECTARES

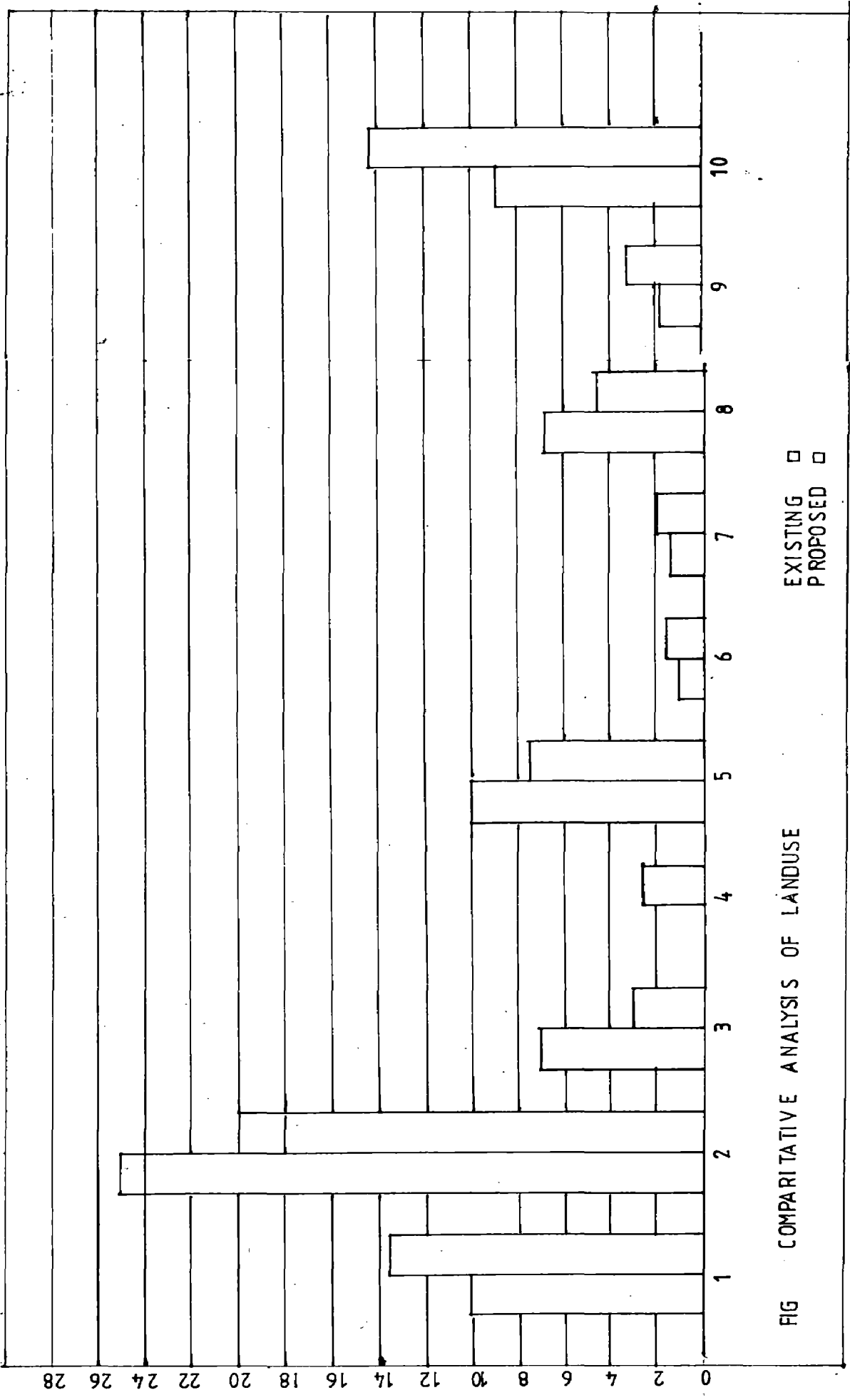


FIG COMPARATIVE ANALYSIS OF LANDUSE

EXISTING □  
PROPOSED □

AREA IN HECTARES

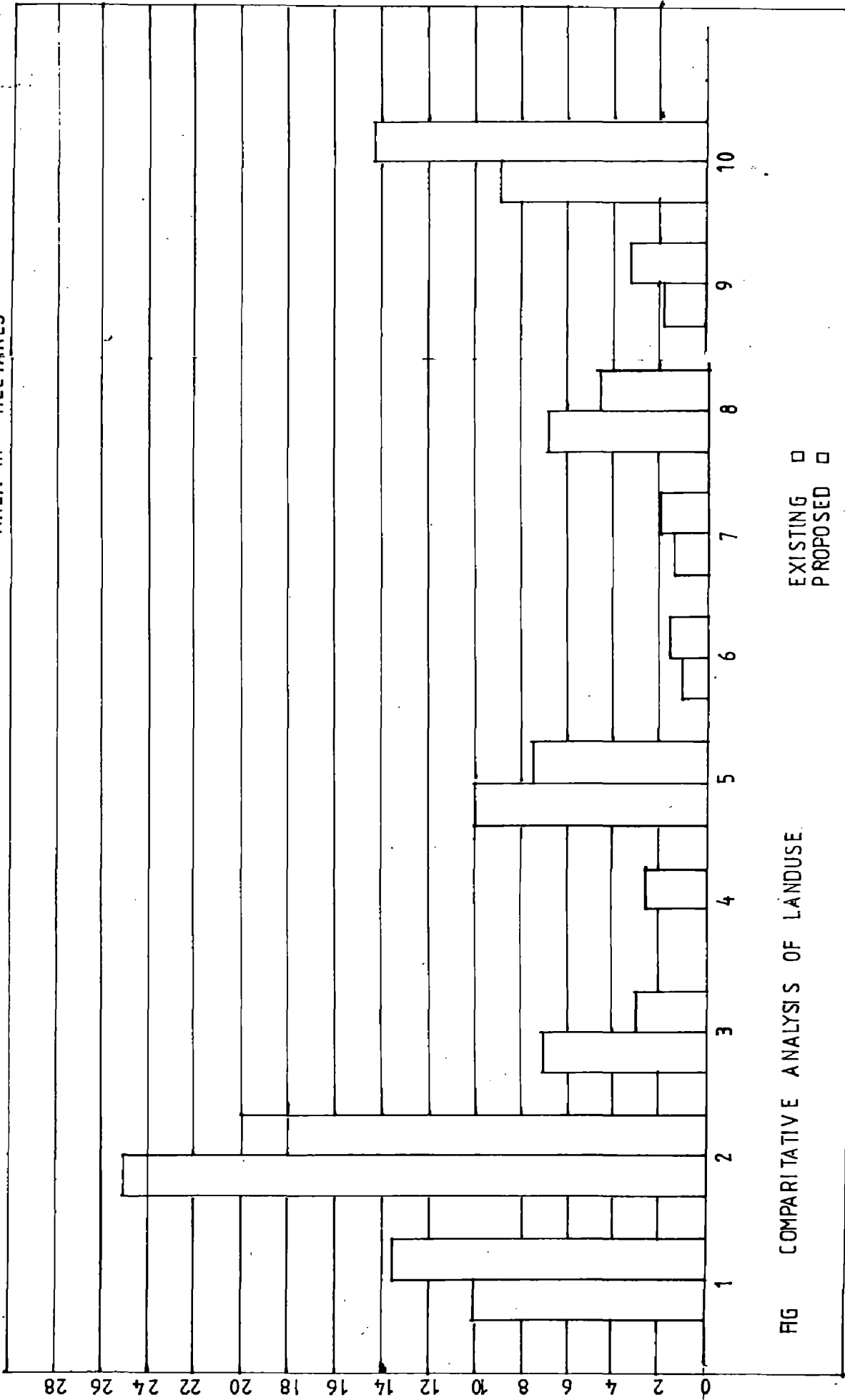


FIG COMPARATIVE ANALYSIS OF LANDUSE

EXISTING □  
PROPOSED □



**Table 13 : Proposed Landuse****(Area in Hectares)**

| Sl.No. | Land Use              | Existing     | Proposed     | Percent       |
|--------|-----------------------|--------------|--------------|---------------|
| 1.     | Residential           | 10.0         | 13.50        | 19.01         |
| 2.     | Retail Commerical     | 25.0         | 20.00        | 28.16         |
| 3.     | Whole Sale Commerical | 6.50         | 3.00         | 4.20          |
| 4.     | Commercial Office     | -            | 2.50         | 3.52          |
| 5.     | Public                | 10.0         | 7.00         | 9.85          |
| 6.     | Semi-Public           | 1.0          | 1.50         | 2.11          |
| 7.     | Recreator             | 1.5          | 2.00         | 2.81          |
| 8.     | Open Space            | 7.0          | 4.50         | 6.33          |
| 9.     | Parking               | 1.25         | 3.00         | 4.22          |
| 10     | Roads                 | 8.5          | 14.00        | 19.71         |
|        | <b>Total</b>          | <b>71.00</b> | <b>71.00</b> | <b>100.00</b> |

The table illustrates that the share of the residential land use increased from 14 percent to 19 percent. This would be divided into high density, medium density and low density dwellings. So that the residential demand of the study area can be reduced and the commuting business persons can be re-habilitated in this area.

The retail commercial land use is restricted to 28.16% of the total area. The main objective is to intensify the shopping activities within the major corridors. The development and spreading of commercial activities in the residential areas and in the streets should be restricted. As in the studies, it is recommended that the whole sale market has to be shifted to Balaramapuram in stages. So, that the retail commercial activities can be extended to these areas.

Once the new Railway Terminal is established land use pattern would change definitely because it has to accommodate the growing demand of commercial office buildings, restaurants, banks, etc. Hence, 2.5 hectares of land has been allocated for these purposes.

The percentage of public spaces can be reduced to 7 hectares from 10 hectares by intensifying the activities, i.e., multi-storied buildings for offices and Railway Terminal.

The area attached with the semi-public establishments have to be increased to 2 hectares. So that, some amount of parking and space for gathering for worshipping can be function without any hinderence.

It is proposed that the parks and open spaces would be an integrated part of the whole study area by creating pedestrian zones and foot-paths around the park and open spaces. So that, the people can walk freely without any conflict. The percentage of open spaces in the proposed plan is about 6.33 percent of the total area.

The existing land attached with the recreational centres, mainly with the Theatres are not adequate for the present day parking demand. Hence, it is proposed that an additional area of 0.5 hectares should be attached with these recreational centres.

As in the studies, the parking demand in the area is alarming due to the rapid influx of vehicular growth. Nearly, 4.22 percent of the total area is allocated for parking which include parking lot at Putharikandom side, East Fort Gate Junction, Attakulangara Junction, Power House Junction and Kripa Theatre Lane.

The percentage of the land under transportation use should be increased from 11.97 percent to 19.71 percent. This is an indication that most of the interior open spaces and vacant land are connected to the main street so that the interior space can be utilised properly.

### **5.3.2 Transportation**

A minimum set back of 3 metres should be provided in front of all new constructions and this area should be paved and protected by the land owners without any break at the property lines which can function as a pedestrian way. The Melepazhavangadi - Killipalam road has to be widened for 4-line traffic and provide parking facilities for the future demand of the new railway terminal. Foot path of minimum width 2 mts has to be provided on either side of the road. Adequate crossing facilities are to be provided at intersections.

A pedestrian path way of 3 mts width has to be provided around the Putharikandam maidan and should be properly surfaced and well lightened. This path way should have access from all other sections from the Chalai bazaar. Parking facility should be provided at the Putharikandam side so that the people can park their vehicle outside of the pedestrian way and they can enter inside the park or go for shopping without crossing the vehicular movement. Development of some new road from the newly widened Attakulangara by pass road to the interior areas, so that the interior

space can be utilize properly. Foot paths of minimum width 1.5 m should be provided on either side with controlled pedestrian crossing at particular intervals.

The Chalai bazaar street experience a high influx of pedestrian movement. So road and streets are not so wide and the possibility of widening the road is also impossible due to the heavy stress of built-up area. So the only possible solution is to convert the entire stretch to vehicle free zone for at least peak hours or for the entire day. The loading and unloading activities in the study area has to be limited to night hours.

Provision of private parking space for the new constructions in this stretch should be removed, and a common public parking space should be developed outside the Chalai bazaar. Once the whole sale market area is changed the relevant of truck terminal get lost and the present terminal can be converted to public parking space in considering the development of the new railway terminal. Provide round-about at Attakulangara Pazhavangadi and Melepzhavangadi to direct free flow of vehicular movements. The proposed road network and parking areas in the study areas is given in map 27 and the capacity of the side walk in different street is given in table 12.

**Table 14 : Capacity of Sidewalks of Different Widths**

| Width of Sidewalks (in m) | Anticipated Capacity (Number of persons/hour) |                    |
|---------------------------|---|--------------------|
|                           | All in One Direction                          | In Both Directions |
| 1.5                       | 1200  | 800                |
| 2.0                       | 2400  | 1600               |
| 2.5                       | 3600  | 2400               |
| 3.0                       | 4800  | 3200               |
| 4.0                       | 6000  | 4000               |

Sources : I.R.C.

**Table 15 : Minimum Sidewalk Width According to Types of Streets and Locations**

| Type of District | Type of Street | Minimum Sidewalk Width (in m) |
|------------------|----------------|-------------------------------|
| Industrial area  | Main street    | 4                             |
| Business area    | Minor street   | 2                             |
| Residential area | Main street    | 3                             |
|                  | Minor street   | 1.5                           |

Source : I.R.C

### 5.3.2.1 Widening of Roads

It is proposed that the existing Power House road has to be widened as a four lane traffic with divider and having pedestrian crossings at appropriate locations. A foot-path of 2 mtrs. width has to be developed on either side of the road with pedestrian guard rails. The Attakulangara- Killipalam road which was already widened as a four lane parallel road to the Power House road which is working as the peripheral road of the study area. A foot-path of 2 mtrs. width has to be provided on either side with the pedestrian guard rails and facility to crossing at convenient location.

### 5.3.2.2 Construction of the Fly-Over

There is a continuous flow from the Chalai main street to the Padmanabha Swami Temple through the East Fort Gate. So, it is better to avoid the crossing at the East Fort Gate Junction. A four lane Fly-Over is proposed to be constructed on the M.G.Road, so that the inter-city traffic can be segregated and the pedestrian flow can be freely allowed to the Temple. A pedestrian way of 1.5 mtrs. has to be provided along the Fly-Over with guard rails which helps the tourist to enjoy the scenic beauty of the city.

### 5.3.2.3 Development of New Roads

As explained in the proposed plan two lane road of two km length is proposed to develop in the study area which reduces the intensity of the vehicles in the main street.

The carriage width of lanes, P.C.U. factor of the vehicle, Design service volume of roads and Equivalent car space of different vehicle are given in table 16,17,18 and 19.

**Table 16. Carriage way width**

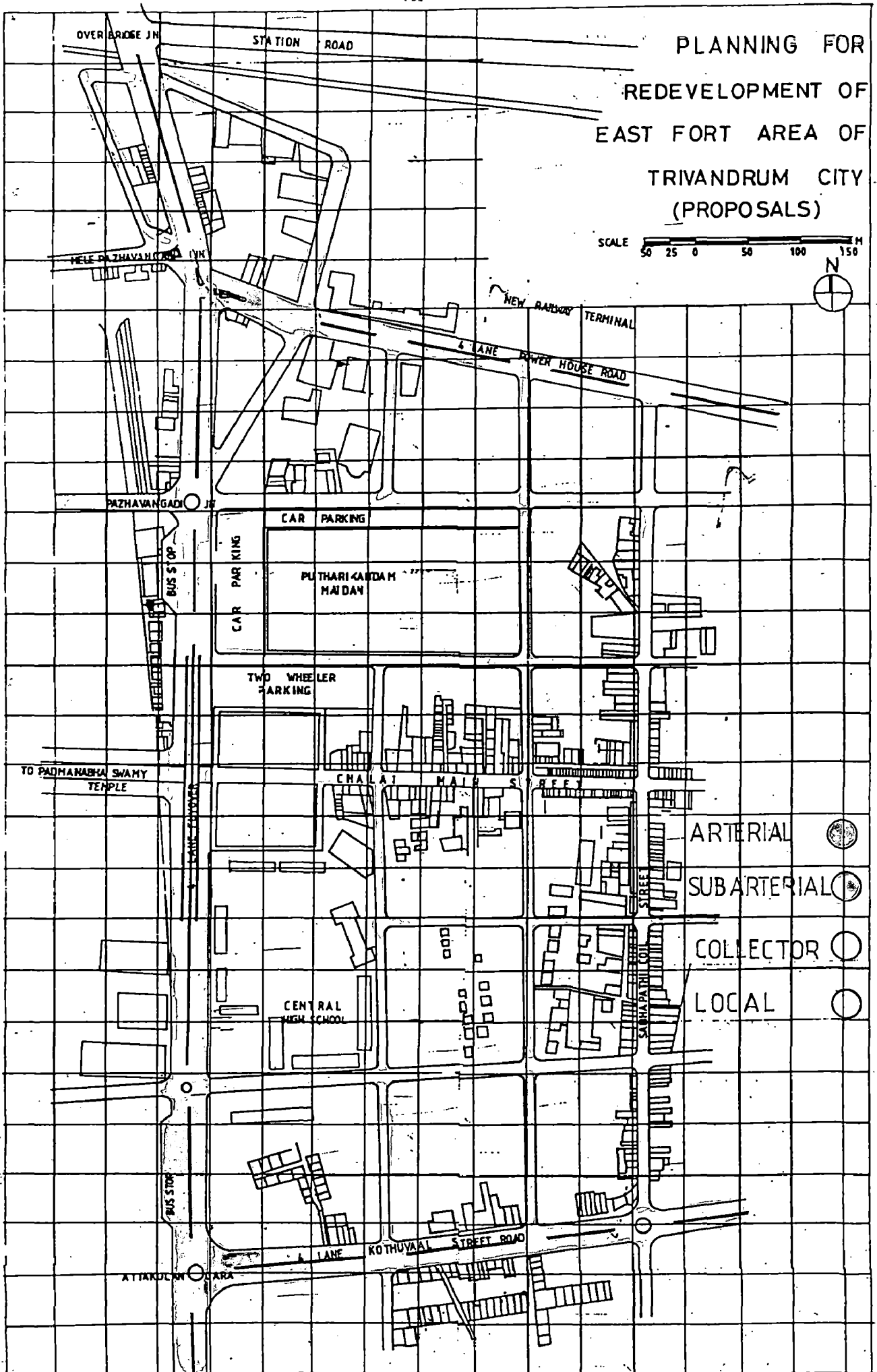
| Discreption | Width of lane in (m) |
|-------------|----------------------|
| Signal lane | 3.5                  |
| Two Lane    | 7.0                  |
| Three Lane  | 10.5                 |
| Four Lane   | 14.0                 |
| Six Lane    | 21.0                 |

Source I.R.C.



PLANNING FOR  
REDEVELOPMENT OF  
EAST FORT AREA OF  
TRIVANDRUM CITY  
(PROPOSALS)

SCALE 50 25 0 50 100 150 M



MAP 27 PROPOSED ROAD NETWORK

**Table 17. P.C.U. factor of Vehicles**

| Sl.No.                      | Vehicle                    | Equivalent<br>5 percent | P.C.U.factor<br>maxmin 5 percent |
|-----------------------------|----------------------------|-------------------------|----------------------------------|
| <b>Fast Moving Vehilers</b> |                            |                         |                                  |
| 1.                          | Two Wheelers               | 0.5                     | 0.75                             |
| 2.                          | Passenger Car              | 1.0                     | 1.00                             |
| 3.                          | Auto Rikshaw               | 1.2                     | 2.0                              |
| 4.                          | Light Commercial Vehicle   | 1.4                     | 2.0                              |
| 5.                          | Truck/ Bus                 | 2.2                     | 3.7                              |
| 6.                          | Agriculture Tractor/Tailor | 4.0                     | 5.0                              |
| <b>Slow Moving Vehicles</b> |                            |                         |                                  |
| 7.                          | Cycles                     | 0.4                     | 0.5                              |
| 8.                          | Cycle Rikshaw              | 1.5                     | 2.0                              |
| 9.                          | Tanga                      | 1.5                     | 2.0                              |
| 10.                         | Hand cart                  | 2.0                     | 3.00                             |

Source : I.R.C. 1980.

**Table 18. Design-Service-Volume for urban roads**

| Sl.No. | Types of Cerrage way | P.C.U/Hours. |              |           |
|--------|----------------------|--------------|--------------|-----------|
|        |                      | Arterial     | Sub.Arterial | Collector |
| 1.     | 2 lane -one way      | 2400         | 1900         | 1400      |
| 2.     | 2 lane-two way       | 1500         | 1200         | 900       |
| 3.     | 3 lane-one way       | 3600         | 2900         | 2200      |
| 4.     | 4 lane undevided     | 3000         | 2400         | 1800      |
| 5.     | 4 lane devided       | 3600         | 2900         | -         |
| 6.     | 6 lane undevided     | 4800         | 3800         | -         |
| 7.     | 6 lane devided       | 5400         | 4300         | -         |
| 8.     | 8 lane devided       | 7200         | -            | -         |

Source: I.R.C. 1980.

**Table 19. Equalent Car Space (E.C.S.) of Different Vehicules.**

| Sl.No. | Vehicle      | Equalent Car Space (E.C.S.) |
|--------|--------------|-----------------------------|
| 1.     | Car/Taxi     | 1.0                         |
| 2.     | Two Wheeler  | 0.5                         |
| 3.     | Auto Rikshaw | 0.5                         |
| 4.     | Cycle        | 0.1                         |

Source: I.R.C. 1980.

#### 5.3.2.4 Provision of Parking Area

As per the traffic volume and parking survey, it is proposed that parking lot has to be provided at appropriate loctions which would help the motorists to park their vehicles and move freely in the desired areas. This avoids pedestrian-vehicular conflict and congestion in the busiest streets and locations. The major parking lots proposed are : 1. At Putharikandom side, 2. East Fort Gate side, 3. Attakulangara Junction, 4. Power House Road and 5. Kripa Theatre Lane. There are 4.22 hectares of land is allotted for parking facilities in this study areas. Parking requirements in certain building areas are given in table 20.

**Table 20. Parking Requirement in Certain Buildings areas.**

| Sl.No. | Building Type | Required parking area in m <sup>2</sup> for every 100m <sup>2</sup> |
|--------|---------------|---|
| 1.     | Residential   | 1.0   |
| 2.     | Offices       | 1.42  |
| 3.     | Commerical    | 1.25  |

Sources: I.R.C. 1973.

#### 5.3.2.5 Creation of Free Zones for Pedestrians

The comprehensive survey reveals that the pedestrian flow in the Chalai main street is tremendous during the peak hours at the rate of 5500 persons/hour. The possibility of widening the street is absoletly nil because there would be and adverse affect in the traditional built character of the street. Once the street is fully pedestrianised, the people can walk freely into shops without any conflict. This free zone to be extended up to the Sree Padmanabha Swami Temple, which would help the pedestrians to reach the Temple without any crossings. A 3 mtrs. wide pedestrian path is proposed around the Putharikandom Maidan for those who come for recreation and entertainment activities.

#### 5.3.2.6 The Surfacing

Most of the roads in the study area needs better surfacing which reduces water-logging and accidents. The pedestrian way and foot-paths have to surfaced with impervious smoot finished materials. with slight slops for drain the water, so that the pedestrian tend to the walk through them.

### **5.3.2.7 Street-Lighting**

Street-light is proposed in almost all the streets including residential areas and foot-paths which reduces the accidents and anti-social activities at odd hours. A better illumination is needed for safe driving of vehicles and smooth movement of the pedestrians.

### **5.3.3 Built Charator**

The proposed built charator of the area is shown in Map.24., which indicates that the height of the building should be governed by the width of the steet. When depth of the plot is large the height would be tall and a grid of 20.m x 20m has to be developed for this prupose. The building height can be restricted to 3 floors in the following roads, either side of the M.G.Road, Power House Road and New Bypass Road, because these Roads have enough carriage way width and pedestrain side walks which will create a sense of skyline of Buildings. In all other streets the building height can be restructed to two stories because these streets have only 2 lane width, otherwise the openness of the Road would be distrubed. A grid of 20m x 20m, can be developed and it can be applied as a tool for Controlling the heights of the building for developing the interior areas. As the grid number from edge to the interior, the height of the building can be sucessevely increased and it should be restructed to 4 floors except M.G.Road, Power House Road and New Bypass Road.

Sloping roof charactor buildings are highly deominant in this study area so that it is proposed to adopt the same form for new development in the form of sunshades and projections. Retangaler plan form buildings are prodomenet in this study area. Hence it is advocated to adopt the same types of plan for new constructions.

The building charactor of the Sabapati Coil Street and Chalai Bazar street have to be maintained by proper Architectural Control in the form of roof form, sun shades and projections which incloude set backs. This historical stretch need more attention for conservations.

Flexible F.A.R. has to be adopted for new constructions, so that a varyiing solid void ratio can be developed which will reduce the monotony of the street elevation.



Smooths finished structures building having light colours are proposed for new developments in this area. The proposed built character of the study area is given in map 28.

#### **5.3.4 Unbuilt Character**

The unbuilt character of the study area has to be maintained to improve the quality of certain locations. A pedestrian path way of 3 mtrs. wide has to be provided around the Putharikandam Maidan, and it should be paved with impermeable materials with proper seating along the pedestrian path. Trees have to be planted in and around the Putharikandam Maidan without affecting the visual axis of the streets. Trees are also proposed to plant either side of all other major streets to create a sense of avenue feeling.

The Electric and Telephone post in the street which reduces the carriage way, block the pedestrian movement, etc., so it is proposed to remove the same for smooth flow. Traffic signages are proposed to fix at only the needy locations and the size of the sign boards and advertisement board have to be standardised to have a clear vision. The proposed plan of open spaces and recreational centres are given in map 29.

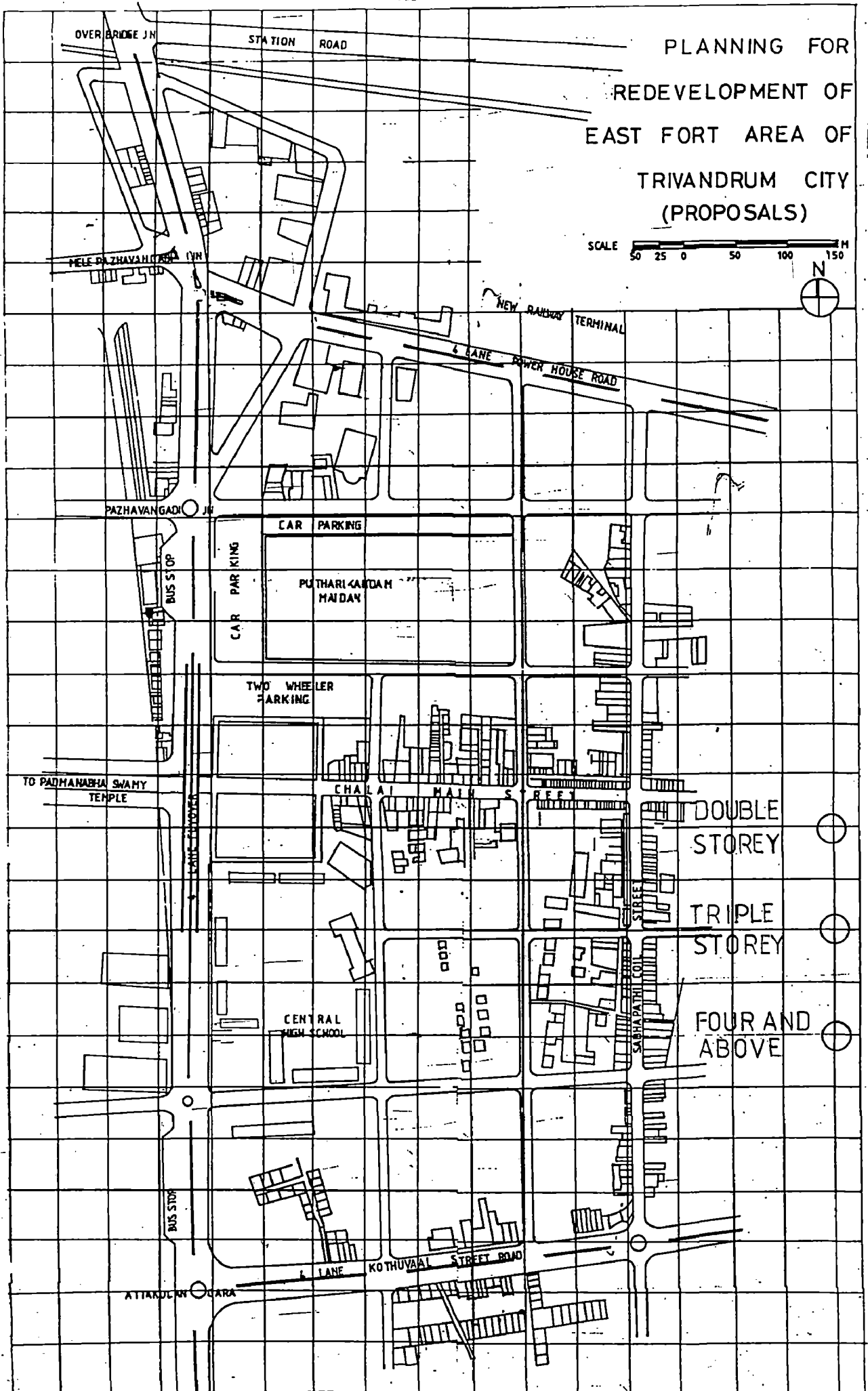
#### **5.3.5 Activity**

It has been proposed that some of the existing activities have to be controlled, some should be restricted and some others should be removed.

The activities like retail commercial, transportation etc., have to be controlled to the certain streets and areas. Religious activity is increasing day by day in the study area due to the increase in number of resident population, and the flow of pilgrims from all over the South India. Their movements should not be disturbed by the vehicular movement. The proposed fly-over would avoid this pedestrian vehicular conflict at the East Fort Gate Junction. Adequate parking facility has to be provided around the temple for the people those who are coming from outside by using light motor vehicles. The whole sale commercial activity has to be shifted to Balaramapuram because such activity need more godown and truck parking, and loading areas. The proposed New Railway Terminal at the Power House Junction would change the present activities and the present truck terminal at the intracity bus terminal is proposed to convert as parking lot. and these terminals should be re-located in the outside of the study area. The commercial activity

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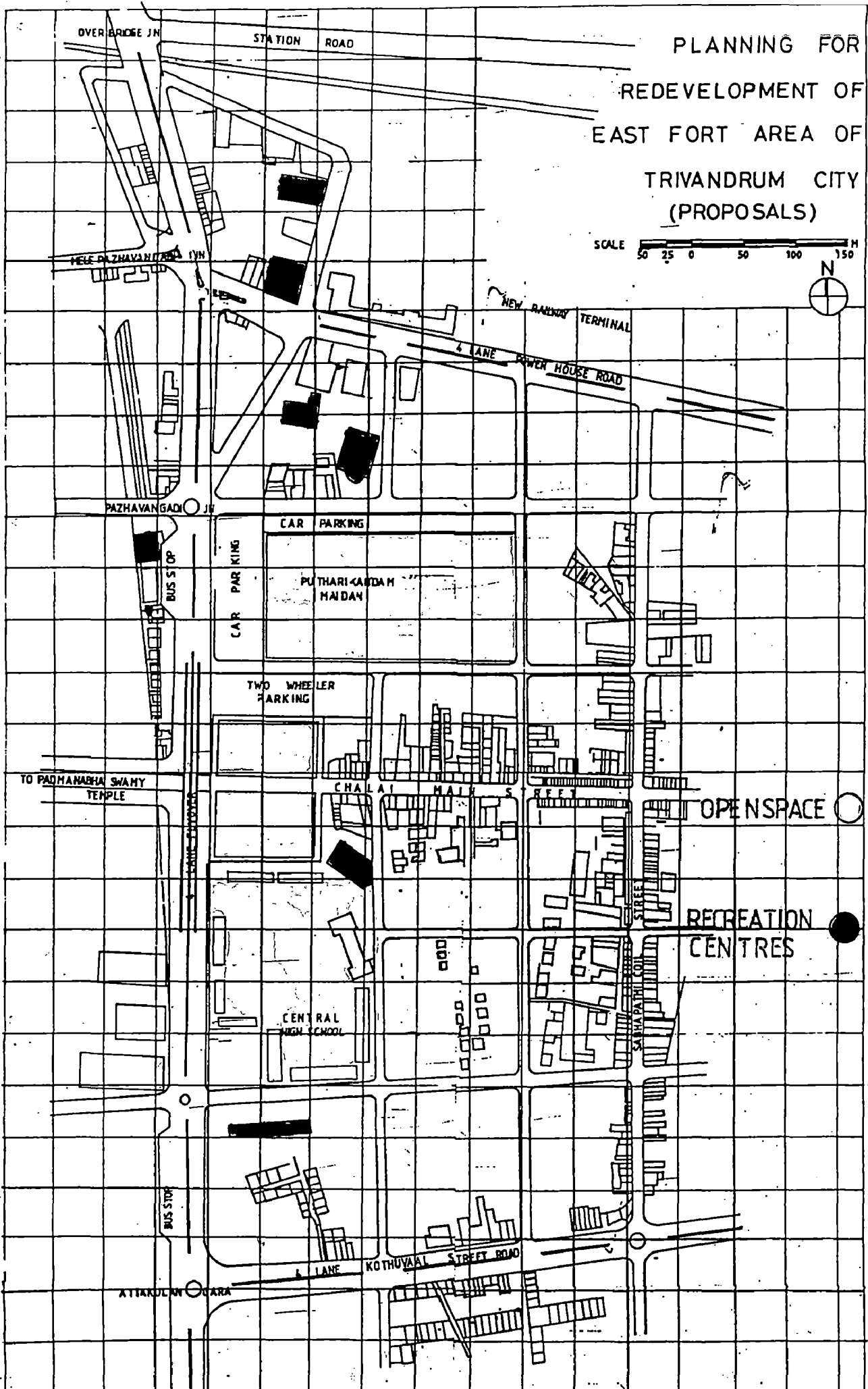
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MAP 28 PROPOSED BUILT CHARACTER  
111

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SCALE 50 25 0 50 100 150 M



MAP 29 PROPOSED OPEN SPACES AND RECREATION CENTRES

has to be restricted to 2 floors and the upper floors are proposed to have commercial residences and offices.

### **5.3.6 Infrastructure : - Physical**

The quality of land in this area is very much depend on the level of availability of land and its accessibility quality of infrastructure facilities available,etc. The rapid growth of population necessitates, augmentation of water, power sewerage, drainage and solid waste managment. The proposed infrastructure plan layout is given in map no. 30.

#### **5.3.6.1 Water**

The Kerala Water Authority supplies drinking water to the entire study area. Water is pumped from the Aruvikkara reservoir and carried to the vellayambalam treatment plant for purification then it is pumped to the study area directly. The water supply system in the study area should be improved because the existing lines were laid down during the princely period. When the population was very less. Over the years the population and households are increased which lead to increase in demand of water supply. As a result the following problems are witnesses such as shortage of drinking water supply with low pressure in the study area. Bore wells are being used by the private concern due to their heavy demand during the summer season since the supply is very less during the same period. Sree vaharam pond can be utilized as an alternative source of water supply by proper, collection and treatment. An overhead water tank having capacity of 150 KL. is propose to set up in the study area in addition to the existing water supply facilities.

#### **5.3.6.2 Sewerage**

Sewerage treatment is essential to check environmental decay as well as to maintain the healthy living conditions. Individual connection from the building should be connected to the main sewerage line laid along the road side, and carried to the treatment plant at Kuriathy and the treated waste taken to the sewage farm located at Valiyathura. The treatment plant is working satisfactorly even though it was established during the princely period.

#### **5.3.6.3 Power**

Strengthening of power supply is highly essential in the study area. Load shedding is absolutely prevailing in the study area even during the mansoons. In fact as



such kerla state depends upon power supply from hydel power stations, partly and partly from neighbouring states. The power productions neither in the the state and transported from outside of the state is almost stagnant. But, over the years, the population has increased to the larger extend which results higher demand of power supply in the domestic sector. Strong measures and policies should be framed to maintain smooth power supply in the system.

#### 5.3.6.4 Solid Waste

Considering the nature of solid waste and the economic aspect of its disposal, need more attention in this area.

It has been found that there is more than 50 percent of Municipal wastes in Thirunanthapuram city which is not collected. as a result, these wastes are accumulated in and besides in the roads, streets, etc. during the summer season. These wastes virtually create hazardous problems which include : (1) it arrests the smooth flow of vehicles, pedestrians, etc. in the city, (2) when a vehicle is passed through an accumulated garbage on the road, the entire atmosphere changed immediately, create bad smell, floating of dusts in the air which lead to air pollution, (3) air pollution leads to create various kinds of allergy, diseases, etc. (4) during the monsoon season, the garbage mixed with rain water and soaks the sewage. as a result, the entire road covered with full of garbage and dirty water, (5) hospital wastes which carry larger quantity of bacteria are stored in the open place, (6) inefficient management system are adopted in the city in relation to garbage collection and their usage's, (7) proper storage system of waste is not available, (8) though more than 50 percent of the waste generated in the corporation area, the city is more less seemed to be a clean city because of nature's blessings. The city is situated in a slightly elevated place. It has a river and several streams, and it blessed by more rainfall. As a result, the accumulated wastes in the city is washed away by the rain water.

The study recommends several measures towards collection and effective usage's of waste in Thiruvanthapuram city, and are listed in the sequel. They are :

1. A suitable Management Information System (MIS) model should be evolved for waste management and implemented.
2. Awareness compaign about garbage and its uses should be adopted.

3. The corporation should give garbage storage kits (dustbins) to the households and give instruction to the households to store them separately by their types, such as degradable and nondegradable. Hence, it is very easy to collect the waste and send it directly to the recycling sites.
4. The corporation should come forward to set up economically and technically feasible recycling plant in the urban fringe.
5. Vermiculture farms may be setup according to the availability of the wastes. Different pits may be set up in the fringe areas of the city after undergoing thorough location and econometric analysis.
6. Garbage based electricity generation plant can also be set up in accordance with availability of the garbage. Techno-conomic feasibility, and location analysis would be carried out before setting up of this plants.
7. Dairy effluent treatment plant : The present effluent plant located in ambalathura does not have biogas production system based on the sludge. If a community biogas plant is constructed besides the effluent treatment plant using output of the effluent plant (slurry) as an input to biogas technology, the prime output of the biogas technology (biogas) may be used for cooking and lighting for the nearer community. The secondary output (slurry) would be used as plant nutrient (Farm Yard Manure) which has more quantity of Nitrogen, Phosphatic, and Potassic after drying as usual.
8. Biogas, the major output of the biogas technology which can be used as an input to generate electricity as is being done at BHU-STP in Varanasi. A similar plant can be setup in Thiruvananthapuram besides the dairy effluent treatment plant after conducting scientific feasibility analysis.

#### **5.3.6.5 Drainage**

It has two aspects, such as flood protection and storm water discharge and are interrelated. The existing Vanchiyoor Thodu has only limited capacity to hold the storm water drainage. Hence it is proposed that to construct a drainage lain parallel to the M.G., Road from Melepazhavangadi to Attakulangara which would be connected Thekkakkari Thodu since the , gradient is also feasible for the same. Fencing on either side of the drains are also equally emportant to prevent dumping of garbage and waste in to it.

### 5.3.7 Infrastructure - Social

Health, education, communication, police facilities etc., are available within the study area and the out skirt of it which are found adequate as per the standards. But by considering the compactness of building and their functions one sub fire stations is proposed to setup in the study area which needs 0.6 hectares of land.

### 5.3.8 Environment

Creation of physical and social Environment for improved quality of life is the major objectives of the redevelopment plan . Major attributes of environment in the study area are :

#### 1 Ecology, Nature, Conservation and Parks.

The existing eco- system of the study area have to be maintained i.e. proper maintenance and establishing relations with the different activities. The open spaces proposed to be developed as centres of attraction to the public

#### 2 Urban Design

The proposed urban form in terms of built, unbuilt, spaces would create an image to the inhabitant which would lead well developed urban fabric.

#### 3. Conservation of Urban heritage.

The streets, such as, Chalai main street and Sabapati coil street those represent the old heritage of the city in building form, layout, and visual axis . These areas are proposed to be conserved as historical stretches.

#### 4. Community Life.

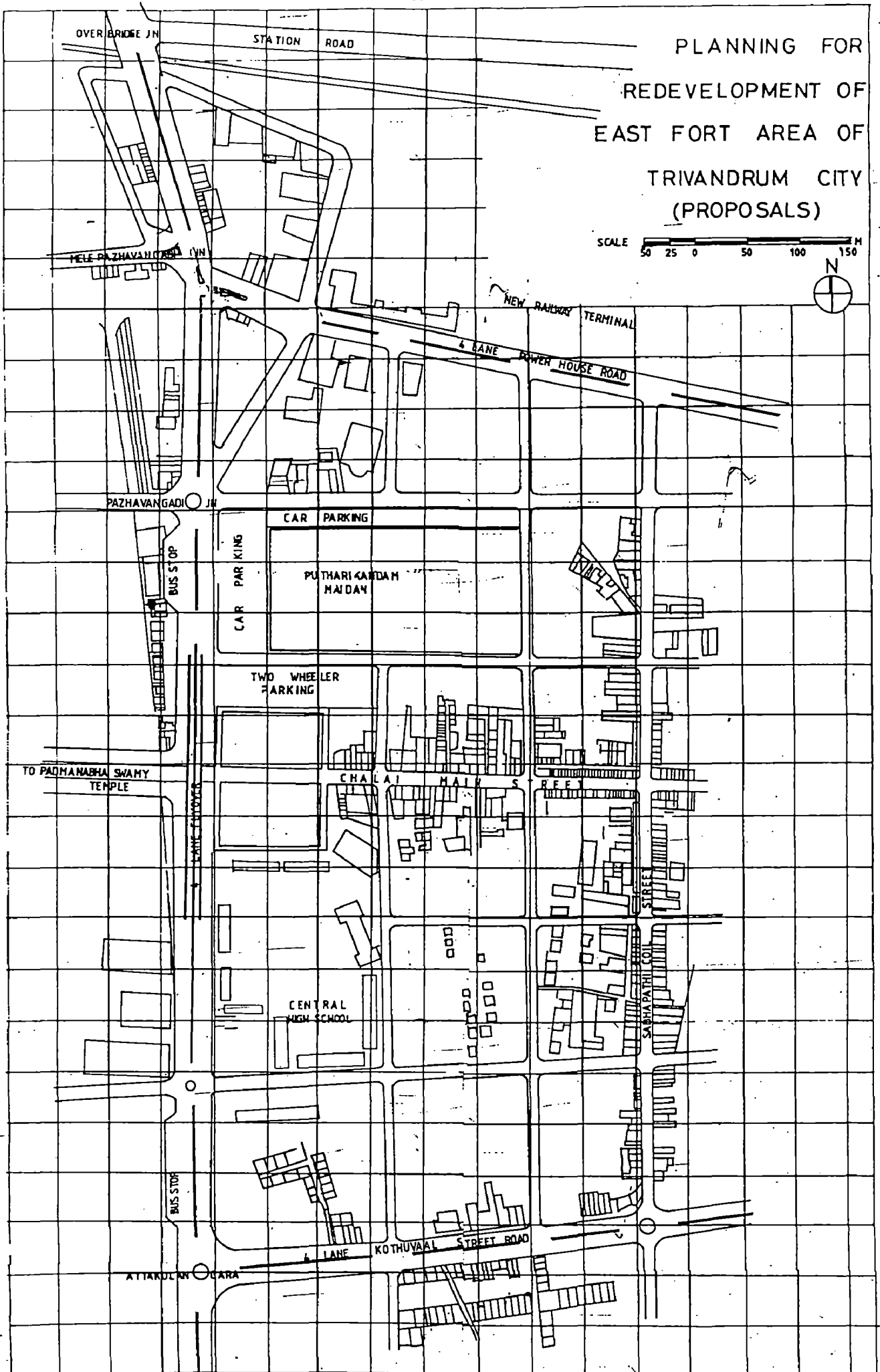
It is proposed that the activities in the study area shall be integrated for improving better community life which would lead the overall development.

#### 5. Condition for safety and convenience.

Proper planning and alignment of roads, foot paths ,vehicle free zones, traffic signages and advertisement boards, etc., would form a sense of safety and convenience to the beneficiaries of the study area, definitely.

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SCALE 50 25 0 50 100 150 M



map. 30

proposed design layout



#### **5.4. Conclusion**

The proposed redevelopment plan for the study area is prepared on the basis of its historic importance, tradition and cultural significant and the growing demands of activities available in the system. The existing activities are analysed individually and comprehensively, and hence proper guide lines were prepared for scientific development of the study area.

If the proposals are implemented as per the guide line, most of the existing problems can be solved without affecting the existing urban fabric of the study area. The investigator hopes that the proposals made in this report are thought provoking to the public as well as the administrators. It is highly essential to phase out the total development stagewise according to their intensity and their priorities. Scheme should be prepared and strategies should be worked out for implementing these schemes. The 74th Consistution Ammendment Act envisages more powers and finances to the Development Authorities to carryout this type of activities so that they can provide better quality of life to the citizens.

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COMPREHENSIVE BUILDING SURVEY SCHEDULE TRIVANDRUM

| Name of shop | Character | Age | Condition | Number of floors | Sold-void | Plan form | Roof Form | Roof Material | Texture | Colour |
|--------------|-----------|-----|-----------|------------------|-----------|-----------|-----------|---------------|---------|--------|
|              |           |     |           |                  |           |           |           |               |         |        |
|              |           |     |           |                  |           |           |           |               |         |        |