

**PHYSICAL AND INFRASTRUCTURAL DEVELOPMENT
ALONG RIVER GANGA
IN PATNA**

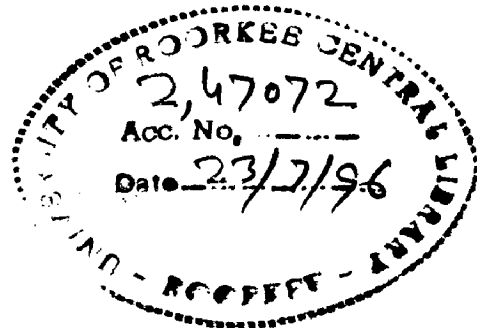
A DISSERTATION

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

MASTER OF URBAN AND RURAL PLANNING

By

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JANUARY, 1996

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the Dissertation entitled "PHYSICAL AND INFRASTRUCTURAL DEVELOPMENT ALONG RIVER GANGA IN PATNA" in the partial fulfilment of the requirements for the award of degree of MASTER OF URBAN AND RURAL PLANNING ,in the Department of Architecture and Planning ,University of Roorkee,Roorkee is an authentic record of my own work carried out for a period of seven months from July 1995 to January 1996 under the supervision of Prof. N. K. Tayal ,Department of Architecture and Planning , University of Roorkee, Roorkee.

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

Place: Roorkee
Date : January, 1996.

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This is to certify that the above statement made by the Candidate is correct to the best of my knowledge.

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ACKNOWLEDGEMENTS

At the outset I wish to express my warm and heart felt thanks and gratitude to Prof.N.K.Tayal of Department of Architecture and Planning ,University of Roorkee for his valuable guidance and encouragement during the course of this study culminating into this Dissertation. At the same time ,I can not forget to express my deep sense of gratitude to Dr. Najamuddin, Professor and Head of Department, who inspired me to select this topic for the study and gave his valuable suggestions whenever needed.

I am greatly indebted to Prof. Vishwamitter, Dr.(Mrs.)Sarila Sahu, Prof. K.C. Kambo, Mr.B.B. Garg , Mr. R. Shankar, Mr R. K. Jain, Ms. Puspalata, and Ms. Nalini Singh who have encouraged and helped me at every stage during this study.

My Special thanks are due to

Prof. Jeetendra Singh -	Head, Department of Architecture, Bihar College of Engineering Patna
Mr. Binay Kumar Singh-	Director, P.R.D.A. Patna
Dr. Ambuj Kumar -	Deputy-Director, P.R.D.A. Patna
Dr. Satish Chandra -	Lecturer, Transport Engineering Section Civil Engg. Dept., U. O. R. Roorkee

Who have helped me by providing valuable basic informations relevent to subject matter of study. I am also thankful to officers and staff of the government Departments and Organisations for providing valuable data, informations and reference materials:

- (a) Offices of the Registrar General and Census Cummissioner, India, New Delhi
- (b) School of Planning and Architecture New Delhi
- (c) Patna Regional Development Authority
- (d) Patna Municipal Corporation
- (e) Bihar State Tourism Development Corporation, Patna

Above all, I do not find words suitable enough to express my sincere thanks to all my Post Graduate student friends in the department specially Rajinder, Binoy Abraham, Jagdev Thakur and Major S.S. Kahlon, not only for their help, cooperation and valuable Suggestions but also for keeping me in good humour all through.

I will be failing in my duty if do not bring out the contribution to Mr. Mohammed Hanif, Librarian and other staff of the Department who never hesitated in giving me their help enabled me to complete the Dissertation in time and I take this opportunity to thank them sincerely.

Above all, I am deeply indebted to my Parents, brother and other family members for their inspiration and help throughout the course.

Manoj Kumar
(MANOJ KUMAR)

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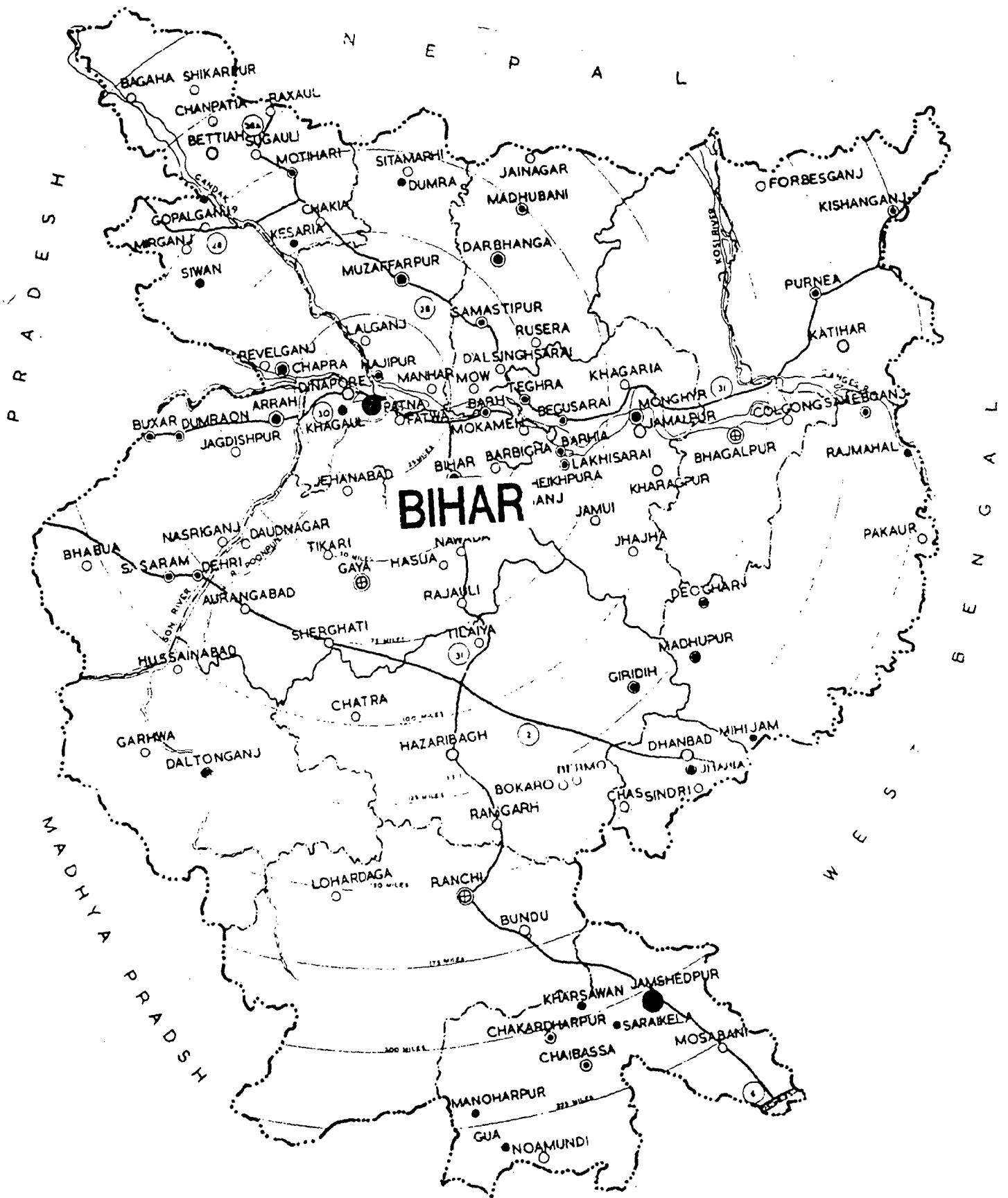
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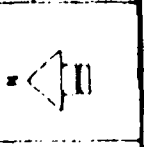
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Chapter 1 :

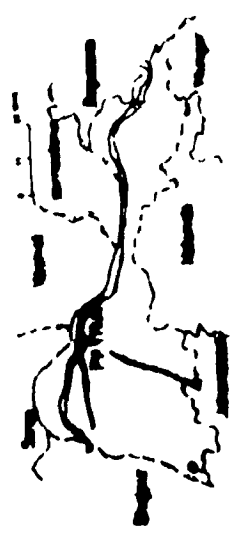
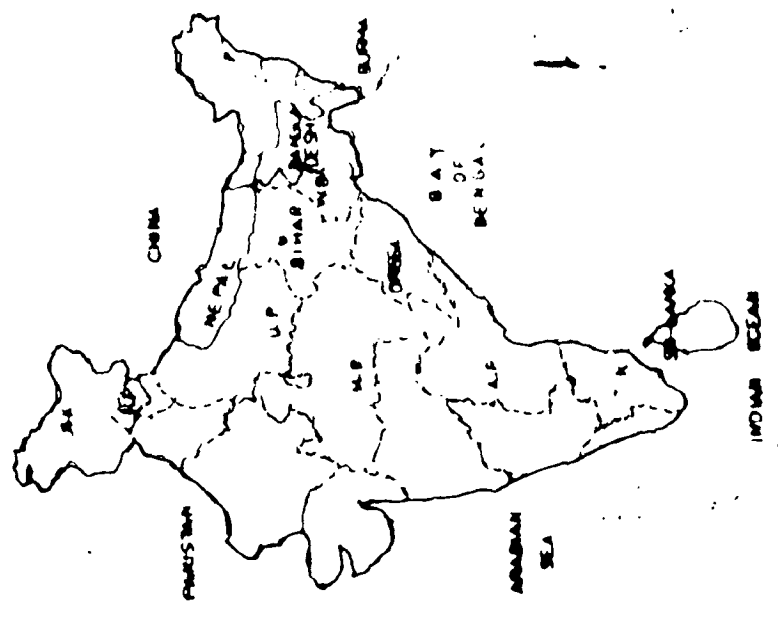
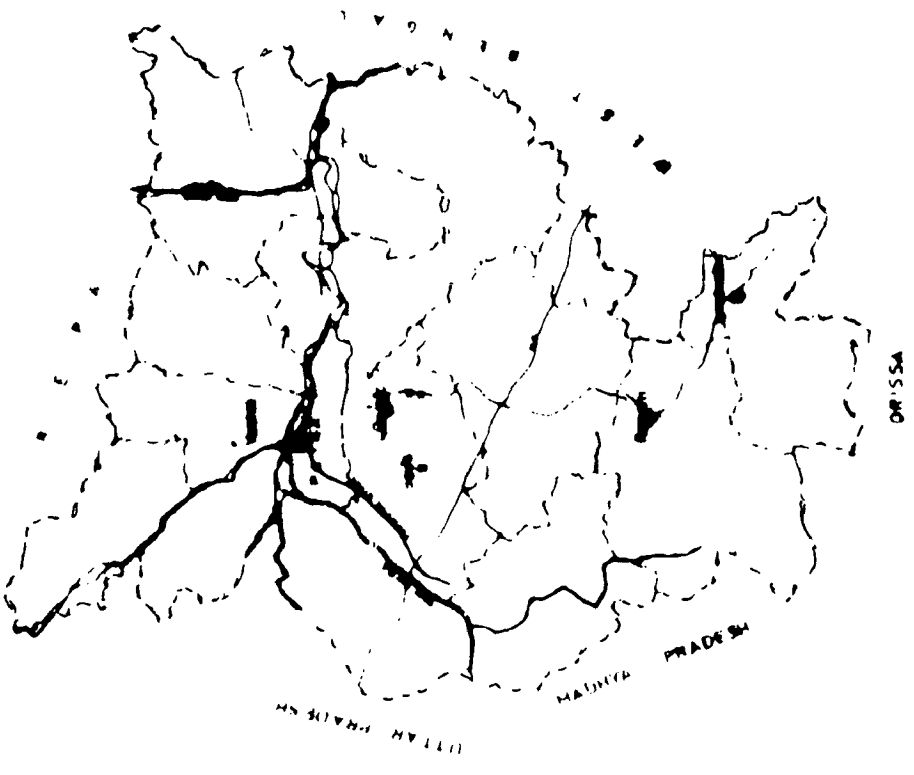
INTRODUCTION



LOCATION OF PATNA
 MANMOHAN LAR
 MAJAPUR
 U.O.R ROORKEE
 (INDIA)



**PHYSICAL DEVELOPMENT ALONG RIVER GANGA
 IN PATNA**



CHAPTER - 1

INTRODUCTION

1.1 INTRODUCTION

River front city can not exist without the river and river holds high importance for the city situated on its bank. Thus the river and the city are inseparable. It would be hard to imagine Paris without the Seine, a Leningrad without the Neva, Toronto without the lake front or Varanasi without the Ganga.

All over the world and throughout ancient times, human settlements settles mostly on the bank of rivers. All civilization of the world in the knowledge have developed along the great rivers i.e. Mesopotamia along Tigris Euphrates, Egypt along Nile, Chinese along Hwang-Ho and Indus along Indus river is acting as transportation artery from the ancient times.

Peopole owe their life and have learnt to live in society and developed different cultures and civilizations on the river front. But in modern town riverfront have been neglected. The result this neglect the town deprives of the great aesthetic potential of the river water. These are often screened with the backsides of industries, slums, dumping yards for all sorts of wastes and unplanned growth.

The river front in Patna has remained a neglected part of the town, so its potential is yet to be realised and harnessed.

1.2 IDENTIFICATION OF PROBLEMS

1. Patna town has only 6.39% of land for Surface & Air transportation of total landuse . It has only two roads -Ashok Rajpath & Chandragupta path except New Bye pass road i.e. connecting Eastern Patna (Old Patna)& Western Patna (New Patna). It has heavy traffic of inter & intra city. Besides inadequate road space, There are many Problems of existing traffic and transportation as-

- (a) road width, maintenance and bad junction results into traffic jams, no proper sight-distances.
- (b) Lack of organised parking spaces, Maximum kerb parking, No off street parking.
Mixed traffic, Crawling speed and deficiencies in different modes.
- (c) Traffic bottlenecks.
- (d) Lack of physical relationship with different modes of transport.
- (e) Encroachment of road by adjoining private property owners.
- (f) The scattered loacation and absolute design of terminals of Bus, Auto rickshaw and pedal rickshaw etc.
- (g) No proper road network.

In addition, to above mentioned probems, Bad management, poor services and maintenance and lack of finance are also constraintsof traffic & transportation in Patna.

2. At present accessibility to the river front is available in a limited sense only. Out of the 23 km length of the river front, There is hardly and properly developed walkways along the bank, except some area, the rest of whole area is accessible at various spots only. On the eastern part of the study area the condition is even worse. The river front is undeveloped mainly because of its unaccessible nature. Patna river front is accessible only 1 km in 23km stretch whereas London has 7 km in 11 km and paris even more about 8 km in 11 km stretch.
3. The Patna town has turned its back towards the river ganga; in spite of the pioucity of the river, its wide-width, more depth andorimportance as trade transport route of two metropolitans Calcutta and Delhi. From this reason, Town is deprived of the great aesthetic potential of the river. water presently one has to peep through small gates or narrow lanes to have a glimpse of the river opening out on the river.
4. Infrastructures like organised walkways, sitting arrangements, recreational facilities etc. needed to enjoy the open river is lacking on the river front of patna.
5. There is landuse problems on the riverfront. Unplanned residential development of river front has resulted a decrease in accessibility. There has resulted a decrease in accessibilty. There non confirming land use e.g. unplanned commercial area, unauthorised jhuggis, cattle houses etc.

and non-compatible landuse has developed.

6. Patna is a flood prone city. The city has constantly been threatened by floods in monsoon seasons from North because the high flood-levels of the river ganga is higher than the general level of th city.
7. Patna as a town site is situated on an upland strip of land along south bank of River ganga between Buxer in the west and Mokama in the east and having an average width 1.5 km to 2 km. The strip slopes towards the south and elevates further in the south. This sort of constrained topography has given as saucer shape to it's ground and a linear shape to the urban settlements.

1.3 AIMS AND OBJECTIVES

- 1 To Assess the problems, its potentialities and utilization of River front to integrate the future development of Patna in an efficient and aesthetic manner.
2. To provide healthful living environment integrated with the overall city development by improving the transport and communication linkages between the river front and the city level.
3. To Create infrastructural facilities not available in the town.
4. To appraise and highlight the physical & infrastructural development along theriver ganga in patna and to give a face lift the town towards river..

1.4 SCOPE

The Scope of this study will cover the development of Riverfront in general and important aspect of town. Detail study of Riverfront of Ganga from A.N.Sinha Institute to Gai-ghat of Central Zone of patna will be carried out.

1.5 LIMATATIIONS:

Such a study needs a lot of study involving enoguh Survey and collections of basic data from various sources. This can be only be done with the help of various sources. This can be only be done with the help of staff in a considerable time. Since I have taken this topic for my Thesis project, therefore, a limitations like time-factor & availability of other persons are there. Therefore I am undertaking this Project with the following limitations :

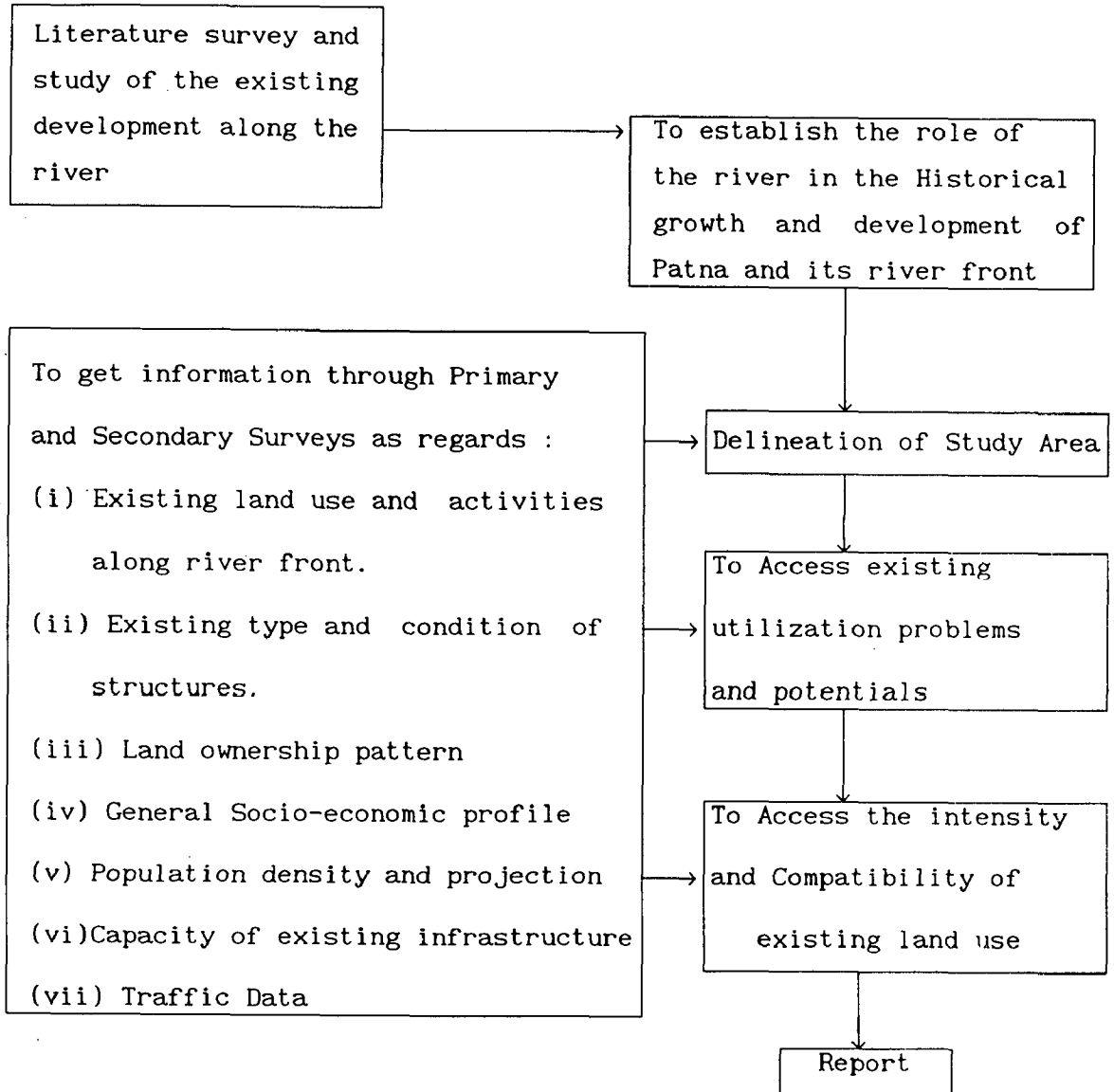
1. The study will be based on secondary data and informations obtained from reco rds of different department.
2. Due to limitation in carrying out detailed Surveys and collecting data from primary sources at individual level . The Study has been based on personal observation's and informations along with some data collected by disscussion with various experts and local people of the town..

1.6 METHODOLOGY

1. A survey be carried out to collect various relevant data regarding riverfront.

2. The information collected through the field surveys and secondary source be analysed for physical & infrastructural development of riverfront of Patna.
3. On the basis of these findings, the planning implications, of riverfront be considered, then planning proposals, and recommendations will be prepared.

METHODOLOGY



Chapter 2 :

LITERATURE SURVEY

CHAPTER - 2

LITERATURE SURVEY

2.1 HISTORY OF PATNA:

About twenty five hundred years ago, Pataliputra known as a patna today, rose to prominence as a seat of imperial govt. of Magadh and act as a Catalyst for spread of Budhism to Asia, Europe and Africa. In that time a small settlement "Pataligram" was existed on this site. This settlement attracts Rishis to establish Ashram in it. The Ashram of Varsha and Upersha had produced grammerian like 'Panini', who worte first ever Sanskrit grammer and great astrologer and mathematician "Arya Bhatta"contribution to mathematics and astrology has been of late been recognised by the world. Arya Bhatta's observatory is said to have existed at khagaul(in Patna) which seems a corrupt form of Sanskrit word "Khagole" means "Science of Astronomy".

In Historians view, the history of Magadha during the period of sixth century B.C. on of seventh century A.D. virtually constituted the history of the Indian sub-Continent as a whole.

2.1.1 Ancient pataliputra :

The most notable king of the Magadhan dynastry was Bimbisara who is credited to have built a new city at the foot of the hills lying to the north of Giriraja. He named the city Rajgriha (Modern Rajgir) or the 'king's House'. Bimbisar was

murdered for the throne by his son Ajatshatru, the founder of Pataliputra. He faced the hostility from the rulers of Sravasti and also the Vrijis and Lichchavis of Vaishali. Ajatshatru fortified the village of Pataligram which lay just south of the confluence of the Ganges and the sone and posted a garrison there to keep the northern tribes, especially the lichchavis in effective check. Later king Udyan, grandson of Ajatsatru, built a town within the fortress and shifted his capital there from Rajgriha.

After the fall of the sisunag dynasty (circa 400B.C.) the Nandas came to power. They in their turn, were replaced by the Mauryas. Chandragupta, the founder of Maurya dynasty brought the whole of Northern Indian and large parts of peninsular India under his capture. The bravery of Chandragupta, diplomacy and cleverness of Chanakya or kautilya, prime minister of Chandragupta have enhanced the glory of Magadh. He successfully defeated the invading army of Greek general Alexander and king of Syria. According to accounts of Magasthenes the Greek envoy, who visited patiliputra during the reign of Chandragupta, this historic city had a population of about 4,00,000, was 80 stadia (9.2 miles) long and 15 stadia (1.7 miles) broad and was surrounded by a moat 600 ft. broad and 45 ft. deep. It had 570 towers and 64 gates. The urban management was the responsibility of thirty members committee.

Due to the contact with Greeks a new Indo-Greek culture

developed, which is well reflected in the archeological finds found through excavation.

2.1.2 Pataliputra under Asoka :

Asoka, the grandson of Chandragupta Maurya, ascended the throne after the death of his father Bindusara in the 272 B.C., The greatest of Indian Emperors is said to have completely changed the appearance of the city. The capital was adorned with fine buildings of stone. Fa-Hien, the Chinese traveller, who visited the city in the 5th century A.D., approximately 650 years after the downfall of Mauryan Empire.

According to him, the city was so magnificent in form and structural beauty that he believed no human hands could have ever built Pataliputra. It must have had some divine builder. The place of Emperor was located at the city centre and it was made of rock-cut walls bearing artistic sculpture clad with precious stones and gems. There was a viharā built to preserve a foot print of Lord Buddha on a stone slab. A viharā was erected on pillars of stones having a circumference of 15 cubits (22.5ft).

During excavations carried out by Colonel Waddell in 1896 and Dr. Spooner in 1913 in Kumhrar, many important elements of that time are excavated and preserved in a Museum.

After the death of Asoka, Pataliputra decayed and for a while its history went into oblivion. But during the reign of the Guptas in the 4th century A.D. the town once again came into

prominence as a capital city. After the Guptas the glory of Pataliputra declined again for some time and in the 5th century A.D. it was ransacked and destroyed by the huns and king Shashanka of Bengal, an arch enemy of Budhism.

The chinese pilgrim Hiuen-tsans who visited the city in about 637 A.D., has written that the monasteries, 'Deva-temples', and 'topes' all lay in a state of ruin and there only seemed to exist a small walled city of 1000 inhabitants towards the north of the ancient capital.

2.1.3 Pataliputra under Shersshah and Mughals :

Afghan chief shersshah established his capital at pataliputra in 1541 and once again the city became a bustling centre of trade and commerce in Northern India, Shersshah also built a magnificent fortress here, of which the 'Paschim Darwaza' and the 'Purab Darwaza' are two significant remains even today.

Before Shersshah reign, Gopal rose to power in Bengal and extended his kingdom and founded pala dynasty. During the reign of palas, pataliputra again became important centre for missionary enterprise for propagating Budhism to other parts of India and abroad.

But pataliputra was ransacked by Bakhtiyar khilji in 1197A.D.

As Delhi saltanat emerged with seat in Delhi, Pataliputra lost its primacy and was reduced to a seat of regional govt.

under various rulers of khiljies, Lodies and Tuglaq dynasties between the 13th century A.D. to 16 century A.D.

Babar acceded to the Delhi throne after the famous battle of panipat in 1526. The sons of the defeated king Ibrahim Lodi tried to consolidate their position in Bihar. Jalan khan was posted at Patna to look after the deteviating situation there. Shershah was appointed as his deputy. He later became defacto ruler of Bihar and later captured throne of Delhi. He made his seat of power in Delhi, but patna was not ignored.

Jehangir acceded to the throne at Delhi and Patna remained headquarters of regional importance. A no. of mosque such as pathar-ki-Masjid and Gujari Mosque were constructed during his reign. Later Patna developed into a centre for Islamic learning as the principal of sabohi.

The city is said to have reached the zenith of its splendour during the reign of Azim-US-Shah, the grandson of Aurangzeb. In 1704 A.D. He named the city as Azimabad after himself.

2.1.4 European settlement of a Patna :

French, Dutch, Portugees, Englishmen came to Patna for business and established themselves in trade of Saltpetre, a basic material for Gunpowder, Thus Patna developed as a trading city.

There was great turmoil between 1720 and 1755 when patna was seized by Aliwardi khan. People of patna witnessed worst

ever massacre which befell on them after Afghan rebellion in 1748.

There take a turning point in the history of India in 1765, Clive succeeded to get Deewani rights of Bengal, Bihar and Orissa from last Mughal ruler Shah Alam. There great administrative and military reforms was done by Englishmen. In 1770 there was onset of worst famine in and around Patna. British inspired by a famine and constructed a vast granery in the form of Golghar in Patna.

2.1.5 1857 Movement :

The events of 1857 in the country had inspired the people of Bihar also and they prepared to overthrow the foreign rules. The letters found in the house of Pir Ali, a book seller of Patna, in the course of search in his house on the 4th july 1857, Confirmed that the rising of movement was not a sepoy mutiny but a planned effort to free the country from foreign rule.

Tayler was commissioner of Patna at thattime and general Lloyd was commander of the military divisions of Danapur cantonment. Tayler wanted lloyd to disarm sepoy. The general was hesitant and at last he reactantly agreed to take away the percussion caps of the sepoy. The Indian soldiers could not tolerate the insult inflicted upon them. The Indian soldiers took their arms, left their lines and marched towards Ara to join valiant Babu Kuer Singh.

Dalhatta and Didarganj Agricultural Marketing produce centre on the proposed developing area.

(ii) CENTRAL ZONE :

Central zone caters the economic activities of the town. All colleges of Patna university except Patna Womens college and Patna Art college; P.M.C.H, A.N.Sinha Institute of Social Sciences, B.N.R school and college, S.C.E.R.T, Govt Polytechnic, Pathar ki Masjid, etc. are situated on riverfront. Some part of central zone near Gandhi Maidan is occupied by Distt. Administration building, S.K.M hall, Bus stand, Bankipur club, Roman Catholic church etc. There is commercial and mixed landuse on both side of the Asoka Rajpath. Subji mandi of the Aanta Ghat and Munsallahpur hat sevres the vegetable requirement of the Zone. The Predominant land use near Gandhi Setu is residential.

(iii) Western Zone :

The predomaint landuse of the Western Patna is Public and Semi-public with residential. But landuse of riverfront is residential with Commerical. There is one organized 'Rajendra Smriti park' near Bans ghat but it is not fully utilized due to vision of Cremation activity of Bans ghat. There is non-confirming and conflicting land use like cattle houses, Jhuggies, Brick kiln etc. in this zone.

CHAPTER : 4

RIVERFRONT

The River front of 23 km stretches on Southern bank of the holy river Ganga which lies in Patna town in between the Didarganj (Eastern Patna) and Danapur (Western Patna) is proposed to be developed.

4.1 LAND USE

4.1.1 Land use characteristics :-

As discussed in chapter 3.6.2, Patna is divided into four zones. However, the river front falls only in three zones, i.e Eastern zone, central zone and Western zone. The Southern zone which is located on the north of main railway line (E.R) doesnot have any riverfront. Accordingly the river front has been divided into three zones, Synonymous to the zones an mentioned above.

(i) EASTERN ZONE

Eastern Patna has wholesale market of cereal and small household articles and service industries of Patna region. But habited area of river front of Eastern zone is residential which is unplanned and developed in a haphzard manner. Maximum part of riverfornt is still vacant due to low lying and Non-accessibility.

There are a few important buildings of Oriental college, Quila house , Sales tax office, Bank of India etc. and Marketing centre naming Gujari Bazar, Gurhatta, Maruganj,

Chapter 4 :

RIVER FRONT

On the 4th August 1857 Tayler was replaced by Summeuls. Then 200 British soldiers and two guns protected the Patna city. The English were not able to stop the activities of the rebels in Northern India though Patna remains peaceful. Ultimately struggle of 1857 failed and the English ruled India another ninety years.

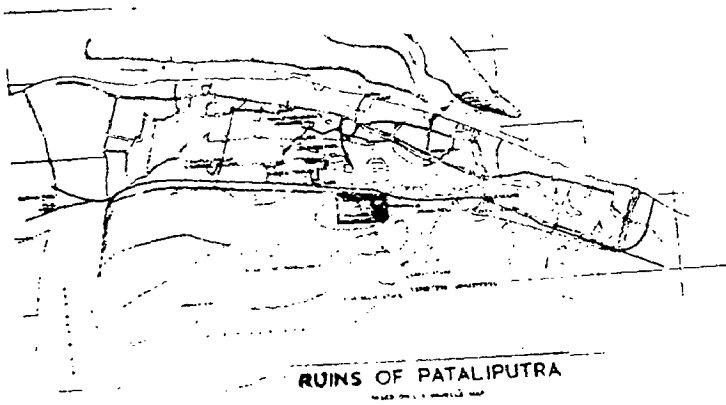
2.1.6 Creation of the province of Bihar & Orissa :

The province of Bihar and Orissa was created in March 1912 by a proclamation of the governor general of India. Patna become the capital of Bihar state and a new capital city was laid out towards the west of the Patna-Gaya Road by Architect J.P. Munnings. It contains the Raj Bhavan, the Secretariat, the Council chamber, the High court and the residences of Ministers, Judges and Other officials. The establishment of the Patna University in 1917 created a cultural focus in the city and imparted to it the functions of a University town in addition to its being the state capital.

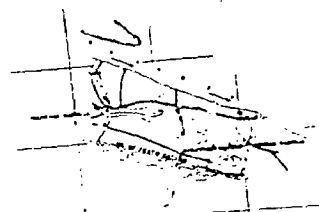
There was an unprecedented uprising in 1942 when the Britishers were engaged deeply in the world war-II. During the mass upsurge innocent people were killed and imprisoned. The Saheed Smarak in front of pre-existing assembly buildings bears a well monumented testimony to these events.

2.1.7 Post Independence Patna:

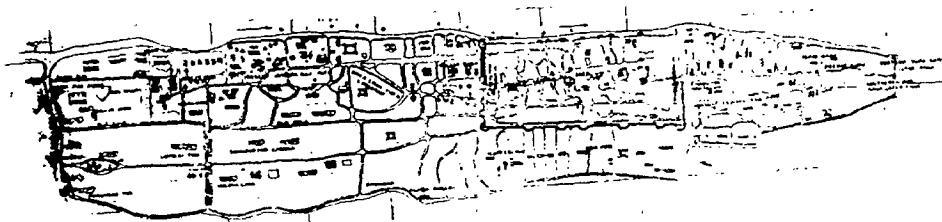
During the post independence period, Government



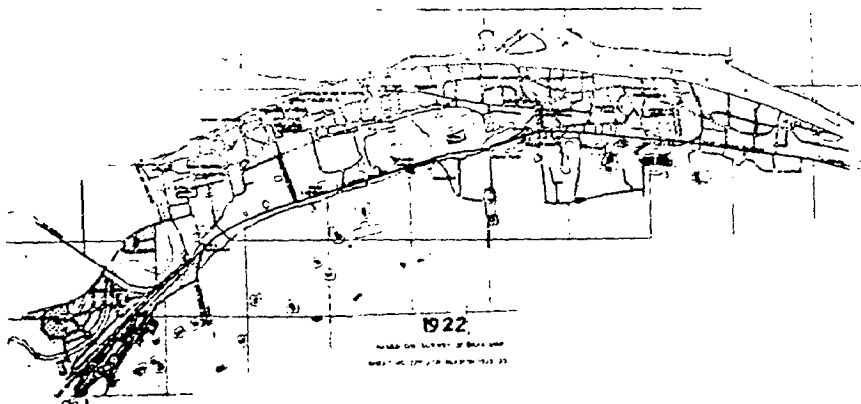
RUINS OF PATALIPUTRA
BASED ON LAMBERT'S MAP



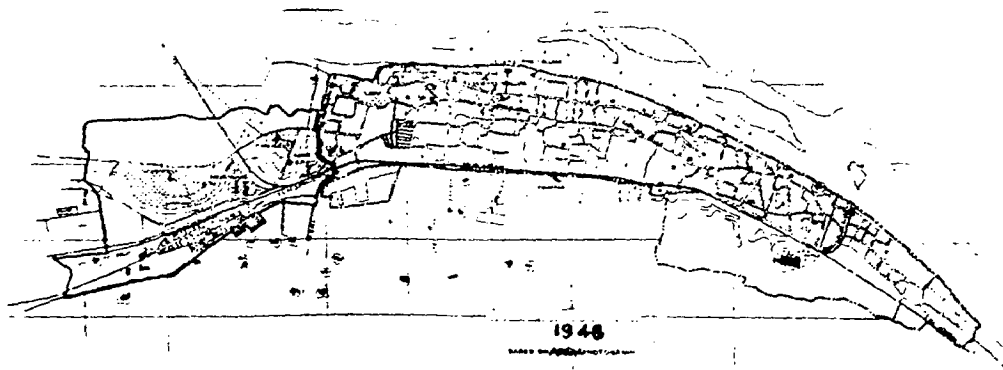
SHER SHAH'S FORTIFICATION
16TH CENTURY
BASED ON LAMBERT'S MAP



1812
BASED ON A MAP
IN JOURNAL OF THE ASIATIC SOCIETY



1922
BASED ON SURVEY OF INDIA MAP
SCALE 1:50,000



1948
BASED ON SURVEY OF INDIA MAP

HISTORICAL GROWTH OF PATNA

activities have increased many-folds and so has its administrative machineries. The implementation of the Govt's welfare programme and the five-year plans have resulted in large-scale building activities in the city both in the public and the private sectors.

Patna, thus, is an ancient city, through the centuries it has chequered history, it has witnessed the rise and fall of many empires. It had its phases of glory and prosperity and also its periods of oblivion and decline.

2.2 IMPORTANCE OF GANGA

The river Ganga travels 2525 km start from Gangotri in the Himalaya and ends of Ganga sagar in the Bay of Bengal. From time immemorial, the ganga has been a faith, worship and devotion of Indians. For Indians ganga is as:

"To touch it, to drink it to bath in it, when alive, to be washed in it when dead, is to be cleansed within and without for life and beyond."According to Vanparv of Mahabharat, Bhagarth through long and arduous prayers persuaded the holy Ganga to descend from heaven to wet the ashes of his ancestors, so that they might ascend to eternal heaven. Lord Shiv held the Ganga (the tremendous flow of the river) in his hair at Hardwar in order to save the earth from her wrath.

Ganga is a perennial river, the possibility of developing water transport as a part of the overall mass transportation system must be taken. A city waterway system (like Venice, Amsterdam , Calcutta etc.) utilizing the Ganga would provide

inexpensive transport, especially for goods to many parts of the city and take a great deal of congestion off the road and maintenance of waterway's cost is also much less.

2.3 GANGA ACTION PLAN(GAP)

The GAP aims of diverting the sewage flowing into the river to other locations for treatment, and converting into a valuable energy source. The various schemes like interception & diversion of sewerage, set up sewage treatment plant & Electric crematoria provide low cost sanitation and an facilities at riverfront etc. are proposed under the action plan to reduce the pollution of ganga.

Under GAP scheme, there electric crematoria and basic infrastructures to be provided to eight Ghats of riverfront in the Patnatown.

2.4 CONSERVATION OF SITES OF RELIGIOUS & ARCHEOLOGICAL SITES

Conservation deals with the aspect of preservation of cultural/ architectural heritage. Conservation aims at maintaining the values of the building and areas providing a spatial setting to them. It is intended as a means of safeguarding cultural heritage with a view to suitably adopting it to the existing societal and functional needs by a series of technical , legislative, financial, fiscal , educational and other measures. The concept of conservation is the reconciliation of change and preservation of a historical area within the planning context and on economically viable basis and to

demonstrate the possibility of environment improvement as a strategy and means of conservation with the help of the local authorities and through community participation.

On the entire stretch of the river front of Ganga in Patna., there are many building's of archeological importance and are heritage for the town such building along with the religious structure shall be very difficult to touch, so preservation of almost all the buildings and physical features should be retained. Religious & Archeological sites must be made integral part of the Master plan of city rather than to serve exclusively an places of tourist attraction. To ensure the preservation of ancient monuments and group of building's ,they should be incorporated into contemporary life and find ways of revitalizing them in such a manner as to have an active part to play in social life.

2.5 PHYSICAL DEVELOPMENT :

The Development Proposal will be made to design the road pattern, other transportation arteries (Water, M.R.T. etc.) within the town. In the study area the landuse, important road-network and the important building's which need restoration barying-form along the Riverfront upto Asoka Rajpath will be undertaking.

Development is carrying out of building, engineering, mining or other operations in, on, over or under land or the making of any material change in the use of any buildings or other land(As defined in Town & Country Planning Act- 1962 of

U.K.) Physical means relating to the structure, size, or shape of something (involving things) that can be touched and seen.

2.6 STANDARD FOR DIFFERENT LANDUSE :

As there is no fixed planning standards of landuse of town or city. So landuse of a well planned city can be taken as standard. The comparative analysis of the land use is as shown in the table.2.1

Table 2.1

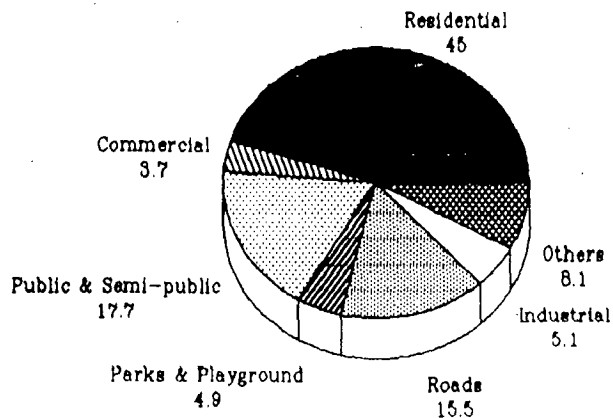
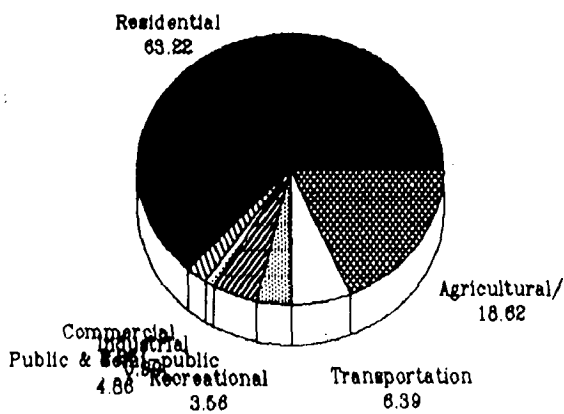
Sl No.	Uses	Patna	Chandigarh	Bhuvaneshwar
1	Residential	63.22	38.0	30.7
2	Commerical	2.26	3.0	2.8
3	Industrial	0.99	9.2	9.0
4	Public & Semi-public	4.86	15.0	14.1
5	Transportation	6.39	18.3	13.0
6	Recreational	3.56	16.5	18.0
7	Others	18.62	-	12.4

SOURCE : MASTER PLAN OF CHANDIGARH, PATNA, BHUVANESHVER AND T.C.P.O.

Patna has high percentage of residential uses in the Comparison of New planned towns and it has high stress on the commercial, public & semi-public, circulation and recreational uses.

Comparision of Patna landuse with well planned city of India and national level

LANDUSE OF PATNA AVG.LANDUSE OF STATE CAPITALS OF INDIA

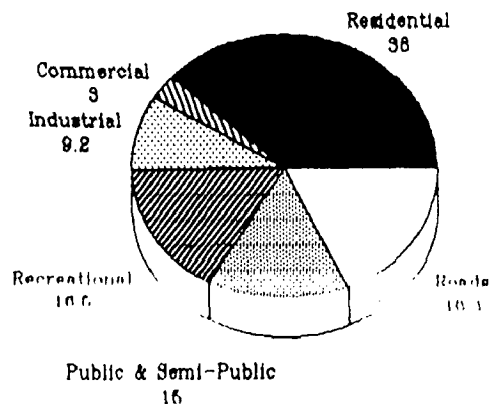
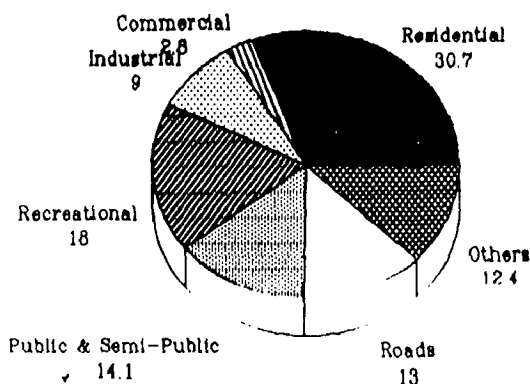


SOURCE: MASTER PLAN PATNA-2001

T.C.P.O. CHANDIGARH

LAND USE OF BHUVANESHVAR

LAND USE OF CHANDIGARH



riverfront development between Delhi and Patna. But some ideas may be incorporate by studying the development along river Yamuna.

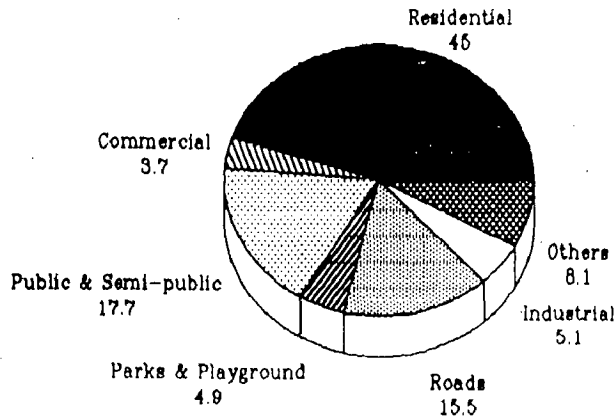
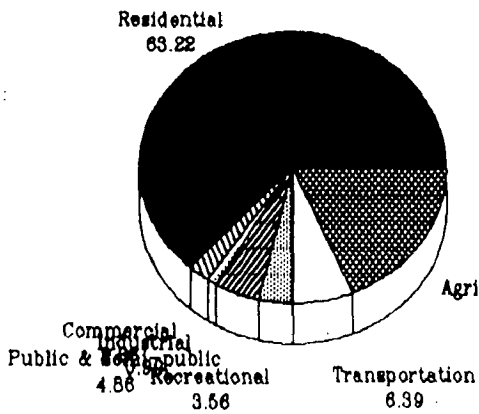
Hardwar, Rishikesh and Varanasi towns are also river facing town. It enjoys the riverfront and its has good aesthetics values. But these towns are religious town whereas Patna is a administrative and commerical town. At Hardwar, Rishikesh and Varanasi, Ganga width (Bed) and depth is less and specially Hardwar and Rishikesh, terrain is hilly, Therefore, Hereriver cannot be developed as transportation artery. But It has some similarities in the development of Ghats as Patna.

There are three rivers Son, Gandak and Punpun meets in Ganga at Patna. Due to availability of depth it has a potential to develop as like a Port city. The Ganga river only floods in monsoon. All the potential of the sea city exists in at Patna except experiencing the tidal effect and accordingly Windward effects.

Some idea may be taken from the development of Nariman point and Cuffe-parade in the Greater Bombay. There is a road provided along the water front (sea shore) and commerical activities liking shopping, hotels, offices etc. has been developed there. Earlier Nariman point and Cuffe-parade was not well developed as the present riverfront of Patna but due to providing it with infrastructures like roads etc., It becomes highly developed and today it is big commercial centre and a landmark of the Greater Bombay.

Comparision of Patna landuse with well planned city of India and national level

LANDUSE OF PATNA AVG.LANDUSE OF STATE CAPITALS OF INDIA

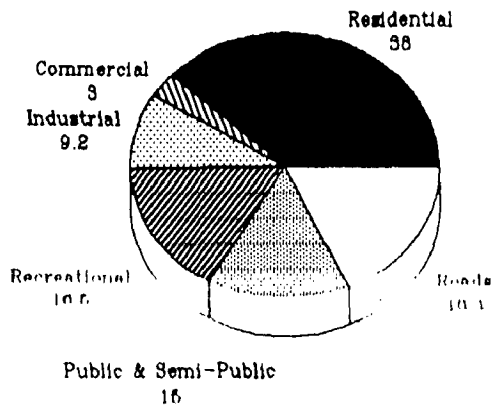
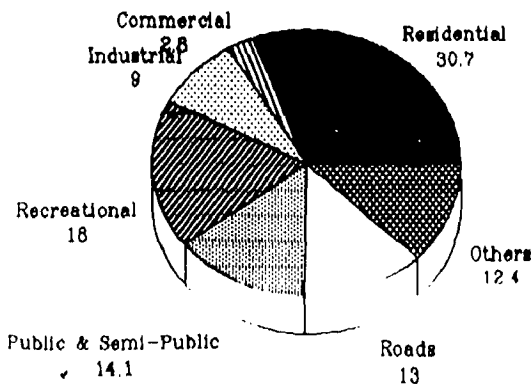


SOURCE: MASTER PLAN PATNA-8001

T.C.P.O. CHANDIGARH

LAND USE OF BHUVANESHWAR

LAND USE OF CHANDIGARH



So it is an urgent need to develop all mentioned uses such as commercial, industrial, public and semi-public, circulation and recreational uses in Patna. The proposed development of commercial, recreational, public and semi-public and transportation on riverfront will reduce the pressure on these uses of city.

2.7 INFRASTRUCTURE :

A term widely used in planning denoting the services and facilities which are an integral part of the life of an urban community .In a healthy urban community such an infrastructure is geared to expanding economic and social life. It comprehends transport facilities and communication, power, shopping facilities, housing, school and recreation facilities.

Infrastructure can be divided in two types according to the nature of their need and function:

- (i) Social infrastructure- It includes the infrastructure needed for the overall social development of an area i.e. school, shopping, health centre, recreation, banks, Post office and open space etc.
- (ii) Utility/Physical infrastructure- This include the basic urban services which are regarded for the Physical development of an area.

It can be classified as Transport network, Water disposal, Surface drainage, Electricity & Communication network.

The quality of life in a settlement very much depends on the level of availability, accessibility and quality of infrastructure provided to it.

2.8 CASE STUDY :

Patna town is developed only one side (southern bank) of the river Ganga but Delhi has developed along both side of the river Yamuna which one side has Ghat, cremation grounds, institutional building, industries, parks etc. and another side is trans-Yamuna colonies i.e. not integrated with the city.

The development of riverfront is yet to be developed considering all the ecological and scientific aspects, As a project of special significance for the city, (As stated in Master plan of Delhi- 2001 A.D). Similarly riverfront of Patna is under developed except on some location.

The Ghat of the Yamuna in Delhi is used as washing of clothes, cremation, bathing and grand rituals. But Ganga-Ghat in Patna is used as bathing, cremation, boat men, ferry station, daily rituals and grand rituals in the festival of Chhatha in the month of Kartik for two days etc.

The water of Yamuna at Delhi is more polluted than the Ganga at Patna. Yamuna in Delhi is dry during two or three months in a year but Ganga is a perennial. Ganga is having wide width and depth from Patna to Bay of Bengal, Therefore, it has a potential for the development for the ferry services and mass transportation system. Patna town is not taking water from river as at Delhi. In general, not much similarities are there for

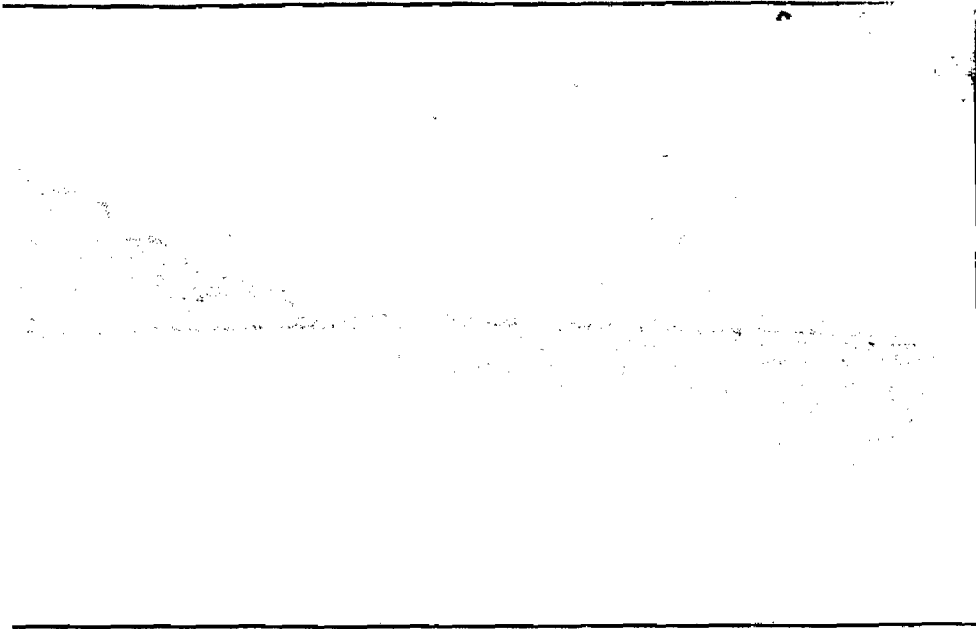
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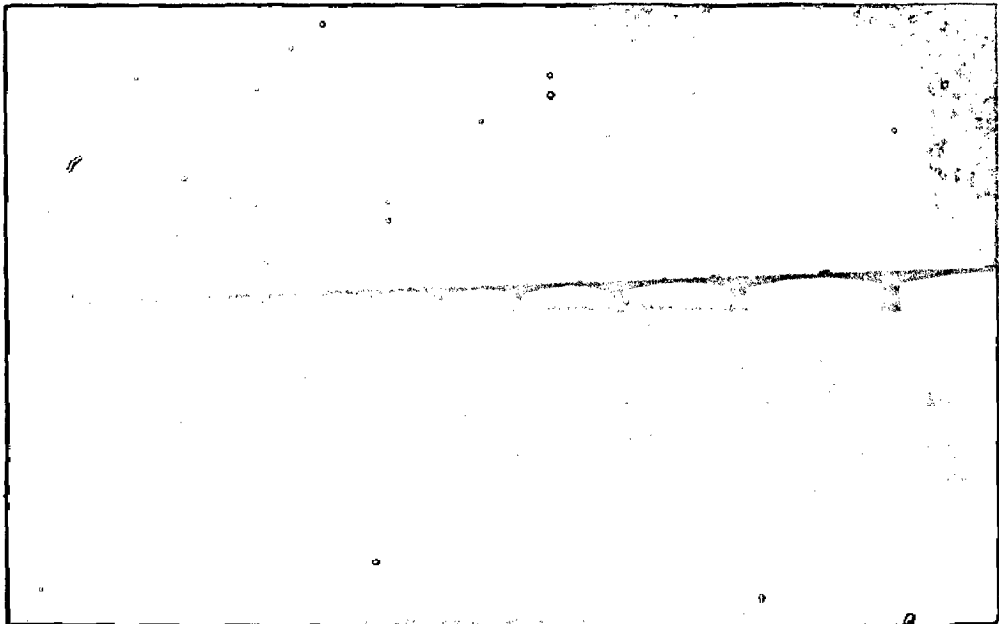
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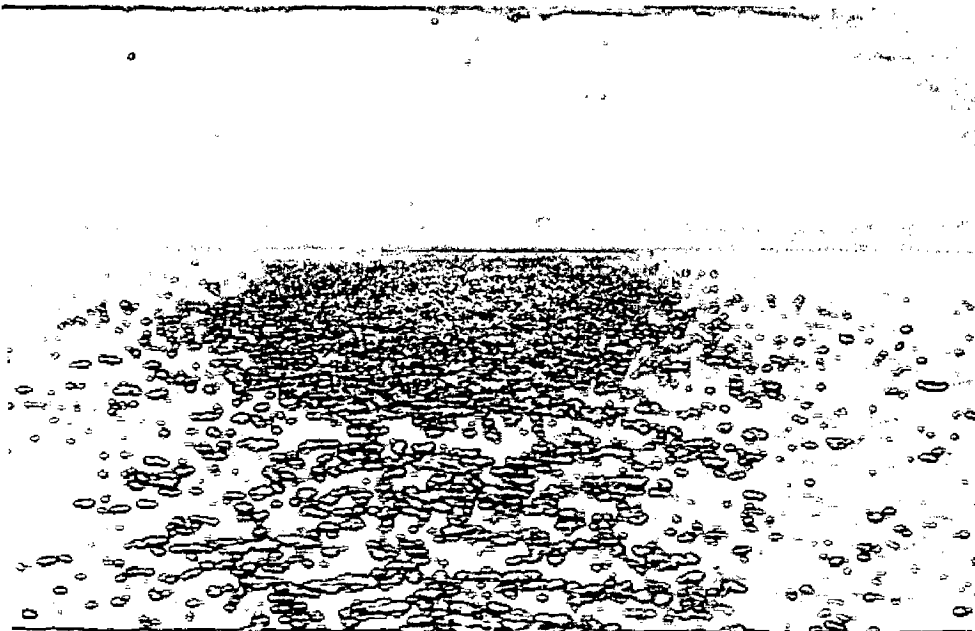
(a) Patna : River front



ahatma Gandhi
etu-longest
ver bridge of
sia



(c) River front of
Patna - View



Chapter 3 :

STUDY AREA : PATNA

CHAPTER-3

STUDY AREA : PATNA

3.1 RIVER FRONT DELINEATION CRITERIA

There are two basic criteria for delineation of riverfront in planning. The first is that of fixing up of a certain distance from the river's edge based upon the average distance of the building edge from it. If there is any road running parallel to the river, then the river front the riverfront may be delineated upto the road. Here by this method, delineation of river front in the Patna has been done. The width of river front is taken upto the road running almost parallel to the river Ganga, "ASHOK RAJPATH".

The Second criteria is to delineate the river front depending upon the river related activities. The river front boundary is fixed at the limit where the influence zone of the activity ends. This principle is much more rigours and difficult to apply principle. It is mostly used in cases of much larger area than a city or part of it.

3.2 INTRODUCTION TO STUDY AREA

Patna, the capital of Bihar state is situated on the southern bank of the river Ganga. Patna is a very old city. It's history dates back to the sixth century B.C. Since then the city has grown through fluctuating fortunes. Throughout this period the city has spread mostly along the bank of the river Ganga, Patna has always been a centre of commerce and trade but has

never promoted industry. It has harboured great institutions of learning and it has also been a centre of administration.

Patna is a linear city which has grown on either side of a main road (Ashok Raj Path) running east to west on a ridge, almost parallel to the bank of the river Ganga (presently NH-30). Along its length the city now measures about 23 km. While the river Ganga always formed a natural barrier for expansion towards the North, any possible southward expansion was greatly restricted because of the southern areas being liable to floods by the river punpun and it's low lying area.

The city can be divided into three distinct zones according to their functions and physical characteristics. The eastern most zone which is the old city and the ancient capital is full of derelict buildings beaded along narrow lanes and bye-lanes with obsolescence and insanitary conditions. This zone contains one of the biggest centres of wholesale trade at Maroofganj and Mansoorganj and also one of the most sacred places of the sikhs in India, the Gurdwara Harmandir sahib, where Guru Govind Singh the tenth Guru of the sikhs was born in 1666.

Contiguous to this zone and towards its west is the middle zone or the central city, covering the area roughly between the Paschim Darwaza in the east and Budh Marg in the West. This zone, is the business and commercial core of the city. This also houses the bulk of the institutional, cultural and district administration building. It is the most overcrowded

zone of the city and others striking contrast within itself between the group of fine buildings on the main and artery roads.

The Western-most zone is the new capital area. It differs significantly from the other zones where monumental buildings are there. It is a planned radial pattern. This area houses principal buildings like state government houses, High Court, Secretariat, Legislative, buildings, Museum, Raj Bhawan & Planetorium etc.

Patna has an extra ordinary background in its all historical, geographical and environmental aspect and it has also unique political, social and cultural history. But the rapid rate of increase of population, haphazard growth of slum in high population density area, unplanned development and increase of traffic has created many problems to the city and riverfront of Patna.

Great cities of the world have been often built on the bank of great rivers. Settlement and civilization came early upon the rivers. From Taxila and Pushkalavat through Indraprastha, Mathura, Kausambi, Prayag and Pataliputra down to Tamralipta, a string of cities stretched along the Ganga and its tributaries.

Even before the advent of the East India company, although the land route was also quite developed along the G.T. Road, the river transport all the Ganga across the vast gangatic plain was the major Contributor of trade and Commerce and

passengers movement. Many big cities have also come up along the river edge-Kanpur, Allahabad, Varanasi, Patna and Calcutta.

Many Water fronts have been rediscovered and redeveloped aesthetically since the beginning of this century. The most illustrious examples are Lake Front, part of Chicago by Denial H Bungham in lower Manhattan in U.S.A.; Thames in London and Seine in Paris.

Patna is a very historic town .It is situated on southern bank of the river ganga along 23 km stretch. The river is very wide and deep Because of this quality of the river, the town is on the Main trade routes of the country and is considered as an important trade centres in the Eastern India.

Inspite of the pioucity of the river, its wide width(bed), depth or importance as trade transport route, the town has turned its back towards the river.The town is deprived of the great aesthetic potential of the river water.

The existence of Patna on the river ganga and its growth along 23 km is really a great distinction for the town as no other town has such a large water front in the country even the Marine drive of Bombay known as 'necklace' is less than half the length of the water frontage that patna has.

3.3 HISTORICAL EVOLUTION OF THE CITY

Patna stands on the site of the ancient metropolis of Patna or Pataliputra. Various legends exist regarding its origin. The most popular legend ascribes it to a prince named

Putraka, who created it with a stroke of his magic staff and named it in the honour of his wife, the princess Patali (story found in Katha- Sarit sagar and in Hiuen Tsiang's Travles). It is also said that originally pataliputra was a village known as Pataligram appears to have been derived from 'patali' or 'trumpet flower'. It was called Palibhotra by Megasthenes.

Ajatsatru's Grandson Udayan, transferred the Magadh capital from Rajgriha to Pataligram. This Pataligram became the centre for development of Patna town. Chandragupta Maurya, Asoka, Samudragupta's great denstiny of Patna was destroyed by Huns and Sasanka in sixth century A.D. In 1541, Shershah while returning from Bengal passed through the place and impressed by it's strategic location and the fortified the place. This caused the town to develop as a trade and commerce centre. This was the milestone for the formation of present Patna.

With the advent of British, one major development took place. This was laying railway line from Calcutta to Delhi via Patna. Thereby patna become on important landmark on the main railway line.

At the time of independence in 1947, this took the shape of an Bihar state capital from provincial state. Therefore, there become a need of state level government offices and other allied offices in Patna. So High Court, Govt. Secreteriat, and Staff'sresidence was planned in Western zone. Then Western zone was administered by Patna Administrative Committee and Eastern and Central zone was governed by Patna City Municipality.

Patna City Municipality and Patna Administrative Committee merged to form Patna Municipal Corporation in 1957.

The heavy demand of houses for Government employs at the time were met by developing residential colonies along railway line in the Western zone of Patna. Afterward housing cooperative society initiated a chain of housing schemes in the Western zone.

One major change took place in the Patna urban Agglomerate with the opening up of a Road bridge on Ganga 'MAHATMA GANDHI SETU' in 1983 linking Patna (South Bihar) to North Bihar by roadways. There is only two road bridges one is Mahatma Gandhi Setu, 5.6km long at patna and the other is 'Rajendra Bridge', 100 km East from Patna at Mokama on the down stream of river Ganga connecting South Bihar to North Bihar.

3.4. LOCATION & GEO-CLIMATIC CHARACTERISTICS

3.4.1 Location

1. Latitude : 25 degree 37 min. North
2. Longitude : 85 degree 10 min. East
3. Elevation : 173 ft. above sea-level.

3.4.2 Topography

Patna is situated on the southern bank of the river Ganges. The southern side of the city, Punpun river flows which meets the river Ganga near Fatuha which is situated has 8 km from Patna in the down stream of ganga in the East and Sone river flowing west of Patna meets the river Ganga near Koilvar and Gandak river meets in Ganga from the Northern Side just in front of central Zone of Patna.

Thus the city of Patna is surrounded on all the sides by the rivers. The ground level of Patna slopes away from Ganga river and the topography of the town is like a saucer. During the Monsoon season all the three river's water level rises and H.F.L. becomes much above the average ground level of the city. As such all the rivers have been provided with protective embankment to prevent the flood water to enter into the city but wherever river is in High Flood level the storm water of the city cannot be drained without proper outlet.

The there at of flood persists and the prophes which Lord Budha had made about 3000 years ago still holds good. Rashtriya Barh Ayog has identified whole of patna as flood prone area. The construction of new Bye pass road and embankment of river Punpun has given some protections to the southern parts of the city from flood from the river punpun. But some parts of the southern areas, which are low lying are still subject to annual innundation and water-logging, especially during and after the mansoons. Most of the parts of Kankarbagh colony, Rajendra Nagar, Nehru Nagar, Pataliputra colony submerged during rainy season due to low lying area and not a proper drainage system.

3.4.3 Climate

Patna has an extreme type of climate. The cold season in Patna is quite pleasant. The days are bright and warm, and the sun is not too hot. when the sun sets in the evening the temperature falls, and the warmth of the day gives place to a sharp bracing cold. The Winter season commences early in

November and ends in the middle of March.

The Summer season, which then sets in, lasts till about the middle of June, Soon after the rainy season starts and continues till the end of September. But as the beginning of this season depends on the setting in of the monsoon winds from the Bay of Bengal, the rains sometimes come in the last week of May and sometimes as late as in the second week of July. The month of May and the first half of June is the hottest. During this period, the effects of heat are at times aggravated by the blowing of hot parching winds and clouds of dust. In the rainy season, the heat is moist and the night are oppressive.

TABLE 3.1

Month	Mean daily air temp.		Rainfall (mm)	Max. Relative (%)humidity	Evaporation (mm)
	Max.	Min.			
JANUARY	23.6	11.0	21.1	74	74.4
FEBRUARY	26.4	13.4	20.0	66	109.2
MARCH	32.9	18.6	6.7	49	207.7
APRIL	37.6	23.3	8.3	47	285.0
MAY	38.9	26.0	28.3	61	285.2
JUNE	36.7	27.1	139.0	75	237.2
JULY	32.9	26.7	265.8	84	170.5
AUGUST	32.1	26.6	307.1	85	136.4
SEPTEMBER	32.3	26.3	242.5	82	123.0
OCTOBER	31.9	23.0	62.8	72	108.5
NOVEMBER	28.9	16.1	5.7	68	81.0
DECEMBER	24.9	11.7	2.4	73	68.2

Source: Meteorology Dept. Patna

During the last decade 1971-80, the highest temperature 44°C was recorded in June 1972. Generally the

maximum temp. in the Patna varies from 43 - 45^oC. the average rainfall is maximum in August month, in which rainy days varies from 10 to 14 days of month and actual rainfall occurs 235-356 mm. The months of October and November are quite pleasant, as there is neither too much hot nor too cold.

From November till April, the prevailing direction of wind is from the west, but a marked change takes place with the commencement of the monsoon, which is generally caused by the first cyclonic storms that enter the mainland from the Bay of Bengal. The moist winds from the Bay first enters Bangala Desh in a northward direction but afterwards gets deflected by the Himalayan ranges and enter the region around Patna from east. So, after the passage of initial cyclonic storms, eastern winds set in Patna and continues with occasional interruptions until the middle of october, after which western winds again become predominant.

3.5 POPULATION GROWTH OF PATNA

The population of Patna town in 1991 as per census report is 10,99,647. It is seen that the population of the city registered of maximum growth in the decade 1971-81 and second higher growth rate is seen in the 1951 census which indicates the increase economic development in the state. In the decade following the year 1951 when programmes of economic developments of the state gained momentum through implementation of the first and second five year plans, the rate of population growth

dropped to 28.61 percent. Thereafter the population of city growth trends vary between 28.61 to 29.7 percent.

Assuming that the present trend of growth will continue for the next decade, the projected population for 2001 is 141,8059 by Geometric progression method. Since the population increases with G.P. and Patna town population trend of past shows the G.P growth.

TABLE 3.2

Year	Population	Rate of increase of population per decade	
		A. P. Method	G. P. Method
1901	134765	-	-
1911	136153	1.01	1.00
1921	119976	-11.90	-12.00
1931	151969	33.10	29.00
1941	196415	23.00	21.00
1951	283479	44.32	37.00
1961	364594	28.69	25.00
1971	473001	29.73	26.00
1981	852731	80.28	61.00
1991	1099647	28.95	25.75

POPULATION TREND PATNA

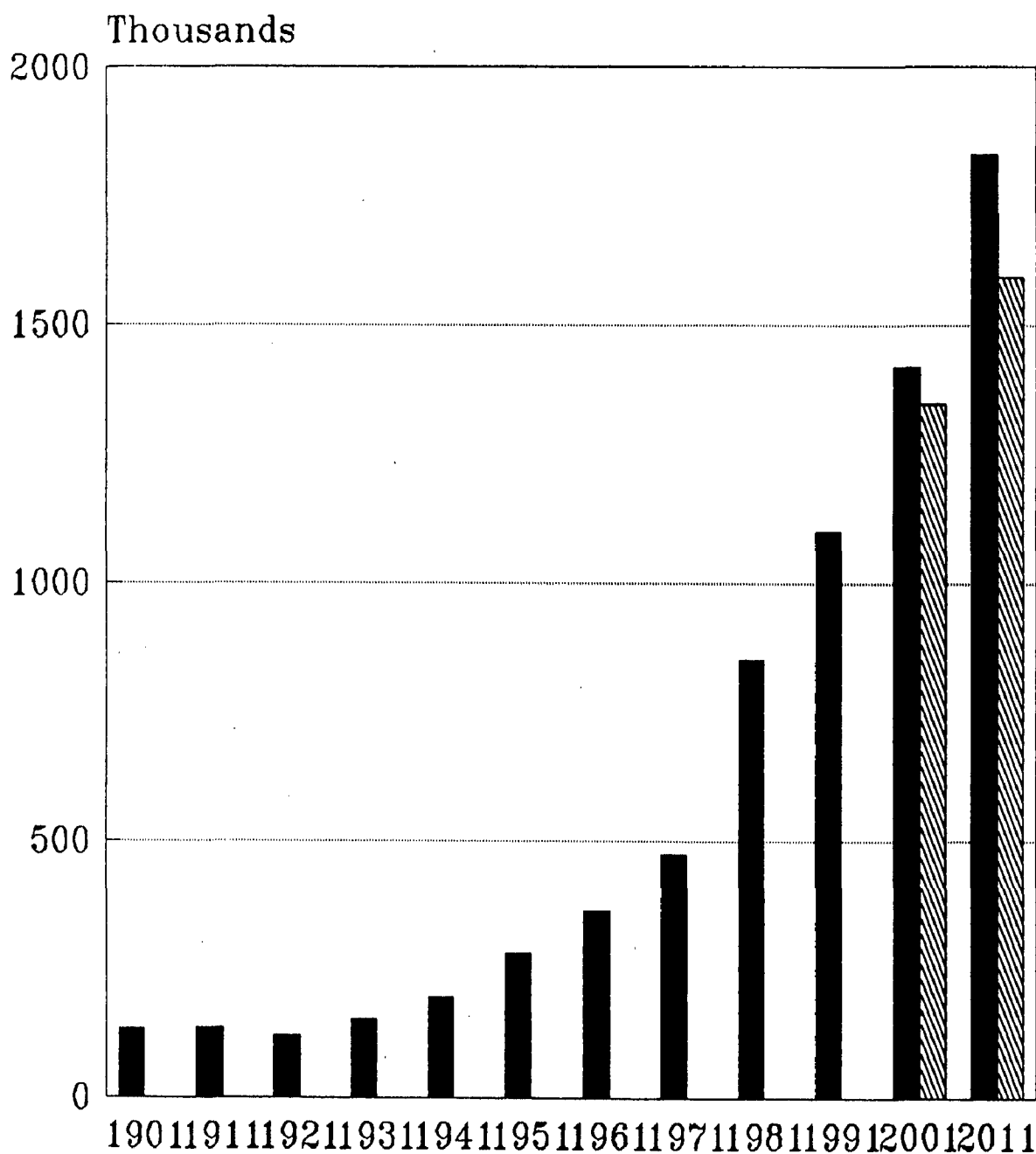


Fig. 3.1

■ Proj.(A.P.) ▨ Proj.(G.P.)

POPULATION TREND IN PATNA (Projected)

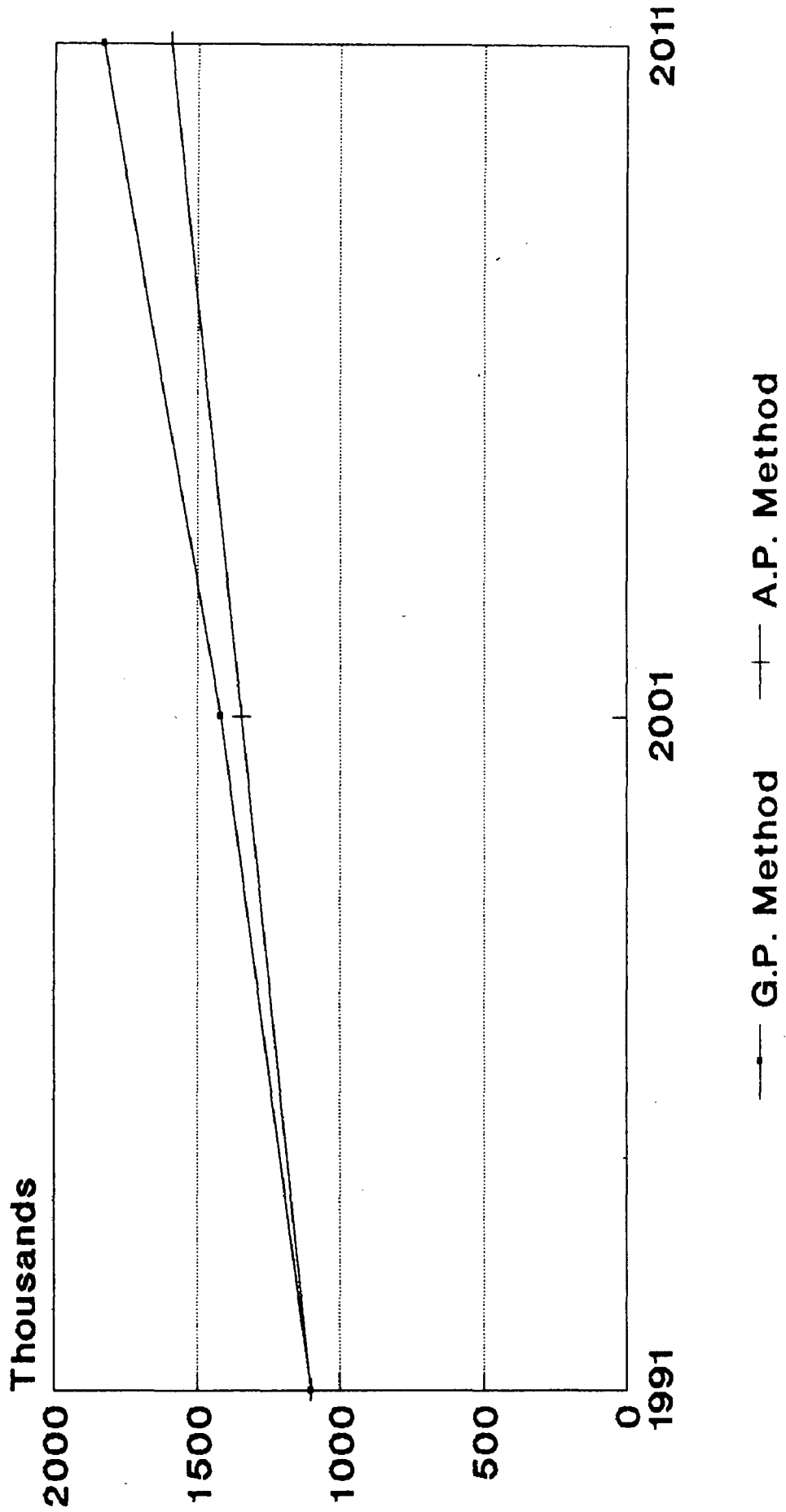


Fig. 3.2

Source:Census Book

TABLE 3.3
PROJECTED POPULATION FOR PATNA

Method	Projected	Population
	2001	2011
A.P.	1346563	1593479
G.P.	1418059	1828671

3.6. LAND USE

3.6.1 Land use pattern

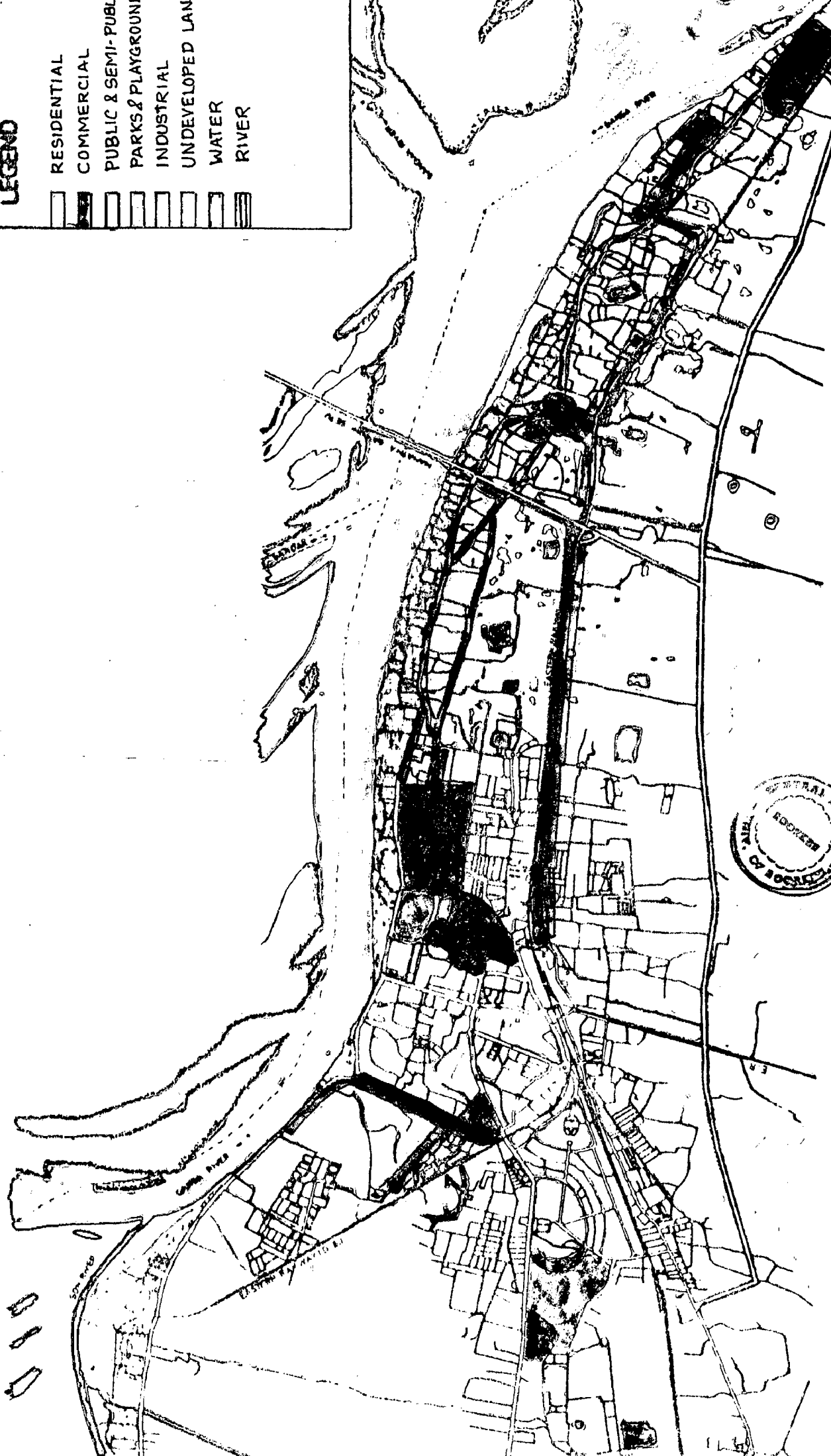
TABLE 3.4

EXISTING LAND USE DISTRIBUTION			
SI.NO.	LAND USE CATEGORIES	AREA IN ACRES	PERCENTAGE
1.	Residential	15900	63.22
2.	Public Open Spaces	350	1.40
3.	Commerical	568	2.26
4.	Industrial	226	0.90
5.	University and Colleges	468	1.86
6.	Hospitals & Clinics	275	1.09
7.	Govt. offices & Secretariat	436	1.73
8.	Surface & Air Transport	1607	6.39
9.	Historical and Archeological Areas	81	0.32
10.	Poultry and Dairy	25	0.09
11.	Orchards and Groves	65	0.26
12.	Graveyard/Burning Ghat	44	0.18
13.	Water Bodies & Canal	397	1.58
14.	Agricultural & Fallow land	4683	18.62
Total		25,151	100.00

SOURCE: MASTER PLAN OF PATNA- 2001

LEGEND

- RESIDENTIAL
- COMMERCIAL
- PUBLIC & SEMI-PUBL
- PARKS & PLAYGROUN
- INDUSTRIAL
- UNDEVELOPED LAN
- WATER
- RIVER



EXISTING LANDUSE

SCALE 1:7,500

MAP NO. 100/55
 (100/55)
 DEPT. OF ARCHITECTURE
 U.O.R. ROORKEE

North Arrow

PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

Land-Use of Patna 1991

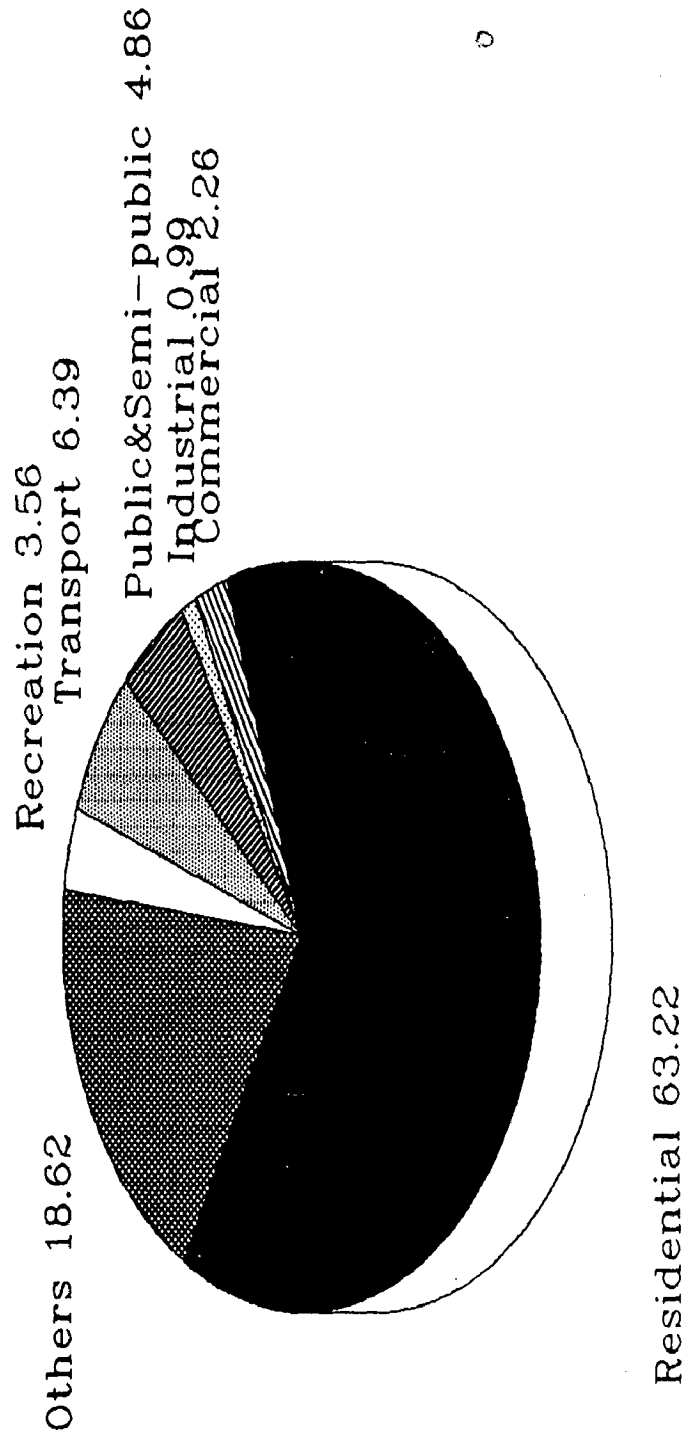


Fig 3.3

The extent of land under residential uses being 63.22% of the aggregate merely suggest disproportionate growth of the city which needs to be reoriented according to norms of a balanced spatial distribution practices. Usually a city must have at least 12 to 15 percent of its total land area given to transportation arteries and terminals but it is slightly above 6 percent in case of Patna including the area under Civil Aerodrome. Presently only 0.26% of the land area is under orchards and Groves. The area under cultivation with fallow lands is fairly high about 18.62% for urban expansion.

As per planning standards fixed by Patna Masterplan there should be of least 0.33 Acre public open spaces for every 1000 persons. According to the requirement for Patna 11 lakh population works out to be 363 acres approx. But because the acreage shown in this category above includes Botanical Garden, zoological park and play areas it is more seemingly more than required. But after setting off these uses the open area would hardly work out to 90 acres in all.

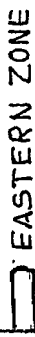
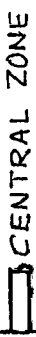
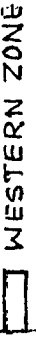
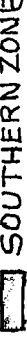
High residential area and less area under Industries suggest the tertiary sector oriented economy of the city.

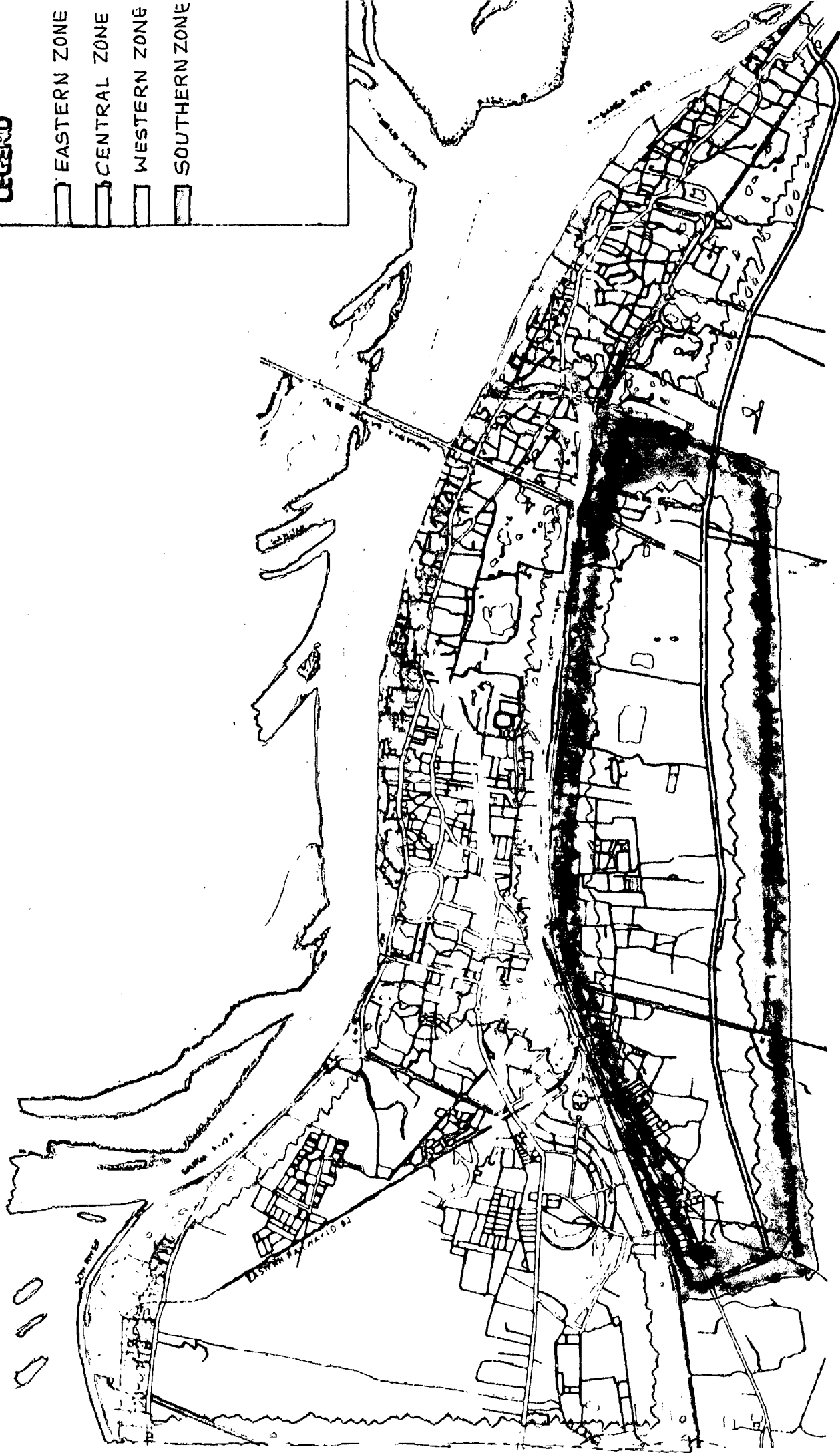
3.6.2 Land use characteristics of various zones

As earlier discussed in report that Patna has three zones accordingly physical characteristics & functions but -

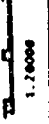

Conforming to the zonal delineation made for the purpose of demographic studies, Patna is divided into four zones which

LEGEND

-  EASTERN ZONE
-  CENTRAL ZONE
-  WESTERN ZONE
-  SOUTHERN ZONE



PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

 1:20000 Scale Feet & Meters	 N
PATNA: ZONE (DEVELOPABLE) MAJOR THESES (1944-45) DEPT. OF ARCHIT. U. O. R. KODEREE	

have one or the other type of specialised functions:

(1) EASTERN ZONE:

This zone caters to the activities like rice, wheat, pulses, spices, vegetable market etc. The famous wholesale markets are Maroofganj, Masoorganj, Maharajganj and Khazekalan. The household and small scale industries like plastics, ferrous and Non-ferrous metals, synthetic rubber, leather etc. are also there in this zone.

(2) CENTRAL ZONE:

Though the zone is unplanned however it consists of Patna University, Patna Medical College, Centres of recreation, retail shopping, District court, Commissioner's and S.P. Office's etc. Retail trade in various consumer goods and Agro-industrial import materials and hardware are also located within this zone. Therefore the zone caters to the economic activities of the towns and study reveals that land values are very high as compare to other zones.

(3) Western zone

The Western zone constitutes of planned segment of the city which consists of state level government institution and allied offices. This zone is functionally not compact but it depends on the other zone for essential requirements and activities. The land use pattern of this zone is less mixed as compared to other zones. But development occurring on its peripheral parts are haphazard.

(4) Southern Zone

This zone is located north of main railway line. The dominant function of this zone is residential. The public transport system is hardly there to connect this zone to other zones.

3.7 OCCUPATION STRUCTURE :

The Western zone has highest working population ratio 278.65/1000 because most of them are Government officials of mixed ranks living in government rendered accomodation. Next higher ratio at working population on (260.43/1000 persons) is living in the central zone where most of them belong to professional class. The Eastern zone reflects intermediate position holder, where this ratio is 255.73/1000. The lowest work particiption ratio is seen in southern zone.

Table 3.5

Zone wise working population of Patna 1991

Sr.No.	Zones	Population	Total workers	Workers/1000 persons	Non-workers/1000 persons
1	Western	138471	37746	278.65	721.35
2	Central	271750	70773	260.43	739.51
3	Eastern	207222	52994	255.73	744.27
4	Southern	161928	38311	236.59	763.62
OVERALL		776371	198864	257.38	742.62

SORUCE. : CENSUS BOOK 1991

Table 3.6

Occupation structural trend : Patna

Year	Primary sector	Secondary sector	Tertiary sector
1961	16.98	21.58	61.44
1971	22.51	18.35	59.14
1981	18.39	20.20	61.61
1991	16.12	20.79	63.09
2001 (projected)	14.81	21.16	64.03

Source : Census Book

The occupational structure as shown in table No.3.6 It is obvious that is tertiary sector is employing the maximum number of the working population i.e. 64.03% (According 1991 census report) and also figures over the three decades indicate a increasing trend. There has been a very nominal increment in the percentage of workers engaged in secondary sector (Table No. 3.5)

From the above analysis one thing is also very vivid that Patna has higher percentage of tertiary sector oriented economy. Therefore, it needs maximum mobility of people from one place to another within the city or outside. So physical infrastructural development along the river will certainly allay the problems of city facing presently as well as it will be good step for future development of city.

Working Population (1991) PATNA

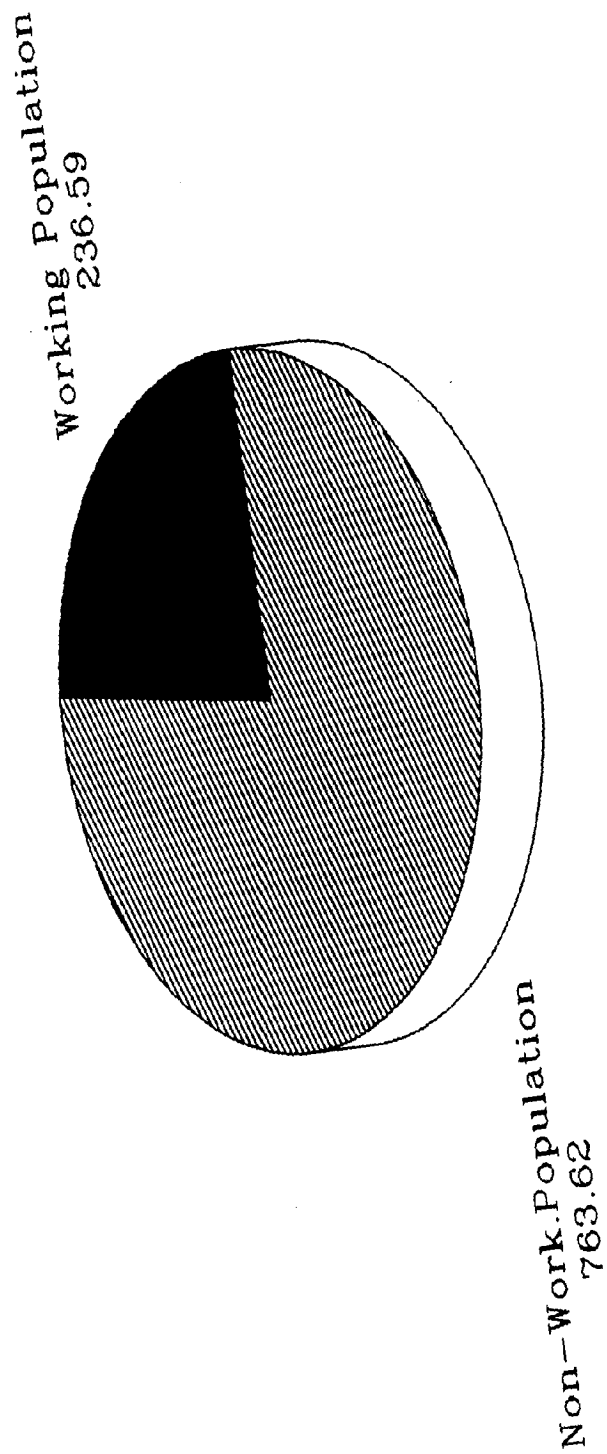


Fig.3.4

Socio-Economic Status (1991)

PATNA

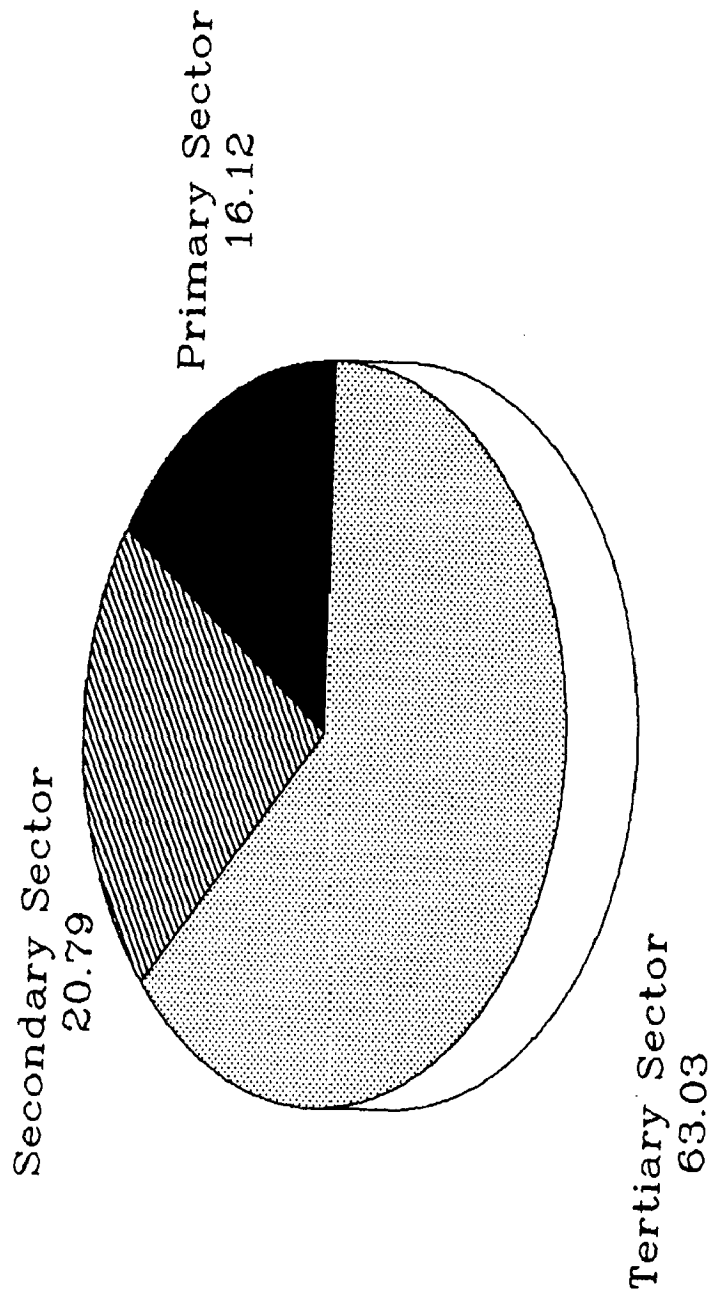


Fig. 3.5

Occupational Trend of Patna

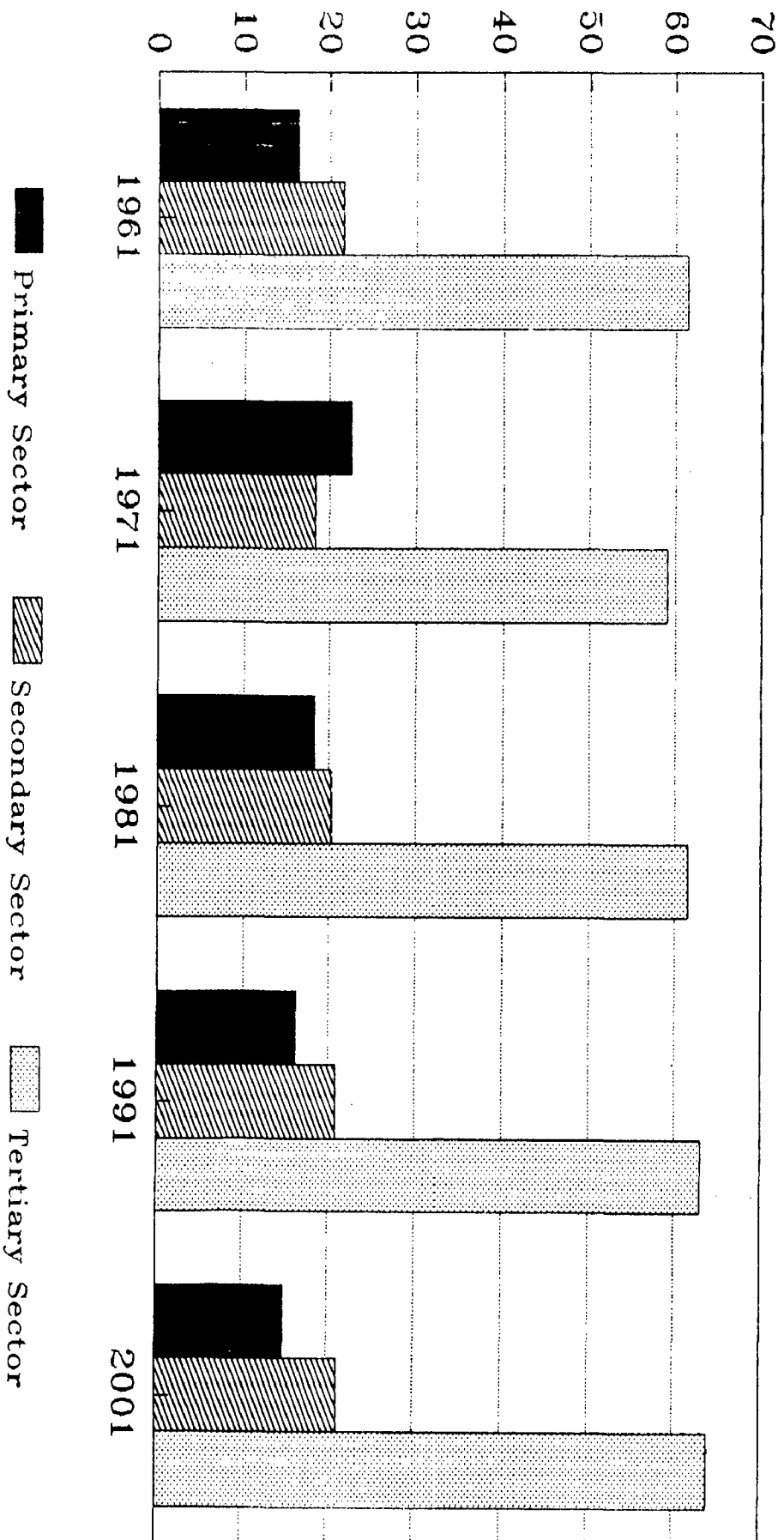


Fig.3.6

Employment Pattern (1981)

Patna

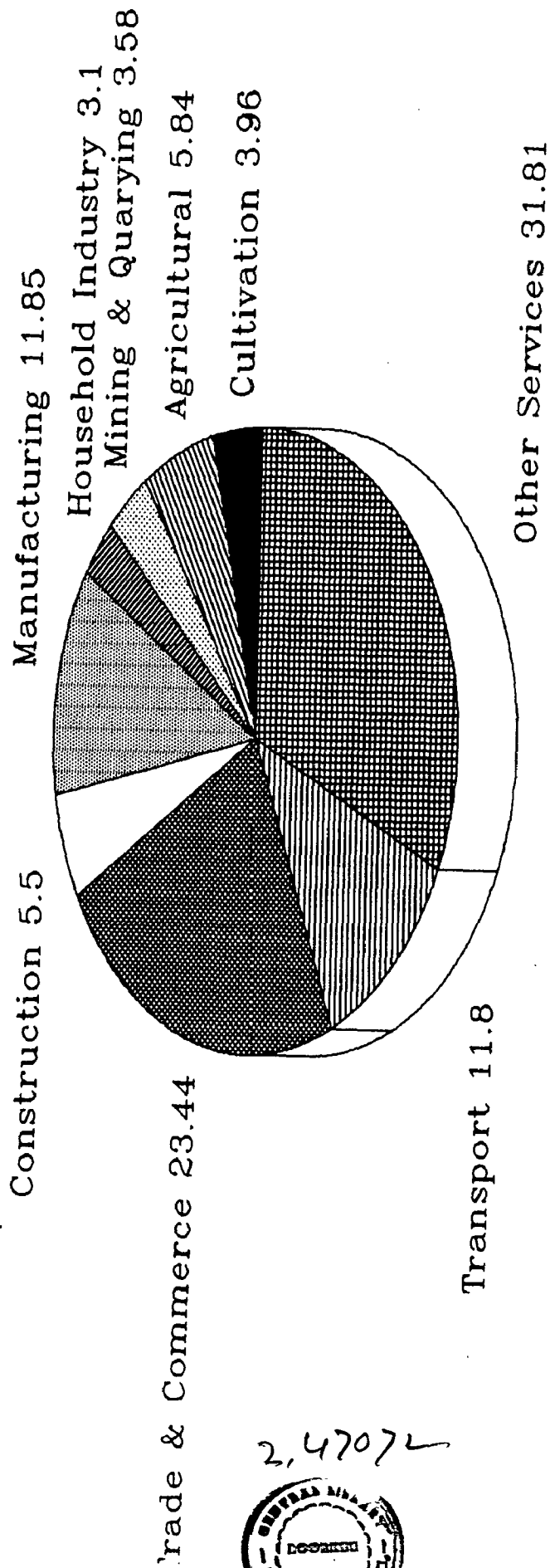
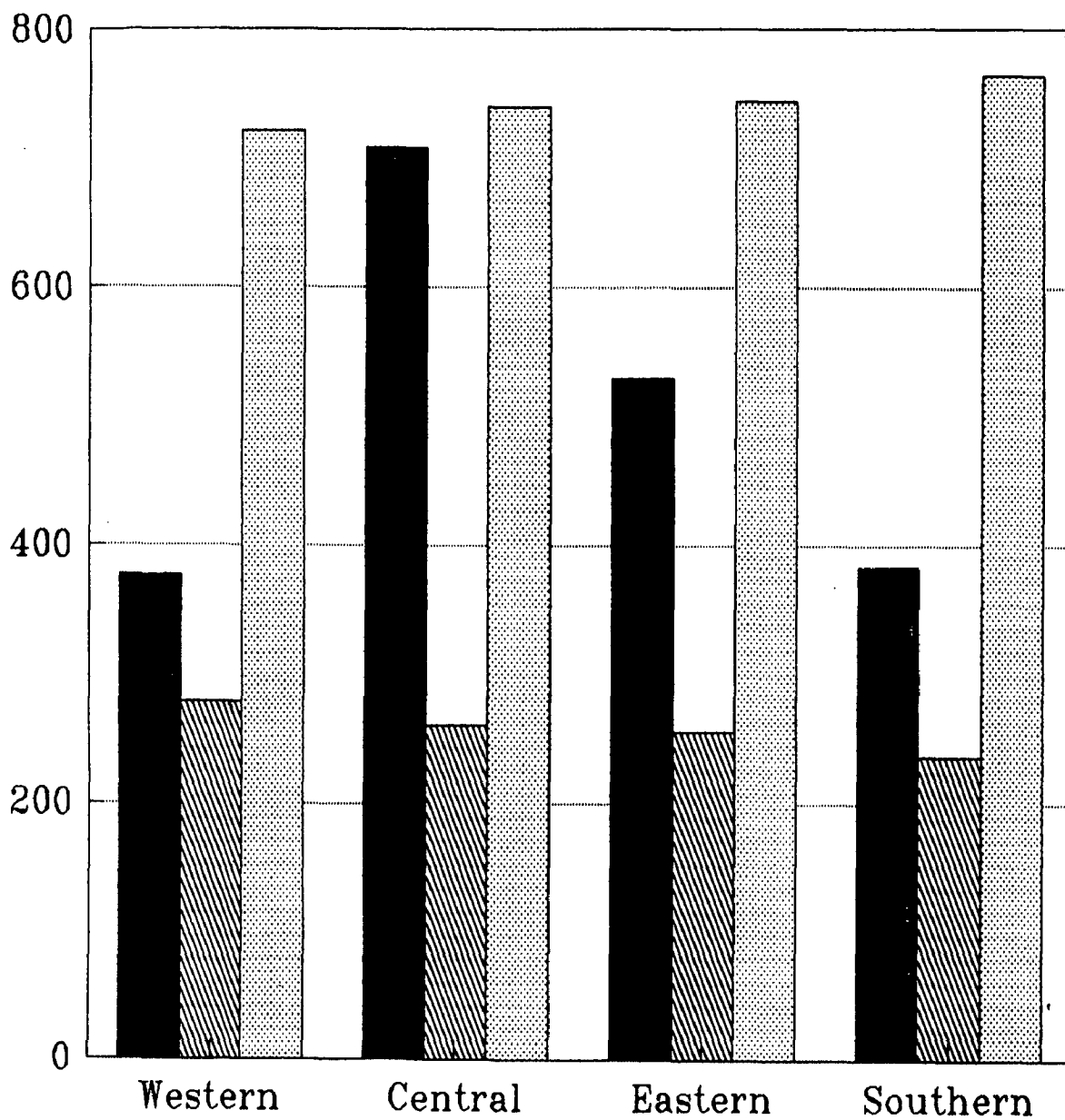


Fig. 3.7

Census Book 1981

Zone Wise Working Population-PATNA



Workres(in hundreds)
 Workers/1000 Person
 Non-Working/1000pers.

Fig. 3.8
51

3.8 PATNA AS A TOURIST PLACE

Patna is the largest town of Bihar and headquarter of Patna district, Patna division and Bihar state. It lies on the main line of the Eastern railway connecting Calcutta, Delhi, Bombay, Madras etc. It is also connected by the road and air. It is mainly administrative and commercial centre and also have places of tourist interest as mentioned below:

- 1> The temples of Bari and Chhoti Patan Devi for the religious place for Hindus. It is an ancient temple of Mother goddess Durga Devi. People from different part of Bihar occasionally visit the temple round the year.
- 2) Pathar Ki Masjid at Sultanganj for the Muslims built in 1626 A.D. by Parwez Shah, a son of Jahangir and then Governor of Bihar.
- 3) Phulwari Sharif is an important places for the Muslims as it contains on old khankah where the hair of prophet Mohammed are preserved. Every year on the occasion of Fetah-Dauz-Dehum (the birthday of the prophet), a large fair is held. It attracts on all India gathering. It has an old Mosque built of red stone and known as 'Sansi-Masjid', believed to have built by Humayun.
- 4) Har Mandir or Patna Sahib is the second seat of the Sikhs after the Golden temple of Amritsar. Here Gobind Singh, the tenth and the last guru of the Sikhs was born in 1666 A.D. Sikhs from all over the country visits this place round the year.

- 5) Padri Ki Haveli roman catholic church, which was built during 18th century.
- 6) Kumhrar- 1912-13 excavations by Dr. Spooner brought to light the mighty pillared hall from the Mauryan date with its highly polished monolithic pillars & also a solid wooden platform has been found. An ideal picnic spot in the garden during winter. A museum in it an added tourist attraction.
- 7) Golghar , 29 metres high silo, built in 1786 to serve as a granary. It gives powerful echo and the panoramic view of the city from the top is splendid.
- 8) Planetarium, On the Jawaharlal Nehru road on kotwali is attraction for the tourist.
- 9) Mahatma Gandhi Setu, the longest river bridge in Asia of 5.6 km length on the river ganga.
- 10) Martyr's Memorial- This monument, in front of the old Secretariat compound, was built to perpetuate the hallowed memories of the brave young men who sacrificed their lives in the historic struggle for independence in August 1942.
- 11) Sadaqat Ashram (The seat of Bihar Vidyapeeth, a National University setup in 1921) are still enhancing the historical importance of Patna.
- 12) Patna Museum is a public museum situated on Budh-Marg and possesses some of the rare exhibits.

- 13) Gandhi Museum contains pictorial and other records showing the associations of Mahatma Gandhi with Bihar.
- 14) Agam Kuan, A great fathomless well situated on the Patna Bypass road near its junction with Chandragupta Path, where persons condemned by Chandashoka (Emperor Asoka before his conversion to Buddhism after the Kalinga war) used to be thrown after slaughter. During Shravana month, a mela is held here on all Mondays.

Patna is a historical tourist centre. Here Megasthenes, Hsien t-siang, Fahien has travelled in ancient times. But it has lost these qualities in recent times. So it must be regained as a tourist centre. Out of fourteen living religions of the world, three religions- Buddhism, Jain and Sikh's important pilgrim centre is situated in Bihar. and also Patna is a capital and important town of Bihar, therefore, Patna has high potential of tourism and riverfront development will also attract tourists in Patna.



(a) B.C.E. Patna

(b) Darbhanga House



(c) Rajendra surgical
Block

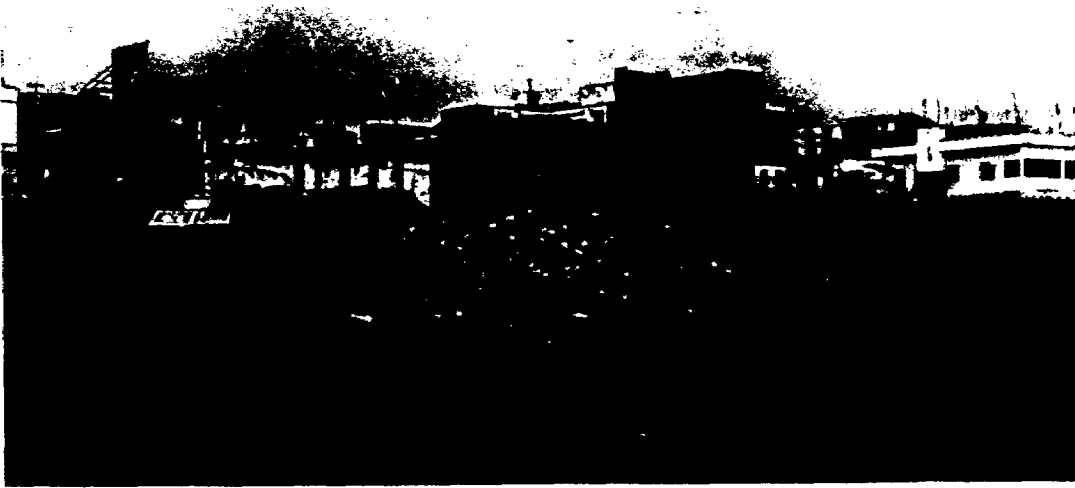


Plate No. 4.1 Unorganised and Unplanned development
on river front



Plate No. 4.2 Activity on river front



plate No. 4.1 Unorganised and Unplanned development
on river front

- (iii) *Brasica Compestris*
- (iv) *Croton Sparsi - Florus*
- (v) *Lantana Camara.*

Besides above said trees and shrubs, some new Species of plants and shrubs should be planted in a well planned way so as to enhance the aesthetic viewof the river front.

4.7 ARCHEOLOGICAL SITES

Places of Historical and Architectural interests situated on the riverfront be conserved because it is heritage of the town. These building are Sadaga Ashram, Protestant church, Mirza Mured Grave, Patna College, Engineering College, Pathar Ki Masjid, Govt. press and Bihar Survey office (Site of old English factory), Padari ki Haveli, Madarsa Mosque, Fort, Bagh Zafar khan, Rajendra Surgical Block, etc.. These buildings are proposed to be provided with appropriate physical setting , So that they may be protected and may highlight the urban landscape of Patna.

4.8 LANDSCAPING:

There is lack of proper landscape from a neighbourhood levels to city level in patna. But there are only some trees and Shrubs existing on river front as:

(a) Predominant Species of Plants-

(i) Azadirachta Indica (Neem)

(ii) Ficus Religiosa (Pipal)

(iii) Pongamia Glabra (Karanji)

(iv) Terminalja Arjuna (Arjun)

(v) Barassus Flavelifer (palm)

(vi) Cassia Fistula (Indian Labernum)

(b) Predominant Species of Shrubs.

(i) Argemone Macicana

(ii) Wild Spinach

enthusiasm in the state capital. Lakhs of devotees offers prayers to the rising Sun at different ghats of the Ganga at Patna. The massive rush towards the various ghats create traffic jams at various places for two or three hours.

4.5.2 Kartik Purnima.

Similarly on the occasion of Kartik purnima lakhs of devotees takes bath on the different ghats of Ganga. So well facilitated Ghat with adequate infrastructure be developed on the river front which should be connected to proper transportation network to overall city.

4.6 BATHING GHAT

The river ganga imparts a holy character to the city. Bathing in the Ganga is a daily ritual with many people. A large number of people also came from outside to take dips in the holy river during festivals. But the bathing Ghat of the city are too few in number and also too inadequate in the conveniences for the People. More bathing ghats are required to be provided on improved lines and the existing ones are required to be remodelled.

There is about 30 ghats along whole stretch of river ganga among Digha ghat, L.C.T.Ghat, Mahendru Ghat, Pathari Ghat, and Patna Ghat is used as ferry services and Bansghat, Gulvi Ghat and Khazekalan ghat is used as cremation activities and the rest ghat has different uses like bathing, etc. except ferry services and cremation activities.

4.4 ACTIVITY RELATED TO RIVER FRONT

Almost every kind of activity from all walk of life occur in the study area.

The activities can be classified under three categories-




- (i) Non-confirming & conflicting activities
 - (a) Commercial activities e.g. subzi mandi, fish market etc.
 - b) Household activities of the people living in the Jhuggies and Jhopari
 - (c) Open defacation
 - (d) Cattle roaming
- (ii) Confirming and conflicting activities
 - (a) Bathing
 - (b) Cremation
 - (c) Cloth washing of Dobhi ghat
 - (d) Navigation or boating
 - (e) Brick manufacturing
- (iii) Confirming and Non-conflicting activities.
 - (a) Fishing
 - (b) Prayer
 - (c) Recreational activities at parks etc.

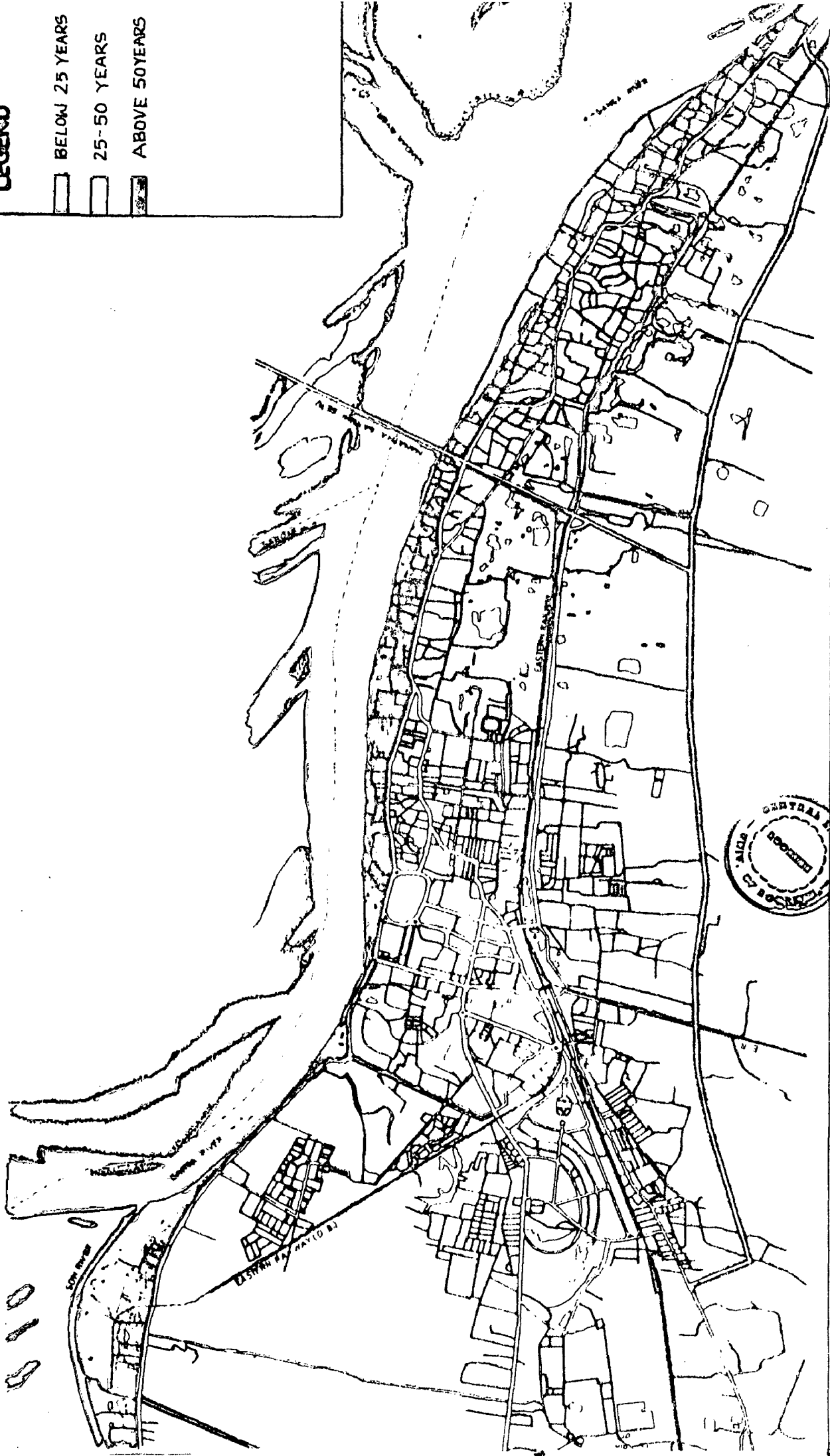
4.5 FESTIVALS RELATED TO RIVERFRONT

4.5.1 Chhatha

Chhatha festival dedicated to the Sun god is celebrated in the month of Kartik month with traditional gaiety and

LEGEND

-  BELOW 25 YEARS
-  25-50 YEARS
-  ABOVE 50 YEARS



AGE OF BUILDINGS

Scale: 1:7,500

North Arrow

U.S. G.P.O. FORM NO. 1 (REV. 1-61)

DEPT. OF ARCHITECTURE

U.S. AIR FORCE

PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

810

4.3 HOUSING CONDITION:

The structural condition of buildings of Western zone is fairly good. But the central zone is marked by old institutional buildings. Eastern zone is marked by the old building in which some of them are in dilapidated conditions.

There are 10 Municipal ward (No.32, 30, 27, 23, 22, 20, 12, 9, 5, 4) along the river ganga in Patna.

TABLE - 4.1
AGE -WISE PERCENTAGE OF BUILDINGS AT RIVERFRONT

Ward No.	Below 25	25-50	50-75	Above 75 years
32	23	32	29	16
30	21	28	32	19
27	24	27	37	12
23	27	28	38	07
22	16	37	39	08
20	14	32	54	00
12	36	32	29	03
09	52	41	07	00
05	57	34	09	00
04	76	24	0	00

Source: Municipal Corporation Patna.

Analysis of secondary data reveals that there is marked difference in age of the building in different wards. The data shows that ward no. 32,30,27,23 22 and 20 has been built first and have many old buildings. World NO. 12,9,5 and 4 are newly developed and most of the buildings are not older then 50 years.

4.1.2 Populaion Density:

The Population Density of Riverfront area is as follows

- (i) Eastern zone - 150 Person/Acre
- (ii) Central zone - Institutional
- (iii) Western zone - 75 Persons/Acre

4.1.3 Land Ownership Classification

Land ownership classification is based on reconnessance survey by the author. It is found as:

- (i) Eastern Zone - Private-owned and Minicipality
- (ii) Central zone - Govt. or Institution and Private-owned
- (iii) Western Zone - Private-owned

There are many temples on the bank of river and the land adjoining to it is owned by temple trust.

Detailed land ownership by plotwise at site to be assessed by Questionnaire attached in Appendix that demand for the tranfer of land could be done for development.

4.2 ACCESSIBILITY

Accessibility to the river front is available in a limited sense only for the genaral public. There is hardly 1 KM. total organised walkways along the whole stretch of the riverfront at different places. The rest of riverfront are mostly accessible of various spots only except the Eastern Patna where the state is even worst. The riverbank lies tramendously under-utilized due to its non-accessible nature.

LEGEND

GOVT.

INSTITUTION

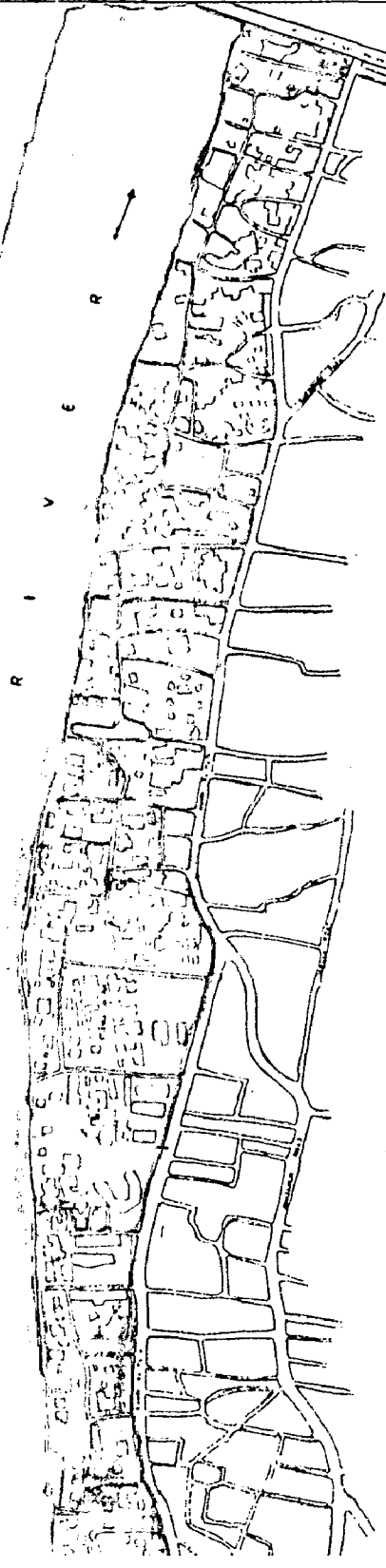
PRIVATE

LAND OWNERSHIP

Scale
1:50,000

INFRASTRUCTURAL DEVELOPMENT ALONG RIVER GANGA IN PATNA

M
G
A



1

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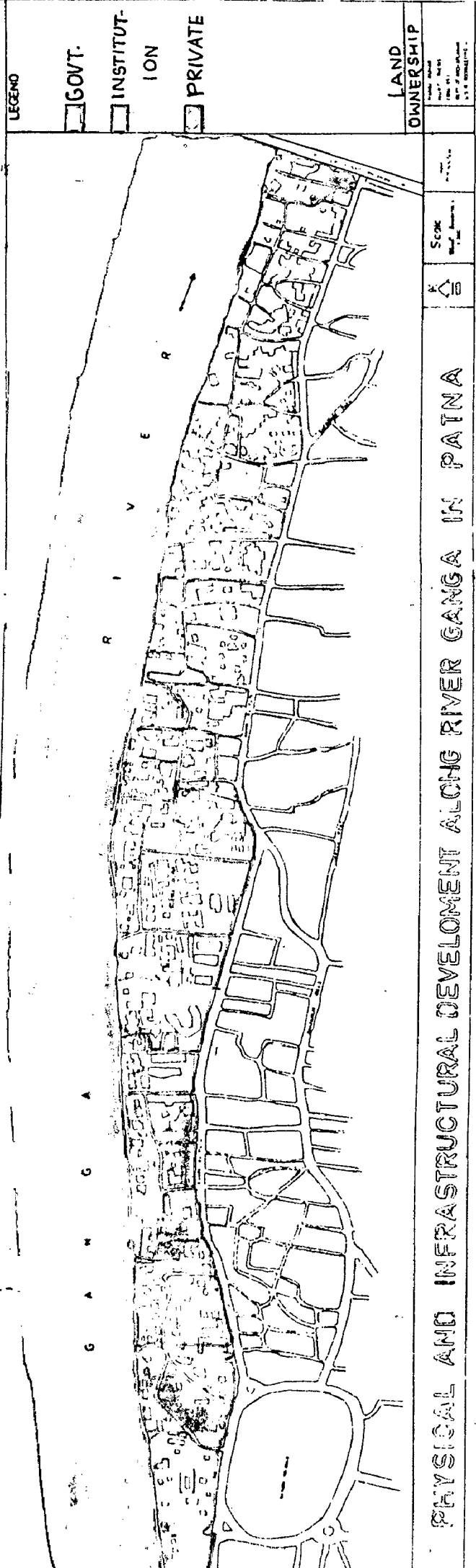
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PHYSICAL AND INFRASTRUCTURAL DEVELOPMENT ALONG RIVER GANGA IN PATNA

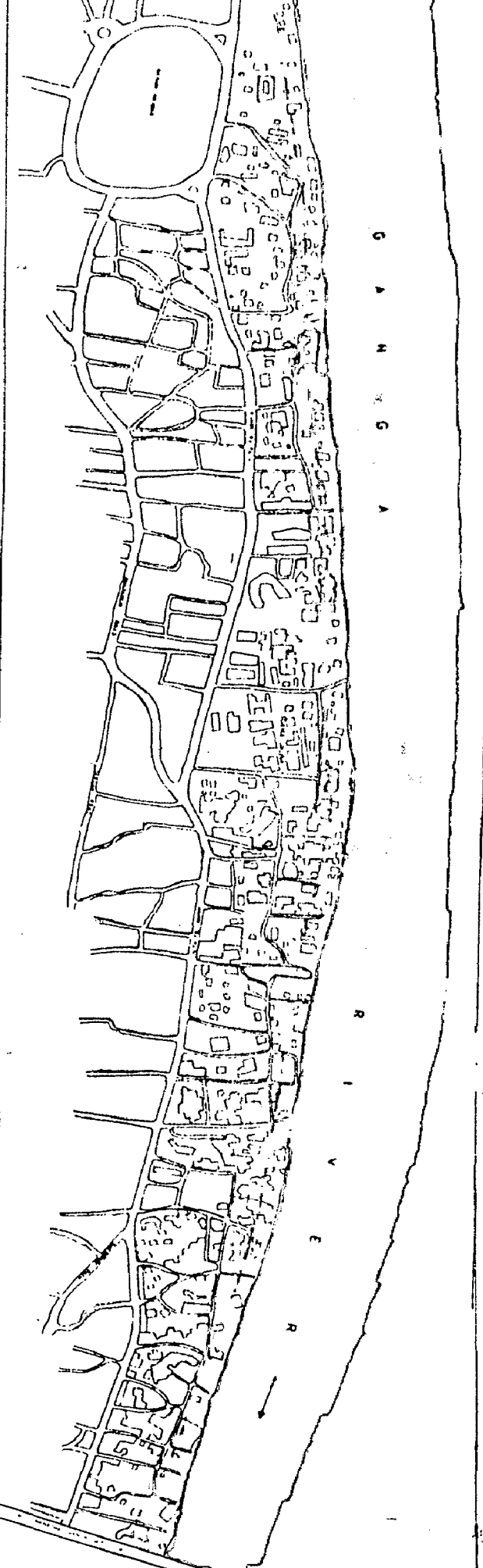
LEGEND

GOVT.
 INSTITUTION
 PRIVATE

LAND OWNERSHIP

Scale: 1:10000
 Date: 1980
 Prepared by: [Name]
 U.S.G. SURVEY OF INDIA

PHYSICAL AND INFRASTRUCTURAL DEVELOPMENT ALONG RIVER GANGA IN PATNA



6 4 N 5 A

Scale
1:10000

LEGEND

□ ACQUIRED FOR DEVELOP

■ BUILDING BE RETAIN

RIVER FRONT

Chapter 5 :

INFRASTRUCTURE AND AMENITY

CHAPTER - 5

INFRASTRUCTURE AND AMENITY

5.1. ROAD

Patna town has only 6.39% of land for surface and air transportation of total land use. It has no proper road network and only three flyover of Rajendra Nagar, Yarpur and Chiraiyatad. The Eastern Zone with its wholesale commercial trade function needs linkage to a terminal point wherefrom the goods could be moved to and from the city. Road's of Eastern Zone are narrow winding and complex in design. They are characterised by blind turning and manacing bottlenecks points. None of this zone are suited for vehicular traffic. But the Western Zone road system is well suited to the existing conditions.

Traffic survey Conducted by S.P.A. Delhi and P.W.D. Govt. of Bihar in 1993 reveals that most of the roads of Central zone and Eastern zone is overcrowded by the traffic in Peak -hours. There is regional traffic of intra city and local traffic of inter city on the old bye pass road, so both traffic creates congestion on the old bye pass road. There is mixed traffic consists of 85-90% of slow moving traffic, traffic bottlenecks, kerb parking and no separate pavement for pedestrian. General carriage way of most important city roads fluctuate between 20 ft to 75 ft. By the riverfront development. aprox. 100 Acres of land has been provided for transportation use.

There is lack of parking space in and around market places. A survey conducted during Year 1995 by author reveals that large congregation of parked vehicles is near Patna Market, Musallahpur hat, Hathwa market, Bus depot to B.N.College, M.M.College to Bus depot, Govind Mitra road and Makhanian Kuan road etc. These are shown in the table No. 5.5

TABLE 5.5

Sr.No.	Places	Cars	Pedal & Auto rickshaw	Scooters	Others
1	Musallahpur hat	20	65	73	29
2	Hathwa market	45	82	65	38
3	Bus depot to B.N. College	145	109	195	67
4	M.M.College to Bus Depot	105	45	74	21
5	Patna Market	63	29	75	25
6	Govind Mitra road	73	165	225	40
7	Makhanian Kuan	95	25	109	37
8	Khazanchi road	65	102	201	56

Source : Field Survey conducted by Author.

5.2 TRAFFIC

Capacity standards are fixed normally in relation to the level of service (LOS) adopted for the design of road. Level of service is defined as a qualitative measure describing operational conditions within a stream and their perception by drivers or passengers. The definition of LOS generally describes these conditions in terms of factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience, and safety. There are six levels of services recognised commonly designated from A to F with level of service. A representing the best operating condition (i.e. free flow) and LOS is affected strongly by factors like the heterogeneity of traffic, speed, regulations, frequency of intersections, presence of Bus stops, on street parking, roadside Commercial activities. Pedestrian volume etc. It renders the L.O.S. concept for the Urban roads somewhat different than the rural roads.

Unlike rural roads, the hourly variation of traffic on urban roads has at least two distinct peak hours - During the morning and evening hours of the day. Further, traffic fluctuates more on urban roads than on rural roads. The urban peak hours traffic constitutes about 8-10% of the total daily traffic depending on various factors including the importance of the road in the network. During peak times, Un- directional traffic is also observed on several roads in urban area. These factors coupled with other urban characteristics make it

necessary to design the urban roads on the basis of peak hour traffic than average daily traffic (ADT).

On two way undivided roads, the traffic carrying capacity is relatively independent of the directional distribution of traffic and design is based on two way total flows. On dual or divided carriage ways, the capacity is dependent on directional split of traffic flow and the design should therefore be based on peak hour traffic in the busier direction of travel. To determine the peak hour factor it is usual to conduct traffic counts for 16-hour day (6 AM to 10 PM) in order to capture all the peaks.

Considering the need for smooth traffic flow, it is not advisable to design the road cross-sections for traffic volumes equal to the maximum. Capacity which will become available normally at L.O.S.- E. At that LOS, the speeds are rather low and freedom to manoeuvre within the traffic stream is very much restricted. Besides, even a small increase to traffic at that traffic volume would lead to forced flow situation and breakdowns within the traffic stream. On the other hand, adoption of a higher level of service like A or B, although enabling near free flow conditions would mean lower design service volumes necessitating higher number of traffic lanes to carry a Specified traffic volume with implicit higher facility cost. As a compromise solution, it is recommended that normally LOS C be adopted for design of urban roads of Patna. At this level, volume of traffic will be around 0.70 times the maximum.

Capacity and this is taken as the 'Design Services Volume' for the purpose of adopting design values.

Total peak hour traffic on most of the junctions is 30 to 38% of the total traffic flow during 12 hour period between 8 A.M to 8 P.M. This passes just in two hours either in the morning or in the evening depending upon the day to day hours of work in the nodal point of activities located in a given direction. Patna being the multi-functional city. Its land use mosaic creates conditions for multi directional flow of traffic during peak hours. When people go to their work during 9.30 A.M to 10.30 A.M towards Western zone where the secretariat and allied offices are located then students, litigants, patients and retail shoppers tend to move in the opposite direction i.e towards the central zone where the P.M.C.H, Patna university, Distt Courts and offices and retail shopping centres etc are located.

Maximum peak hour volume of traffic within central zone is on junction of Braj Kishore path-Rajendra path (North of Chirain Tal overbridge), Ali-Imam path - Budha Marg junction(near G.P.O) and Mazharul Haque path -Dak Bungalow road.

There is large congregation of parked vehicles near Patna market, also in between Patna G.P.O and Mahavir Temple, and road flanks of Bus Depot and M.M.College etc. It obstruct the smooth traffic flow and cover the space of right of way. So off-street parking space be provided in all these places including all shopping centres of the city. There are 110 road

junctions in city according to master plan 2001, in which majority of them are devoid of minimum turning sight distance and angle capable of allowing safer movement of vehicles entering or leaving major road.

TRAFFIC NEAR RIVERFRONT

5.2.1.a *ASHOK RAJPATH NEAR B.N. COLLEGE JUNCTION*

The carriage-way width of Ashok Raj Path at B.N. College Junction is 12.3 m and it is undivided, Two way traffic is allowed on this road. According to the IRC classification this road comes under sub-arterial road. Thus the road is sub-arterial, undivided three lane, two way. There is no such classification as three lane two way in IRC code no. 106-1990. So the total design service volume is taken as the mean of two lane two way, and four lane two way is 1800.pcu/hr.

TABLE 5.1
ANALYSIS OF TRAFFIC AT ASHOK RAJ PATH

TIME PERIOD	TOTAL VOLUME(PCU)	VOLUME/TOTAL DESIGN PER IRC VOLUME
6-7	1203	0.66
7-8	2262	1.25
8-9	3639	2.02
9-10	4859	2.69
10-11	4995	2.77
11-12	5987	3.32
12-13	5419	3.01
13-14	4514	2.50
14-15	5354	2.97
15-16	4028	2.29
16-17	4674	2.59
17-18	4743	2.63
18-19	4141	2.30
19-20	3585	1.99
20-21	3070	1.70
21-22	1565	0.86

Source : Department of Transport Planning, SPA- New Delhi

It shows that the road remains congested from 7 A.M. to 9 P.M. having a peak hour between 11 A.M. to 12 A.M.

5.2.1 Ramana road near Hathwa market

According to IRC classification the road is two lane, undivided, two way collector road, Total design volume for this road is 900 pcu/hr.

TABLE 5.2
ANALYSIS AT RAMANA ROAD

TIME PERIOD	TOTAL VOLUME(PCU)	VOLUME/TOTAL DESIGN SERVICE VOLUME
6-7	297	0.33
7-8	567	0.63
8-9	909	1.01
9-10	1215	1.35
10-11	1454	1.66
11-12	1359	1.51
12-13	1125	1.25
13-14	1341	1.49
14-15	1008	1.12
15-16	1170	1.30
16-17	1188	1.32
17-18	1035	1.15
18-19	902	1.00
19-20	765	0.85
20-21	391	0.434
21-22	1565	0.86

Source : Department of Transport Planning SPA- New Delhi

It shows that road remains congested from 9 A.M. to 9 P.M. having peak hour from 12 A.M. to 1 P.M.

5.2.2 Road leading to civil court

According to I.R.C. classification this road comes under

two lane, undivided two way collector road. The total design service volume for this type of road is 900 pcu/hr.

TABLE 5.3

TIME PERIOD	TOTAL VOLUME(PCU)	VOLUME/TOTAL DESIGN SERVICE VOLUME
6-7	266	0.29
7-8	368	0.41
8-9	1097	1.22
9-10	1196	1.33
10-11	2237	2.49
11-12	2504	2.79
12-13	1650	1.83
13-14	1892	2.10
14-15	1983	2.20
15-16	1473	1.64
16-17	1676	1.86
17-18	1593	1.77
18-19	1165	1.29
19-20	960	1.07
20-21	845	0.94
21-22	294	0.33

Source : Department of Transport Planning SPA New Delhi

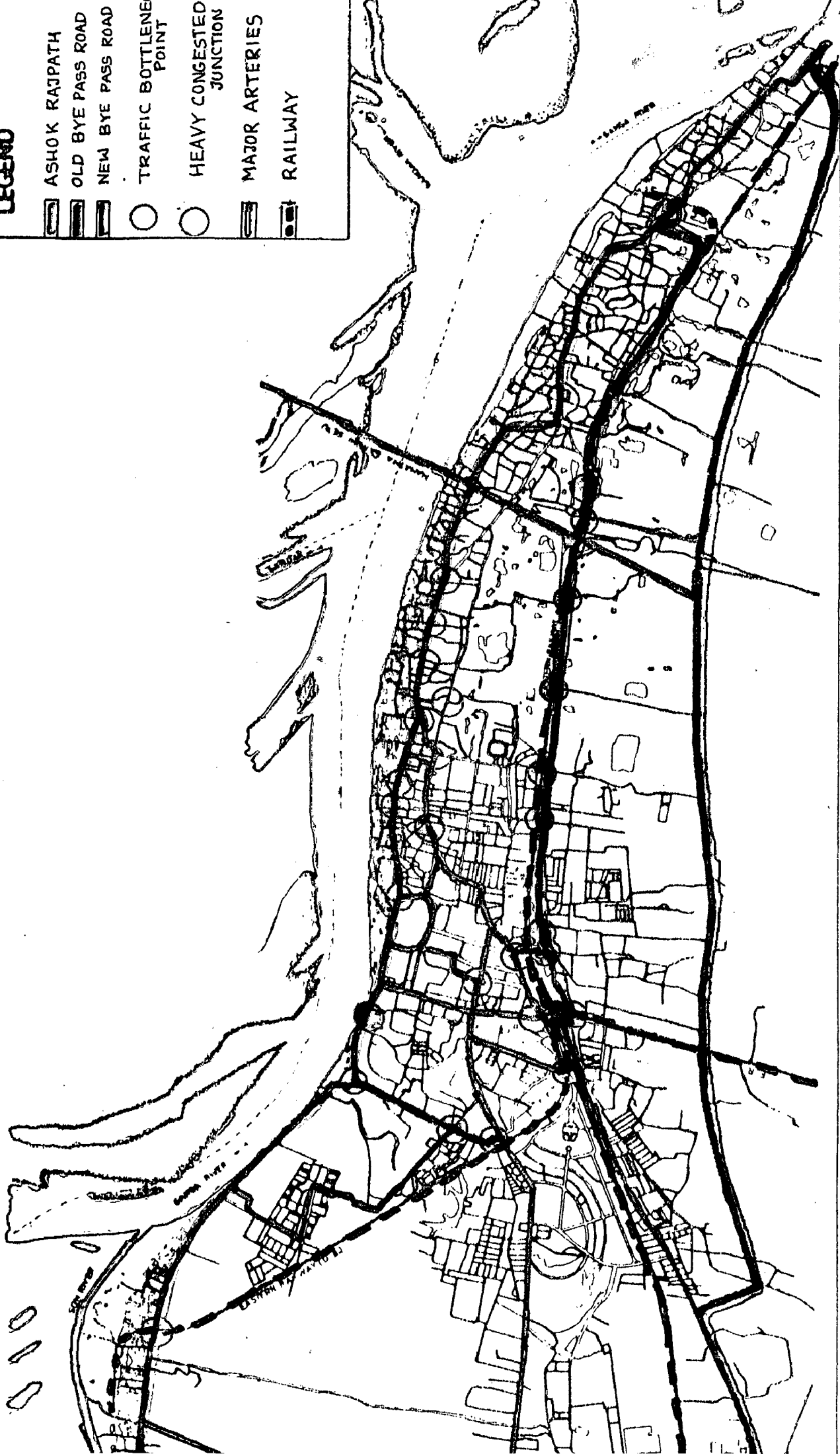
It shows that road remains congested from 8 A.M. to 8P.M. and Peak-hour is 11 A.M. to 12 A.M.

5.2.3 The road leading to law college ghat

According to I.R.C. Classification this road come under two lane, undivided, two way collector road. Total design service volume for this type of road is 900 pcu/hr.

LEGEND

-  ASHOK RAJPATH
-  OLD BYE PASS ROAD
-  NEW BYE PASS ROAD
-  TRAFFIC BOTTLENEK POINT
-  HEAVY CONGESTED JUNCTION
-  MAJOR ARTERIES
-  RAILWAY



PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

PATNA: EXISTING TRAFFIC & TRANSPORT

Scale: 1:2,000

North Arrow

Author: [Name]

Dept. of [Name]

U.S. ENGINEERING

TABLE 5.4

TIME PERIOD	TOTAL VOLUME(PCU)	VOLUME/TOTAL DESIGN SERVICE VOLUME
6-7	270	0.30
7-8	387	0.43
8-9	1188	1.32
9-10	1305	1.45
10-11	2340	2.60
11-12	2520	2.80
12-13	1647	1.83
13-14	1890	2.10
14-15	1935	2.15
15-16	1377	1.53
16-17	1548	1.72
17-18	1449	1.61
18-19	1161	1.29
19-20	963	1.07
20-21	891	0.93
21-22	297	0.33

Source : Department of Transport Planning, SPA- New Delhi

It shows that the road remains congested from 9 A.M. to 8 P.M. having the peak hour between 11 A.M. to 12 A.M.

The analysis shows that roads leading to the river bank remains congested for the most of the time of the day.

5.3 ELECTRICITY :

Electricity, one of the most important forms of energy is the life blood of modern society. It is indispensable for any development whether Industry or Agriculture, and for improving the living standards of the people. As there is Electric Crisis all over the India, so Patna town is not exception. There condition of electricity is not satisfactory. The Bihar State

Electricity Board has to make adequate arrangements to meet the present deficiency and the future needs.

5.4 SANITATION :

Topographically, Patna is saucer city, though the ground generally slopes gently towards the south i.e. opposite to riverside. Most of the roads of central and southern Zones get inoperative due to water logging during rainy season. Mechanically operated Pumps at Antaghat, Arya Kumar Road etc. take enough time in draining it out into the Ganga.

The provision of proper drainage for the city is difficult due to two main reasons- firstly, the city has constantly been threatened by floods from the north, because the highest flood level of the river Ganga is higher than the general level of the city. Secondly, vast areas towards the south of the Eastern Railway Main line is low lying area. During the monsoon, the main storm water outfalls channels of the city at Mandiri, Mainpura and Antaghat could not discharge full water into the river Ganga as top level of the river used to be higher than the discharge levels of these outfall channels.

5.5 COMMUNICATION

Physical development along communication routes require the least amount of effort for guiding development and Telecommunication which is a vital and essential infrastructure for socio-economic development. It can replace to a large extent

the personal travel and an such can become very cost effective. Provision of telecommunication facilities assumes a special importance in the context of the river front a development.

5.5.1 Telephone Exchange:

There are five telephone exchanges in the city. The demand for additional connections are so high that these exchanges are not in a position to cope with it and Besides extension of existing telephone Exchange, Southern Patna urgently needs a separate exchange due to quantum growth of populatin in this area.

5.5.2 Post Office;

There are two main post office in patna, one is G.P.O. in Western zone and second is Bankipur post office in Central Zone and 104 sub-post-office in the city at present. Eastern zone has no main branch post office, so it can be provide on the river front of Eastern zone.

5.6 WATER SUPPLY

Drinking water supply is taken through tube wells from depth of 95- 190 mt. (approximately). The city is not dependant on the supply of water from river ganga. The water from river ganga is not fit for drinking without treatment process. There is intermittent water supply during Morning and Evening and no proper water supply Network existpresently at Patna.

5.7 HEALTH

Patna is a major centre of health care in the northern and central Bihar. It covers a wide range of specialised treatment through preventive and curative medicines apart from sophisticated survey. Here private practitioners and specialists of various fields run their own clinics and nursing homes profitably.

Hospitals of various levels and specialisation cover an area of 154 acres in the existing land use of the city. The hospitals or dispensaries in both private and public sectors have altogether 4175 beds. There were 61 beds per lakh population in 1991 in India whereas 520 beds per lakh population in the Patna and 32 beds per lakh of population in state owned hospitals.

Private Nursing home of eminent specialists of all fields provide all facilities on payment, but most of the people of Bihar do not get medical services due to their low income level. So there should promote Ayurvedic, Yunani, Homeopathic and other cheaper systems of medical care for common ailments of chronic nature because substantial population of the state are much below the poverty line. Since the more government run hospitals are required in the city. But hospital shall not be proposed on the riverfront development because hospitals like P.M.C.H. and Kurji Hospital etc. already exist there.

5.8 EDUCATION :

Patna university which is oldest and one of the most important academic and research institutions in the state is located almost central in the city and is situated on the riverfront. The university will not be disturbed from the river front development scheme except area or strip notified by Government. University and institutions are facing financial problems these days because of limited funds available to them by Govt. so colleges and university will get good amount of money by proposed development on riverfront.

5.9 RECREATION :

The Patna town is lacking of recreational facilities especially outdoor such as Health resorts, riverside resorts, acqaria, camping sites etc. which can be provided on the riverfront. It shall be regional level facilities which can be enjoyed by a wide range of population residing within and outside the city. The analysis of recreational area on the riverfront is shown in the table No. 2. The whole open space towards river will be available to city for recreations.

5.9.1 PUBLIC OPEN SPACES AND PARKS

Patna has three major public open spaces. The first and the biggest is the Gandhi Maidan in the Central zone situated to the west of the highly congested residential areas of Bakarganj. This is the only public open space in the city where organised games and large public meetings can be held. The second large

public open space is the Hardinge parke in the Western zone situated along the north of the Hardinge Road. This is the only large organised park in the city. The third open space is the mangles large park in the Eastern zone, situated to the west of the Guru Govind Singh Path. These three parks together comprise an area of about 100 acres. Other minor parks such as the Golghar park, Dunbar park, Congress Maidan park, the old kadamkuan park and a few other municipal parks in the city accounts for another 15 acroes or 50.

There is 120 Acre Botanical Garden in the Western zone and only one good sport stadium at Rajendra Nagar in the Central zone of the patna. But its an extremely inadequate for the present population of the city.

5.9.2 Club

Bankipur and New Patna club are most popular and well maintained club in Patna. The Lion's Club and Rotary Club here overtones of social services, rather than recreation. There are clubs of professionals or sports but which are not open to the common men.

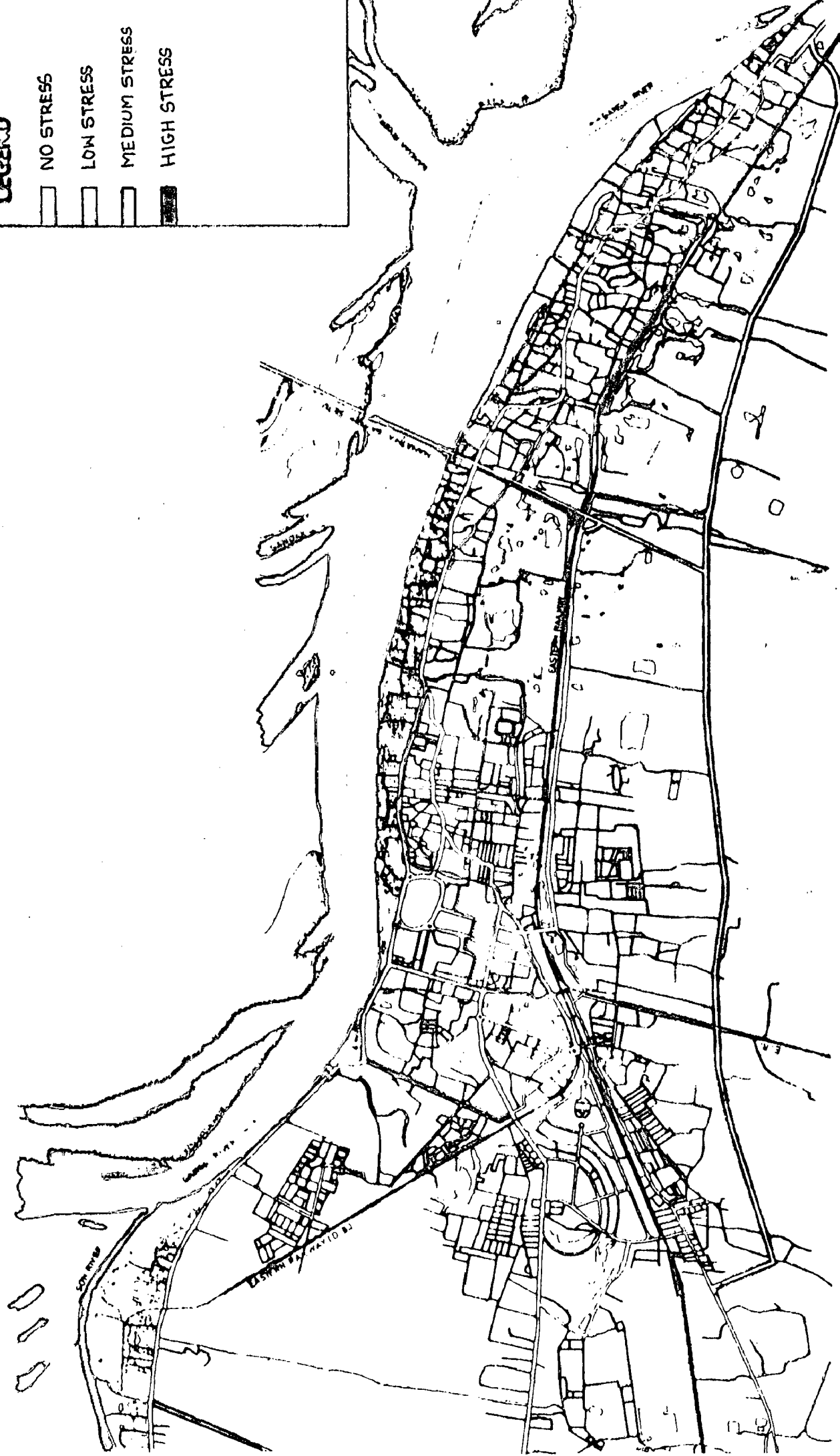
So Recreational club be proposed to develop on the river-zone of each which Patna.

5.9.3 CINEMA AND THEATRE

There are altogehter 14 cinema house in the city, of which 11 are located in the central zone and the rest three are

LEGEND

- NO STRESS
- LOW STRESS
- MEDIUM STRESS
- HIGH STRESS



PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

STRESS ON RECREATION FACILITIES

Scale: 1:20000

Author: MURTI THESSE

1994-95

DEPT. OF ARCHITECTURE

U.S.P. ROORKEE

showed by Eastern and Western zone with southern zone has zone, like cinema Hall, most of the the halls are located in the central zone. There are altogether 20 including those attached to educational institutions. However Ravindra Bhawan, I.M.A. Hall, Kalidas Rangalaya and Prem Chand Rangshalla occupy prominent position in the field.

Due to popularity of T.V. with cable and video, Cinema and therefore is facing financial loss, but space should be provided to such instruction in each neighborhood and cinema house be provided in Eastern, Western and Southern zone of Patna with C.B.D. or shopping centre.

5.9.4 LIBRARIES

Sinha library and Khuda Bux Library of Patna is National level reputed library. Besides these, Mangles tank library, legislative Assembly library, Patna Museum library and British library occupy important position in the city. An equitable distribution of libraries in space would be needed to serve the older as well as newer area of Patna. Since library is sufficient all zones of Patna except Southern zone. Therefore, required number of libraries be provided in eastern and western zone.

5.9.5 Water surface :

There is no proper water surface recreational facilities like boating, surfing, yatching, etc in Patna

so infrastructure for development of water surface recreational facilities be provided on the riverfront as proposed.

5.9.6 Camping sites or picnic spot

Riverfront should be utilized for the best sites for camping or picnic spots in Eastern and Western zone by providing proper infrastructures- like accessibility and other relevant facilities on sites.

5.10 COMMERCIAL

5.10.1 Shopping centre or Market

Patna town needs 480 Acres of area for shopping because here Economy is based upon tertiary sector and 63.62 % of total land use is residential today. Population projected upto year 2011, Patna town needs extra 542 Acres of land for shopping centre Among 57 acres of land has been provided on the river front as proposed.

The Patna town has 2.26% of land under commercial use only so it should be increased some extent to meet the requirement of the town.

5.9.2. HOTELS

Patna town has a large in flow of population of Domestic as well as foreign. It has location of advantage of excellent tourist centre in the Eastern India due to most important pilgrim centre of Hindu, Buddhist, Jain and Sikh, which is

Trend of Tourist Inflow PATNA

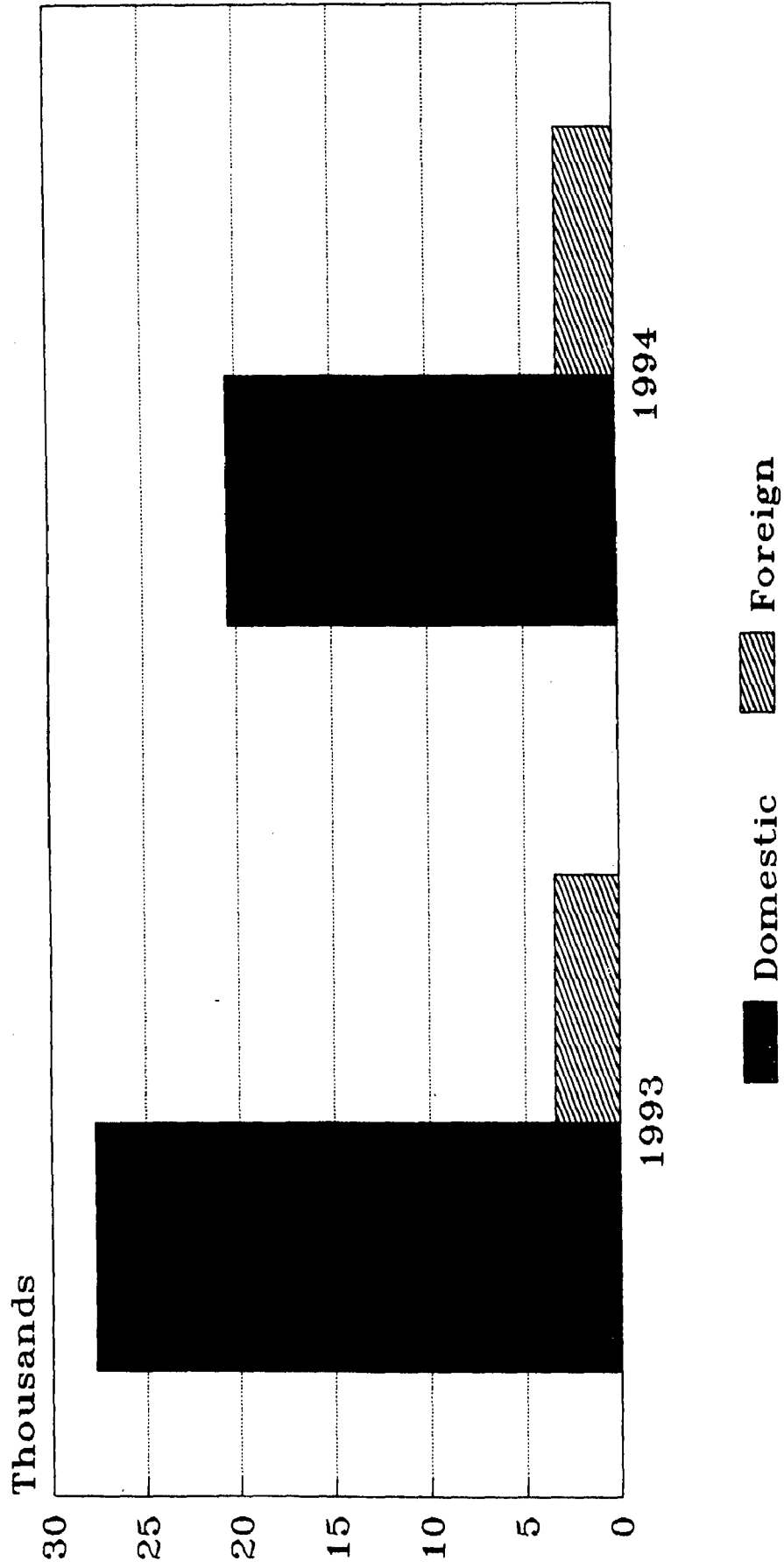


Fig. 5.1

Source: B.S.F.D.C. Patna

situated in or near by the Patna town. Total no. of tourist visiting Patna is shown in the table. 5.5

TOURIST IN FLOW IN PATNA

TABLE 5.5

YEAR	TOTAL NO OF TOURIST		TOTAL NO. OF BED USED	
	DOMESTIC	FOREIGN	DOMESTIC	FOREIGN
1993	27682	3380	24181	816
1994	20556	3102	13779	858

SOURCE : B. S. T. D. C PATNA

There are many Hotels and restaurants of lower standard only few are of higher standard such as Maurya is only one five star, Chankya and pataliputra is three star Hotel in Patna. There are no river view. Hotel in Patna, so however of hotels and rest room in the order of Amenity and rent be provided on the river front by considering convenience, comfort and enjoyment of Domestic and foreign tourist as well as city dweller's itself.

5.10.3 CONFERENCE FACILITY

There is no separate conference facility in the Bihar

State. At present conferences are held in Banquet Halls of Hotels. so conference Hall of different capacity in a single structure or campus be provided on the proposed river development scheme.

5.10.4 Office :

The Economy of Patna town and its people is growing and a number of regional offices of private and public sector have taken roots on the soil of Patna. Now Government public and private sector are experiencing need of additional offices due to expanses. In order to meet these requirements, office building be provided on the under developed area of riverfront.

5.11 INDUSTRY

Patna town is mainly services oriented town. According to 1991 census, only 20.79 percent people work in secondary sector of the Economy and rest are dependent on primary and tertiary sector.

The Eastern zone has mostly house hold industries of old as well as new varieties. Some industries Catering to the Agro-industrial needs of servicing, repair and manufacturing of space have sought locations sporadically every where without adequate facilities for the activity itself and to the inconvenience of people residing nearby.

Apart from existing small industrial units in Eastern, zone, There are Bata Shoe Factory, Digha Industrial Estate, Patliputra industrial Estate, Polson's Dairy in the Western zone In future industries should be located in the Satellite towns-like Hajipur, Fatuha, Masaurhi etc.to maintain the good environment of the city.

5.12 GRAVEYARD AND BURNING GHATS

There is Graveyard and burning ghats of different religion of people of patna is as follow:

(i) Muslim : Muslim Graveyard are located almost everywhere in the city except Western and Southern zones of Patna

(ii) Christian : Christian Graveyard are near Peermuhani only.

(iii) Hindu : Burning Ghats of Hindu are located on the bank of river Ganga, and there are existing for burning ghats in the city Bans Ghat, Gulabi

Ghat, Khazekalan Ghat and Patna Ghat. There is need of one burning Ghat near Digha ghat to serve the need of Western zone.

5.13 RELIGIOUS PLACE

Temples, Mosques, Churches and Gurudwara have a much greater role in maintaining the community structure of the

society. There is important religious place of different religions is as follows:

(i) Hindu : Mahavir temple near patna railway station, Bari and Chhoti patan Devi in Eastern zone has a regional interaction along with the city itself and there is a series of temples on the river front.

A redevelopment scheme for Bari patan Devi is needed and it should be connected by the link road to river front.

(ii) Muslim: The mosque near Western Gate of patna railway station, Pathar ki Masjid and mosque situated at Phulwari Sharif has equally more important for the people of islamic faith.

(iii) Sikh : The patna sahib in patna city, and Harmandir near Gai-Ghat has nation wide visitors.

(iv) Christian : As the city doesn't have sizeable christian population the churches which exist are enough to meet the requirement on specific locations.

5.14 MILK SUPPLY

Milk is supplied to city by Milk vendors from Mokama, Fatuha, Barh, Bakhityarpur, Gaya and other places, private cattle owners and Dairy farm. Milk centers be provided in every residential district and milk depots in every neighborhood centre of the city.

5.15 POLICE STATION AND POST

Urban communities are comparatively anonymous and they

are more dependent on police for security. There are 18 police stations in the Patna but it would be increases up to 35 due to development of new areas. So Adequate space should be provided to the neighborhood areas and river front to maintain law and order in the city.

5.16 FIRE SERVICES

There are two fire stations of patna city one is on Sudarshan Path and another are Lodipur on Budh marg. Due to lack of proper road network and congestion on roads by traffic. Fire vehicles take enough time in reaching the sites of occurrences of fire. Existing fire fighting devices are quite inadequate due to development of multistoried building block. Besides Existing two fire stations, a well equipped fire station is needed in central zone. since the highest congregation of multistoried block is in central zone and it will also serve the proposed building block of river front.



5.1a. Traffic on
Minorarteries.



5.1b Width of Ashok
Rajpath



5.1.c Traffic on
Ashok Rajpath



Plate No. 5.2 Religious Temples on River front

Chapter 6 :

**PROPOSALS AND
RECOMMENDATIONS**

CHAPTER - 6
PROPOSALS AND RECOMMENDATIONS

6.1 MAJOR RECOMMENDATIONS FOR THE TOWN

The recommendation are as follows.

- (1) The volume and smooth flow of traffic shall be increased as mentioned below :-
- (a) Regional traffic which do not have work in the city and presently moving on the Ashok Rajpath which is also NH 30 and Old bye pass road, shall be shifted to newly proposed road along the river Ganga, thereby reducing the regional traffic on Ashok Rajpath and Old bye pass road.
- (b) The bottlenecks on Ashok Rajpath which at present is as serving city road as marked on the map 5.1. should be removed. This will facilitate the easy flow of traffic on this road.
- (c) The Flyover at congested railway crossings especially at fivepoints i.e. Agam kuan , Kumharar and Bahadarpur on Old bye pass road ; Mithapur railway crossing and on Dak Banglow Chauraha should be provided.
- (d) Parking lots to cater the requirement of Patna market, Govind Mitra road, Makhnian kuan road has been proposed on terminal junction of river front development. This will relieve the pressure of Kerb parking and another parking lots to cater the Gandhi Maidan C.B.D.area has been proposed on terminal junction of river front

development. This will relieve the pressure on the parking in market area.

- (e) The Study on the old bye pass road, Hardinge road, Station road, Dargah road, Khazanchi road and all major road adjoining shopping centres or markets reveals that they also need parking spaces and necessary proposal be prepared for Parking lots. It is also suggested that off street parking should be proposed rather than Kerb parking within the area.
 - (f) Patna needs efficient traffic signal system and it is proposed that electronic Signalling System be provided on all traffic junctions.
 - (g) Safe Pedestrian Subways has been provided on all Six terminals of the my Study area for the safe movement and flow of pedestrian traffic crossing the proposed traffic arteries and tram ways. Similarly sub ways should be provided Kumharar Gumti, Bhutnath temple, Bahadurpur Gumti, Rajendra Nagar, Kankarbagh More and Chirain Tal on old bye pass road ; Patna railway station, Income tax chauraha, secratariat and Botanical garden on Bailey road also suggested.
 - (h) Sight distance and Alignment of old roads should be studied and provided wherever necessary.
- (2) The Rajendra Nagar Goods shed and the adjoining area needs careful study and is proposed that relevent proposal should be proposed for that.

(3) Ferry services along river Ganga having Stations at terminal points has been proposed in my proposal. This will again ease the congestion on Ashok Rajpath and Old bye pass road.

(4) Community and Recreation facilities along the river Ganga has been proposed in the proposal to cater the requirement of town.

(5) Similarly there is a need of review the Master Plan to provide the Transport Nagar to centralise the transport facilities with provision of loading or unloading of goods, , spare parts supply, repair and servicing workshop for heavy vehicles and idle and active parking of vehicles, retiring room for drivers, primary health care and refueling stations, etc in organised manner and associate terminal facilities of transport

(6) Similarly it is proposed that local bodies should have strict control over the activities like encroachment, movement of stray cattles (Khataals)etc. in the city.

(7) The another bank (Northern) of river Ganga has a very good potential for development. Therefore Study must be carried out and Proposal should be prepared accordingly to have the development on the other side of Ganga river towards Hazipur and Sonapur.

6.2 PROPOSALS FOR RIVER FRONT :

The state government has agreed that 360 feet wide strip on the right bank of river Ganga extending from Didarganj to Digha Ghat has been provided for making relevant Planning proposals to make the Patna town efficient. The notification of

this effect has been (As enclosed in the Appendix) made by the Government. The Government has agreed in principles that MRT, waterways and road and other amenities can be provided as deem fit by the planners within this notified strip.

The Government is not very keen to make acquisition of the land along the existing roads and plots etc. as, this causes lot many problems with the public. However the government desires that three buildings namely B.C.E. Main building, Darbhaga house and Rajendra Surgical Block have been monumental and archeological importance be retained as they are and wherever they fall within 360 feet, the same may be reclaimed from river Ganga and no harm should be done to these buildings. The structures falling in 360 feet wide strip can be pulled down or redesigned or can be face lifted as per proposals of the planners.

The Author conducted the relevent survey in the field of traffic and transportation by home interviews and discussions with the residents of Patna, the Authorities and other institutions of public interest and accordingly the proposals have been proposed. Within this parameters and limitations, I have made my proposal which is practical and will make the city efficient. The important highlights of my proposals are as follows :-

Basically there is total traffic congestion on Ashok Rajpath, Dargah road, Khazanchi road and old Bye pass road etc. With the result, vehicle starting from Digha Ghat (Western End) covering a distance of about 23 km takes about two and half

hours, wherever this distance should be covered within 45 minutes and lot many accidents are being reported as per police records.

Therefore it was necessary to provide the traffic arteries along river in this notified strip. Therefore traffic ways in this form steamer, which is the lowest means of transport has been proposed on the entire strip covering a distances of 23 kms. If need be this can be further extended upto Calcutta as enough water is available round the year in the river. Even so, more heavier ships than steamer can travel in this water. If this develops the cheapest and safest water transport can be developed between Patna and Calcutta later on.

Again the rapid transit system in the form of two line trams has been proposed from Eastern end (Patna Ghat) to Western end (Digha Ghat) to cater the local traffic of Patna.

And road also been proposed along the river in this strip to cater the pedestrians, slow and fast moving traffic.

All these transport will be developed in inter-related manner by the way of timings, so that congestion can be avoided on the traffic generation point and easy transport be available for the passengers connectinhg the various nodes of the city.

The proposal has been made in such a fashion that the traffic nodes are connected with three types of transport with the close proximity and availability of parking space and local transport (Auto and Pedal rickshaw, taxi, scooter etc). Parking lots and Terminal junction be linked to inter-city transportation systems so as to facilitate the passenger

transport from these junctions to city and vice versa as proposed.

Major portion along the river has also been developed as bathing Ghats and Amusement spaces for boating, yatching, Surfing, etc. To enable bathers to use and this space can also be used as long walkway and Amusement Parks etc. somewhere the parking has been taken right in this space because of restriction imposed by the Government. But the designing has been proposed in such fashion that whenever festival or fairs like Chhatha, gatherings on Kartik Purnima happen, this parking space can be used as additional space for festival.

Within the limitation as agreed by Bihar Government by providing of 360 ft.wide strip, the deviation from normal standard has been done and the following spaces has been allocated-

- (i) Water ways - This will be within the river, there fore no land has been provided for this except at terminals.
- (ii) Footpath - 30 ft. wide footpath on either side of road.
- (iii) MRT - 30 ft. wide.
- (iv) Vehicular traffic road - 90 ft. wide.

Now this will take 180 ft. strip and balance 180 ft has been left for the development and Service road etc. In this balance strip, the following development are as follows-.

- (i) Commercial such as hotels, shopping centre etc
- (ii) Offices
- (iii) Conference facilities
- (iv) High rise structures due to availability of proper

light, air and view etc.

(v) Residence for the persons working in the New Development.

(vi) Transport terminals, etc

Land has been reclaimed in the Ganges river at three places namely - B.C.E, Darbhanga house and Rajendra surgical Block (As shown in the Map..4.1.) not to demolish the important structures of Historical and Archeological importance and to facilitate the easy flow of traffic without creating any bottlenecks.

Mahatma Gandhi setu road has been connected to river front road by One-Fourth clover leaf for the traffic of North Bihar and Nepal.

Off street parking has been provided in the multi-floor structure (Ramp Garages or mechanical Parking devices) on the proposed six transport terminals by considering the future projection upto year 2011.

TABLE 6.1
PROPOSED PARKING AT RIVERFRONT OF CENTRAL ZONE

Terminal No.	Long term		Short term		Total	
	Cars	Scoters	Cars	Scoters	Cars	Scoters
1	200	150	500	2000	700	2150
2	100	100	300	1500	400	1600
3	50	100	100	500	150	600
4	50	100	50	250	100	350
5	50	100	50	250	100	350
6	200	150	350	1000	550	700
Total	650	700	1350	5500	2000	5750

Source: As calculated by Author by considering existing and future projections of parking requirement.

Balance Area of notified strip after deduction of land taken for transport network, which has been proposed for development is

Total length of stretch (Central zone) x width of strip
 = 7000 metre (7 km) x 54.81 metre (180 feet)
 = 383670 sq.m
 = 94.80 Acres of land.

TABLE 6.2
 REQUIREMENT FOR DEVELOPMENT PROPOSAL
 (PROJECTED UPTO YEAR 2011)

Uses	Town level (Comprising of Eastern, Central, Western and Sothern Zone)	Central zone	Proposed Riverfront
	1	2	3
All figures are in Acres			
1 Commercial	542	225	57
2 Offices	218	115	14
3 Residential	7526	1915	15
4 Transport terminals -	-	-	4

Source : Field survey (Decided in the pre discussion with Patna Town Planning Authority and Administrative body etc)

Details of column- (3) of Table

(Proposed river front)

For the whole development along river front of Ganga

F.A.R. 3 to 4 is accepted as per discussion of officers of Patna

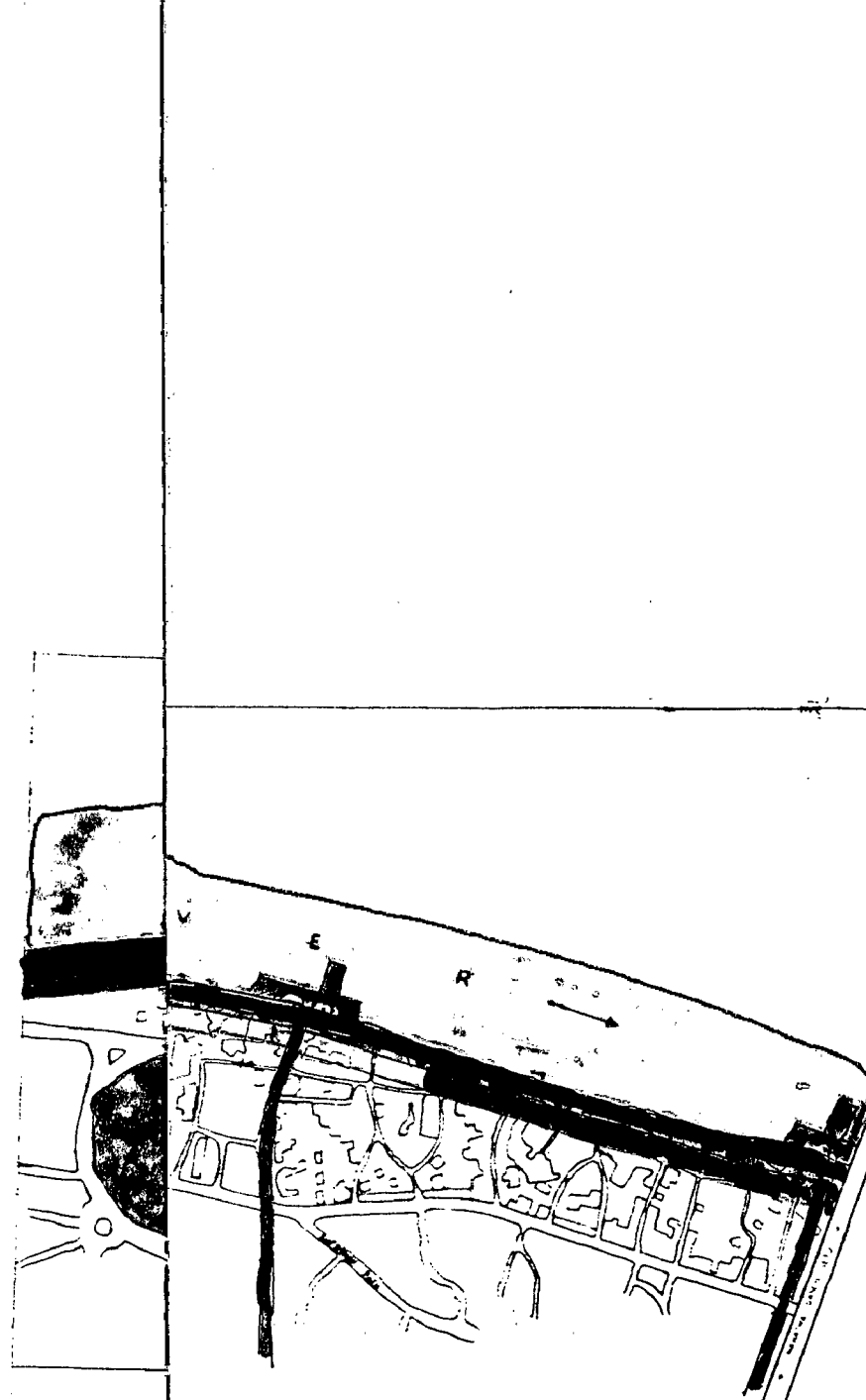
Regional Development Authority and other officers of Administrative persons and Survey conducted it with public bedepending upon the development of townscape / urbanscape along the riverfront.

The details of it is as following :

1. Commercial	Total area 57 Acres
	Proposed on river front
	(in Numbers)
(i) Hotel 300 beds	2
(ii) Yatri Nivas-(200 beds)	3
(iii) Conference facilities	
(a) Capacity (1000 persons)	1
(b) Capacity (500 persons)	2
(c) Capacity (250 persons)	4
(d) Capacity (100 persons)	6
(iv) Shopping centre	4
(v) Cinema hall	4
(vi) Milk booth	4
(vii) Electric sub-station	8
(viii) Petrol Pump	4
(ix) Telephone Exchange	1
(x) Sub post office	4
2 Offices	Total area 14 Acres
(i) Government offices	
(ii) Public and semi public buildings	

3	Residential High-rise apartments	Total area 15 Acres
4	Transport Terminal Terminal stations	Total area 4 Acres 6

Subways and Under pass road have been provided to facilitate the Vehicular and Pedestrian movement between city and ghat without disturbing the traffic on MRT and Vehicular traffic on road and footpath as mentioned in the Proposed map.



LEGEND

- PROPOSED PLAN**
- COMMERCIAL
 - RESIDENTIAL
 - ▭ OFFICES
 - ▭ GHAT & FERRY STAT
 - ▭ TERMINALS
 - ▭ ROAD
 - ▭ MRT
 - ▭ SUBWAY
 - ▭ WATER
 - ▭ PLAYGROUND

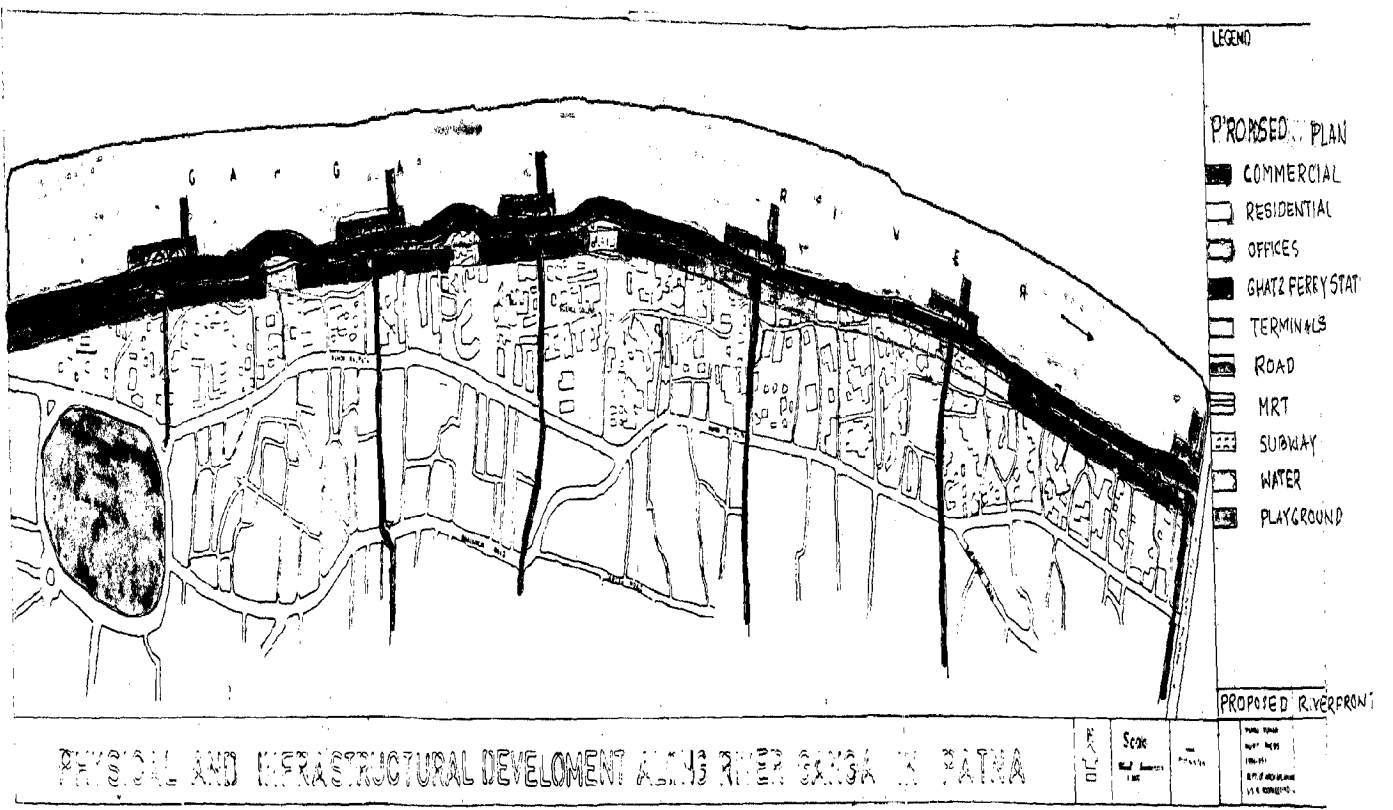
PROPOSED RIVERFRONT

PATNA

BIHAR

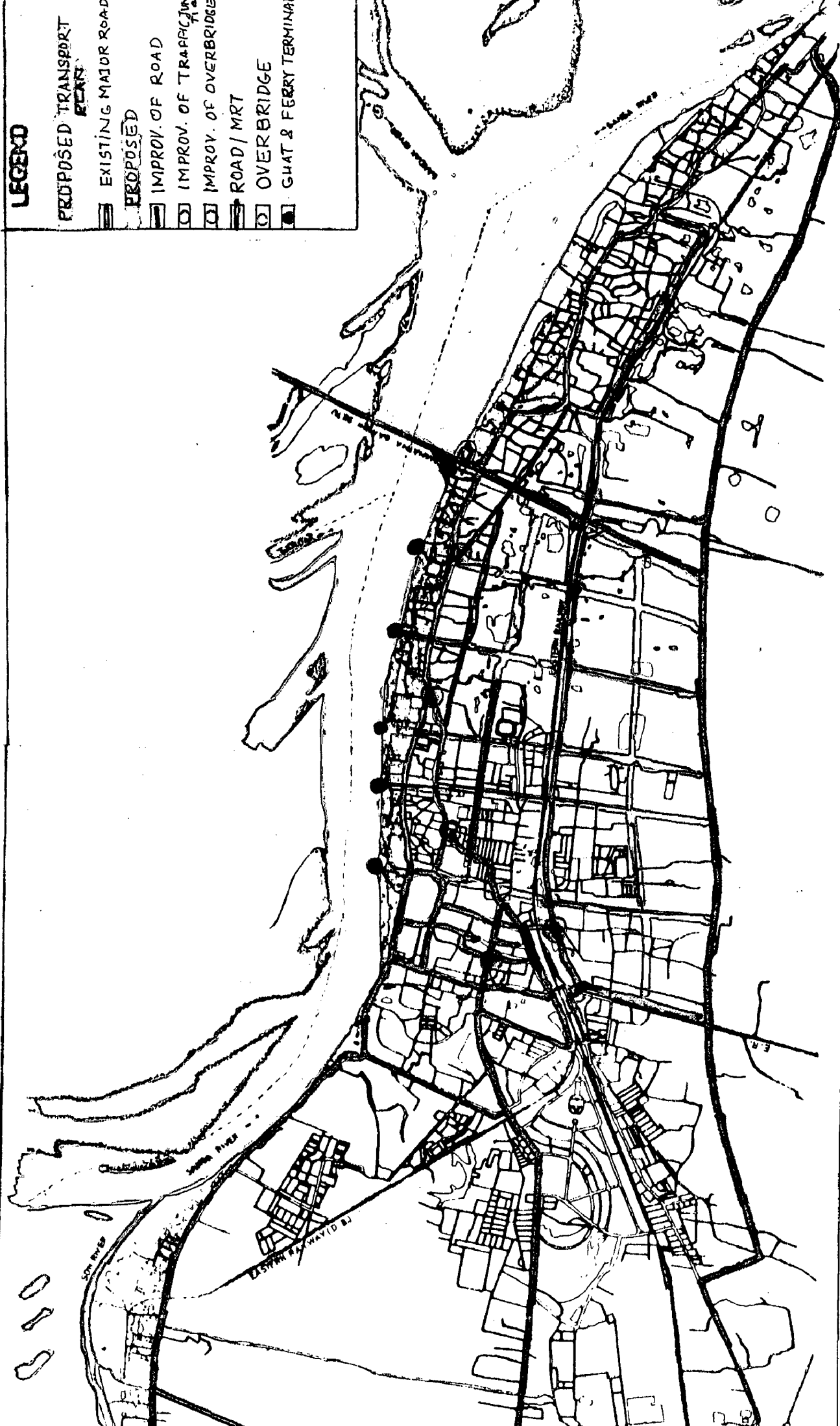
Scale

STATE PLANNING
 DEPT. OF ARCHITECTURE
 U.S. S. 800/41/INDIA



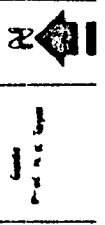
LEGEND

- PROPOSED TRANSPORT **ROAD**
- EXISTING MAJOR ROAD
- PROPOSED
- IMPROV. OF ROAD
- IMPROV. OF TRAFFIC
- IMPROV. OF OVERBRIDGE
- ROAD / MRT
- OVERBRIDGE
- GHAT & FERRY TERMINAL



PHYSICAL AND INFRASTRUCTURAL DEV. ALONG RIVER GANGA IN PATNA

1:2000



MAJOR ROAD
 ROAD THE SS
 (1994-95)
 DEPT. OF ANCHORAGE
 U.S.R. ROOPELINC

Chapter 7 :

CONCLUSIONS

CHAPTER - 7

CONCLUSION

The physical and infrastructural development along river Ganga in Patna as proposed will be certainly a mammoth scheme and really be very ambitious project not only for the capital of Bihar but for whole of the state. The facilities created along the riverfront shall not only relieve the traffic load but shall become a source of attraction and tourist puller for the town. It will generate good amount of tourist visiting the town for relaxation and enjoyment of the facilities along the river. It will also provide a much better and healthier living environment for the city people.

Infrastructural planning essentially is planning the extension of existing infrastructure. Therefore, the analysis of existing system and the monitoring of its functioning and performance should be considered an integral part of planning process. The establishment of target consumption indicators should be linked to the formulation of objectives.

The project has been delineated into three parts depending upon the characteristic of the different areas of the town.

Part I - From A.N. Sinha Institute to Gai-Ghat

Part II - From Gai-Ghat to Didarganj

Part III - From DighaGhat to A.N. Sinha Institute.

The Author in this study has limited himself to part I only.

This proposed project will change the townscape of Patna with increase of smoothness and volume of traffic, Additional road, water way, MRT and Multi-storeyed buildings etc provided on the riverfront. Hence the town will be one of the beautiful city of the country.

APPENDICES

पटना क्षेत्रीय विकास प्राधिकार (अत्यावश्यक सूचना)

पटना शहर में गंगा नदी के दक्षिणी तट की विकास योजना का कार्यक्रम प्राधिकार के द्वारा सुनिश्चित किया गया है। यह सौभाग्य की बात है कि पटना को गंगा नदी का पावन तट लगभग 30 कि.मी. से अधिक की लम्बाई में उपलब्ध है। इस योजना के कार्यान्वयन के लिए लोक आशान्वित है। यह योजना स्ववित्त पोषित के आधार पर प्रस्तावित है। इस योजना में जिन लोगों की भूमि अथवा भवन प्रभावित होंगे उनकी समुचित क्षतिपूर्ति करने का लक्ष्य निर्धारित है। योजना में गंगा नदी के सामने चौड़ी सड़क, बस, ट्राम तथा उपलब्ध स्थलों पर इमारतों का निर्माण करने का लक्ष्य है। योजनान्तर्गत लगभग 360 फीट चौड़ी भूपट्टी पूरे शहर के किनारे में विकसित की जायेगी। इस भूपट्टी पर आमलोगों के द्वारा किसी प्रकार का निर्माण कार्य नहीं किया जाये। इस पर योजना के सीमांकन का कार्य शीघ्र प्रारंभ होने वाला है।

उपर्युक्त योजना के निरूपण के लिए सर्वेक्षण का कार्य बिहार कालेज ऑफ इंजीनियरिंग के माध्यम से किया जा रहा है। योजना का सर्वेक्षण कार्य तथा योजना के कार्यान्वयन में नागरिकों से सक्रिय सहयोग की अपेक्षा है।

ह./- एम.एम. सिंह,

17-6-95

उपाध्यक्ष।

APPENDIX 'B'

QUESTIONNAIRE FOR PROPERTY SURVEY

1. DATE OF SURVEY
 2. NAME OF OWNER
 3. ADDRESS - HOUSE NO./PLOT NO.
LANE/STREET
SURVEY PLOT NO.
 4. USE OF PROPERTY
 - RESIDENTIAL
 - COMMERCIAL - SHOP
 - OFFICE
 - GODOWN
 - MIXED
 - ANY OTHER
 - RECREATIONAL
 - INDUSTRIAL
 - OPEN
 - GOVT./PRIVATE
 - INSTITUTIONAL
 - ANY OTHER
 5. PLOT AREA
 6. BUILT OF AREA - GF
FF
SF
- TOTAL

7. TYPE OF CONSTRUCTION

- GOOD (NEW, PUGCA, RCC, RBC)
- FAIR (PUGCA OLD)
- ROAD (TEMPORARY)
- MIXED
- APPROX YEAR OF CONSTRUCTION

8. ANY OTHER INFORMATION

SIGNATURE OF SURVEYOR

APPENIDX 'C'

TABLE NO. 2

WARD NO.	NO. OF HOUSES
1	5003
2	3797
3	5423
4	5820
5	3329
6	3342
7	3034
8	4343
9	3357
10	3391
11	6468
12	4414
13	4752
14	7516
15	3620
16	3591
17	4682
19	6825
20	3670
21	3977
22	6000
23	3365
24	3964
25	5770
26	3576
27	4825
28	5349
29	3966
30	3964
31	2734
32	5798
33	2719
34	2450
35	2662
36	2680
37	3072

Source: Municipal Corporation Patna

APPENIDX 'D'

TABLE NO. 1

RECREATIONAL AREA PER THOUSAND OF POPULATION

WARD NO.	POPULATION in 1000	RECREATIONAL Area(Acres)	RECREATIONAL AREA PER 1000(Acres)
1	35.68	14.27	0.4
2	27.08	9.45	0.35
3	38.07	13.93	0.36
4	41.05	12.45	0.30
5	23.74	6.41	0.27
6	23.84	7.05	0.31
7	21.65	--	---
8	31.00	6.51	0.21
9	23.94	7.09	0.61
10	24.02	3.63	0.15
11	46.01	9.63	0.21
12	31.05	10.04	0.33
13	33.09	1.69	0.05
14	53.61	17.07	0.33
15	25.85	0.26	0.11
16	25.06	0.26	0.01
17	33.36	2.00	0.06
18	48.67	11.07	-0.24
19	26.17	--	--
20	28.36	9.93	0.33
21	41.80	12.41	0.29
22	23.36	--	---
23	28.27	--	---
24	41.13	6.17	0.15
25	25.51	5.36	0.21
26	34.41	12.39	0.36
27	38.15	--	---
28	28.27	--	---
29	28.30	11.61	0.41
30	19.51	1.95	0.10
31	41.35	---	---
32	19.36	2.32	0.12

Source: Municipal Corporation Patna

Will a five-star hotel replace PMCH?

The Times of India News Service Patna, November 22 : No city in the world has such a long river front as Patna which has a 25 kilometre stretch along the river. And yet the river is mostly hidden from the city by buildings, slums and huts. A river front which should have been utilised commercially as well as to provide much-needed breathing space to the city dwellers, has largely been wasted, pointed out Professor Jitendra Singh here today. He was making a presentation at an interface organised by the Bihar chapter of the Indian Institute of Architects.

Plans to develop the river front at Patna were at least 20 years old, confessed the vice chairman of the PRDA Mr. M.M. Singh. But the important difference between earlier plans and the present one, he said, was that the scheme is visualised as self-financing. "We will not accept any money from the government, instead we are confident that PRDA will earn a lot of money from the project," he said.

HUDCO, Mr. Singh added, had shown keen interest in the project and the HUPCO chairman had agreed to help PRDA in getting a detailed project report prepared.

The initial surveys had already been done by the Bihar College of Engineering. Under the scheme, he informed, a 120 feet wide road would be built along the river; 30 feet will be set aside for pedestrians; 60 feet will be earmarked as the green belt and the space facing the river would be auctioned to raise money for the project. "Some plots can be auctioned to builders

for constructing apartment houses while others can be auctioned for five-star hotels, recreation centres, shopping complexes, offices and so on.

The stretch between the A.N. Sinha Institute and the Law College, he pointed out, was the official area and had government buildings. This would be the stretch, he hinted,

Rajendra Surgical Block. These are sections where, he said, the road could vest over the river and pillars used to prop it up. To put the entire load on pillars would of course be prohibitive.

Such a project would normally have taken ten years or more but nobody has the patience to wait so long, he added. In view of the com-

way connecting Danapur to Fatuha or Didarganj. This will provide a parallel route to the congested Ashok Rajpath as well as a rapid transit system. Parking lots will be laid out beside the highway, he added.

During the interface some of the panelists objected to the scheme and described it as 'over ambitious'.

proposals to shift the Patna University to Bahadurpur in the fifties, nothing had come off it and the idea of shifting the university now is absurd, he said.

Mr. I.N. Sinha, a retired chief engineer, however dispelled apprehensions that the river could be shifting its course away from Patna or that its water may dry up. Studies



merical viability of the project and the fact that the state government will not have to shell out any money, the government is obviously keen to show results as early as possible.

At the outset, Mr. Jitendra Singh outlined the project as visualised by the engineering college. This scheme visualises a eight-lane road with dividers, which will be a high-

ious. Two eminent historians, Mr. J.C. Jha and Mr. Surendra Gopal, were shocked at the possibility of the university being shifted and some of the historic buildings pulled down. Mr. Jha recalled that he joined the Patna University in the forties and remembers rose gardens and tennis courts on the river banks. Picnics on the river bank were also quite popular. But despite

there was no harm in planning big

were made of the river for the last 400 years and the river banks had remained firm during all this period, he claimed. Moreover, Inland Waterways Corporation had also carried out surveys and found that between Patna and Allahabad a minimum depth of six meters was always available.

Mr. Sinha also pointed out that

provided money was not a constraint. He quoted a foreign expert as saying that 'a dam can be built on a chunk of cheese, provided money is no constraint'. The interface however provided no unanimity on the likely cost of the project. While Mr. H.K. Sinha realised that a plan which merely had visualised a 40 feet wide road on the river bank was estimated to cost Rs. 80 crore, Mr. I.N. Sinha put the figure at Rs. 2,000 crore. The PRDA vice chairman also maintained that ten years ago the estimated cost was Rs. 80 crore.

There were other speakers who felt that the river front should complement the university campus, that development should take place from the centre to the periphery and not the other way round and that efforts should be made to clean up the state capital first. Panelists also felt that there should be a clear focus before the project is taken up. Is it being taken up for easing transport bottlenecks or is it being planned to provide breathing space to the city? Should the river front be cleared of buildings, and the space exploited commercially? Should a five-star hotel come up where the Patna College is situated at present? And should aesthetic considerations outweigh commercial ones?

(Since the PRDA is going ahead with the ambitious project, what do the readers feel about it? Is it a feasible project and how would you like to improve upon it? Write your views and send it to us. Mark the envelopes "River Project". We will publish your views to benefit the experts! --President Editor)

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