DEVELOPMENT ALONG HIGHWAYS - PLANNING PROBLEMS AND PROPOSALS

A DISSERTATION

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

MASTER OF URBAN AND RURAL PLANNING

By

MAJOR R. VENKATESWARA RAO

DEPARTMENT OF ARCHITECTURE AND PLANNING
UNIVERSITY OF ROORKEE
ROORKEE-247 667 (INDIA)

JANUARY, 1998

CANDIDATE'S DECLARATION

I hereby certify that the work which is being presented in the thesis entitled **"Development along Highways : Planning problems and proposals"** in partial fulfilment of the requirement for the award of the degree of **Master of Urban and Rural Planning** submitted in the Department of Architecture and Planning, of the University is an authentic record of my own work carried out during the period from August 1997 to January 1998 under the supervision of Mr. R . Shankar, Associate Proffessor in the Department of Architecture and Planning, University of Roorkee, Roorkee, India.

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

Dated :28 January, 1998

(Major R Venkateswara Rao)

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

(Rama Subramaniam Shankar)
B. Arch, P.G.Dip. in Planning,
A.I.I.A, A.I.T.P, M.C.A,
Associate Professor,
Dept. of Arch. and Planning,
University of Roorkee,
Roorkee 247 667
(India)

ACKNOWLEDGMENT

I would like to extend my sincere and heartfelt thanks to Prof. R. Shankar, firstly for giving me the opportunity to work under him, secondly for suggesting me such an excellent and unexplored (in a wholesome way) topic, and thirdly and most importantly for his total involvement and constant guidance at each step of my thesis work.

I also would like to thank Dr. Najamuddin, Prof. and Head of the Department for his encouragement, Mr. R.K.Jain, Assoc. Prof. and course coordinator for his fullest cooperation and helping nature. A special mention and thanks to Dr. A.M.A.Siddiqui, who had readily and willingly given whatever data he could give me on this subject.

My sincere thanks are also to Mr. Nirmaljit Singh, C.E in Ministry of Surface Transport, Dr. S.M.Sarin, Head of Environment & Road traffic safety Division, C.R.R.I and Dr. Nishi Mittal of same Division for their patient hearing , guidance, views and supply of literature on the subject. I am also grateful to the concerned officials at Indian Roads Congress for their cooperation, guidance and access to their library.

I also would like to acknowledge with thanks the service rendered by P.W.D staff at Muzaffar nagar, Roorkee and Hardwar especially the Executive Engineer of No.3 division, Muzaffar nagar and J.Es(technical) at Roorkee and Hardwar. I am very grateful to Lt. Col. Nanjappa, Chief Instructor Workshops, Bengal Engineering Group and Center

for whole heartedly making available the draftsmen and surveyor's help when ever I required them for carrying out field work, making charts etc.

A special mention is to be made for Dept. of Planning and Architecture's computer lab I/C Mr. Sharafat Ali and Mr. Rakesh Kumar and Library I/C Mr.Ashwani and Ammonia print machine I/C Mr. Anil for their full cooperation in their respective fields.

I would like to thank my other three class mates Mr. Ashok kumar, Miss Kavitha Maddula and Mrs. Rajashree Bhardwaj for their excellent camaraderie, mutual cooperation and friendship and also special mention and thanks to my wife Mrs. Anuradha, M.Sc, B.Ed for understanding attitude when the work pressure was more and helping in proof reading now and then.

Lastly, but most importantly I would like to thank my parent organisation, i.e. Indian Army for sponsoring me for doing this under 'Post Graduate Training Program' there by giving me the opportunity to study again in this prestigious University, excellent Department and under such dedicated staff.

CONTENTS

1. CHAPTER-1 : INTRODUCTION

1.1	Background	1
1.2	Status of Indian Highways/Roads	2
	1.2.1 National highways	
1.3	Problem Identification	4
1.4	Objections	5
1.5	Methodology	5
1.6	Scope and Limitations	6

2. CHAPTER-2 : LITERATURE REVIEW

2.1	Introduction	14
2.2	Literature from Abroad	15
	2.2.1 HRB special report-17 Roadsides, their use and protection	15
	2.2.2 Master plan for right-of-way, Wayne county	16
	2.2.3 Road side design guide	17
2.3	Indian Literature	18
	2.3.1 Ribbon development along highways and its prevention	18
	2.3.2 Economic impact of encroachment of Delhi roads	19
	2.3.3 Problem of ribbon development	20
	2.3.4 Highway engineering	21
2.4	General Study of Highway Development	22
	2.4.1 Introduction	22
	2.4.2 Extent of Problem	24
	2.4.2.1 Urban situations	25
	2.4.2.2 Rural / Inter city situations	26
	2.4.2.3 Suburban situation	26
	2.4.3 Ill -Effects	27
	2.4.4 Recent Studies	28

2.4.4.1 Road side amenities 28

2.4.4.2 Utilisation of bypasses 29

3. CHAPTER-3 : STUDY AREA DESCRIPTION

3.1 Introduction 32

3.2 Location 33

3.3 Study Area as Existing 33

3.4 Topography 35

3.5 Description 36

3.5.1 Muzaffar nagar bypass 37

3.5.2 Stretch between Muzaffar nagar bypass and Sisouna 37

3.5.3 Sisouna 37

3.5.4 Stretch between Sisou na and Chapar 38

3.5.5 Chapar 38

3.5.6 Stretch between Chapar and Barla 39

3.5.7 Barla 39

3.5.8 Stretch between Barla and Faloda 40

3.5.9 Faloda 40

3.5.10 Stretch between Faloda and Purkazi 40

3.5.11 Purkazi 41

3.5.12 Stretch between Purkazi and Burahedi 41

3.5.13 Burahedi 42

3.5.14 Stretch between Burahedi and Gurkul narsan 42

3.5.15 Gurkul narsan 42

3.5.16 Stretch between Gurkul narsan and Mandavelli 43

3.5.17 Mandavelli 43

3.5.18 Stretch between Mandavelli and Mangalore 43

3.5.19 Mangalore 44

3.5.20 Stretch between Mangalore and Roorkee 45

3.5.21 Roorkee 45

4. CHAPTER-4 : ANALYSIS OF DEVELOPMENT ALONG HIGHWAY STRETCH

4.1	Introduction		48
4.2	Analysis of Problems along Highway stretch		49
	4.2.1	Encroachment on the highway	49
	4.2.2	Prevalence of insanitory conditions/ polluting agro based activities	50
	4.2.3	Absence of planned amenities and facilities	50
	4.2.4	Undesirable and incompatible land uses and activities	51
	4.2.5	Access roads	51
	4.2.6	Bottle necks	52
	4.2.7	Hazardous traffic movement	52
	4.2.8	Accident prone highway stretches	53
4.3	Road side activities		54
4.4	Analysis of Road side Activities between Settlements		56
	4.4.1	Dhabas	57
	4.4.2	Brick kilns	58
	4.4.3	Jaggery making	58
	4.4.4	Fallen / Felled trees	59
	4.4.5	Cultivation	60
4.5	Analysis of Road side Activities within Settlements		60
	4.5.1	Extension of residential activities	61
	4.5.2	Extension of commercial activities	61
	4.5.3	Dung cake making	62
	4.5.4	Garbage dumping	63
	4.5.5	Road side parking	63
	4.5.6	Informal sector	64

5. CHAPTER-5 : ANALYSIS OF PROBLEMS

5.1 Introduction 75

5.2 Networks 77-93

5.3 Prioritisation of problems 94

5.4 Resources availability: 94

5.4.1 Institutions 95

5.4.1.1 *Existing legislations/Acts* 95

5.4.1.1.1 *U.P. Roadside land Control Act* 95

5.4.1.1.2 *U.P. Roadside land Control Rules, 1964* 96

5.4.1.2 *Existing Organisations* 98

5.4.2 Manpower 99

5.4.2.1 *Technical* 99

5.4.2.2 *Executive* 99

5.4.2.3 *Police (Enforcement)* 99

5.4.3 Capital 100

5.5 Critical Review of Existing Resources : 102

5.5.1 Existing legislations 102

5.5.2 Existing organisations 103

5.5.3 Technical manpower 104

5.5.4 Executive manpower 104

5.5.5 Police 105

5.6 Prospects of a new basis for highway planning and development : 106

5.6.1 Separate organisation 106

5.6.2 Private participation 107

5.6.3 Other funds 108

5.6.4 Integrated highway planning 108

5.6.4.1 *Roadsides planning at inception stage* 108

5.6.4.2 *Road geometry condition* 110

5.6.4.3 *Access roads* 110

5.6.4.4 *Sign posting* 111

5.6.4.5 *Incompatible/Undesirable land uses on roadside land* 111

5.6.4.6 *Adequate right-of-way* 113
5.6.5 Accident prevention 115
5.6.6 Central legislation 118
5.6.6.1 *Modalities* 118
5.6.6.2 *Broad framework* 119
5.6.6.3 *Organization & Staff* 119

6. CHAPTER-6 : PLAN PROPOSALS
6.1 Introduction 120
6.1.1 Objectives 120
6.1.2 Criteria 120
6.1.3 Parameters 121
6.2 Planning measures 121
6.3 General proposals 122
6.3.1 Rest areas 127
6.3.2 Truck terminals 128
6.4 Specific proposals 129

7. CHAPTER-7 : IMPLEMENTATION OF PLAN PROPOSALS
7.1 Introduction 138
7.2 Funding Prospects 138
7.2.1 Role of private developers 139
7.2.2 Incentives for private investment 141
7.3 Authority and Implementation 142
7.3.1 Creation of executive 142
7.3.2 Permanent record office 143
7.3.3 Powers of highways authority 144
7.3.4 Independence from revenue authority 144
7.4 Economics of Implementation 145
7.4.1 Estimates of costs 145
7.4.2 Estimates of benefits 145
7.5 Conclusion 146

8. APPENDICES

9.1 Appendix 'A' - U.P Roadside Land Control Act, 1945 147-157

9.2 Appendix 'B' - U.P Roadside Land Control Rules, 1964 158-166

9.3 Appendix 'C' - I.R.C Specified Road Sections 167

9.4 Appendix 'D' - Paper Clippings on 'Development along Highways' 168-170

9. BIBLIOGRAPHY 171-172

LIST OF TABLES

Table	Title	Page
1.	Total outlay and expenditure on transport sector (roads)	10
2.	Energy consumed by road transport	11
3.	Roads - Total and surface road length by categories in India	12
4.	State wise road length in relation to area and population	13
5.	Total registered vehicles in India	24
6.	Effect of provision of by pass on accident rate and speed	30
7.	Development on state highway - 45 Stretch between Muzaffar nagar and Roorkee	47
8.	Building line specifications	97
9.	Total taxation and revenue collected on road transport	101
10.	Standards for building lines and control lines	113
11.	Land width for different classes of road	114
12.	No. of accidents and persons killed in India and in U.P	115
13.	Fixed object and fatality by object type	116

LIST OF FIGURES

Figure	Title	Page
1.	Methodology	7
2.	Map showing state highways and other roads of western U.P	8
3.	Map showing Indian highways	9
3a.	Map showing study strecth between Muzafarnagar & Roorkee	9a
4.	Plate - 1	66
	Top :Auto repairer's advertisements encroaching till paved road edge	
	Bottom :Road side land being used as garbage dumping ground	
5.	Plate-2	67
	Top :Dhabas encroachment leaving just a vehicle space on the highway	
	Bottom :T-Junctions encroached by petty traders obstructing the highway	
6.	Plate - 3	68
	Top :Activation on encroached roadside land in front of newly opened Mangalore market.	
	Bottom :A woman making rope with the help of her children on the road shoulder.	
7.	Plate-4	69
	Top & Bottom : Dried dungs cakes stocked on road shoulders	

8.	Plate - 5		70
	Top	:	Temporary wooden shacks occupying road side land in Purkazi town.
	Bottom	:	A welder spreading his operations till road edge.
9.	Plate - 6		71
	Top &		
	Bottom	:	A memorial under construction abutting highway
10.	Plate - 7		72
	Top	:	Highway turned into a narrow alley with a sharp bend in Purkazi town.
	Bottom	:	Unexpanded culvert at the entrance of Mangalore town, making it a one way traffic.
11.	Plate-8		73
	Top	:	Uncleared fallen trees reducing road availability
	Bottom	:	Bottlenecks due to un-widened culverts
12.	Plate - 9		74
	Top	:	A holy place (Mosque) in centre of Mangalore town
	Bottom	:	A hardware shop in Mangalore town encroaching till paved road edge.

Networks

13.	Network for problem No. 1	78
14	Network for problem No. 2	80
15	Network for problem No. 3	82
16	Network for problem No. 4	84
17	Network for problem No. 5	86

18 Network for problem No. 6 88
19 Network for problem No. 7 90
20. Network for problem No. 8 92
21. Overall superimposed cause-effect network 93

General proposals

22. Typical rest area 130
23. Typical rest area with petrol station 131
24. Typical rest area with petrol station and accommodation 132
25. Typical plan of rest areas 133
26. Typical layout of truck terminal 134
27. Typical section and plan of highway between settlements 135
28. Typical section and plan of highway within settlement 136
29. Typical under pass for highway within settlement 137
30. Organisational network for suggested highway authortiy 142

CHAPTER-1

INTRODUCTION

1.1 Background:

Creation of a "complete highway" - complete to serve the public, for service and utility, for safety, for economy, and for beauty-should be the criteria to be followed for planned development along highways. As we all know, there is an intimate relationship between the highway and its roadsides. The highway affects adjacent land sides, often stimulating their development; and, in turn, these land sides affect the movement of vehicles on the highway, often interfering with their safest and most efficient operation. Therefore, whatever measures taken to improve the character of highway service will also improve the nature of the road sides, and vice versa.

Today all the major cities in the world and their surrounding suburban areas are suffering from a malady we might call "auto intoxication". The automobile has changed our economy, and also changed the pattern of our communities. Limited transportation facilities earlier necessitated compact urban centers.

The development of the automobile and its increased use as a means of daily transportation, and the companion improvement and building of roads into hitherto inaccessible area on the outskirts of cities have created a metropolitan pattern so common place that we have a cliché' to describe it- "urban sprawl".

It was natural, in the course of this outward expansion, that initially most of it would take place along and adjacent to existing roads radiating from the city. And it is understandable, too, that the first improvements to these roads bothered little with changes in alignment and grade and almost not at all with widening of right-of-way or the control of access or marginal use. As a result many of these roads, which to day are still the main approaches to our cities, are cluttered with a misalliance of uses.

1.2 Status of Indian Highways/Roads :

India covers a vast geographical area of 32,87,782 sq. Km., inhabited by approximately 950 million people and hence it has one of the largest road networks in the world. The country's total road length was 20,26,209 km. in 1991-92. Seventh plan laid emphasis on a co-ordinated and balanced development of road network in the country under

(i) Primary road system covering national highways.

(ii) Secondary and feeder road system covering state highways and major district roads; and

(iii) rural roads including village roads and other district roads.

1.2.1 National Highways: Central Govt. is responsible for national highway system. Present national highway system (refer Fig-2 for national highway network) includes a total road length of 34,058 km. Though national highways constitute only 2% of the total

road length, they carry nearly 40% of road traffic. It will be interesting to know some statistics on Indian roads & highways which are displayed in tables (refer Tables 1 to 4) that are attached in this chapter.

In western world the problem of ribbon development along highways started during 60"s and by now it has been almost tackled by them. But in India this problem is growing day by day and is afflicting highway by highway but still there is no proper planning of road side development.

Although there may be adequate right-of-way available on both sides of the carriage way, as it is unplanned and undeveloped, the encroachment takes place and consequently the ribbon development occurs. This in turn highly affects the road efficiency. Similarly numerous access roads, some legal and some illegal and commercial activities at these junctions with highways are also affecting Indian highways efficiency.

The problem of road traffic has become gigantic. The road traffic is increasing by 10% and roads are increasing only by 3 to 4%. The investment in roads has gradually come down in the Five Year Plans. The outlay on the roads was 6.7% in the first-five year plan but the total plan expenditure had comedown to 3.5% in the 6th plan and 2.7% in the 7th plan. The present infrastructure of road network ofcourse can not cope with massive increase in the volume of vehicles as well as traffic on the roads.

1.3 Problem Identification :

The unplanned and often unauthorised growth taking place along the sides of our highways, both national and state, result in various adverse impacts and are a critical planning problems along our major transportation corridors. Inspite of the early recognition of this uncontrolled growth along the highways which is often less than 20 or 30 mtrs in depth and early legislation on roadside land control gazetted by the then U.P. Government in 1945, the ribbon development along the highways continues to pose innumerable planning problems. Absence of proper highway developmental controls, bi-laws, zoning, plan policies etc. applicable to the entire network of national and state highways (refer Fig-3 for U.P state highways) in India (with suitable variations for different regions and conditions) and more importantly the absence of effective implementing organisational machinery might be the two important reasons for the continued uncontrolled and often illegal encroachment taking place along the highways.

There is an urgent need to undertake a systematic study of the development along the highways, identify and analyse the planning problems and suggest solutions to mitigate these problems, as orderly and planned development of land abetting the highways is instrumental to and an effective indicator of planned regional development.

A stretch of state highway between Muzaffarnagar and Roorkee is considered to be taken for the purpose of MURP Thesis with the following objectives.

1.4 Objectives :

1. To study in general the type of "ribbon development" occurring along our national and state highways resultant planning problems and the prevailing standards, rules & regulations.

2. To study in detail various types of development that has occurred along the selected stretch of the state highway including the characteristics of highway and its users and identify and analyse the resultant problems.

3. To workout various plan proposals interms of highway development standards, typical cross sections for both urban and rural stretches, development controls for land along the highways, policy guide lines and strategies for future development etc. to take care of present as well as the future requirement.

4. To make suitable proposals for effective implementation of highway development plans including recommendations on desirable organisational network, powers and responsibilities and ways of dovetailing this into existing system.

1.5 Methodology:

Starting with the general study of ribbon development along national and state highways based on available literature and secondary data, this work is intended to cover

the study of the selected stretch of state highway through field surveys as well as contacting various officials, agencies for secondary data. The existing development along the selected stretch of the highway, its characteristics and the characteristics of the user will be recorded through field surveys on maps and supplemented by photo studies. The analysis of the data will be done through graphical and statistical methods. The set of plan proposals will be in the form of diagrams, sketches, maps, tables, charts and statements. This will be done in consultation with the highway planners/engineers and other authorities concerned with it. A suitable time-frame say 20 years will be considered for suggesting plan recommendations and guidelines. For detailed methodology, refer Fig-1.

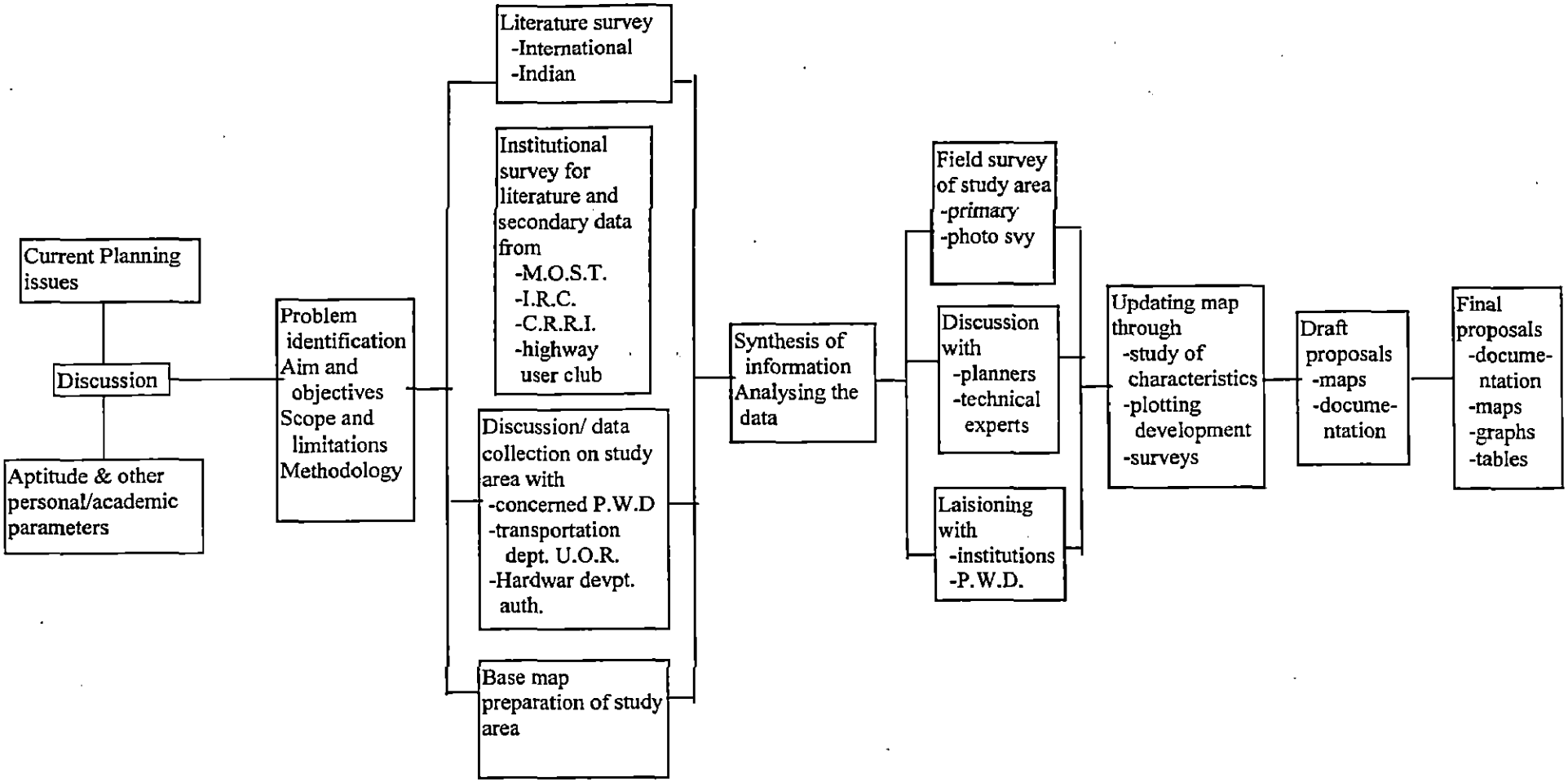
1.6 Scope & Limitations :

Though the study covers specifically a small stretch of state highway i.e. between Muzaffarnagar - Roorkee falling with in Western U.P., it should be applicable to a large no. of other similar regions having similar characteristics. The accuracy and the depth of study depends largely on the accuracy and availability of data on various aspects of highway and the ribbon development along the highways. The study also offers enormous scope for undertaking similar studies along the national highways under totally different conditions.

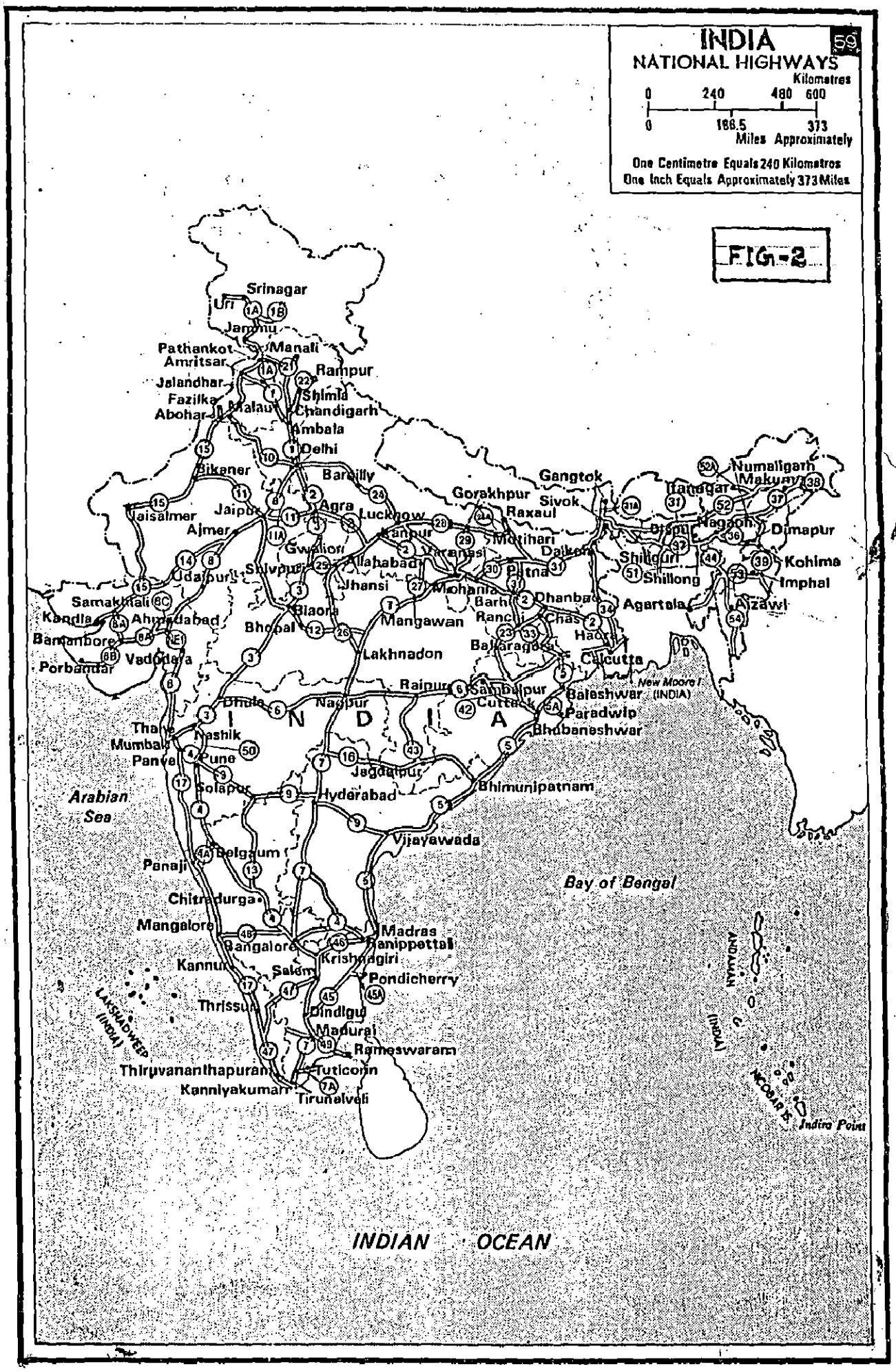
FIG - 1

Refers to para 1.5

METHODOLOGY

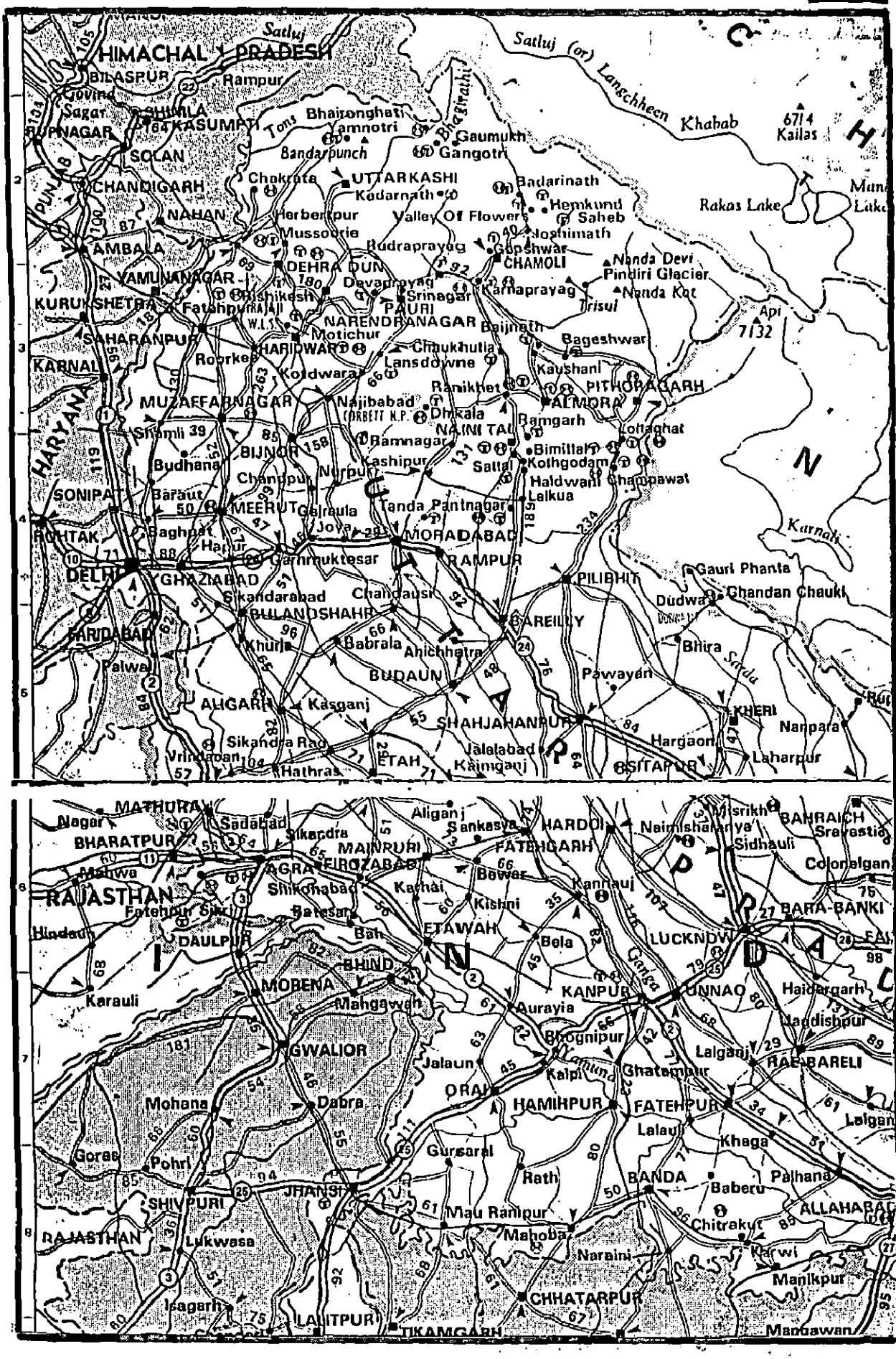


INDIAN NATIONAL HIGHWAY NETWORK



STATE AND OTHER MAJOR ROADS OF WESTERN U.P.

FIG 3



LAYOUT OF STUDY STRETCH BETWEEN MUZAFFAR NAGAR TO ROORKEE

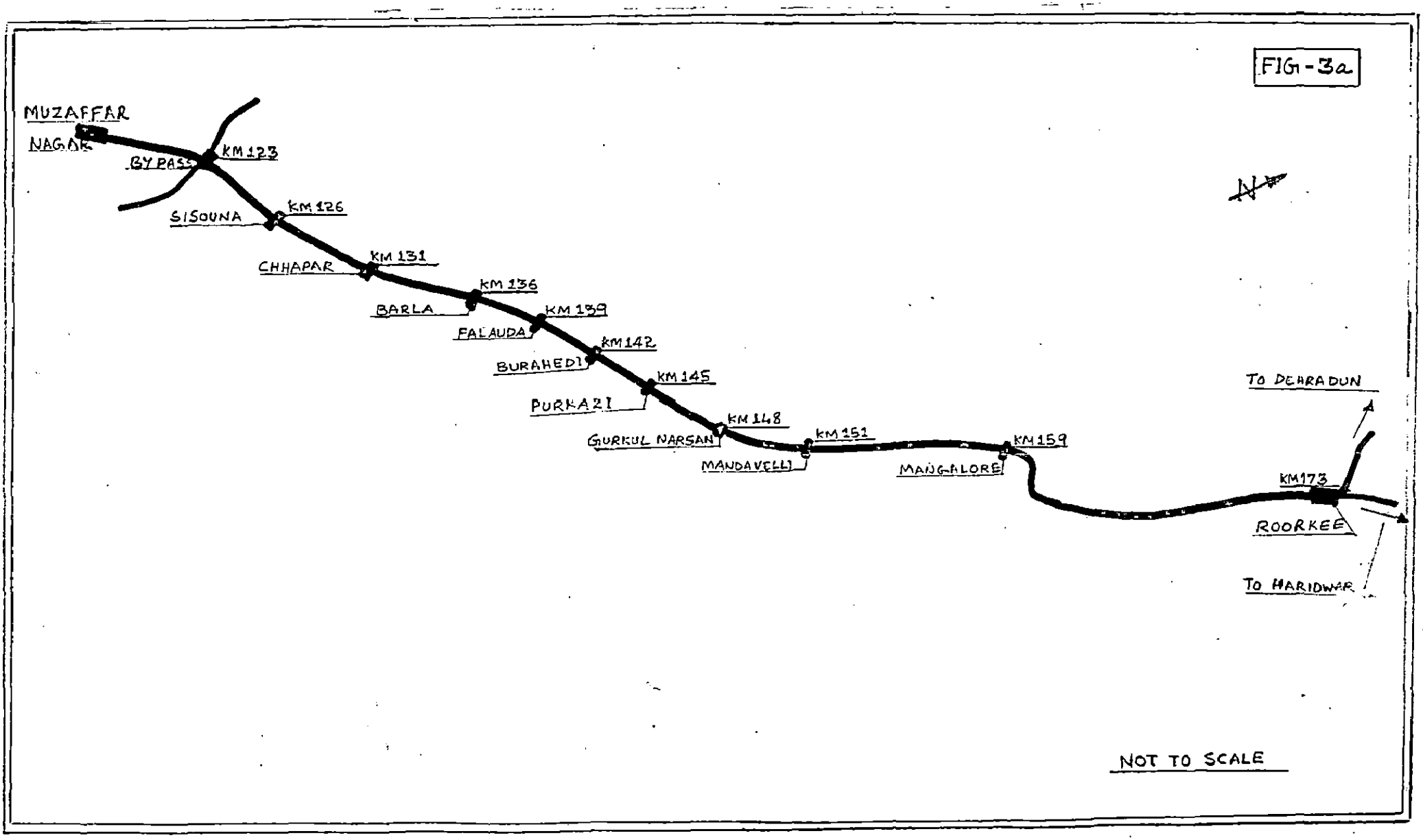


TABLE -1
TOTAL (CENTRE+STATES) OUTLAY AND EXPENDITURE ON TRANSPORT SECTOR (ROADS) (RS. IN CRORES)

Plan Period	Outlay	Exp.
First Plan (1951-56)	135	147
Second Plan (1956-61)	263	242
Third Plan (1961-66)	297	440
Annual Plans (1966-69)	291	309
Fourth Plan (1974-79)	871	862
Fifth Plan (1974-79)	1353	1701
Annual Plan (1979-80)	454	467
Sixth Plan(1980-85)	3439	3887
Seventh Plan (19785-90)	5200	6335
Annual Plan (1990-91)	1833	1731
Annual Plans (1991-92)	2066	1925
Eighth Plan (1972-97)	12833	-

Source : Compendium of Highway Statistics by I.R.C., New Delhi, 1993.

TABLE - 2

ENERGY CONSUMED BY ROAD TRANSPORT

(Figs. in Million Tonnes)

Type of Energy	1984-85	1990-91(P)	Percent in increase or decrease
Coal replacement	94.72 (72.30)	145.01 (80.81)	8.85
POL Consumption	10.70 (77.46)	16.73 (82.50)	9.39

(P) = Provisional

Other transport modes are Railways, Civil aviation, Water transport

Source : Compnedium of Highway Statistics by I.R.C., New Delhi, 1993.

TABLE - 3

ROADS - TOTAL AND SURFACE ROAD LENGTH BY CATEGORIES IN INDIA
(As on 31st March) (in '000 kms.)

Category of Roads	Total/Surfaced	1951	1961	1971	1981	1989
All India	T	399.9	524.5	917.8	1489.9	1998.4
(A+B+C+D)	S	157.0	263.0	397.9	683.3	964.1
A.PWD Roads	T	193.5	280.9	357.4	547.9	641.7
		(48.5)	(53.6)	(38.9)	(36.8)	
(I+II+III)	S	117.3	195.2	273.7	423.0	528.8
I) National Highways	T	19.8	23.8	23.8	31.7	33.0
		(5.0)	(4.5)	(2.6)	(2.1)	
	S	-	21.0	23.3	31.5	32.7
II) State Highways	T	@	@	56.8	94.4	123.1
				(6.2)	(6.3)	
	S	@	@	51.8	90.3	120.4
III) Other PWD Roads	T	173.7	257.1	276.8	421.8	485.6
		(43.5)	(49.1)	(30.1)	(28.4)	
	S	117.3	174.2	198.6	301.2	375.7
B. Panchayati Raj Roads	T	206.4	197.2	357.5	633.2	988.9
		(51.5)	(37.6)	(38.9)	(42.5)	
	S	39.7	35.9	64.8	153.6	295.8
C. Urban Roads	T	-	46.4	72.1	123.3	157.2
			(8.8)	(7.9)	(8.3)	
	S	-	31.9	53.3	85.9	111.6
D. Project Roads	T	-	-	130.8	185.5	210.6
				(14.3)	(12.4)	
	S	-	-	6.1	20.8	27.8

Note : @ : Include with P.W.D. Roads; S: Surfaced Road Length; T: Total Road Length; Figures in brackets indicate the percentage share to total road length.

Source : Hand Book Management Information, Dec. 1992, Ministry of Surface Transport, Transport Research Division.

TABLE - 4

STATEWISE ROAD LENGTH IN RELATION TO AREA & POPULATION

S.No.	Description	All India States	U.P.	U.S.A.
1.	Total Road (E) Length (km.) (As on 31.3.91)	2036750	215366	6237290
2.	Area (Sq. Kms.)	3287263	294411	9372614
3.	Population (1991 Census) (Lacks)	8443.2	1390.3	247.35
4.	Road Length (Kms.)			
	(a) Per 100 sq. Km. of area	62.0	73.1	66.5
	(b) Per Lakh of Population	241.2	154.9	25216.5

E = Estimated

Source : Compendium of Highway statistics, I.R.C., New Delhi, 1993.

CHAPTER-2

LITERATURE REVIEW

2.1 Introduction:

Although in U.S.A., the roadside planning has started as early as 1950s, in India such planning is still yet to start. There is no comprehensive literature written/ available in India on roadside development planning i.e. 'Development along highways'. There are separate studies carried out and papers written on individual aspects of highway roadside development such as 'ribbon development' ,'encroachment problem', 'threat with roadside hoardings', 'control of access roads to highways', 'roadside land control acts' etc., but a wholesome study of all these problems and planning proposals to overcome these maladies to give a 'complete highway' i.e. complete to serve the public, for service and utility, for safety, for economy, and for beauty has not yet been tried.

The book review has been covered in three parts. In the first part, the literature from abroad mostly from U.S has been reviewed as it is considered to be pioneer in roadside planning after being encountered with similar problems as we are facing in India now. The literature reviewed in this part contains literature as old as 1950s to as latest as 1990s.

The second part of the review contains literature from India. With in India, Indian Roads Congress (I.R.C) was the first body to have started some thinking on this problem which can be seen in its publication no.15, on ribbon development (1973). In 90s Central

Road Research Institute (C.R.R.I) has also done some studies on Delhi roads and published reports. All above and some more has been covered in this part.

The third part contains 'General Study of Highway Development'. This part covers the actual unplanned development that has taken place in India, the extent of this problem, ill effects of this unplanned development and finally the studies that have been carried out regarding this problem have been covered. Since most of this is already very well covered by Mr. R.P.Sikka and Mr. J.B.Mathur in their paper "problem of ribbon development : Can we save our highway system ?" which was published in a I.R.C journal, some portion of this has been covered under this part as book review.

2.2 Literature From Abroad:

2.2.1. *Highway Research Board special report 17-Road sides Their use and protection - January 13-16, 1953 - Published in 1954, Washington, D.C.*

This report covers the proceedings at a symposium on "Roadsides : Their use and protection". This report isolates the conditions and consequences that result from the interaction of the highway and its road sides, each upon the other, and, once having identified the problem, seeks those directions of betterment that will promote greater safety and facility of highway travel and, at the same time to improve the physical and functional character of the adjacent areas themselves.

The panel for this symposium has got highly diversified i.e. it has a highway designer from a progressive state (Maryland state roads commission), a traffic Engineer of wide renown, a distinguished lady who has urged roadside protection for many years representing garden clubs and civic groups; a top official of the motorists group, who has been in the fore front of the movement to obtain improvement of the highway corridors, and a planner who has been associated in a most practical way with the problems confronting us in this field

By these various view points expressed by experienced and talented people, the paper gives us a wholesome view on the problem of the roadsides, their use and protection, not only from one point of view but from many.

2.2.2. *Master Plan for Right-of-way, Wayne county -by Wayne county Road Commission, December, 1969:*

This report presents a Master Plan for Right-of-way for primary and local roads under the jurisdiction of the Wayne county Road commission. The purpose of the Master plan is to establish required widths of right-of-way for county roads in order to advance the development of an adequate highway transportation system in Wayne county.

In this paper, the prime objective in establishing right-of-way requirements through a master plan is to provide a control over roadside development in the location of buildings and other facilities at appropriate setback distances. The preservation of right-

of-way by establishing proper setback distances has numerous benefits which have been given in this report.

Further, the report also covers various standards for different categories of roads, master plan for right-of-way, collector roads, plan revisions and plan enforcement. It also gives guidelines for landscaping, permit guidelines for signs and landscaping and permit specifications. Neat sketches explaining cross section standards have also been given.

2.2.3. *Roadside Design guide-developed by American Association of State Highway and Transportation Officials :*

Roadside Design guide was developed by the American Association of state Highway and Transportation officials (AASHTO) task force for Roadside safety under the chairmanship of Mr. James F. Robert's. This document presents a synthesis of current information and operating practices related to road side safety.

Another noteworthy point is that this document is a guide. It is not a standard or a design policy. It is intended for use as a resource document from which individual highway agencies can develop standards and policies. While much of the material in the guide can be considered universal in its application, there are several recommendations that are subjective in nature and may need modification to fit local conditions. However, the report says that significant deviations from the guide should only be based on operational experience and objective analysis.

2.3 Indian Literature :

2.3.1. *Ribbon Development along Highways and its Prevention-Indian Roads Congress Publication No.15, 1996 (revised)*

This publication is a sort of guide on 'Ribbon Development in India'. It deals exhaustively on all aspects of ribbon Development which is main part of my thesis i.e. 'Development along Highways: Planning Problems and Proposals'. The publication is covered in eight articles/chapters. The first chapter gives details of the committee which approved this publication originally in 1973.

The second chapter gives out the reasons for Ribbon Development in India and the third chapter covers ill effects of Ribbon Development. These ill effects are well substantiated by vivid photographs. In the fourth chapter the publication reviews measures that are possible for controlling Ribbon Development. The fifth article covers as to how other countries have tackled this Ribbon Development menace.

The sixth chapter covers the existing laws in India on controlling Ribbon Development, their deficiencies and suggestions for improvement. Finally before ending the publication with recommendations to prevent Ribbon Development, a Model Highway Bill of the Government of India has been given in the seventh chapter.

2.3.2. *Economic Impact of Encroachment of Delhi Roads-CRRI, New Delhi Report, September, 1995.*

This report prepared by Mrs. Nishi Mittal and Dr. S.M. Sarin of Environment road traffic safety division , CRRI is an excellent study on the encroachment problem in Delhi and its economic impact. After a brief introduction on the condition of roads and increasing traffic in India, the report gives out the objectives of the study as ; identifying the problem of encroachment, assessing its impact and then recommending measures to overcome this ever-growing problem. A brief notes on methodology adopted for the study has been given.

In the causes of encroachments the study team covers population and vehicle explosion, commercialisation of residential properties, lack of enforcement and road user behaviour. Then the study team identifies different types of encroachment on the Delhi roads such as on street parking, automobile shopkeepers, restaurants and hotels, building material suppliers, migrant labourers, hoardings, stray cattle, holy structures etc.

The study team did detailed economic cost analysis considering land use parameters and then assessing economic cost. Finally total costs and encroachment in Delhi has been arrived at. This document/study throws useful light on how to go about a problem. In this case, the problem is encroachment which also is one of the main causes

of highway roadside problem. Knowing how to deal with part of a whole problem, facilitates us to solve other similar issues also.

2.3.3. *Problem of Ribbon Development : Can we save our Highway System - By R.D. Sikka and J.B. Mathur*

This is a paper from Journal of the Indian Roads Congress, Vol. 49 Part 3. In this paper, the authors, after a brief introduction as to how the problem of ribbon development starts and the efforts done through various legislations and also by various organisations, dwell upon the extent of problem by considering it in three categories/situations i.e. urban, rural and suburban. They also cover the ill effects of this problem.

The paper discusses recent studies done to tackle this ribbon development problem, like road side amenities and utilisation of by passes. Future scenario regarding this problem is predicted by projecting population and vehicle figures till 2001. The paper further gives out corrective measures under three headings :

(i) Planning measures :

(ii) Engineering measures ; and

(iii) Legislative measures.

each of the above measures are explained in detail and dwelled upon at length. Then the authors give out an organisation for proper enforcement for controlling ribbon

development. Before concluding the paper the authors discusses economics of implementation and gives out points for discussion.

On the whole, this paper is an excellent work on how to tackle the problem of Ribbon development in a wholesome way and it is well supported by neat and well laid out sketches/drawings.

2.3.4. *Highway Engineering-By S.K. Khanna and C.E.G. Justo Pages 809-819, Chapter 13.*

Although this book generally covers Engineering aspects of highways, one chapter i.e. chapter 13 deals with Road side Development. Under this, the authors give out environmental factors in planning and development of highways. Two pressing problems faced on existing highways have been given as encroachment and ribbon development. The chapter also discusses road side development and abroriculture. Under this, points to be considered have been given in a sequential form.

The authors also discusses on how to plan the plantation of trees on highways giving arrangement of roadside trees and renovation including choices of species to be planted depending upon some factors. Details of roadside nursery layouts, points to be kept in mind while planting of trees on road sides and the way care should be taken on the trees planted on highway road sides and finally soil erosion control methods have been discussed.

2.4 General Study of Highway Development:

2.4.1 Introduction:

Literally the term roadside development means unplanned growth of towns in long strips along the main roads. This is a world-wide phenomenon and there are innumerable cases of cities steadily expanding along the inter-city routes radiating away from them. Reason for this is that enterprising businessmen find the roadside near outskirts of towns and cities, a most attractive location for setting up industries and commercial establishments. Easy accessibility and availability of social and economic infrastructure in close proximity are other factors conducive for linear development along the highways. Net effect is that shops, hotels, tea stalls, repair shops, petrol pumps, residences and business establishments, all extend their activities indiscriminately, many times coming right on to the highway. The environment is thus spoiled by ugly structures, drains let off on highways, and garbage deposited on the road side land. In the Indian context, all these activities collectively constitute Road side Development or Ribbon Development.

Problem of Ribbon Development has been existing for a long time and been debated by various bodies like the Indian Roads Congress, Ministry of Transport and the Planning Commission. The Indian Roads Congress through its Committee on Ribbon Development had considered the problem in early '70s and prepared a Special

Publication No. 15 - 'Ribbon Development Along Highways and its Prevention'. This document contained a series of recommendations besides a Model Highway Bill to be enacted by the Center for checking the problems in a firm manner. Some of the progressive States even brought out legislations of their own to arrest the menace ribbon development. Notable Acts in this regard are: the Bombay Highway Act of 1955 the punjab Scheduled Roads and Controlled Areas Restriction of Unregulated Development Act of 1963, the United Provinces Road side Land Control Act of 1945, the Mysore Highway Act of 1964, and the Prevention of Ribbon Development Act of Jammu & Kashmir. However, in spite of these efforts the problem of ribbon development has continued to grow unabated. In fact the situation today is much worse than it was a couple of years back. On the technical front the Indian Roads Congress has continued to provide guidelines or recommendations for control of ribbon development. In 1972, it published IRC : 46 ' A Policy on roadside Advertisements' followed in 1976 by IRC : 62 ' Guidelines for Control of Access on Highways' and in 1977 by IRC : 70 'Guidelines on Regulation and Control of Mixed Traffic in Urban Areas'.

But these norms and guidelines cannot be implemented without express executive powers with the highway authorities. In turn this has to be backed by strong enforcement. On both fronts the position remains weak and virtually without change for the last 40 years As a consequence ribbon development has been spreading like wild fire. In some States, such as Kerala whole inter-city sections of arterial routes have been completely

enveloped by continuous strip development. In other States, previously unaffected the problem has suddenly escalated possibly due to sharp increase in long-distance traffic.

2.4.2 Extent of the Problem:

In the past few years there has been steep increase in the road traffic. A multitude of factors has been responsible for this : momentum generated by successive Five Year Plans : rise in population : growing urbanization : expansion of industry and agriculture : and so on. During the last three and half decades, the total vehicle population in the country has increased by nearly 30 times and trucks alone by 10 times as is apparent from Table - 5.

TABLE - 5

TOTAL REGISTERED VEHICLES IN INDIA**

Year (as on 31st March)	**Total No of Vehicles** (in thousands)	**Total Trucks** (in thousands)
1951	306	82
1961	665	168
1971	1865	343
1981	5173	527
1985	8796	783
1986	10226	858

** **Source** : Pocket Book on Transport in India, 1985-86. Transport Research Division, Ministry of surface Transport.

During the same period, the share of passenger traffic carried by roads has jumped from 33 to about 80 percent. Side by side the share of road transport in total freight

movement in the country increased from 11 percent to about 50 percent. As the traffic has grown in this manner, so has the economic activity and consequent ribbon development along the highways.

Ribbon development has many facets. The problems created by it are related to the volume of traffic, pattern of landuse adjacent to the highway and size of roadside amenities required by the traffic. One might consider the subject under three distinctive categories :

2.4.2.1. Urban situation : In urban areas the value of the land has increased at breathtaking rate, with the result that there is little space available for expansion and development of roads. As it is, intensive activity in the cities leads to mixed type of traffic ranging from pedestrians, hand-carts, rickshaws, animal drawn vehicles, cycles, motor-cycles and auto-rickshaws to trucks and buses. Heterogeneous traffic has unique problems of its own. In addition utility companies like telephones water supply and electric supply, continue to dig up the roads indiscriminately to lay and maintain their lines. All these factors together adversely affect the capacity of roads and severe congestion and poor riding quality are common occurrence on highways passing through cities. Even bypasses developed on the outskirts become ineffective in a short while as the city starts expanding in that direction. Concerted efforts by several authorities are necessary to find a working solution to these problems. For instance this will need effective land-use planning and development of access control facilities like expressways.

2.4.2.2. Rural and Inter-city situations : As traffic volumes on highways have continued to increase so have the needs of road user for service facilities. In the absence of any planned wayside amenities provided by the Govt. there is a tendency on the part of private entrepreneurs to set up roadside tea-stalls, Dhabas and rest areas in all sorts of manner. Such establishment occurring at frequent intervals badly disturb the flow of through traffic not to mention the resulting congestion and increase in accidents. At most of wayside eating places, there is no arrangement for parking of vehicles which invariably use the main carriegeway for this purpose. Uncontrolled water and garbage discharge on the highway also adversely affects the environment. The other problem in rural sections is the frequency of access points. Business and industrial units are being put up continuously along the highway, assuming a free right of access, but without regard to the consequential negative effects of ribbon development.

2.4.2.3. Suburban situations : The situation in suburban areas is a mixture of the urban and rural situations. The main problem is uncontrolled industrial and commercial establishment, apart from residential units coming up too close to the highways. The sudden change of environment from 'rural' to 'urban' creates all types of other disturbances, for instance heavy truck traffic merging with local traffic consisting of pedestrians and cyclists. Moreover at the suburban fringe there is little planning control. Clever entrepreneurs anticipating a kill start developing the adjacent land in completely unplanned manner. Resulting ribbon development remains as a permanent feature when the suburban areas are absorbed into the main city.

2.4.3 Ill-Effects :

The unabated ribbon development along highways has several ill-effects. Some of these are :

(i) Speed of travel and the capacity of highways are seriously impaired. This leads to waste of fuel and increase in vehicle operating costs in turn creating artificial demand for additional traffic lanes for which money cannot be easily found.

(ii) Increased congestion leads to higher incidence of accidents and road fatalities. The annual loss on account of accidents at current prices is estimated to be of the order of Rs. 800 crores. And to this factors like human misery and bread-up of established family life and the toll will be indeed huge.

(iii) Relief facilities like by-passes become obsolete in a short time. There are already cases of a second by-pass being necessary for the first one built a couple of years earlier. Obviously repetitive investment of this type is not feasible.

(iv) Ribbon development is generally having serious consequence as regards the environment. Around large cities the emissions of pollutants has increased to intolerable levels. Besides consumption of energy has gone up disproportionately.

Unless the situation described above is brought under control expeditiously, the highway system will be completely crippled by the turn of the century.

2.4.4 Recent Studies:

For a better understanding of the ribbon development problem, and factors affecting it, the Ministry of Surface Transport had commissioned certain studies between 1982 and 1985. These covered aspects like the extent of roadside amenities available for highway users, the pattern of truck parking along the National Highway, utilisation of by-passes, causes of ribbon development etc. Relevant conclusions from some of these studies are given below.

2.4.4.1. Roadside amenities : A survey of Grand Trunk Road from Delhi border to Amritsar(NH 1) carried out in 1982 showed that it had more than 400 wayside establishments like Dhabas and vulcanising/spare parts shops, in addition to 123 petrol pumps. This comes to about 1.25 establishments per km of road, apart from access roads from private properties, junctions with recognised roads etc. When the survey was done, volume of traffic on NH 1 was of the order of 11000-16000 PCUs (only fast vehicles) which has later increased to above 16000-24000 PCUs, presumably the number of establishments would have gone up further on that account.

Establishments in such numbers along the arterial routes attract good deal of truck parking by the roadside, thereby causing disruption to smooth flow of through traffic. Pattern of truck stoppages was studied on NH 45 and NH 7 in Tamil Nadu between

Madras and Kanyakumari. Parking accumulation at different sites at the peak time was found to vary from about 40 to 125 trucks. Most of the parking was during night and early hours of the day, and the duration of each stop was around 15 to 30 minutes. Average frequency of stops by the drivers was after covering 75 to 100 km of travel. What is of significance, however is that in the absence of laybyes, most of the trucks were seen to be parked directly on the roadway and generally in a haphazard manner creating unsavory hold-ups and congestion.

The studies are a pointer to the need for regulated wayside amenities along the highway at intervals in order to minimise some of the negative effects of unfettered ribbon development.

2.4.4.2. Utilisation of bypasses : Seventeen selected bypasses (9 in North India and 8 in Southern States) were taken up to evaluate their effectiveness vis-a-vis the growing influence of ribbon development. Construction of bypasses generally leads to improved speeds for through traffic and a reduction in the accident rate as compared to old route through the city. The extent of through traffic varies with respect to size of the city, ranging from 50 to 75 percent for smaller towns, to less than 25 percent for bigger cities. Amount of such traffic will also of course depend on factors like the length of bypass, location of city vis-a-vis origin and destination of the traffic etc.

TABLE - 6

EFFECT OF PROVISION OF BYPASS ON ACCIDENT RATE AND SPEED

State	Name of Town	N .H. No.	Population of town as per 1981 census	Yearly accident rate/km*		Average speed in km/hour*	
				on old route	on bypass	bypass	old route
Tamil Nadu	Trichy	45	3.62.045	4.803.20	45.9	28.6	
--do--	Salem	7 and 47	3.6 1.177	4.20	0.50	37.0	22.0
--do--	Bhawani Kumarapalayam	47	77.046	0.90	0.30	47.0	29.0
Haryana	Rohtak	10	1.66.000	1.57	0.53	32.21	14.36
--do--	Gurgaon	8	2.92.000	1.52	0.72	42.72	13.38
U.P.	Mathura	2	1.59.000	1.43	0.82	38.63	16.78

* *Observations relate to 1983*

Disquieting part, however is that no sooner a byepass is ready, the city starts expanding towards it and there is build-up of ribbon development activities alongside. This is evident from the land use map for Madurai, 19 years after construction of the bypass. Madurai facility was built in 1960 with hardly 6 establishment close to it, but in 1985 there were 174 commercial establishments adjoining the bypass besides 26 industrial and 134 residential units. As a result, accidents on the bypass increased from 2 to 25 per year, while spot speeds have reduced from 80 kmph, (design speed) to 35 kmph.

At the rate ribbon development is spreading, most of the existing bypasses will loose their utility within the next 1-2 decades. This indeed is alarming. It is obvious too that without innovative planning and stiff controls on haphazard development along the highways, the problem will be impossible to contain.

CHAPTER-3

STUDY AREA DESCRIPTION

3.1 Introduction :

The need for an orderly development along highways is more relevant in a country like India where there is ever increasing population (34 million in 1974 to 94 million in 1997) and equally growing unemployment which is forcing people to go for unconventional but lucrative enterprises along the roads/ highways.

As discussed earlier, there is no study which is existing in India which deals with the problem 'development along highways' in a wholesome way. This thesis project attempts to do it now. For any study to develop proposals, it is very important that existing planning problems peculiar to our country conditions are studied first, data collected, compiled then analysed with the available literature, draw deductions through the analysis and finally make out or recommend suitable planning proposals for an orderly and planned development along the highways.

This chapter deals with the individual settlements in the under taken study area. The information discussed in this chapter is collected by the author mostly through field work and only some of it is through secondary sources. The study area taken for the

purpose as discussed above is the stretch between Muzaffar Nagar Bypass (excluding city) and Roorkee (including town) Saloni bridge on State highway.

3.2 Location :

The study area lies on the state Highway No. 45, which is called as 'Delhi-Nitipass Road'. As name suggests, the highway starts at Delhi and ends at Nitipass. However till Meerut the highway now comes under NCR and accordingly it has been made in to 4 lane road. The study area in Muzaffar Nagar is located at Km. 123 i.e. the start point is located 123 Km. from Delhi. The study area's end point is located at Km. 173 i.e. end point is located 173 Km. from Delhi. That gives us a study area of highway stretch of about 50 kilometers.

3.3 Study Area as Existing :

Highway stretch under study area is a two laned road with 7 Mtr. width through-out and having right-of-way of about 120 feet to 130 feet in general. Where ever there are human settlements along on the highway the right-of-way reduces to 50' to 80'.

The state highway is under state Public Works Department (PWD) and the stretch under study is devided between two PWD Division Offices, one at Muzaffar Nagar under an Executive Engineer and another situated at Roorkee, again under an Executive

Engineer. The Muzaffar Nagar Division has under it the road between Km. 120 to km.148 and the Roorkee Division has got under it the road stretch between Km 148 to Km. 170.

This road is an important one in the sense that it carries traffic destined to three places i.e. Hardwar and onwards, Dehradun and ahead and Saharanpur towards Punjab. For traffic oriented to above places the route is common till Roorkee from Delhi. Therefore, the stretch chosen as study area is an ideal stretch to be studied. In addition, till Meerut (from Delhi) the highway is already covered by NCR Plan and taken care of interms of widening of the road, hence it has comparatively less problems for study purposes.

The highway stretch under study has got four comparatively bigger settlements at approximately equal distances from each other. They are, starting from Muzaffar Nagar - Chapar, Purkazi, Gurukul Narsan and Mangalore. This stretch has also got five more smaller settlements. All these settlements are abutting the highway and are linearly growing along the highway (ribbon development). Since on average, at every 4 to 5 km gap, a settlement is followed by, entire area in between is getting clogged with Dhabas, seasonal fruit sellers, house plots etc. Such a stretch is ideal for studying so that plan proposals can be suggested or prepared for the worst possible case . While selecting the study area easy accessibility is also kept in mind as repeated visits to study area are must for a serious study. Muzaffar nagar town has been excluded from the study area as a by-pass to it is already existing .

3.4 Topography :

As already discussed, the study area is a stretch of state highway starting from Muzaffar Nagar by-pass in south going towards north till Roorkee town. This covers a highway road length of about 50 Km. This highway is generally devoid of any major road crossing except Purkazi-Laksar road and when it enters Roorkee from where a major road towards Dehradun takes off. Otherwise the road has many minor roads leading to the villages on both sides of the highway.

The highway has one major canal crossing at Mangalore where a bridge with high banks is existing but it (highway) is interspersed with numerous small channels/nalas for which many culverts are existing throughout the stretch. There is only one railway crossing in this stretch i.e. at Roorkee and this has been provided with an overhead bridge with high embankments. The road generally is raised with drain pits on both sides except is some urban stretches where it is low lying in comparison to surrounding ground.

This highway stretch consists of villages at regular intervals abutting the highway as given under :

Mile Stone	Name of place/village	Remarks
123	MuzaffarNagar By pass crossing	

126	Sisouna village
130.6	Chapar village
136.1	Barla village
138.8	Faloda village
142	Purkhazi village
145	Burahedi village
148	Gurkul Narsan village
151.5	Mandavelli village
159	Mangalore village
173	Roorkee town

3.5 Description :

Now, villages and the stretches between the villages will be discussed one by one as they come on the state highway starting from Muzaffar Nagar (Also please refer table -7).

3.5.1. *Muzaffar nagar by-pass* (Km 123.0) : This bypass was started some 10 years back and is operational now. However generally the light vehicles do not prefer to travel by this because of bad condition and excess length. Heavy vehicle have to travel by bypass only as city roads for them are out of bounds. Because of this bypass, and a major road going towards Saharanpur from here, there is prominent cross road formation and lot of road side development has taken place here. This development is of mostly dhabas, tyre repair shops with a couple of temples and a petrol station. All these have invariably encroached on the P.W.D. land at least for 20 to 25 feet on either side.

3.5.2. Stretch between *Muzaffar nagar bypass* and *Sisouna* (Km. 123 to Km. 126):The stretch is having a length of only 3 km. but these 3 km. are without much hindrance. In this stretch, although P.W.D. land is supposed to be 65 feet on either side of the road, it is seen that at some places farmers have encroached with their fields up to 20 feet on both sides. Because of this encroachment there is no drain canal on either side of the road. The stretch is generally straight and plane. At km. 124.4 there is a monument being built just 20 feet from the edge of paved road.

3.5.3. *Sisouna* (Km. 126): The first few houses of village Sisouna along this highway are supposed to have come during 1950's as per the villagers. Now, the village developed along the highway for a length of about 200 meter and is spreading still. The development

involved on both sides by encroaching P.W.D. land is a gurdwara, 4 to 5 tyre repair shops, residential compounds, in addition storing of dried dung cakes.

3.5.4. Stretch between *Sisouna* and *Chapar* (Km. 126 to Km. 130.6): This stretch is generally straight but has too many access roads with in a distance of 4.6 Km. Among these, two are junction points one at Km 127.4 and another at 129.4. The first cross road point has some petty shops coming up now but the second junction point do not have any development as on today. The road till km 130.4 is plane but from km. 130.4 for about 200 mtr. distance the road proper is a bit higher having smaller drain section on its left and a steeper drain on its right.

3.5.5. *Chapar* (km.130.6) : Chapar has road side development of around 400 mtr on either side of the high way. It starts with educational institutions i.e. Jaibharath Inter College which was established in 1952 and Sumitra Devi High School for girls (established in 1991). It has a police Station whose front Compound wall is just 12 feet away from road edge. There are speed breakers before and after the police-station. From police station onwards all other establishments are also just 12 feet from road edge for the next 200 mtr. distance. There is a small narrow bend while the road passes through the town towards one end. Before the developed area finishes there is another speed breaker. Chapar has a petrol station also.

3.5.6. Stretch between *chapar* and *Barla* (Km. 130.6 to km. 136.1): This stretch of above 5.5 km. is generally straight and plain. This stretch has got maximum culverts i.e. 12 and has three brick kilns near km 133 on either side of the road. At Km. 132.6 for some distance road is on a raised (embanked) ground having water logged drain sections on both sides of the highway. There is an educational institution, i.e. V.S.R. degree College, Barla at Km.134.8. This college's intermediate wing was started as early as 1955, it's degree wing being opened in 1995. In this stretch, there is a Samadhi which is constructed almost on the road shoulder at Km. 133.0 and a half cut fallen tree which covers till road edge from tree line which is about 20 feet away.

3.5.7. *Barla* (Km. 136.1) : Barla is small village which has roadside development of about 250 mtr. length on either side. It has a speed breaker at the entrance itself followed by a bad road of about 30 Mtr. length. Although the property line/building line is generally well away from the main road (at stipulated 65' both sides from center line), there is encroachment in the vacant road side land by dumps such as aggregate, sugar cane, green grass, dried dung cakes and finally even garbage. Barla has a SBI branch and a telephone exchange.

3.5.8. Stretch Between *Barla* and *Faloda* (Km. 136.1 to Km. 138.8): This stretch is of about 2.7 Km. length only. Immediately after Barla the road rises (on raised ground) and continues to be on low embankment till Faloda. On both sides of the road 20 feet either side there are proper drains which are water logged with the excess water from the fields. This stretch has got fine culverts and has one access road. Because of embanked road there is no road side development.

3.5.9. *Faloda* (Km. 138.8): Faloda is a small village developing on the roadside. It has two speed breakers, one at the entrance and one at the end-but-some more development has taken place even after this second speed breaker. The encroachment on road-side is mostly residential. Some stretch of the highway is lower than the surrounding land and development on either side hence the road is Prone to water logging and therefore this stretch is Patchy and is in bad condition.

3.5.10 Stretch between *Faloda* and *Purkazi* (Km. 138.8 to Km. 142): This is a stretch of 3.2 km. length only but has lot of development along. Immediately after Faloda the highway takes a right curve with right-side land in depression for a stretch of about 100 mtr. followed by three dhabas. From km. 139.6 till km. 140.2 there are electric poles closeby to the Paved road. There is a road junction at Km. 141.2, these roads are going to the nearby Villages on either side of the road. This junction is slowly developing with 4 shops and a bus-stop already existing. These shops contain cycle, kirana, carpenter shops

in addition to a Masjid. Before the stretch enters Purkazi town, it has a Sugarcane crusher, three dhabas and three more shops. At the entrance of Purkazi town, again there are series of about 5 to 6 dhabas, a saw will, huge compound wall of Radha soami satsang.

3.5.11 *Purkazi* (km 142): At the entrance of Purkazi itself there is a huge electric 132 KV substation on the right side. After some residential and commercial development at the entrance there is comparatively no development for about a km with only temporary wooden cubicles, dung dumps and garbage dumps. After this stretch again the development starts from Purkazi bus stop with repair shops on either side stacking their equipment till almost Paved road edge. The Parked vehicles, mostly tractors, trucks and rickshaws compound the problems. About 300 mtr after this there is a prominent bend in the highway with residential properties closing in on to the road as near as 8 feet from paved road edge and as high as 25 feet. Vehicles coming from opposite on the other side of the bend as near as 20 yards are invisible. This bend is a bottle neck on the highway. In addition to all these ill developments there are two access roads and two speed breakers within the town.

3.5.12. Stretch between *Purkazi* and *Burahedi* (Km. 142 to Km. 145): This is a stretch of 3 km. with comparatively less development. It has four to five Kabadi shops about five to six dhabas and a Masjid on its roadside land. There is a slight bend in the road immediately after Purkazi town, other wise this stretch is straight and plane.

3.5.13 *Burahedi* (km 145): This is a Very small roadside village. It has developed on the right side of the highway only, as on the left there is a pond. There are two speed breakers with in a distance of 50 mtr. There is a police barrier on the far end of the village with a highway patrol vehicle and a room in which the guard of patrol sleeps/ takes rest. The barrier is followed by another set of two speed breakers in a distance of 50 mtr.

3.5.14 Stretch between *Burahedi* to *Gurkul Narsan* (Km. 145 to Km. 148): This stretch of 3 Km. is a straight plane road with comparatively less development. It has one access road going to Sakauti village, about two dhabas, one cane crusher factory and two culverts. It has a bridge i.e. a canal crossing just before Gurukul Narsan Village.

3.5.15 *Gurkul Narsan* (Km 148): Gurkul Narsan is a small but well developed area on either side of the highway. It has a SBI branch and the shops here are encroaching road side land till tree line i.e., about 20 feet from road edge on either side. Even this left over 20 feet is often occupied by parked vehicles. In the other words it has clear right-of-way whose encroachment is of temporary nature. The road otherwise is straight flat and clear. Due to encroachments the drainage canal on both sides of the road is not clearly defined.

3.5.16 Stretch between *Gurkul Narsan* and *Mandavelli* (Km. 148 to Km. 151.5) : This 3.5 Km. length stretch is a straight road with well defined tree line and drain line on both sides of the road. But this stretch is developing on the road sides slowly with three access roads already existing, a petrol station, a prominently placed building constructed in the memory of uttarakhand agitators who laid down their lives, one or two residences, one or two shops and one tyre repair center. There is some development in the form of shops which has come up at the road junction going to Nursan kur village.

3.5.17 *Mandavelli* (Km. 151.5) : This is small developing village astride this state highway spanning just 150 mtr. in length along the highway. The village has developed on both sides of the road and there is no fresh development taking place.

3.5.18 Stretch between *Mandavelli* and *Mangalore* (Km. 151.5 to Km. 159) : This stretch has a clear distance of 7.5 Km. The road level is plane till Mangalore grain market after which it raises on embankment to accommodate bridge on Ganga Canal and then comes down to the plane level at the entrance of Mangalore town. Although, there is less development astride this road stretch till Mangalore Market, there are as many as nine access roads leading to villages, four culverts and a prominent bridge over Ganga canal which exists on this stretch.

The stretch has well defined tree line and drain (nala) line along it on either side. However, there is lot of development which has come up and still coming up astride and in-front of Mangalore grain Market which is well away from actual Mangalore town. The development at the Grain Market consists of eating, barber and cycle repair shacks, all encroached in-front of the compound wall of the Mandi. On the other side of the road in-front of the market there are many vacant rooms with shutters waiting for future business men and some eating stalls and tyre repair shops already in business. These shops invariably extended their verandah like temporary roof construction till tree line almost encroaching 20 feet of P.W.D. land.

3.5.19. *Mangalore* (Km. 159) : In between study area stretch, after Purkazi, Mangalore is second large settlement. At the entrance only, there is a culvert having a branch canal underneath with only 5 mtr. wide (at all other places the paved road is of 7 mtrs. wide). This restricts traffic speed and sometimes in case of heavy vehicles i.e. buses, trucks it will be a one way traffic on this culvert due to its restricted width. After this narrow culvert, the building line in rest of the town is well set back but store dumping (steel dumps, grain bag dumps etc.) by shop keepers, tyre repair shops and parked vehicles (mostly trucks) covered whole of road side land leaving only paved road surface or some time only a part of paved road surface to the highway traffic. The road takes a small smooth curve where a holy place (Masjid) jets into the curve obstructing clear visibility and occupying road side available land. After main settlement, the road is on an embankment for a distance with no development astride the road and again after

some distance when the road comes down to plane, there are shops and a theater and two dhabas on the out-skirts of the town.

3.5.20 Stretch between *Mangalore* and *Roorkee* (Km 159 to Km. 173): The stretch is a straight road of 14 Km. Length. Compared to other stretches, this is more in length and also most developed, probably because of Roorkee and its influence on the nearby major settlement Mangalore. The initial 4 to 5 Km. are without much development. There is a Police barrier near Km. 161. From km 162 the development starts with few dhabas and shops and with vacant plots having compound wall.

From Km 164 the development on both sides of the road increases with educational institutions, shops, vacant plots with compound walls. Residential activity is already existing on both sides of the road as well as in depth away from road especially more on the right side of the highway. Just now, there is no extra encroachment on to the roadside land, however due to vehicles parked in-front of these establishments, this activity itself becomes into a temporary encroachment. From Km. 170 there are Army and university establishments on both sides of highway till km. 172, therefore there is no encroachment.

3.5.21. *Roorkee* (Km. 173): Roorkee is the end of our study area road stretch which starts at Muzaffar Nagar bypass. The highway passes through Roorkee town for a

distance of approximately 4.5 Km. The first 2.5 Km. are not affected much except for a stretch of about 300 mtr. (which is a civil area with bus stand, taxi stand and commercial establishment) as other 2.2 Km. are flanked by Army and University properties respectively. The other two km. stretch is crowded and has only about 40 feet right-of - way till Solani Bridge.

There are many access roads joining/emanating from this highway which complicate the traffic problem. There are two different patches/bottlenecks with in Roorkee town stretch. These are one at Bus stand cum Taxi stand and another at Civil lines junction where four roads meet the highway at various angles. The Bus stand patch is more time delaying because of heavy temporary encroachments in the form of extended shop frontages, parked vehicles (buses, taxis, jeeps, scooter and cycles) and unauthorized private operator's vehicles-stand (buses & jeeps) which take passenger to nearby places such as Saharanpur, Laksar, Mangalore etc.

TABLE - 7

DEVELOPMENT ON STATE HIGHWAY-45 STRETCH BETWEEN MUZAFFAR NAGAR AND ROORKEE*

S. No	Stretch between	Distance in Km.	Brick Kilns	Dhabas	Development Typre repair shop	Petrol Pump	School	Access roads	Culverts	Speed breaker	Remarks
1.	Muzaffar nagar bypass (km123 to Km 126)	3.0	1	34	3	1	-	1	2	-	Most of the Dhabas are at the by- pass junction
2.	Sisouna to Chapar (Km 126 to Km 130.6)	4.6	-	5	-	-	1	7	5	-	-
3.	Chapar to Barla (km130.6 to Km 136.1)	5.5	3	-	-	1	3	5	12	1	-
4.	Barla to Faloda (Km136.1to km.138.8)	2.7	-	-	-	-	-	1	5	1	-
5.	Faloda to Purkazi (Km 138.8 to Km 142)	3.2	1	12	2	1	-	3	6	2	-
6.	Purkazi to Burahedi (Km. 142 to Km. 145)	3.0	-	6	-	1	-	1	1	2	-
7.	Burahedi to Gurkul narsan (Km. 145 to Km. 148)	3.0	-	2	-	-	-	1	2	4	-One Canal Crossing at Km 147.8 -One Police barrier
8.	Gurukul Narsan to Mandavelli (Km 148 to Km. 151.5)	3.5	-	-	1	1	1	4	5	-	-
9.	Mandavelli to Manglore (Km. 151.5 to Km 159)	75	-	4	4	-	-	9	5	-	-Shops encroachment infront of Manglore wholesale market - Ganga canal crossing brdige. - Branch canal culvert is a bottle- neck
10.	Mangalor to Roorkee (Km. 159 to Km. 173)	13.0	-	11	3	2	3	6	4	-	Police barrier

* SOURCE : Data collected by author through field survey during Sep-Oct 1997

CHAPTER-4

ANALYSIS OF DEVELOPMENT ALONG HIGHWAY STRETCH

4.1 Introduction:

In the previous chapter, each of the settlement coming on the selected stretch of the highway and the stretches between them have been described adequately. Common feature for all of them is that , they are the development along the highway. This development is a sort of parasite on the roads (i.e., it thrives because of highway). In other words without highway most of this development looses it's relevance and dies it's own death. After going through this highway development, some common problems which are seen on this highway stretch are :

Common Problems Identified	Causal Activity Type
(i) Encroachment on to the highway -Temporary -Permanent	(i) Extension of residential and commercial activities, Dhaba business etc.
(ii) Prevalence of insanitory conditions on the road sides.	(ii) Garbage dumping, dung cake making litter thrown by informal sector, etc.
(iii) Absence of planned amenities/ facilities on the highway.	(iii) Parking any where to seek food, rest, etc.
(iv) Undesirable, incompatible land uses on the road side land.	(iv) Brick kilns, jaggery making, display of hoardings, etc.
(v) Too many access roads.	(v) Development at road junctions.
(vi) Bottlenecks.	(vi) Traffic jams, accidents, speed delays, etc.
(vii) Hazardous traffic movement.	(vii) Mixed traffic, delays and fatigue.
(viii) Accident prone stretches.	(viii) Accidents, loss of life and property.

This type of development is undesirable both for settlement people and to the road user. Undesirable to the settlement people after some time because it gets too over crowded and presents problems such as pollution (noise, air, water), accidents, difficulty in communicating with in the settlement situated on both sides of the highway and finally increased cost of living. Similarly this development is undesirable to the road user because it becomes unpleasant (drive), uneconomical, increases fatigue, and finally wastes invaluable time.

Similarly, it is important to discuss/ analyse the road side activities occurring on this stretch which are directly related to all the common problems mentioned above. Only when we know the problems and their initiators/ abettors can we analyse the problem on the whole and then suggest recommendations/ proposals.

4.2 Analysis of Problems along Highway Stretch :

4.2.1. Encroachment on the highway : This highway stretch is encroached heavily both 'with in the settlements' and 'in-between the settlements'. The nature of this encroachment is both temporary as well as permanent. In case of temporary the encroachments consists of portable wooden cubicles (shops in such structures seen in Purkazi- refer top photo, Plate-5, Fig-8), seating arrangements of Dhabas under a make shift verandah (seen on the stretches in between all settlements), shops displaying their articles till highway paved edge (seen in all settlements), drying and dumping/ stacking

of dung cakes (seen prominently in Barla), garbage dumps (seen in Sisouna and Barla), and lastly but more menacing of all being haphazard parking at will by vehicles , mostly by buses and trucks.

Similarly, permanent encroachment consists of holy places and samadhis abutting the highway (a mosque in Mangalore- refer top photo, Plate-6, Fig-9 and a samadi near Sisouna- refer top & bottom photos, Plate-9, Fig-12), residential encroachment on to the highway (mostly in Purkazi), fields encroachment (between Muzaffar nagar by-pass and Sisouna, electric transformers, P&T department's rooms constructed on the road side land all along highway at equal intervals.

4.2.2. Poor environmental quality : The highway stretch is full of small settlements in-between. Hence the activity in some form or other is present through out the stretch. In other words, with in the settlement, residential, commercial and small scale industrial activity and in-between the settlements dhaba and industrial activity. Due to these human based activities, often garbage, litter, grease, oils, and some times even dung is dumped to make cakes for firewood. All these things further give rise to foul smell, fly menace and unpleasant view making this highway stretch environmentally unfriendly.

4.2.3. Absence of amenities : Most important requirement of any road user is food and rest then comes repair cover and medical need etc. In this stretch, there are no organiséd eating places or cafeteria's therefore, the road user perforce depends on

24/8/15

unorganised dhadas by stopping his/ her vehicle on the road shoulder itself as there are no parking places provided by these dhabas (refer top photo, Plate-2, Fig-5). Similarly as there are no rest areas provided or truck way-side terminals available on this highway stretch, the truck drivers stop their vehicles on the road shoulder (some times on the road itself) only and then take much needed rest. Although there are repair facilities available in this stretch, all of them are encroaching onto the road themselves with out catering for any vehicle parking space.

4.2.4. Undesirable and incompatible land uses : Land uses like opening a brick kiln adjacent a highway not only damages road sides with its excavation work but also invites vehicles (for loading bricks and unloading firewood to burn bricks) but also creates unplanned access roads leading in and out of brick kiln. Similar damage is also done by factories, industries, sugar cane crushers or any other unplanned, undesirable and incompatible land uses.

4.2.5. Access roads: There are innumerable access roads leading to and from nearby villages and to the properties abutting the highway. These cross-section/joining points (refer bottom photo, Plate-2, Fig-5) are inviting unplanned development in these junctions. Similarly, too many villages are abutting the highway at too close intervals and these too are developing along highway in an unplanned manner and at breakneck speed.

4.2.6. Bottlenecks: The numerous Nalas which cross the highway in east to west direction through 9 Mt. Width culverts makes these points into bottlenecks (refer bottom photo, Plate-8, Fig-11 and bottom photo, Plate-7, Fig-10) for traffic on this highway. Wherever these culverts are there, the road width suddenly decreases as these culverts provide just paved road width of about 7 meters without any shoulder safety on either side forcing traffic to slowdown while negotiating opposite traffic. The canal and railway track coming into this stretch are well bridged but with only providing 7 Mt. carriage way i.e. exactly two lane width. This does not cater for any extra safety distance. Wherever there is a settlement abutting the highway, at some places due to encroachments by population and consequent disturbance to actual cross-section of the highway (i.e. drain pits absence on both sides), the highway gets clogged with rain/drain water and the surface gets worn off making that much portion in to rough road with pot holes etc.

4.2.7 Hazardous traffic movement : The movement of traffic on highways is becoming hazardous day-by-day. Some of the reasons which can be listed are;

- Mixed traffic
- Public utilities situated on roadsides
- Bad shoulders/ unprepared shoulders
- Level difference between road and shoulder
- Potholes/ bad patches on the road

The highway has only a two laned paved surface i.e. 7 mtr. The traffic consists of bycycles, carts etc. of one category speed , auto, tractor etc. of another category speed and

cars, trucks and buses of yet another category of speed. all these have to use same single lane and overtake each other from the other (opposite) lane when it is not in use. For getting opposite lane clearence the fast moving vehicles sometimes may have to waste lot of time. Although the cycles and bullock carts can use the road shoulders, the shoulders themselves are not in good a condition or sometimes there may not be any shoulders existing with encroachments occupying it.

Similarly, there are bad patches on the road and pot holes which exists mostly because of undrained water patches on the road. these undrained water exists because of poor camber(slope) given to the road or sometimes there are no roadside drainages existing. Also at some places, road level is increased but shoulder level is left untouched there by having a level difference between both making transfer of vehicles from carriegeway to shoulder and vice-versa difficult.

4.2.8 Accident prone highway stretches : Some stretches of the highway are extremely accident prone . Some of these types are;

- Sharp bends
- Acute slopes of bridges
- Settlements divided by the highway
- Too many junction points
- Inadequate sign posting

The sharp bends in the highway where the opposite traffic cannot be seen (like the bend in Purkazi town- refer top photo, Plate-7, Fig-10)) can cause lot of accidents. Similarly, the rail and canal overbridges at Roorkee and Mangalore respectively have too much slopes on eitherside.

The Mangalore bridge approach road even has curve on either side of the bridge. Access roads at the entrance and the exit of the embanked approach road complicates the matter further as traffic enters/ exits in to the highway from/ to access road without caring about the through traffic of highway which leads into many accidents.

When the settlements are bifurcated by the highway or when a settlement develops on both sides of the highway, the cross traffic is bound to be there in that settlements and this cross traffic doesn't pay any care/ attention to the through traffic on the highway leading to the accidents. Too many junction points because of too many access roads on either side of the highway also invites lot of mixed traffic on to the highway which conflicts with the through traffic.

4.3 Road side Activities :

The state highway 45 stretch under study, like any other highway in India is full of bustling roadside activities. Roadside activi ties can be divided in to two. Firstly activities in between the stretches of settlements and secondly activities involved with in the settlements adjoining the highway. If we see the first case i.e., activities in between the

stretches of settlements. Never ending line of Dhabas (temporary eating shacks) on both sides of the highway with thriving business takes first place among these roadside activities. The other activities are brick kilns and sugar cane crushing and jaggery making in the adjoining fields. At some places as farmers have ploughed even PWD land on road sides, farming activity also can be counted in this category. Coming closer towards road, the trees fallen due to wind or storm are cut/cleared only till paved road way.

In the second type of activities, i.e., the activities on/along the highway passing through settlements, the prominent one is the general encroachment on to the road shoulders by the residential properties, shops etc. In some villages women were seen using road shoulders for making ropes (refer bottom photo, Plate-3, Fig-6) and in most of the villages road shoulders are being used for stacking dried dung cakes. In some villages road shoulders are being used for dumping garbage too. In all the villages, road shoulders are being used, by villagers to park their own bullock carts, by unloading/loading trucks, by buses/jeeps leaving/taking passengers. In some big villages, small scale industries and services such as repairing works, welding works spread almost till paved roadway. In Purkazi, Chapar and Mangalour the informal sector activities such as fruit vendors, kabadi etc. have encroached on to the roadside space. In Falouda, once in a week the 'Weekly Mandi' occupies almost every inch of available roadside space. The entrance of the newly constructed Manglour co-operative Market is getting clogged slowly by the service sector activities (refer top photo, Plate-3, Fig-6). Since there is no private land

available between market wall and the road, these entrepreneurs have occupied P.W.D. land available on both sides of the paved highway.

Road side activities can be summarised as under:

(a) Activities occurring between the settlements;

(i) Dhaba business

(ii) Brick kilns

(iii) Jaggery making

(iv) Fallen/ Felled trees

(v) Cultivation

(b) Activities occurring with in the settlements;

(i) *Extension of residential activities*

(ii) Extension of commercial activities

(iii) Dung cake making

(iv) Garbage dumping

(v) Road side parking

(vi) Informal sector activities

4.4 Analysis of Road side Activities Between Settlements:

Analysing ***first type of activities*** one by one i.e. activities happening on both sides of highway between settlements;

4.4.1. Dhabas : Dhabas are temporary sheds constructed by farmers in their fields i.e. their front portion in line with the P.W.D. land which is generally 65 yards away from centerline of road. These temporary sheds are given on rent to the hoteliers/caterers, who start dishing out food to the road users. Slowly as the business picks up these dhabas are extend towards road (refer top photo, Plate-2, Fig-5) with a verandah type of structure with seating arrangement, all this in the P.W.D. land. Initially when there is only one Dhaba the road user parks his vehicle to a side of that Dhaba while taking services from it. But as a series of Dhabas gets established one beside another, there will not be any space left on the sides to park vehicles and hence the road user perforce parks his vehicle in front of the Dhaba further encroaching in to the P.W.D. road side land. This leaves just paved portion on the road and some times even some portion of this paved portion on the road is covered by the parked vehicle.

Dhabas are constructed by the farmers at a cost of Rs. 20,000 to 30,000 and are given on rent for about Rs. 10,000 a month. In turn the Dhaba owner earns anywhere between Rs. 10,000 to 30,000 per month exclusive of rent and electricity bills. His season is from Jan to Oct. every year. No wonder, Dhabas are Mushrooming on highway road sides being such a lucrative business in the process encroaching roadsides and causing irreparable damage to the highway itself.

Type : Temporary as only seating area is encroached with a makeshift roof

Duration : Whole day and whole year.

Impact : Visual, physical (obstruction) and environmental.

Nature of effect : Encroaches into invaluable road space thus affecting road capacity, vehicles speed and road safety. Also affects environment by their shabby structures, and with the litter and waste thrown by them.

4.4.2. Brick kilns : On this highway, in the study area stretch of abut 50 Km., there are as many as 10 to 12 brick kilns on the road sides making an average of one in every 8 to 10 Km. distance. With so many brick kilns, that many access roads will have to be there direct to the highway and all these brick kilns will have to dig their surrounding earth to takeout clay and burn bricks creating waterlogged areas on the sides of the highway. Also a brick kiln after every 10 km. stretch on a highway is not a pleasing sight.

Type : Permanent as its operations are based on a permanent structure.

Duration : Whole day, whole year except monsoon season.

Impact : Physical and environmental.

Nature of effect : Vehicles coming out or turning into the kiln suddenly will affect the speed and safety of other highway traffic. The smoke emitted by it and the look of dug and sometimes water logged areas on both sides of highway are environmentally unpleasant.

4.4.3. Jaggery making : Although temporarily established is the fields, the crane crushing and jaggery making will invite lot of bullock carts and tractors in to that area

from main road. Vehicles getting out and getting in to the highway suddenly from somewhere in a unorganised access roads is a harmful roadside development.

Type : Temporary as sugarcane crop is seasonal.

Duration : 3 to 4 months in a year.

Impact : Physical, environmental and visual.

Nature of effect : Tractors and bullock carts carrying sugarcane and jaggery will be getting in and out of the area from the main highway at their slow speed thus affecting the other highway traffic. Similarly the smoke emitted is environmentally unhealthy and sometimes in a windy day it can be blown on to the highway thus affecting road users visually.

4.4.4. Fallen/ Felled Trees : At approximately 20 feet from road edge, there are tree lines on both sides of highway. When any of these trees fall on to the road due to heavy winds or rains, the trees are cleared only till paved road edge, Thus leaving its main stump (trunck) on the road shoulder and beyond (refer top photo, Plate-8, Fig-11). Such stumps are serious obstructions to the fast moving traffic.

Type : Temporary in nature but are almost semi permanent.

Duration : Uncertain, sometimes even years.

Impact : Physical and safety.

Nature of effect : Uncleared tree stumps till road edge will cause physical obstruction to the traffic that would like to use road shoulders for their movement like bullock carts. The motor vehicles perforce have to keep some safety distance from the tree stump thus

further narrowing the available roadspace. Sometimes when vehicle comes in opposite direction while another vehicle negotiates the tree stump ,the opposite vehicle have to stop standstill to give pass to the other vehicle. Also these tree stumps are serious accident hazards.

4.4.5. Cultivation : On some stretches, especially in the stretch from Muzaffar Nagar to Sisouna village, the road side P.W.D. land has been encroached by the farmers with their fields flattening the roadside drains. The road thus lacks of any roadside drainage and hence is prone to water logging and sub-sequent damage of surface.

Type : Permanent.

Duration : Through out the year.

Impact : Physical, environmental and safety.

Nature of effect : The field's encroachment affects the highway traffic as the available road space is physically reduced by the encroachment. Due to this encroachment the roadside drains are missing and this stretch of highway is spoiled sometimes by the undrained rain water and sometimes by spilled (excess) water from the fields. This restricted road space and the bad patches present lead to increased accidents.

4.5 Analysis of Road side Activities with in the Settlement :

Now, we can analyse the ***second type of activities*** one by one i.e. activities happening on both sides of the highway with in a settlement.

4.5.1. Extension of residential activities : Residential properties have encroached on to the road in a large way. In chapar village even police station compound wall has come right on to the road shoulder. This type of residential encroachment is more in case of chapar and Purkazi. In Sisouna village, residential compound walls have encroached onto the road as near as 12 feet. In some road side settlements roadside space is being used to tie their cattle, for sitting on cots and even as parking space for their carts, tractors and for stacking the fodder for the animals.

Type : Permanent.

Duration : Through out the year.

Impact : Physical, visual, environmental and safety.

Nature of effect : All the extended residential activities mentioned in the above paragraph occupy some of the road side space(P.W.D. land) hence these activities are physically restricting the available road space of the highway. Physical obstructions like dung stacks and compound walls and sometimes even residences and holy places, are visual obstructions to a driver and also are serious safety hazards on the highway. Also the dung, garbage and litter thrown through these activities spoil the road side environment.

4.5.2. Extension of commercial activities : In bigger settlements, most of the residential encroachments are further converted in to commercial establishments in the form of shops and small scale industries. Some shopkeepers stacked Cement, Grain bags till road

shoulders and similarly some more entrepreneurs have stacked steel, building materials (refer bottom photo, Plate-9, Fig-12) and even disused motor parts (by motor repairers). Invariably the welders (refer bottom photo, Plate-5, Fig-8) and vehicle repairers spread their ware till road shoulders.

Type :

Duration :

Impact : Similar as above

Nature of effect :

4.5.3. Dung cake storage space : In almost all the villages roadside land and in some cases up to the road shoulders is being used to stack dried dung cakes in a pyramid shape by the villages (refer top & bottom photos, Plate-4, Fig-7). From distance they look like small huts with dried grass covering them. At some places even dung stacks, before they are made in to cakes are seen getting collected on road shoulder itself.

Type : Temporary stacks.

Duration : Throughout the year.

Impact : Physical and environmental.

Nature of effect : This is a sort of small scale house industry in these villages. It involves stacking fresh dung, making them into cakes and then drying them . For all these activities and for finally stacking them into a pyramid shape, the highway roadsides are liberally used . All these activities are physically obstructive and present an unclean and unhygienic environment along the road sides.

4.5.4. Garbage dumping : In some of the villages, especially in village Barla it is seen that roadside land is extensively being used as a dumpsite for garbage thus affecting road capacity and giving an unpleasant sight (refer bottom photo, Plate-1, Fig-4).

Type : Temporary.

Duration : Present throughout the year.

Impact : Physical and environmental.

Nature of effect : In these roadside villages, the houses have cultivated fields behind them and road in front of them. Therefore the easier way for them(settlement people) is to dispose garbage on to the roadside space as it is a free space available in the absence of any municipality type of organisation. This garbage not only is a physical obstruction but also emits foul smell, presents an ugly scene, and is unhygienic to both settlement people as well as road user.

4.5.5. Roadside Parking : In small villages in this stretch, like Sisouna, Barla and to some extent even Gurkul Narson, the villagers on road sides, in addition to encroachment by their residences further (mis) utilise the road side space in-front of their residences by Parking their tractors, bullock carts and grass thrashers. In big villages like Purkazi, Mangalour and chapar, loading-unloading activities by trucks and tractors almost on the road impedes the traffic movement tremendously. In Purkazi town rikshaw pullers wait on right on the road shoulders waiting for the passengers. For the local buses and local jeeps transshipping passengers between these villages the stopping points for unloading

passengers and their luggage are right on the highway itself forcing the vehicles behind them to either stop completely behind them or slow down considerably affecting their efficiency.

Type : Temporary.

Duration : All times and throughout the year.

Impact : Physical, visual and safety.

Nature of effect : The vehicles which are parked on the roadsides are serious obstructions to the other highway traffic as the effective road space is reduced. Bigger vehicles parked will give visual obstruction to the vehicles coming from same side, especially this problem is more acute if there is even a slight bend(curve) in the road. Because of these reasons there are high percentage of accidents which take place on the highways.

4.5.6. Informal Sector : Finally unorganised informal sector causes no less damage than the organised sectors talked about till now. Especially in towns i.e. Purkazi and Mangalour, the vendors on Pushcarts and the hawkers occupy spaces on roadside land almost till paved road edge. Over enthusiastic shop keepers have kept their shop's name display board almost on road edge to attract road user (refer top photo, Plate-1, Fig-4). For example is Barla a motor cycle repairer kept his display boards just on the edge of paved road along with 2 two wheelers as an advertisement to substantiate his claim.

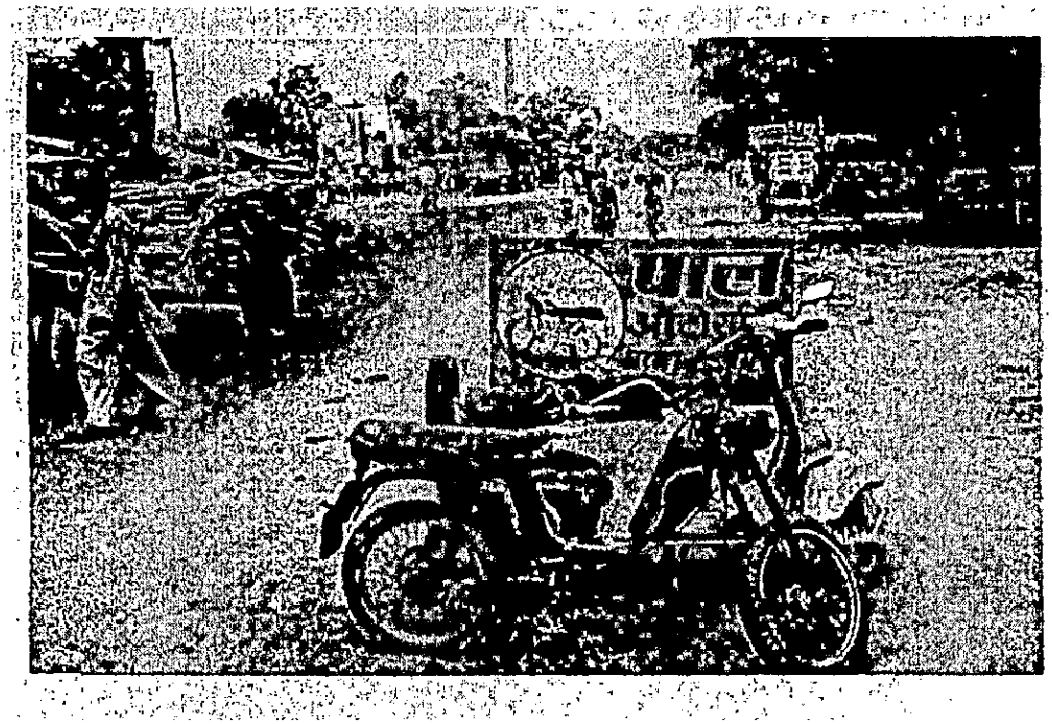
Type : Temporary.

Duration : Mostly during day time, throughout the year.

Impact : Physical, environmental and safety.

Nature of effect : The vendors, hawkers and the push carts involving them occupy physically whole of the roadside available land thus restricting the highway to the paved portion only. Every day they help in spoiling the roadside environment in the form of litter, peels etc. which they and their customers throw. Finally in the eagerness to sell their ware to the road user, they meet with accidents by coming into the way of a fast moving vehicle etc. .

FIG - 4
PLATE - 1



Refers to
para. -4.5.6

Refers to
para.- 4.5.4

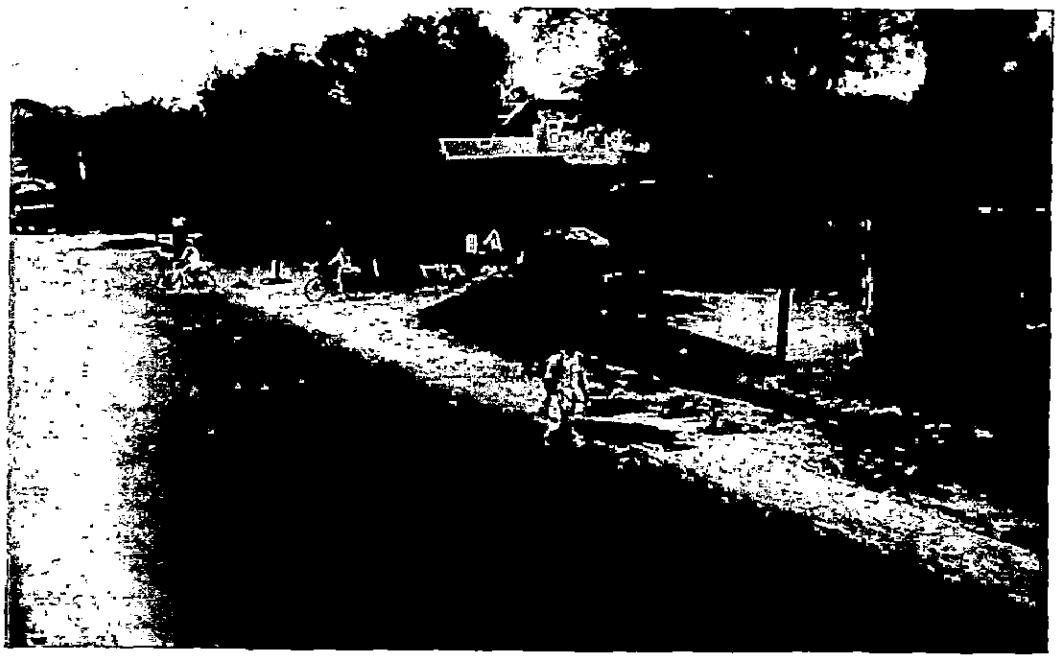
TOP: AUTO REPAIRER'S ADVERTISEMENTS ENCROACHING TILL PAVED ROAD EDGE.

BOTTOM: ROAD SIDE LAND BEING USED AS GARBAGE DUMPING GROUND.

FIG - 5
PLATE - 2

Refers to para. -4.2.3 & 4.4.1

DHABAS ENCROACHMENT LEAVING JUST A VEHICLE SPACE ON THE HIGHWAY



Refers to para.- 4.2.5

T- JUNCTIONS ENCROACHED BY PETTY TRADERS (CABINS) OBSTRUCTING THE HIGHWAY

FIG - 6
PLATE - 3

Refers to
para. -4.3

Refers to
para.- 4.3

TOP: ACTIVITES ON ENCROACHED ROAD SIDE LAND INFRONT OF NEWLY OPENED MANGALORE MARKET.

BOTTOM: A WOMAN MAKING ROPE WITH THE HELP OF HER CHILDREN ON THE ROAD SHOULDER.

FIG - 7
PLATE - 4

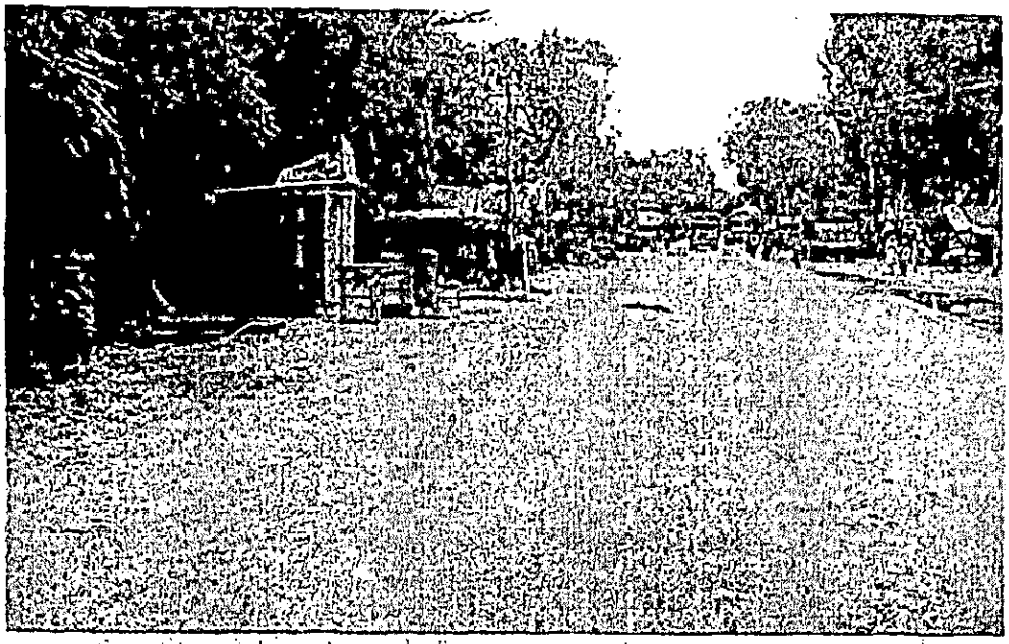
▲

DRIED DUNG PLATES (FIRE WOOD) STOCKED ON ROAD SHOULDERS

▼

Refers to
para. -4.5.3

FIG - 8
PLATE - 5



Refers to
para. -4.2.1

Refers to
para.- 4.5.2

TOP: TEMPORARY WOODEN SHACKS OCCUPING ROAD SIDE LAND IN PURQUAZI TOWN.

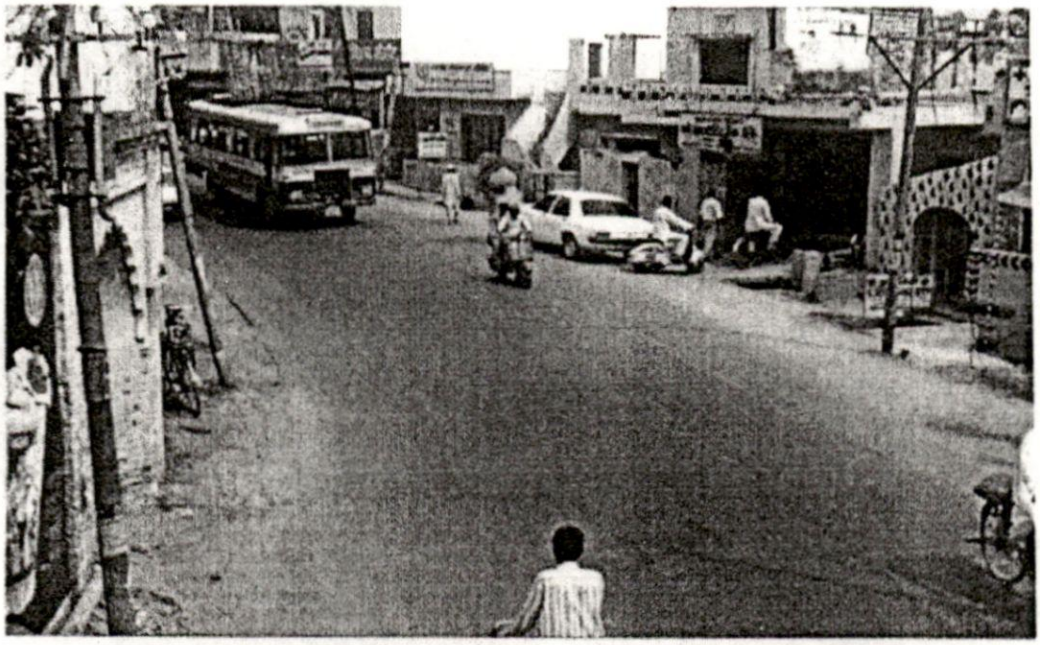
BOTTOM: A WELDER SPREADING HIS OPERATIONS TILL ROAD EDGE.

FIG - 9
PLATE - 6

▲ **A MEMORIAL UNDER CONSTRUCTION ABUTTING ROAD** ▼

Refers to
para. -4.2.1

FIG - 10
PLATE - 7



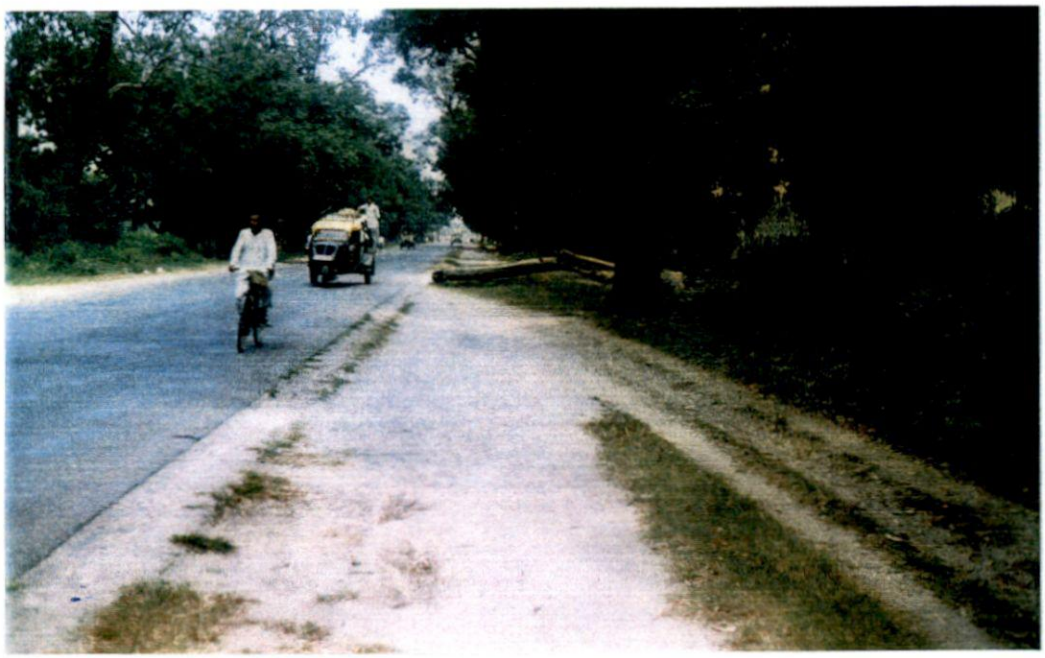
Refers to
para. -4.2.8

Refers to
para.- 4.2.6

TOP: HIGHWAY TURNED INTO A NARROW ALLEY WITH A SHARP BEND IN PURQUAZI TOWN ALL DUE TO RESIDENTIAL ENCROACHMENT.

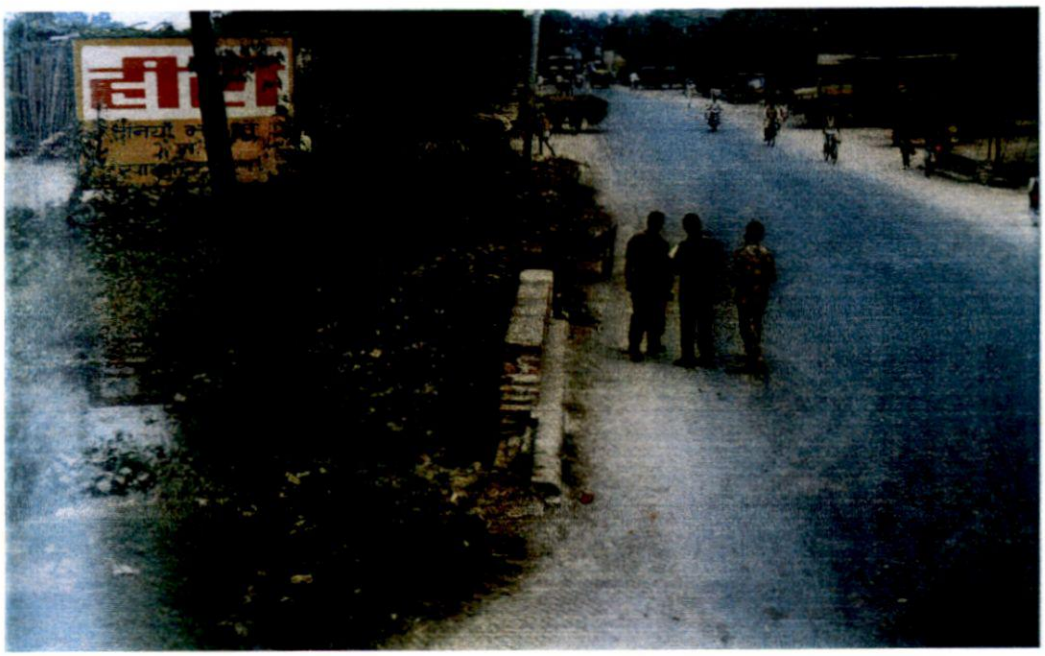
BOTTOM: UNEXPANDED CULVERT AT THE ENTRANCE OF MANGALORE TOWN, MAKING IT A ONE WAY TRAFFIC(BOTTLE NECK).

FIG - 11
PLATE - 8



Refers to
para. -4.4.4

UN CLEARED FALLEN TREES REDUCING ROAD AVAILABILITY

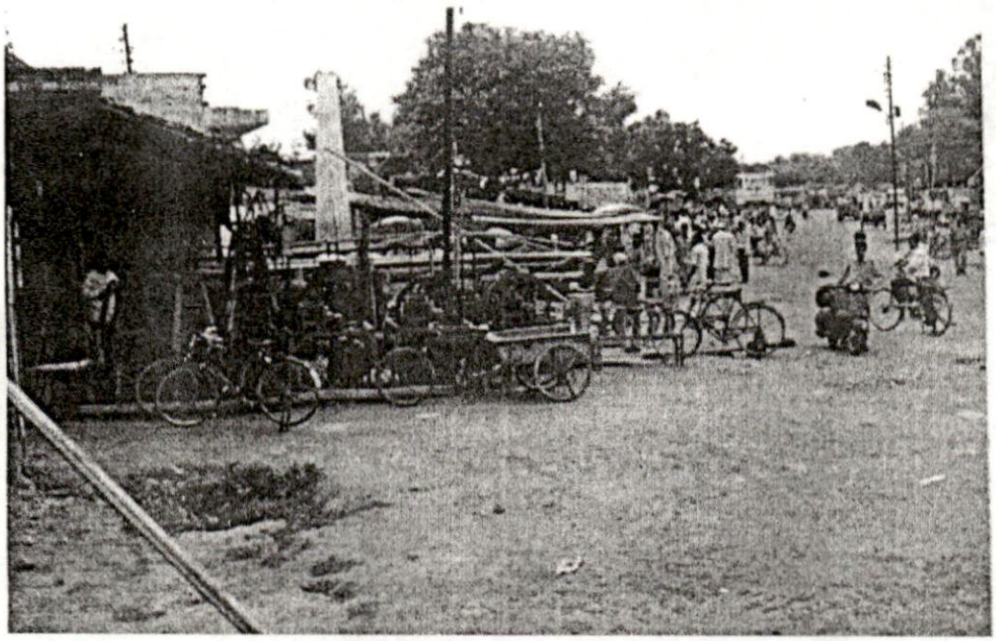


Refers to
para.- 4.2.6

BOTTLE NECKS DUE TO UN-WIDENED CULVERTS (NUMEROUS) AND ROAD SHOULDERS BEING USED AS GARBAGE DUMP SPACES AT MANY PLACES

FIG - 12
PLATE - 9

Refers to
para. - 4.2.1



Refers to
para.- 4.5.2

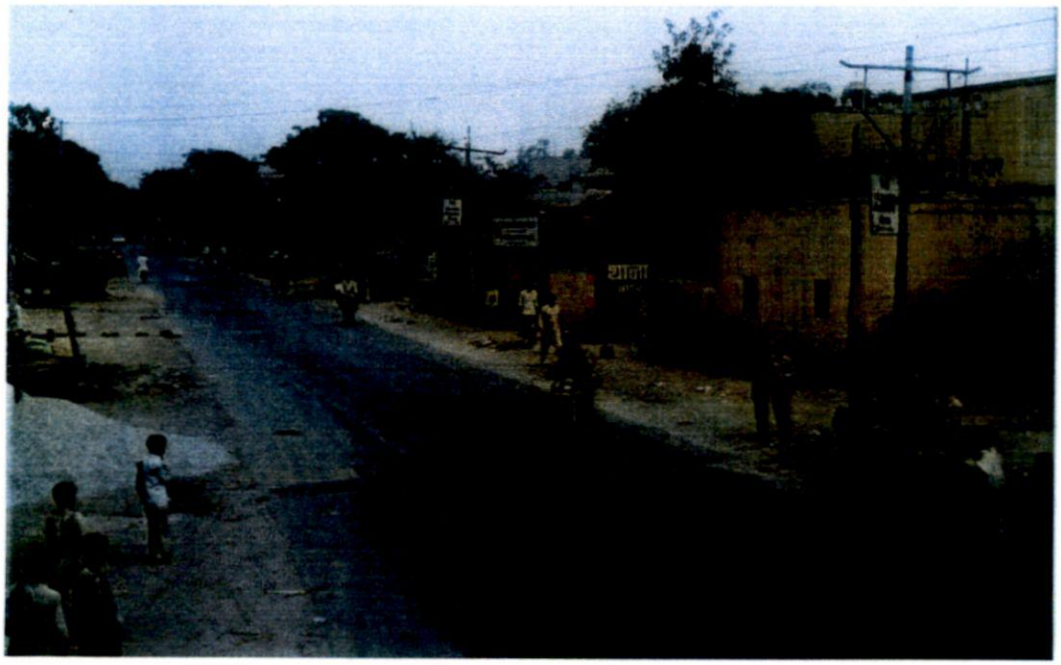
TOP: A HOLY PLACE (MOSQUE) IN CENTER OF MANGALORE TOWN JETTING IN TO THE HIGHWAY.

BOTTOM: A HARDWARE SHOP IN MANGALORE TOWN ENCROACHING TILL PAVED EDGE OF HIGHWAY.

FIG - 12A
PLATE - 10

SCHOOLS ALONG HIGHWAY PUTTING CHILDREN SAFETY IN JEOPARDY

Refers to
para. -4.3



CONSTRUCTION MATERIAL (LEFT), EVEN POLICE STATION SPILLING ONTO THE HIGHWAY

CHAPTER-5

ANALYSIS OF PROBLEMS

5.1 Introduction :

In the previous chapter, the selected study area highway stretch roadside development has been analysed in detail and the problems have been identified. These problems and their related causal activities have been further analysed and discussed. These problems do not exist in isolation, as each problem is interconnected with some causes. Again, some causes of a problem are the source of some other problem also. Therefore, both causes and problems are interconnected and analysing further we also see that the causes occur because of certain conditions and they lead to certain effects. All of these can be put/represented in the form of a chain for each problem. Since problems are interconnected these individual chains can be connected to form a complex network(web).

The succeeding paragraphs will present cause-effect network for the each of the eight problems identified in the previous chapter with definitions/ descriptions as applicable to this thesis and manifestations of these problems as seen/observed in thesis study area. Finally all these individual cause-effect networks will be overlapped to see the core causes to be taken up and form a basis for plan of actions. Also for formulating a planning basis, the problems will be prioritized in their degree of seriousness and the available resources of the study area stretch will be discussed

critically, evaluating merits and demerits of available resources and then look into prospects of a new basis for highway planning and development.

This cause-effect network gives us the linkages. This has unique advantages in the sense that it gives clear picture of inter-relative steps of various problems and the impact of their linkages.

5.2 Cause-Effect Networks of Problems:

This network helps a planner in making development proposals by concentrating and focusing on 'root causes' and not on the 'symptoms'. Normally a problem with more linkages with causes has more impact and hence should be tackled at a higher priority. It means that it is more serious than a problem with comparatively less linkages to causes. By tackling such a higher priority problem's causes first we will be indirectly/automatically neutralizing partially some other problems also.

The networks of all these individual problems are combined to present a final composite network of problems. This is done through a process of superimposition of networks one over the other and merging of respective causes and effects . The final picture as presented in Fig is as complex and comprehensive as a real life situation.

The individual caues-effect networks and the final network are presented as per the sequence of problems discussed in the previous chapter, in succeeding pages;

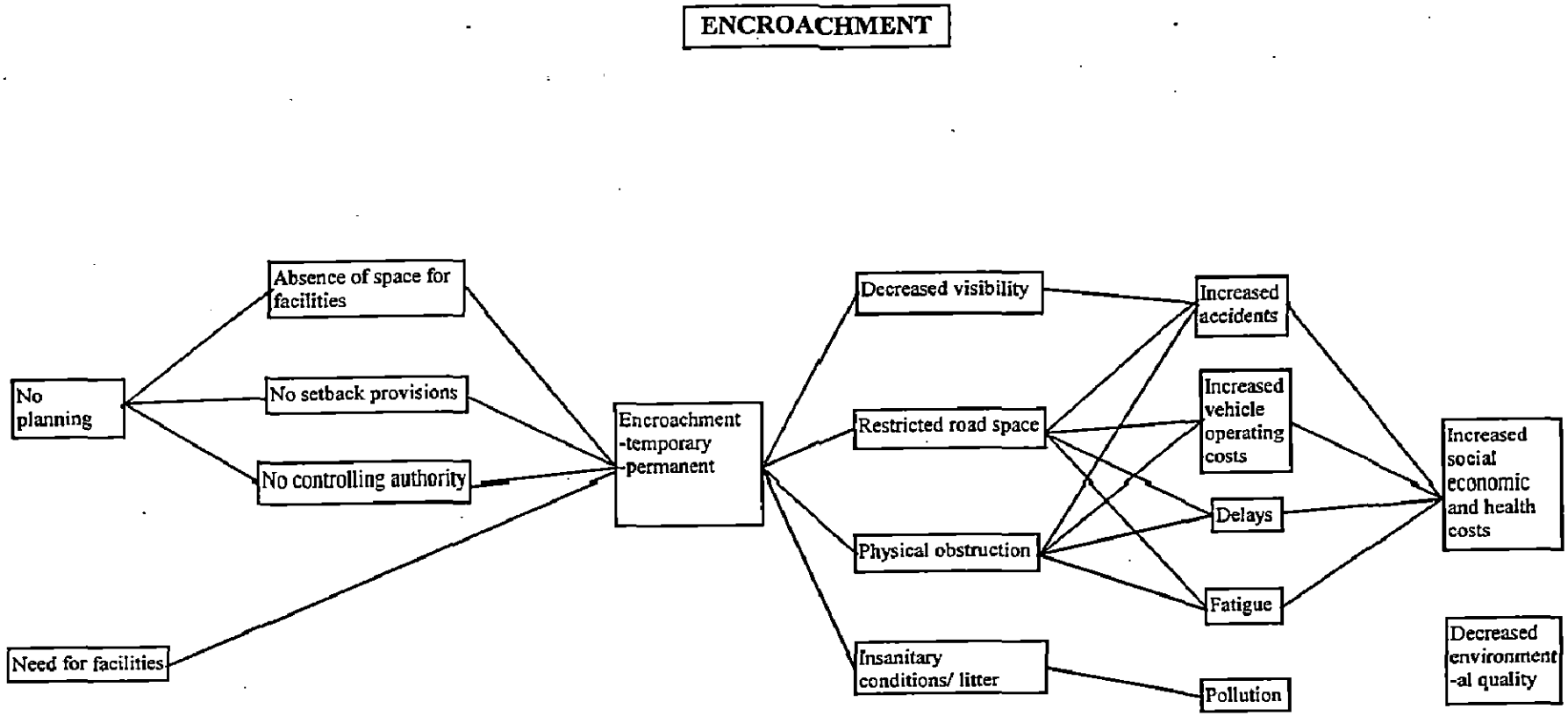
CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-1

ENCROACHMENT

Definition/ description: Encroachment in this thesis is defined as "any construction or activity, temporary or permanent in nature, which occupies the legitimate right-of-way space of the highway". Temporary is one which occupies space for some time of the day/ year and is easily movable. Permanent is one which occupies the space permanently (throughout the day, whole year) and is not easily movable.

Manifestation: In the thesis study area, the temporary encroachment is manifested by vendors, hawkers, rickshaw parking, shop's ware, vegetable mandies etc. with in a settlement and dhaba seating arrangements, seasonal fruit stalls, garbage heaps, dried dung stacks etc. in-between the settlements. Similarly the permanent encroachment is manifested mostly by public utilities like transformers, electric/telephone poles/lines, P&T rooms and religious places like temples, mosques, gurdwaras etc..

FIG - 13


ENCROACHMENT
No planning
Absence of space for facilities
No setback provisions
No controlling authority
Need for facilities
Encroachment -temporary -permanent
Decreased visibility
Restricted road space
Physical obstruction
Insanitary conditions/ litter
Increased accidents
Increased vehicle operating costs
Delays
Fatigue
Pollution
Increased social economic and health costs
Decreased environment -al quality

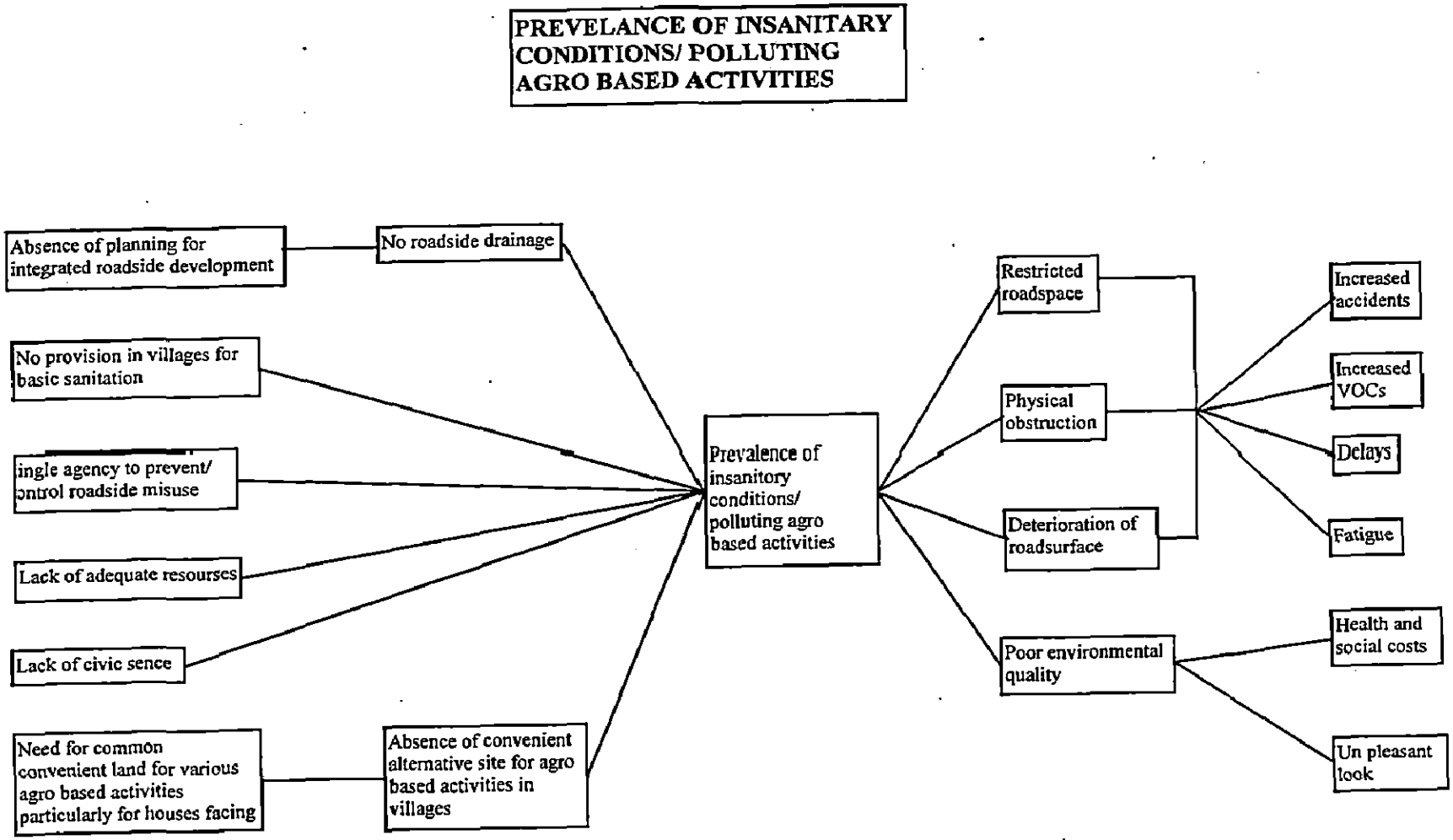
CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-2

PREVALENCE OF INSANITORY CONDITIONS AND POLLUTING AGRO BASED ACTIVITIES

Definition/ description: The term 'prevalence of insanitory conditions/ polluting agro based activities' in this thesis study area is defined as "all that affects the environment visually, physically, or in vodour or through air, solid and water.

Manifestation : In the thesis study area, 'prevalence of insanitory conditions/ polluting agro based activities' is manifested in the form of garbage, dung and in dungcake making activity/ process including stacking, waterpools on the road and beside the roads, smoke emitted from the fields(jaggery making) etc..

FIG - 14


PREVELANCE OF INSANITARY CONDITIONS/ POLLUTING AGRO BASED ACTIVITIES
Absence of planning for integrated roadside development
No roadside drainage
No provision in villages for basic sanitation
ingle agency to prevent/ ontrol roadside misuse
Lack of adequate resourses
Lack of civic sence
Need for common convenient land for various agro based activities particularly for houses facing
Absence of convenient alternative site for agro based activities in villages
Prevalence of insanitory conditions/ polluting agro based activities
Restricted roadspace
Physical obstruction
Deterioration of roadsurface
Poor environmental quality
Increased accidents
Increased VOCs
Delays
Fatigue
Health and social costs
Un pleasant look

CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-3

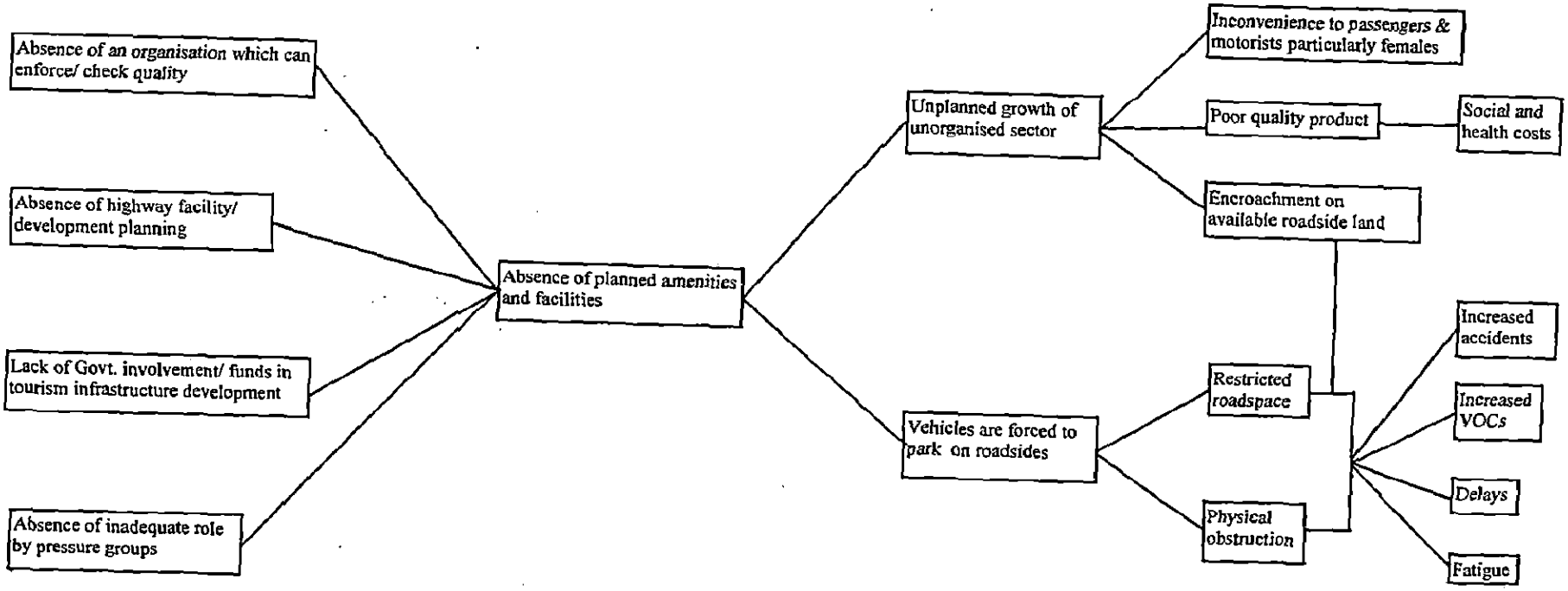
ABSENCE OF PLANNED AMENITIES AND FACILITIES

Definition / description: Absence of planned amenities and facilities in this thesis are defined as " minimum required needs and requirements of a highway user, the absence of which will seriously affect highway user as well as highway itself".

Manifestation: In the thesis study area, the needs and requirements affecting the road user are infested in the form of his/ her food, water, toilet, rest etc. requirements i.e. in other words organised eating places, rest areas, medical posts etc. and also in the form of his vehicle needs such as repair, recovery, fuel, parking etc., in the form of mobile repair and recovery vans, petrol pumps, parking areas, truck wayside layouts etc.. Some common additional facilities like telephones, entertainment, and shopping can also be included in this category.

FIG - 15

ABSENCE OF PLANNED AMENITIES AND FACILITIES



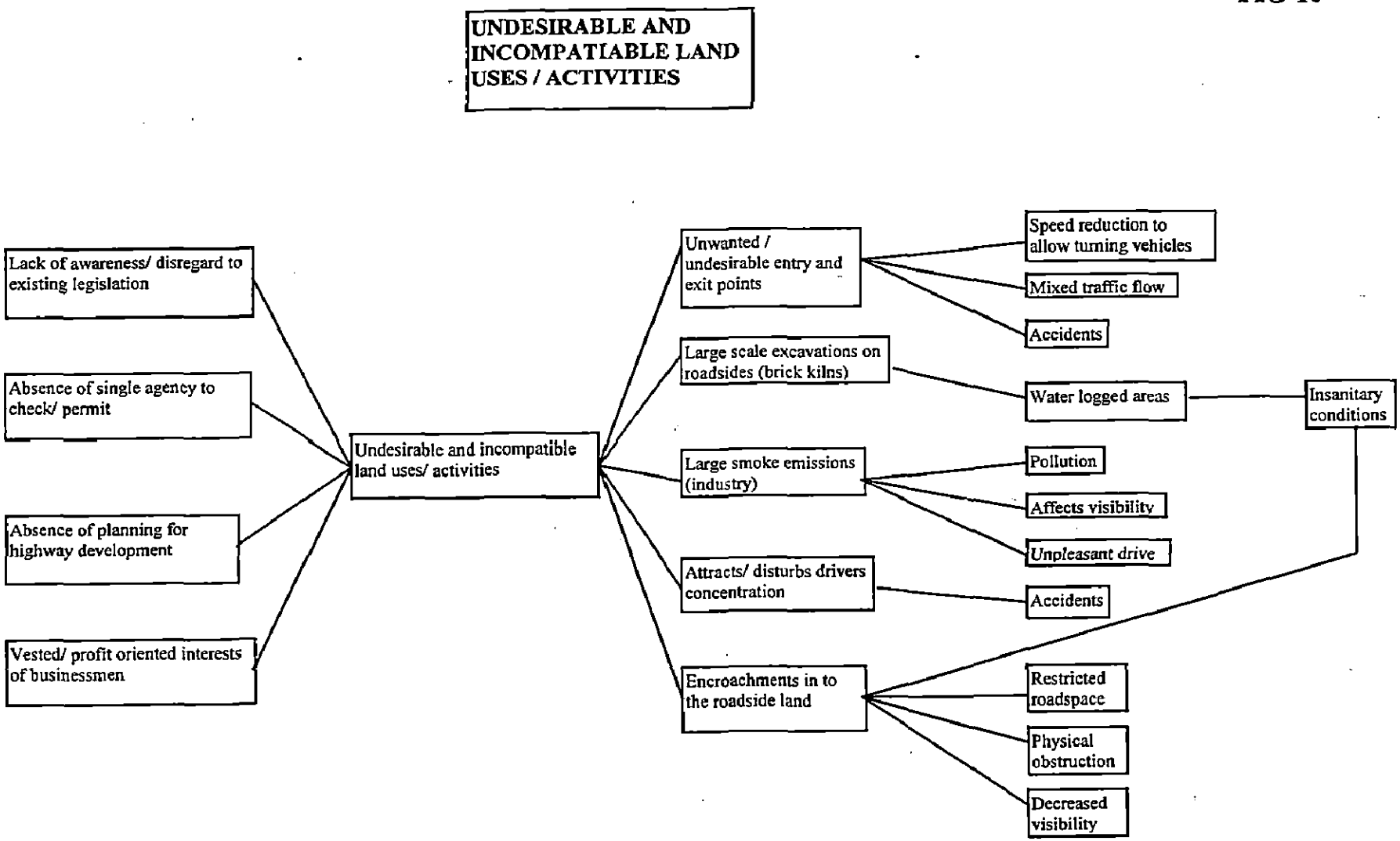
CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-4

UNDESIRABLE AND INCOMPATIBLE LAND USES AND ACTIVITIES

Definition/ description: Undesirable and incompatible land uses and activities in this thesis area are defined as " the land uses sited/ situated on the immediate vicinity of highway sides whichdirectly or indirectly affect the highway and its traffic".

Manifestation : In this thesis study area, undesirable and incompatible land uses and activities are manifested in the form of factories, hoardings and brick kilns (permanant use), and jaggery making fields (seasonal).

FIG-16


UNDESIRABLE AND INCOMPATIABLE LAND USES / ACTIVITIES
Lack of awareness/ disregard to existing legislation
Absence of single agency to check/ permit
Absence of planning for highway development
Vested/ profit oriented interests of businessmen
Undesirable and incompatible land uses/ activities
Unwanted / undesirable entry and exit points
Speed reduction to allow turning vehicles
Mixed traffic flow
Accidents
Large scale excavations on roadsides (brick kilns)
Water logged areas
Insanitary conditions
Large smoke emissions (industry)
Pollution
Affects visibility
Unpleasant drive
Attracts/ disturbs drivers concentration
Accidents
Encroachments in to the roadside land
Restricted roadspace
Physical obstruction
Decreased visibility

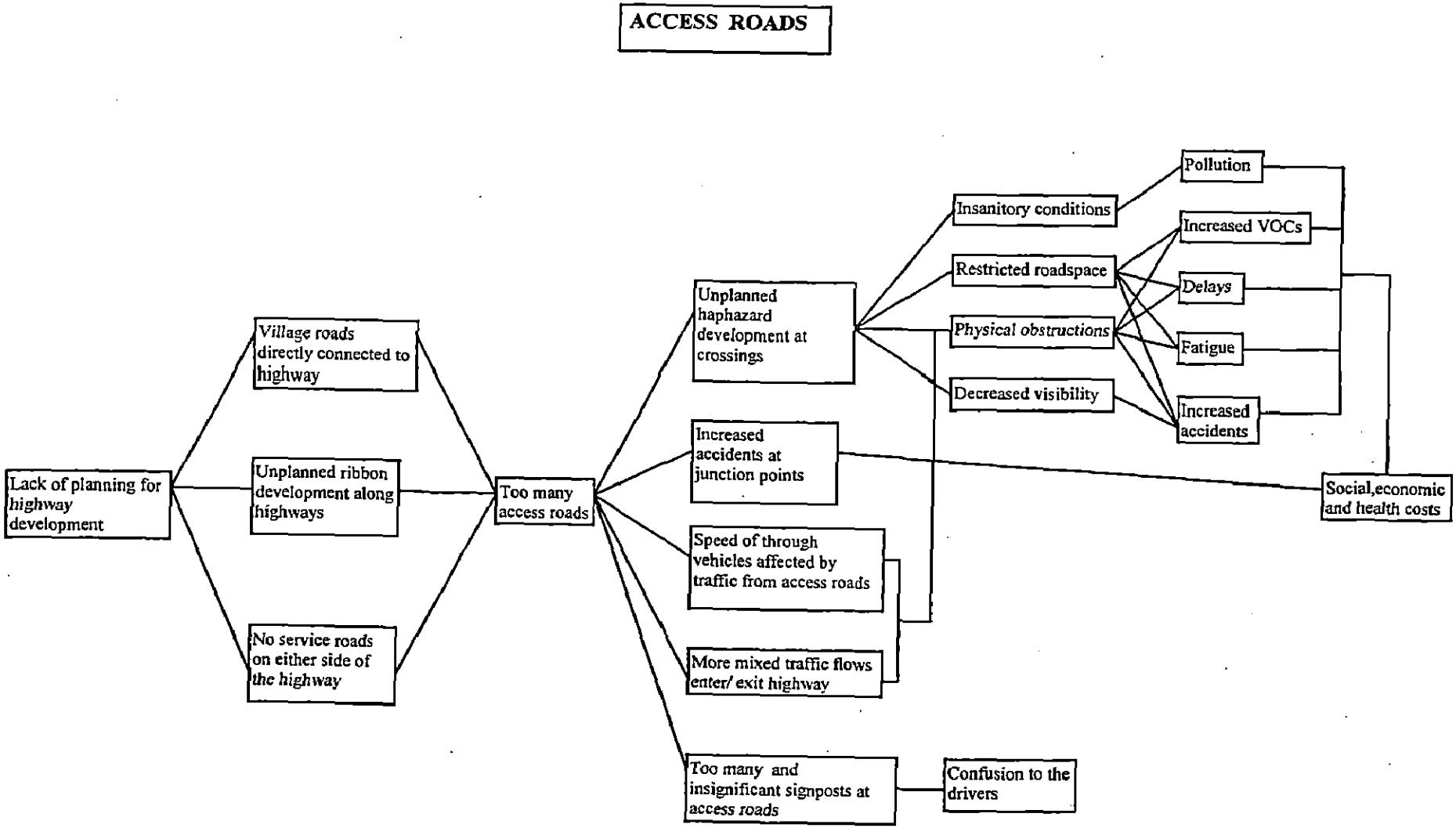
CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-5

ACCESS ROADS

Definition/ description : Access roads in this thesis are defined/ described as "all those roads, tracks or paths clearly defined or temporarily being used which join the highway at the same level as that of highway making some angle with the highway".

Manifestation : In this thesis study area, access roads are manifested in the from of permanant state roads leading to towns and villages, private roads leading to industries, colony's etc. and temporary made roads to lift grain from fields, seasonal activities like jaggery making etc.

FIG - 17


ACCESS ROADS
Lack of planning for highway development
Village roads directly connected to highway
Unplanned ribbon development along highways
No service roads on either side of the highway
Too many access roads
Unplanned haphazard development at crossings
Increased accidents at junction points
Speed of through vehicles affected by traffic from access roads
More mixed traffic flows enter/ exit highway
Too many and insignificant signposts at access roads
Confusion to the drivers
Insanitory conditions
Restricted roadspace
Physical obstructions
Decreased visibility
Pollution
Increased VOCs
Delays
Fatigue
Increased accidents
Social,economic and health costs

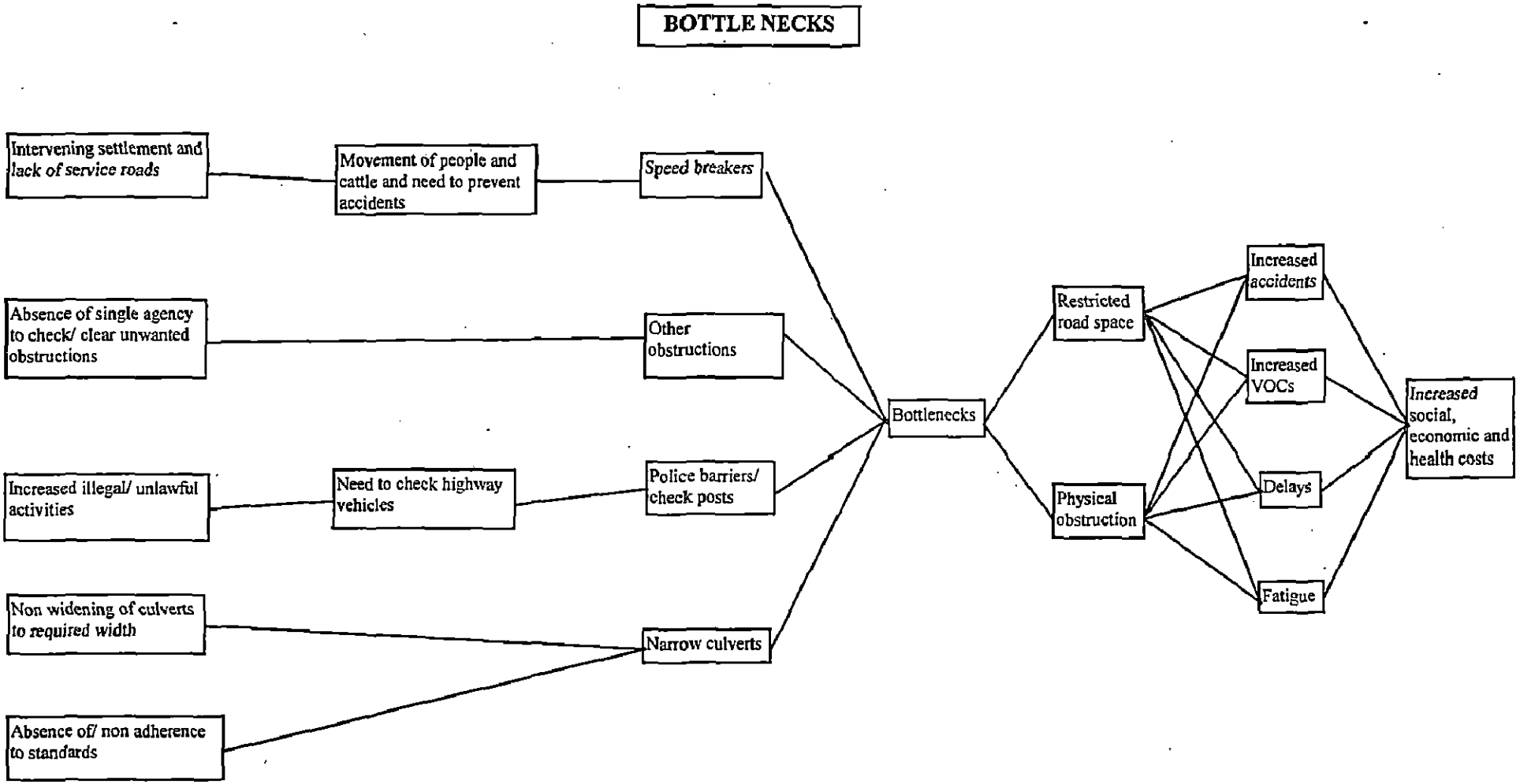
CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-6

BOTTLENECKS

Definition/ description : Bottleneck, in this thesis is defined as "any construction or natural obstruction which restricts the roadspace and slowsdown the traffic".

Manifestation : In the thesis study area these bottlenecks are manifested in the form of speed breakers, unexpanded culverts/ bridges, police barriers (artificial obstructions) and fallen tree trunks occupying space till paved road edges (natural obstructions).

FIG - 18


BOTTLE NECKS
Intervening settlement and lack of service roads
Movement of people and cattle and need to prevent accidents
Speed breakers
Absence of single agency to check/ clear unwanted obstructions
Other obstructions
Increased illegal/ unlawful activities
Need to check highway vehicles
Police barriers/ check posts
Non widening of culverts to required width
Narrow culverts
Absence of/ non adherence to standards
Bottlenecks
Restricted road space
Physical obstruction
Increased accidents
Increased VOCs
Delays
Fatigue
Increased social, economic and health costs

CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-7

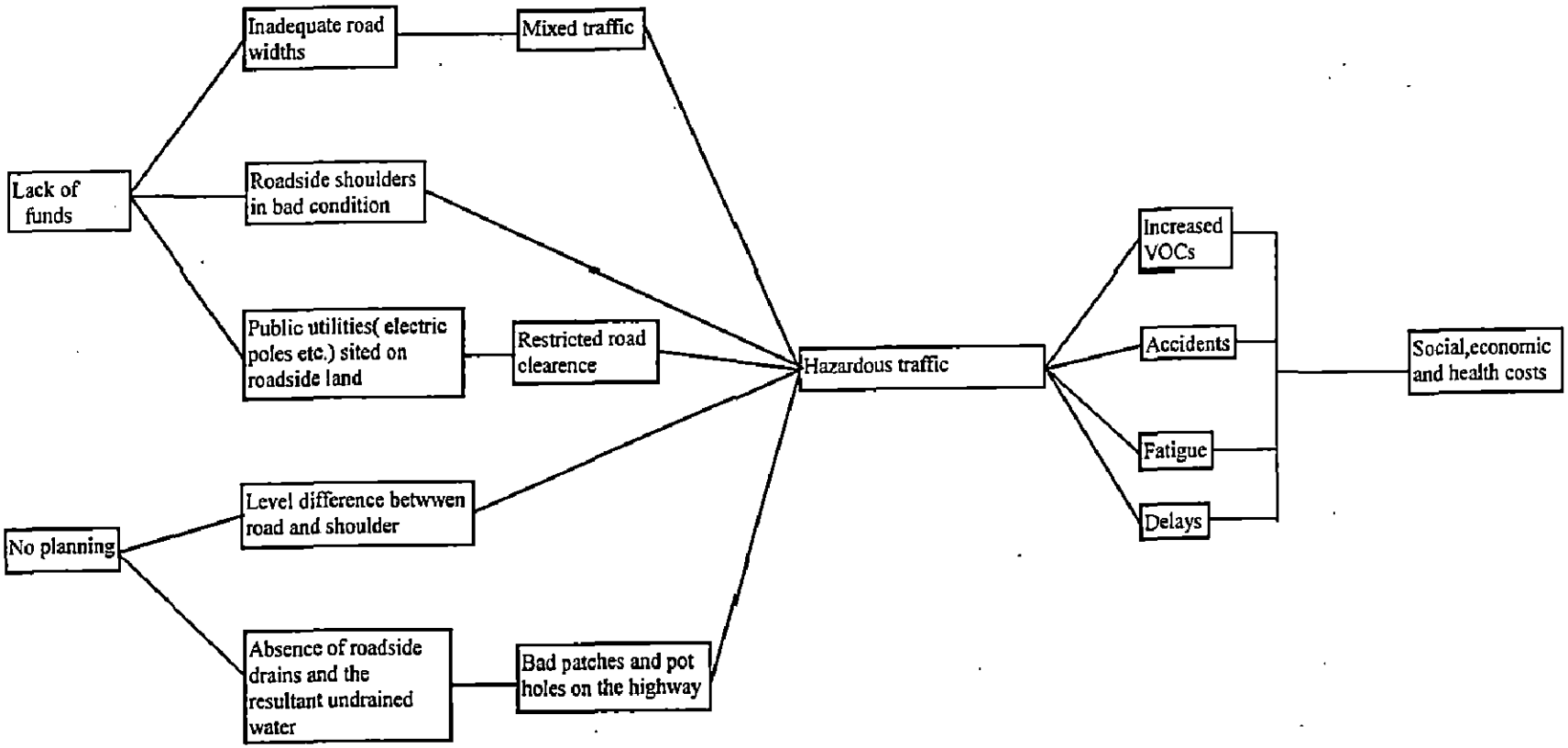
HAZARDOUS TRAFFIC MOVEMENT

Definition/ description : Hazardous traffic movement in this thesis is defined as "that traffic movement which by its own nature or because of road condition becomes hazardous".

Manifestation : In this thesis study area, this movement is manifested by mixed traffic flows, siting of public utilities on roadsides, different levels between shoulder and carriegeway, bad road conditions etc.

FIG - 19

HAZARDOUS TRAFFIC MOVEMENT



CAUSE-EFFECT NETWORKS OF PROBLEMS : PROBLEM NO.-8

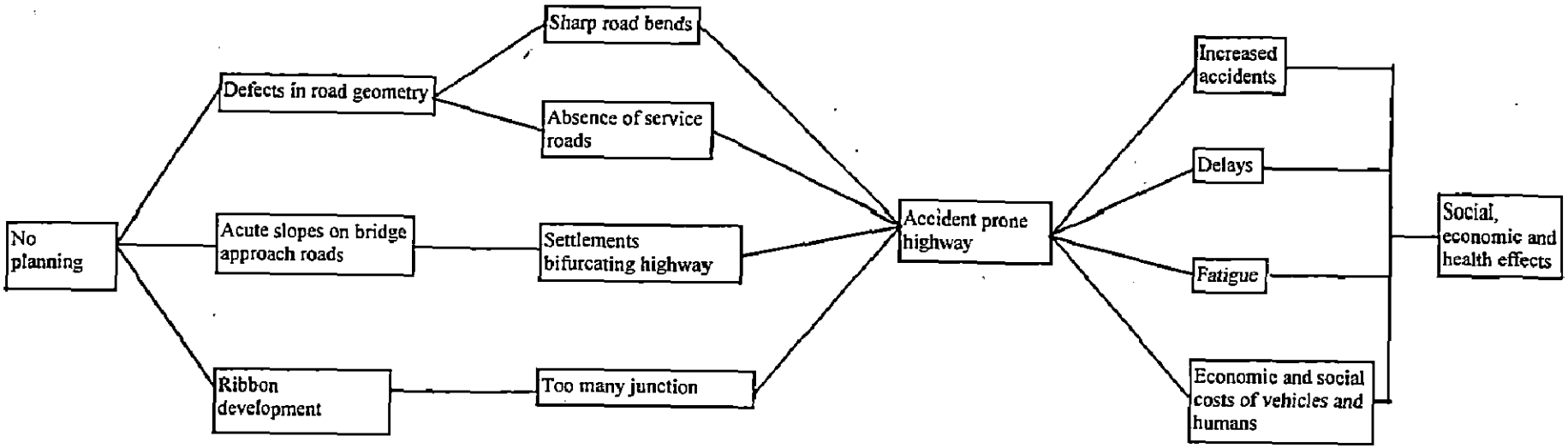
ACCIDENT PRONE HIGHWAY STRETCHES

Definition/ description : Accident prone highway stretches are "those stretches of highway which by nature of highway geometry or due to inadequecies in the highway roadside environment, cause accidents".

Manifestation : In this thesis study stretch, these are manifested by sharp bends, acute bridge slopes, bifurcating settlements, junction points etc.

FIG - 20

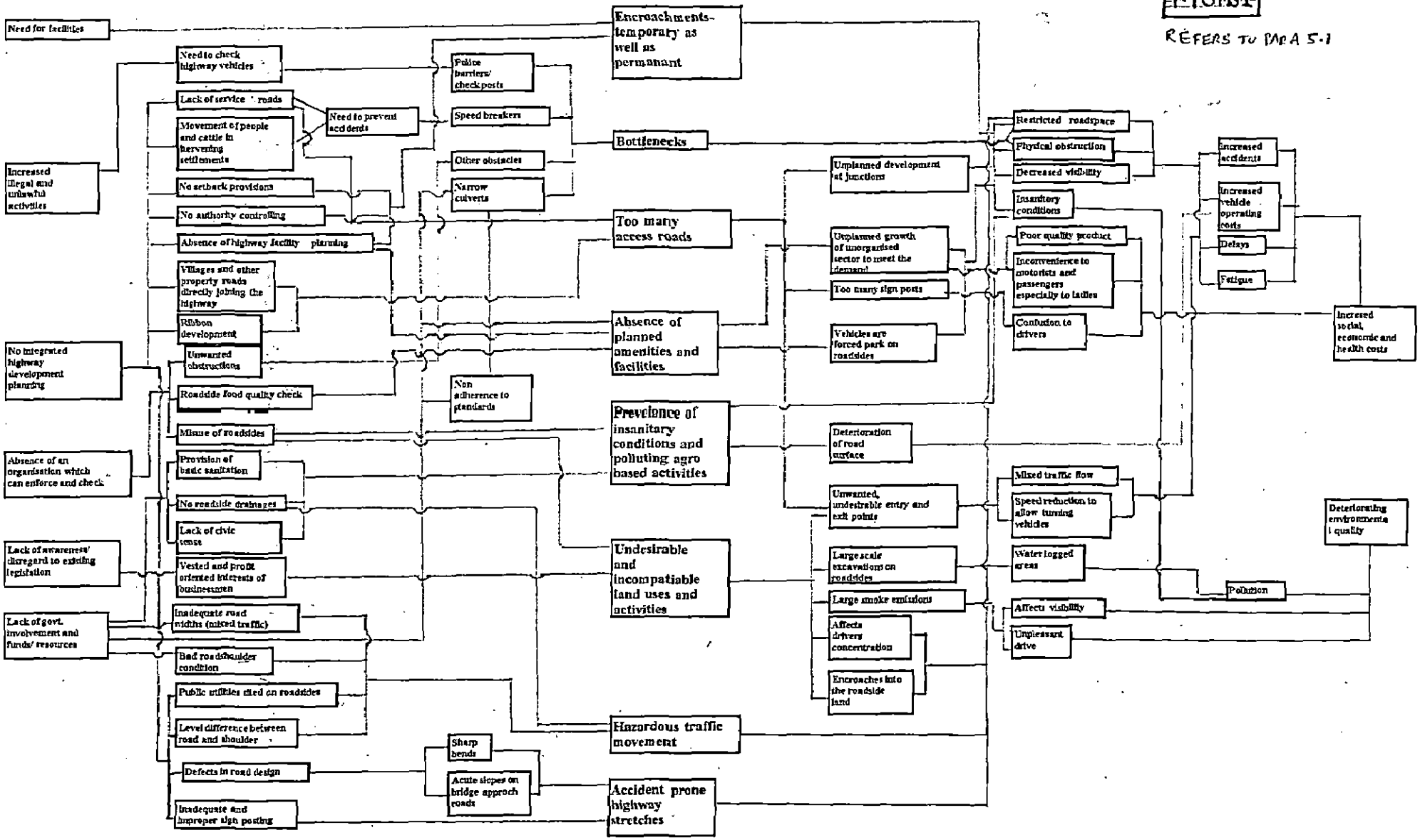
ACCIDENT PRONE HIGHWAY STRETCHES



SUPERIMPOSED NETWORK

FIG-21

REFERS TO PARA 5.1



5.3 Prioritisation of problems :

S.No.	PROBLEM	PRIORITY	SERIOUS-NESS
1.	Encroachment	I	High
2.	Absence of planned amenities/ facilities	I	High
3.	Prevalence of insanitary conditions/ polluting agro based activities	I	High
4.	Hazardous traffic	I	High
5.	Too many access roads	II	Medium
6.	Bottlenecks	II	Medium
7.	Incompatible/ undesirable land uses	II	Medium
8.	Accident prone stretches	II	Medium

5.4 Resources availability:

Resources available for highway roadside development can be listed in to two broad categories

5.4.1 Institutions

5.4.2 Man power

5.4.3 Capital

Again these can be subdivided into;

5.4.1 Institutions

5.4.4.1 Existing legislations/Acts

5.4.1.2 Existing Organisations

5.4.2 Manpower

5.4.2.1 Technical

5.4.2.2 Executive

5.4.2.3 Police (Enforcement)

5.4.1 Institutions

5.4.1.1 *Existing legislations /Acts* : Although, there is no national level legislation existing on the type of development that can take place along highways (or roads), there are only a few states including Uttar Pradesh (U.P.) state which have legislations. U.P has promulgated its act in 1945 itself namely 'The United province roadside land control Act-1945' (Attached as appx). It was further strengthened and modified through 'U.P. Roadside land Control Rules, 1964'.

5.4.1.1.1 *U.P. Roadside land Control Act(Given at appx)* : This talks of declaring a Controlled area along a road. That is any land within a distance of four hundred and forty yards from the centre line of any road will be deemed as a controlled area for the purpose of this Act. There are some restrictions imposed on erection or re-erection of any building, or for making or extending any excavation, or laying out any means of access to a road in a controlled area except with the previous permission of the Collecter in writing. As per this Act even land can be acquired by the State Govt. under the land Acquisition Act, 1894. The Act also talks about the procedures for claims and compensations.

The Act also debars, the land under controlled area to be used for the purpose of a charcoal-kiln, pottery kiln or lime-kiln and no land within a controlled area shall

be used for the purposes of brick-field or brick-kiln except under and in accordance with the conditions of, a license from the Collector which shall be renewed annually. The Act also talks about offenses, penalties and the minimum authority who can try the offenders.

However the Act gives concessions (savings) to the following activities;

(a) erection or re-erection of buildings upon land included in the inhabited site of any village as entered and demarcated in the revenue records or upon sites in a municipal, notified or town area that are already built up on the date of the issue of the notification (declaring a controlled area);

(b) erection or re-erection of a place of worship or a tomb, cenotaph, grave, graveyard, or marghat or of a well enclosing any of the above if they are existing at the time of notification(declaring a controlled area);

(c) excavations(including a well) made in the ordinary course of agricultural operations;

(d) the construction of an unmetalled road intended to give access to land solely for agricultural purposes.

5.4.1.1.2 *U.P. Roadside land Control Rules, 1964* :Through these rules, the U.P. Govt. gives out procedure for applying to erect or re-erect any building, excavation, or layout any means of access to a road in a controlled area. Different set of documents that have to accompany the application for re-erecting a building and for making or extending excavations are given.

Some principles on which Collector will grant permission are given as under:

(a) (i) Bus stands should be setback sufficiently from the given building line limit prescribed for the road so as to permit a service road subject to a minimum distance of 100 feet from the centre of the road. Access to the stand should be limited to one point on the main road.

(ii) Construction of buildings shall not be allowed with in the building lines, i.e. within the distance specified below from the centre line of any road of the description given in the following table:

TABLE - 8

BUILDING LINE SPECIFICATIONS

Ser1.No. 1	Categories of road 2	Open and agricultural areas 3	Urban and industrial areas 4
1.	National provincial highways	75	60
2.	Major District roads	60	45
3.	Other district roads	50	30
4.	Village roads	20	20
5.	Cement Concrete tracks	30	30
6.	Motor Roads (in hills)	50	Question does not arise
7.	Bridle roads (in hills)	25	Ditto.

(b) The opening of Sullage towards the road shall not be permitted.

(c) The approach should be in such a manner as not to interfere with or endanger the flow of traffic on the road.

(d) No construction or excavation likely to affect public health shall be allowed with in controlled area except after obtaining the advice of the health officer.

However, in case of charcoal kiln, Pottery kiln, lime kiln or brick kiln or brick-fields, the restrictions are more in the sense that the above limits(building line)) get doubled. In addition to some administrative details, these rules also exempts Brick and pottery making in village from taking license. As per these rules, the Collector shall inform the chief Engineer, Public works Department or any other officer designated by him in this behalf and the Health officer, of all licenses granted by him and the conditions imposed, if any.

5.4.1.2 *Existing Organisations* : Public works Department in the state is responsible for laying and maintaining roads starting from State highways and below. The roads are divided into various divisions, each division headed by an Executive Engineer. In case of the State highway in the thesis study area, 22 kms of highway stretch is with No.2 Division, Executive Engineer at Roorkee and around 25 kms State highway stretch is with No3 Division, Executive Engineer based at Muzaffar nagar. Beyond these stretches again the responsibility of state highways lays with other Divisions headed by Executive Engineers. However, the P.W.D. land is till the edge of legally

acquired land (in this case 120 to 130 feet) on either side of the highway which is popularly known as right-of-way.

5.4.2 Manpower

5.4.2.1 *Technical* : Technical manpower for the state roads is from/provided by P.W.D. itself. However the construction and maintenance works are undertaken by private contractors selected through sealed tenders. In case of study area state highway, the original plan of it is as old as 1909. At present, plans for maintenance, shoulder strengthening and culvert/ bridge re-alignments are made by the respective P.W.D. divisions.

5.4.2.2. *Executive* : In the execution part, three organisation's manpower in the state is involved, first is P.W.D. and their hired staff who execute the work on the road proper and with in its right -of-way. The second is Collector or District Magistrate, who according to the Acts existing, is responsible to give/refuse permissions for erection, re-erection of buildings, brick kilns, access roads etc. The last organisation is police who are to give protection while P.W.D. or Municipal Corporation (as the case may be) takes up the job of removing encroachments of their properties.

5.4.2.3 *Police*: As already discussed the land till right-of-way of a road is owned by P.W.D. Invariably because of nature of poor or no road side planning which takes place in India, the roadsides are encroached, the causes of which are adequately discussed at the start of this chapter and since there is no in built

organisation with P.W.D. who can evict them, they have to request local authorities to give them police help. The police, therefore are indirect enforcement agency acting for P.W.D. In some cases when municipality of a settlement feels the roads have become too narrow with in a settlement, they also take police protection for clearance drive.

5.4.3 Capital :

The state highways are financed and maintained by the state Govt. A part of the State finance also is given by Central Govt. However, the finances given by Central Govt. for State projects are lapsable every year. The state government collects road finances through following financing sources.

(a) Registration fee for registration of vehicles

(b) Issue or renewal of driving licenses

(c) Levy of permit fee on transport vehicles

(d) Goods/Passenger tax on transport vehicles

(e) Tax on motor vehicles and parts

All these taxes are levied at the discretion of the state concerned, so they vary from state to state. The Central Govt. also collects taxes in the form of import and excise duties on motor vehicles, their parts, tyres, tubes and POL(Petrol Oil lubricants). 80% of this is further distributed to the states in the ratio of their POL consumption. However, both at Central and state level it is unfortunate to observe that the levels of taxation do not bear any relationship to the investment on roads on

one hand, and and on the other hand even if fully the taxes are expended, the funds are very meager if the total road infrastructure (even if only highways) are to be taken up. It is complained that the government uses road transport taxation as a means of general revenue mobilisation but does not adequately invest back on roads. A comparison of the revenue earned by the government by way of road taxation and the investment made on road improvements is given in the table below:

TABLE - 9

TOTAL TAXATION AND REVENUE COLLECTED ON ROAD TRANSPORT

Year	Total taxation on road	Expenditure on roads transport (Capital & maintenance)
1974-75	1341.1	442.3
1975-76	1436.6	502.6
1976-71	1572.8	629.3
1977-78	1587.6	690.5
1978-79	1832.2	899.8
1979-80	2292.5	1021.5
1980-91	2387.6	1209.23

Source: Road Development plan for India (1981-2001) published by I.R.C

The above table shows that the Government spends just about half the amount realised from taxation on road construction and maintenance.

5.5 Critical Review of Existing Resources :

A basis for highway development planning can be arrived at, provided the existing resources are known and their plus side and minus side is seen then depend or dovetail those plus sides right away, suggest measures for minus sides or suggest different set altogether if it is going to be more easier and less costly. Since, in the above paragraphs we have seen what are the available resources in the state in terms of institutions, man power and capital, we need to critically evaluate / review them so that we can come to/arrive at some basis for proposing planning measures for highway development.

5.5.1 Existing legislations : In the existing legislations/Acts of U.P. state, the catch point is controlled area declaration. There are lot of restrictions put in the controlled area of four hundred and forty yards from centre line of any road on either side, but all the powers to permit or not to permit have been given to the Collector(DM) who changes quite frequently and who has many other important pressing works than looking into the violations of these restrictions. Taking advantage of this situation and the savings given in the Act, many persons construct, erect etc. all those which have been prohibited by the law.

A state highway passes through many a district having so many Collectors, each of them with different way of looking at things and under different compulsions, hence all can't have uniform type of dealing with the controlled area activities as given in the Act. Also the savings given in the act such as area within

village/municipal boundary, holy places, excavations and access roads for agriculture purposes makes this Act ineffective as people take indirect advantage of all those.

The, U.P. Roadside land control Rules of 1964, somewhat try to correct some of the above lapses by some more details on what should or shouldn't be there at what distances (including a sketchy mention of a service road). It also says that all permissions granted by Collector must be informed to Chief Engineer, P.W.D. and health officer. but in practice, firstly very few people away from urban limit take permission to erect, re-erect buildings (including dhabas)etc. and even if there are any permissions granted, the Collector rarely informs Chief Engineer P.W.D. or his representative Officer i.e. Executive Engineer or so.

5.5.2 Existing Organisations : At State level, the organisation which looks after highway construction and maintenance is P.W.D. and at national level the National Highway Authority of India Limited(NHAI) which was constituted after National highways Act 1956 has been passed. The P.W.D. in U.P. state is full of potential but totally lacks in efficiency. The lethargy of the department is aided and compounded by constant 'lack of funds' status. Inspite of State highway (No 45) being highly important highway for the state, no interest is being taken. This route is important not only from tourism and pilgrimage point of view but also because it originates from Country's Capital and opens up routes to whole of Garwal region. Whatever meager work is done on the highway is because of Kumb mela which comes once in 12years or so. If motivated, supervised properly and with some more discipline and of course

with adequate funds the Public Works Department can do wonders with the staff available to it.

5.5.3 Technical Manpower : As already discussed above the technical backbone of State highways is P.W.D. and it has got very good technically qualified officers and lower technical staff who have many years of experience with them and with good basic technical knowledge. What they lack is modern/advanced methods to collect, store and interpret the technical information. It will be surprising to know that the P.W.D. offices doesn't have even cross-sections of existing roads, and the land records map they are having were prepared by a Britisher during 1909. For simple information an Executive Engineer may have to wait for hours, may be days for the Munim (an appointment who keeps records) to come, search and give him. If the data is computerised any officer/technician who needs it should /can access it themselves. The same Munim can be trained in computer and asked to store all data in it. Proper maps can be made. The P.W.D. will have a competent technical manpower if their work culture and technology is modernised.

5.5.4 Executive manpower : Executives in P.W.D. seems to be lacking in initiative, otherwise the offices and their data could have been more organised. It is surprising to know that an Executive Engineer of P.W.D. rarely works in office but mostly works from his residence. Inspite of legislation existing in U.P. or even without legislation, they are not even bothered to take action or initiate action when people encroach into the acquired P.W.D. land (right-of-way), which is a legal P.W.D.'s property. As per U.P. roadside land legislation, all constructions with in a

controlled area are to be done with collectors permission. However, when interviewed the Dhaba owners said that they do not take permission from anybody. This amply shows that the collector is not following the Act. Unless an executive like Collector knows about law, adheres to it and implements, it will be impossible to control this roadside land development however strong the Act may be. Another view point is that for 1945 (when the law was enacted) situation, the Collector(who was supreme in a district) was the right person but now, with the changed times a separate executive agency is required to check, permit, penalise or evict roadside developments.

5.5.5 Police : If the Collector is law ensurer or implementor, Police are the enforcing tool. Therefore, they do not act directly but only act when asked by the Collector. In an unplanned, unpermitted roadside development police are not to be blamed as when the Collector or P.W.D. themselves do not bother then who is there to ask the Police to help them clear the encroachments. On the other hand, the Police force have not been increased in the same proportion as population growth and in addition they have to perform many new tasks like VIP protections, escorts, road duties and other similar sundry duties in addition to their actual policing duties.

As per our discussion in the above paragraphs, we had a separate, independent Police like force which can help reporting the things going against law(i.e. roadside land control Act) to the Collector and also clear them before they become entrenched or unmanageable. Or as another alternative the police can be posted with some extra dedicated staff(Police Personnel) whose only job is as explained above.

5.6 Prospects of a new basis for highway planning and development :

5.6.1 Separate Organisation : The conclusion drawn from existing organisation set up is that there should be a single, separate organisation with the state which can do this work. Since P.W.D. is already responsible for construction and maintenance of state highways, they can be further given a wing to look after these aspects. The law itself needs to be more clear and is to be reviewed time to time as the situation in 1945 was not applicable in 1964. In 1945 they didn't feel/foresee any requirement for a service road, hence no mention of it. However, by 1964, the requirement was felt because of the way the 'Ribbon Development' was growing. Now the requirements are much more. For example with the speed the Urbanisation is catching up, the highways are getting clogged with the roadside development. In such a situation, there is a constant requirement of somebody keeping a vigil on roadside developments inspite of strictest law enacted against it. As for general population the awareness about Act/ Laws is nil till the time they are penalised for its disobeyence. In earlier times the civil police could act when they were requested for, as such development was negligible. Now, with already overstretched duties and tremendous roadside development that is taking place, there is a strong/Urgent requirement of separate police type of enforcing organisation whose only job is to clear unauthorised construction/activities at the budding stage itself.

It is very easy to suggest a separate organisation only to look after roadside land and it be having an arm for enforcing this exclusively on the lines of police etc.

important as planning a highway with its carriage way of 2 lanes or 4 lanes or converting a single or two lane into two lane or four lane or planning for bridges in between etc.. It is seen that even in the latest paper advertisements calling for tenders for national as well as state highways, there is no mention of siting or planning for such facilities. The roadside planning should be an integral part of highway planning. If the zoning of land along highway and the facilities and amenities for it are not planned at the inception stage itself and accordingly land is acquired then even the latest best planned 4 or 6 lane highway also will meet the same fate of existing highways with full of encroachments. Also if roadsides are planned and accordingly a little more land is acquired at the inception stage itself the cost of acquiring this extra land will be phenomenally less than the cost required for acquisition at a later date which will have legal battles and delays. Absence of planning at inception stage will also give rise to problems of encroachments and the resultant social and economic costs in terms of accidents, increased vehicle operating costs, delays and the fatigue to the drivers.

One example of this lack of planning is the recently upgraded(to divided four lane) highway between Delhi and Mathura. No sooner the road construction finalised the Dhabas have come up on both sides of highway and there are vehicles (trucks, cars etc.) parked on the road itself with their occupants taking rest or eating in those dhabas. For Indian conditions if there can't be a highway rest area constructed like an American highway rest area, there definitely can be an organised rest area with some (affordable, homely) Dhabas pooled in an open court- yard but well away from highway and with well laid out approach roads and parking area etc.

5.6.4.2 *Road geometry Condition* : Better planning of road geometry is required in the sense that there is no camber given to the road at some places resulting in puddles of water getting stagnated and the road surface getting worn out. Similarly at many places there is no provision for road side drainage, or even if the drainage is there it is so small that hardly any drained water can be accommodated in it. At some more places, the ground on either side of the highway is higher and thus makes all rain water to stay on the highway itself. This is more in case of intervening settlements where the shopkeepers or residents in their enthusiasm to have their entrances on to the road have neglected and filled existing drainage to a small nala. If the P.W.D. has adequate funds and makes and maintains the roadside drainages as per specifications regularly, then there could not have been such a problem. Similarly, there are sharp bends especially when highway goes through settlements (Purkazi).

5.6.4.3 *Access roads* : The problem about numerous access roads joining the highway should be thought about in the inception stage itself and accordingly service roads should be planned with limited access points. This access road problem is more in case of upgraded roads i.e. an earlier district road when it becomes state highway, still these access roads will remain and may rather increase.

Therefore, there should be an integrated plan for all highway roads which will have provision for service road along it on both sides and this service road will have limited access points. Say, one in 5 Km. standard length. Similarly, when a highway passes through a settlement, the way every village outside settlement is connected by an access road, every shop and house facing the road will have a small access

path/road on to the highway . The settlement facing the highway must have grid pattern of road network with a service road facing highway with limited openings to it(highway). For cross-movement of traffic with in a settlement across highway, there should be one under-bridge/pass or over-bridge for every say 1 to 2 Km. length.

5.6.4.4 *Sign posting* : In an integrated planning where there are provisions for roadside facilities, limited access points, grade separators leading to road side settlements, it is a must that proper sign posting indicating all these be placed all along highway but at regular spaced intervals. At present there are too many unnecessary sign posts on highways indicating colonies, villages, factories and even houses on the highway itself. All these minor ones should be combined in a sketched board after every 5 Km. or so and such boards should be placed at a distance from service roads where highway access points meet.

5.6.4.5 *Incompatible/Undesirable land user on roadside land* : In case of U.P., the Roadside land control Act talks about prevention/restrictions on having brick kilns etc. on road sides. It doesn't talk any thing about industries which try to take maximum advantage of a highway by locating themselves right next to the highway. This in turn will have some access roads to it, lot of traffic in and one and of course pollution through its smoke or effluents. Now that planning has come till district level, the State must ensure that every distance has a separate industrial area with only one access road to the highway. The master plans have to be made for every district in which the 'roadside land zoning" is kept in mind. Obviously roadsides should be

kept free of all such construction/activity which will directly or indirect hamper the highway and its traffic movement.

While doing zoning of land abutting roadside land it is to be kept in mind that sub division of land into plots etc. if done should be with all neighborhood facilities provided so that for small requirements people do not cross highway. Similarly access roads from these areas should be clubbed through collector street and via service road only it should join highway. Whatever building activity has to come within this highway roadside land zoned areas should be prescribed with controlling building lines, set -back distances, control lines, heights of building etc. I.R.C through its publication S.p-15 'Ribbon development along highways and its prevention' has recommended following standards for building lines and control lines.

TABLE - 10

STANDARDS FOR BUILDING LINES AND CONTROL LINES

S.No	Class of Road	Plain rolling terrain			Mountainous and steep terrain - Distance between bldg. line & road boundary (meters)			
		Rural areas		Urban Industrial areas	Rural areas		Urban areas	
		Width between (Overall width) (meters)	Width between Control Lines (Overall width) (meters)	Distance between building lines & Road boundary (Set-back distance) (meters	Normal	Exceptional	Normal	Exceptional
1.	National and State Highways	80	150	3-6	5	3	5	3
2.	Major District Roads	50	100	3	5	3	5	3
3.	Other District Roads	25/30*	35	-	5	3	5	3
4.	Village Roads	25	30	-	5	3	5	3

* If the land width is equal to the width between building lines indicated in this column, the building lines shall be set back 2.5 meters from the road land boundary lines

5.6.4.6 *Adequate right-of-way :* It is known that every road will have a carriage way (paved position), shoulder (hardened ground) and roadside drains. To minimize accidents, now-a-days the concept is to have a 'clear zone'. i.e. a clear area of 30feet on either side of the road

edge. And of course some space will also be required to be catered for the future increase in traffic demand. To meet all these present and future requirements, there is a need to have adequate right-of-way which should be acquired at the inception stage itself to cut the further speculative costs in acquiring land. I.R.C. through its special publication no.15 'Ribbon Development along highways and its prevention' has recommended following land widths.

TABLE - 11

LAND WIDTH FOR DIFFERENT CLASSES OF ROAD

S.No.	Class of Road	Plain and rolling countries				Mountainous and steep terrain			
		Rural areas		Urban areas		Rural areas		Urban areas	
		Normal	Range	Normal	Exeptional	Normal	Exceptional	Normal	Exceptional
1.	National and State Highways	45	30-60	30	30-60	24	18	20	18
2.	Major District Roads	25	25-30	20	15-25	18	15	15	12
3.	Other District Roads	15	15-25	15	15-20	15	12	12	9
4.	Village Roads	12	12-18	10	10-15	9	9	9	9

Road side advertisements coming with in right-of-way and also other wise must be regulated and should conform to the guidelines laid down by IRC through its publication IRC: 46-1972. A policy on Roadside Advertisement (First revision).

5.6.5 Accident Prevention : Every year all around the world many people get killed and many more get injured in a number of accidents which happen because of various reasons. Looking at some of the statistics in India.

TABLE - 12

NO. OF ACCIDENTS AND PERSONS KILLED IN INDIA & U.P.

S.No.	Year	Total no. of Road accidents in India	Total Killed in India	No. of accidents in U.P.	No. of People Killed in U.P.
1.	1983	1,77,057	32,849	10,129	4,154
2.	1984	1,94,842	35,119	11,673	4,516
3.	1985	2,07,061	39,215	12,753	4,872
4.	1986	2,15,455	40,050	14,151	5,597
5.	1987	2,33,981	44,440	15,025	6,078
6.	1988	2,46,736	46,561	15,367	6,728
7.	1989	2,70,015	50,711	16,063	7,111
8.	1990	2,82,602	54,058	16,318	7,639
9.	1991	2,94,022	56,525	16,864	7,806
10.	1992	3,08,087	57,217	17,214	7,900

Source : Compendium of highway statistics by I.R.C.

There are many reasons for accidents to take place on highways including driver error in the form of excessive speed, falling asleep, reckless driving, under the influence of alcohol etc. A driver may also leave the road deliberately to avoid a collision with another motor vehicle or with objects on the road. Roadway conditions are a factor in some cases. Poor alignment, Poor visibility due to weather conditions, low pavement friction, inadequate drainage, or substandard signing, marking or delineation may play a contributory role. Finally, vehicle component failures may sometimes cause a motorist to run off the road. Failures in steering or breaking systems or tire blow-outs are typical vehicle-related causes.

When an accident does occur, its severity is dependent upon several factors, including the use of restraint systems by vehicle occupants, the type of vehicle, and the nature of the roadside environment. Of these factors, the highway Engineer/planner generally has a significant measure of Control over only one -The roadside environment. Under roadside environment a traversable recovery area or 'clear zone' can be provided which is free of obstacles such as unyielding sign and luminaire supports, non-traversable drainage structures, utility poles, and steep slopes.

In India there are no statistics available on accidents occurred due to fixed objects placed on roadsides, which is the main cause worry to a highway planner/Engineer. However, for getting a general idea on this important (for roadside development planning) area some statistics of USA are given below.

TABLE - 13

FIXED OBJECT FATALITIES BY OBJECT TYPE

S.No	Fixed object	1983	1984	1985	1986	1987
1.	Tree/Shrub	2841	3021	2989	3444	3299
2.	Utility	1377	1426	1298	1495	1406
3.	Guard rail	1310	1446	1258	1374	1326
4.	Embankment	1288	1264	1211	1332	1396
5.	Culvert/ditch	1259	1198	1337	1472	1393
6.	Curb/wall	865	899	982	960	861
7.	Bridge/overpass	803	738	628	577	571
8.	Concrete barrier	263	240	225	197	203
9.	Sign or Light Post	488	480	508	551	538
10.	Other Pole/Support	495	434	481	518	495
11.	Fence	434	455	431	478	484
12.	Building	110	105	101	100	108
13.	Impact attenuator	16	10	14	9	18
14.	Other fixed object	565	629	630	699	729
	Totals	12114	12345	12093	13206	12827

* Source : Road side design guide, by A.A.S.H.T.O, U.S.A

Although all these fixed objects mentioned above are not applicable to Indian roads and conditions, we can definitely take into account the ones applicable to us and wherever possible keep the rigid things(like trees, utility poles) as far in the clear zone as possible and other rigid things (like sign posts) which can't be placed far away should be made unrigid say make with hard plastic or as suggested by above U.S. Roadside design guide have shear pins at the base plate which break and gives way to the vehicles easily

on impact. Such detailed roadside environment planning at inception stage and also as on required basis(for already existing roads) will go a long way in making highway travel lot less accident free.

5.6.6 Central legislation : Land is a state subject and hence till now there is no attempt made from central Govt. towards enacting a legislation on the land belonging to the roads(highways) including right-of-way and the land abetting the highways. However, it is seen that by leaving this responsibility to states, not even a single state except Assam has enacted any comprehensive legislation so far. States like U.P., Punjab, Maharashrtra, J&K, Karnataka and Haryana only have done some effort and have some legislation towards this end. Even this legislations with states are with lot of loop holes and far from reality (not in conformity with Present Conditions). The Act should be passed by Centre which can be adopted and implemented by states by their machinery so that their land rights (in case of State highways) are retained.

5.6.6.1 *Modalities* : There should be one National level Central legislation. However, the power should rest with Central Govt. only in case of National Highways leaving State to deal with State highways according to the guidelines given out in the Central legislation. This legislation can also be adopted to other major district roads etc. by the State.

5.6.6.2 *Broad frame work* : The proposed legislation should have the following aspects covering it;

(a) Prevention of Unauthorized occupation and removal of encroachments from Highways land.

(b) Control of access points to highways.

(c) Regulation of different types of traffic permitted on highways.

(d) Control of use of road/and its land for public utilisation, drains etc.

(e) Issue of Licenses and lease deeds for temporary use of high ways land.

5.6.6.3 *Organization & Staff* : As already indicated in earlier paragraphs under separate organisation, looking at the financial constraints, already existing NHAI, C.P.W.D. and P.W.D can be entrusted with this task with a nominal amount of additional staff but with a separate enforcement force with police powers.

CHAPTER - 6

PLAN PROPOSALS

6.1. Introduction :

In the previous chapter through cause effect network, the root causes for the existing highway problems have been identified and a discussion on basis and methods to solve these have been made. In this chapter, before going for phased (short, medium and long) plan proposals, we will outline our objectives, define our criterias, delineate parameters for working out our plan proposals and finally discuss the future scenario.

6.1.1 Objectives :

The objectives for our proposals are as under;

Economic benifit - for users, state and nation.

Safety - while travelling on a highway for both road user and the adjoining population.

Comfort - Giving comfortable drive by giving a good road and road side facilities.

Faster movement - By providing good roads, the time taken between two places will shorten saving invaluable time.

Environmental quality -Better landscaped and clean roadsides provide enjoyable, asthetic appearance and environmental quality.

6.1.2 Criteria :

In making plan proposals our country's specific cultural requirement / traits, necessities and habits are kept in mind in general and the state's local conditions are

thought of in particular. The fulfillment of objectives will be in accordance with the affordability of road user, peculiar characteristics, conditions (weather etc.) of India. Also, economy, sustainability, maximum appeal, future trends and finally the emerging private participation/enterprenuership because of govt.'s liberalization are accounted for.

6.1.3 Parameters :

The following parameters have been considered;

-Fast growing urban situation

-Future rise in road side developments

-Physical conditions i.e. for plane and rolled terrain of the country.

-Taking into account of all existing resources including legislation's.

6.2 Planning measures :

Keeping all the above aspects in mind, the following planning measures have been recommended as per priority of action. The priority of action is divided into short, medium and long, meaning suggested implementable period of less than 5 years, 5 to 10 years, more than 10 years duration respectively. For proposals which need more explanation, sketches, guidelines etc separate proposals have been attached subsequently.

6.3 General Proposals :

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	**Medium term measures (5 to 10 yrs)**	**Long term measures (10-15 yrs)**
1	**2**	**3**	**4**	**5**	**6**
1.	Encroachment	I	All types of encroachments such as hawkers, vendors, garbage dumps, dhaba extensions etc. to be cleared till right-of-way	Vehicle parking areas in rest areas and truck way side terminals to be made functional to arrest vehicle parking encroachment	Permanent encroachments like Public Utilities, transformers etc. to be shifted to underground or to the edge of right-of-way. (Refer details from road cross section proposed at Fig. 27 & 28)
2.	Absence of Planned amenities & facilities	I	- Land for opening wayside rest areas and truck layouts be acquired. (Refer general proposals Fig. 22 to 26) - Active Private Participation - Reorgnisation of Existing Petrol	Dhaba based rest areas (or amenity centres) with common facilities to be constructed at the earmarked placed. (Refer general proposals from	Sign boards indicating facilities and maps indicating facilities be prepared

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	Medium term measures (5 to 10 yrs)	Long term measures (10-15 yrs)
1	2	3	4	5	6
			Pumps as per proposal given	Fig.22 to 25).	
3.	Prevalance of insanitory conditions	I	- Proper road side drainages are to be constructed. - Civic sense, importance of cleanliness to be propagated through NGOs in road side settlements.	An organisation be set up whose one of the job is to check, penalise and remove insaritary conditions/activities on road sides	Villagers are to be made to realise the importance having toilet facilities and common areas to work with dung etc. Govt. should work towards achieving this.
4	Hazardous traffic movement	I	- Road shoulders be properly hardened and levelled as per specifications to enable slow moving traffic to use the shoulders. - Clear and controlled (restricted)	- Where the traffic Load is more than the road capacity, the lanes be increased as per I.R.C. specifications - Paved road, shoulders and road side land to be given	With in a settlement under-passes be constructed at every 1 km distance of settlement (Refer general proposals at Fig. 29)

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	Medium term measures (5 to 10 yrs)	Long term measures (10-15 yrs)
1	2	3	4	5	6
			sign posting to avoid confusion to drivers because of too many unimportant sign posts.	proper slope as per specifications for effective drainage of water - Road level be raised to 2 mtr. above surrounding space with in a settlement to avoid mixed traffic and cross movements (Refer general proposals at Fig. 28)	
5.	Too many access roads	II	-Immediate landzoing the road side land with in controlled area and putting restrictions on access roads to highway	-With in settlement, service roads to be made with foot path one side and raised highway on the otherside	-Service roads to be made all along the highway on both sides at the edge of right-of-way (Refer general proposal Fig. 27).

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	Medium term measures (5 to 10 yrs)	Long term measures (10-15 yrs)
1	2	3	4	5	6
				(For details refer Fig. 28).	
6.	Bottlenecks	II	- Unimportant speed breakers and police barriers to be removed.	- An organisation set up to check and clear the	- All narrow bridges to be replaced as per road classification
			- Police to obstruct road/put barriers only when they need to check vehicles (At some places barriers are there without any police presence).	unwanted obstruction on roads (like fallen tree trunks) - All narrow culverts to be widened.	
7.	Incompatible/ Undesirable land uses	II	- Existing legistation & its provisions on incompatible land uses in controlled area to be implemented.. - Immediate landzoing of road side	- An organisation to be set up to enforce law. - Existing brick kilns to be re-sited behind controlled line.	All industries to be shifted to industral areas of respective districts to be connected by one access road.

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	Medium term measures (5 to 10 yrs)	Long term measures (10-15 yrs)
1	2	3	4	5	6
			land by all district town planning offices and to be Co-ordinated at state level.. - All advertisement boards be re-sited/readjusted as per I.R.C. specifications on the subject.		
8.	Accident Prone stretches	II	- At the place where bridge approach road meets plane road, no access roads be allowed. To ensure this bridge protection wall to continue for about 50 meter on either side. - Level difference between road	- Sharp bends within and outside settlements be redone to smoother, acceptable curves. - New tree saplings 30' from paved road edge be put to make a fresh tree line.	- Old tree line at 20' distance be cleared to prevent accidents. - Sign post be made with plastic material or iron poles with shear pin at base which, on collision collapse and lessen impact.

S. No	Problem	Priority	Planning proposals as per plan duration		
			Short term measures (2 to 5 yrs)	Medium term measures (5 to 10 yrs)	Long term measures (10-15 yrs)
1	2	3	4	5	6
			and shoulders be filled to enable easy crossing of vehicles from shoulder to paved portion and vice versa.	- Formation of a 30feet 'clear zone' on the road sides to lessen the impact of accident. (Refer general proposals at Fig.27)	

REST AREA/AMENITY CENTRES

1. Facilities Available :

(a) Pooled Dhabas/restauratnt

(b) Manned Common toiltes

(c) Telphone

(d) Petrol, water servicing, repair bay, recovery arrangements with vehicle spare parts shops etc. (one at every 30 kms distance i.e. 60 kms distance on the same side of highway)

(e) Accommodation, ambulance facility (one at every 60 kms distance i.e. 120 kms distance on the same side of highway)

(f) Parking area

2. Guidelines :

(a) The rest area should be located next to right-of-way.

(b) There should not be any construction till 50 meters from right-of-way.

(c) A minimum of 100 mtr x 100 mtr should be left infront (towards highway) exclusively for parking.

(d) Entrance and exit roads from and to service road should be made by rest area owners themselves, approach roads should be made as per I.R.C. specifications.

(e) State health dept. to check quality of road served.

(f) Each rest area/amenity centre should be staggered on both sides of highway with a guideline gap of 10 kms between two (giving a gap of 20 kms on the same side of highway).

TRUCK WAYSIDE TERMINALS

1. Facilities Available :

(a) Parking area

(b) Pooled dhabas/restaurants

(c) Manned Common toilets

(d) Drinking water facilities

(e) Truck servicing/repairing bays

(f) POL

(g) Vehicle spare parts shop, repair service etc.

(h) Cheap accommodation

(i) Telephone

2. Guidelines :

(a) A minimum parking area of 200 mtr x 200 mtr

(b) Truck wayside layout to be on both sides of the highway almost identically.

(c) Private transport offices can be allowed. However vehicles will not be permitted to park waiting for business.

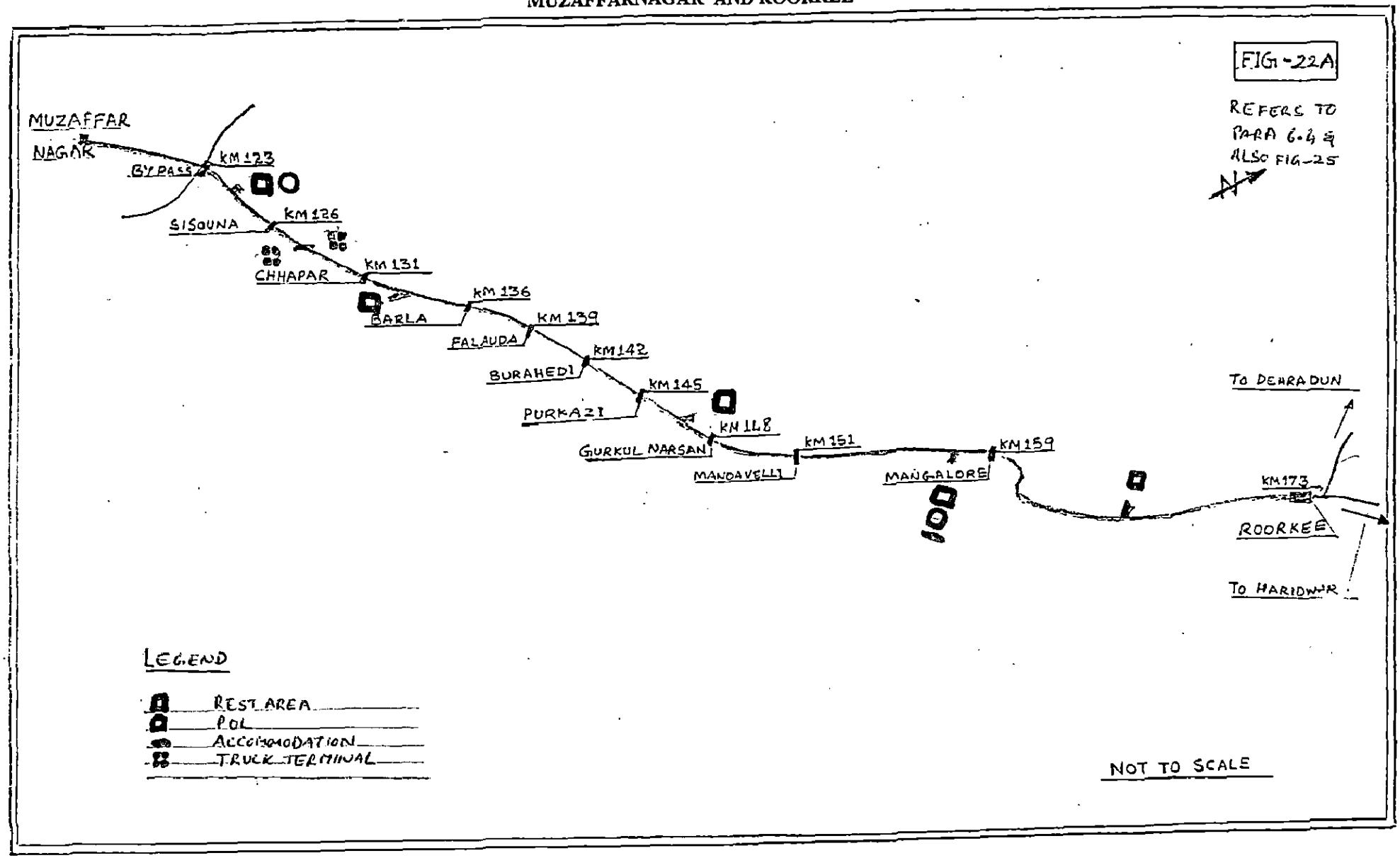
(d) The construction work can be only after 50 mtr distance from the service road (i.e. right-of-way).

(e) Entrance/exit roads to and from truck terminal from highway will be made at the expenses of the terminal enterprenuer and these roads will be made as per I.R.C. specification for deviating from highway.

(f) State health dept. to check quality of food and area around.

(g) The twin truck terminals (opposite to one another on highway) will have a gap of atleast 50 kms from next twin truck terminals and their location will not coincide with other rest area/ amenity centre locations.

SPECIFIC PROPOSALS FOR THE STUDY AREA HIGHWAY STRETCH BETWEEN MUZAFFARNAGAR AND ROORKEE



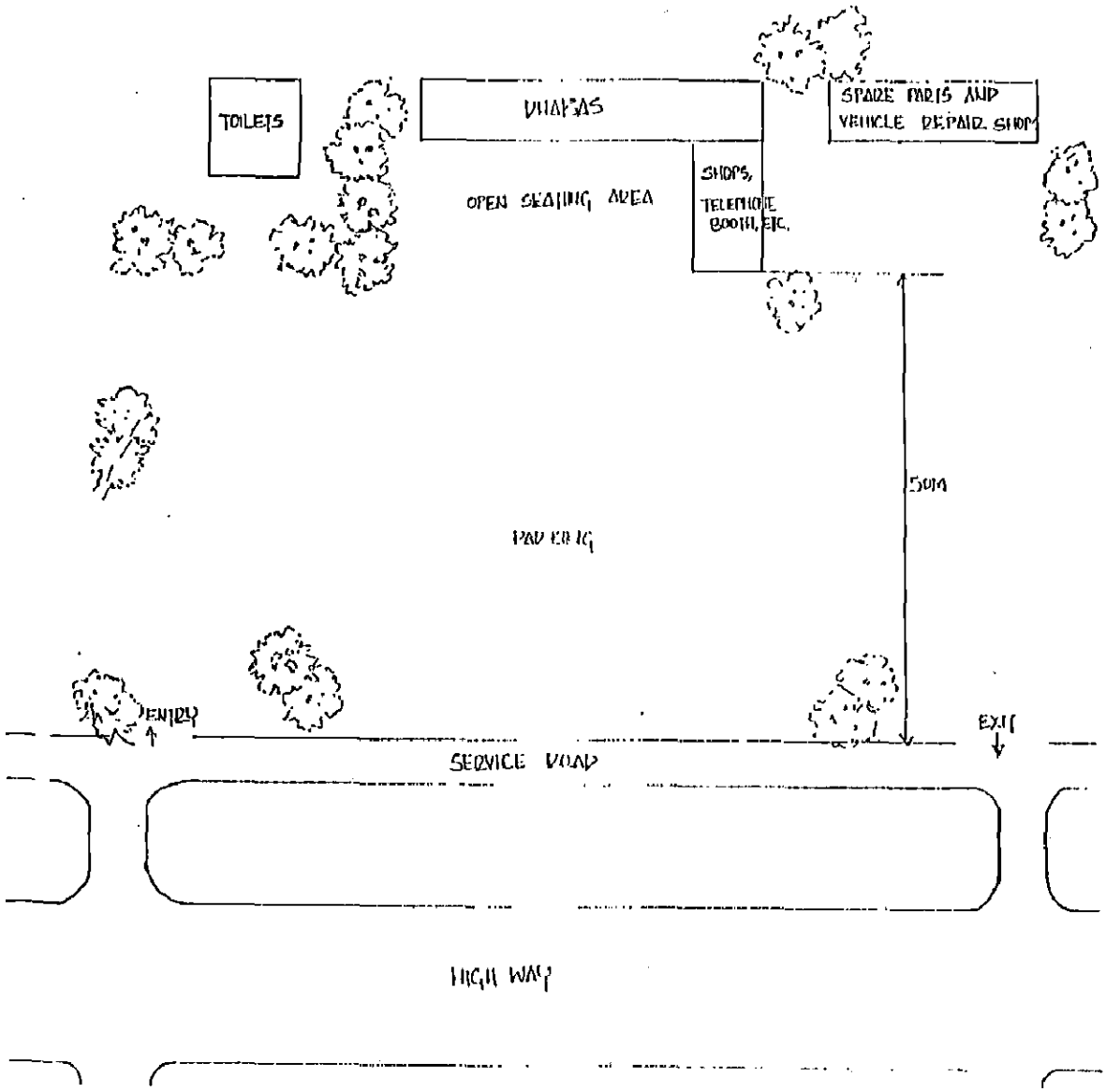
6.4 Specific Proposals :

Details of amenitity Centres/rest areas and truck wayside terminals between Roorkee and Muzaffar Nagar

S.No.	Type of Facility	At/ near (Km. Stone)	Between substretch	Remarks
1.	Rest area	166	Roorkee-Manglore	To be sited on right side of road as canal view can be utilised.
2.	Rest area + POL + accommodation	155	Manglore - Mandavelli	To be sited on left side of the road. Because of very close proximity of canal and its view, accomodation is suggested.
3.	Rest area	146	Gurkal Narsan - Burahedi	Right of road
4.	Rest area	134	Barla - Chappar	Left of road
5.	Truck Terminal (includes, POL, servicing & rest)	128	Chappar - Sisouna	Suggested at this place as it is seen that lot of trucks park near by-pass to eat, take rest before entering it or immediately after leaving by-pass.On both sides of road.
7.	Rest area + POL	124	Sisouna - Muzaffarnagar by-pass Junction	Right of the road

GENERAL PROPOSALS

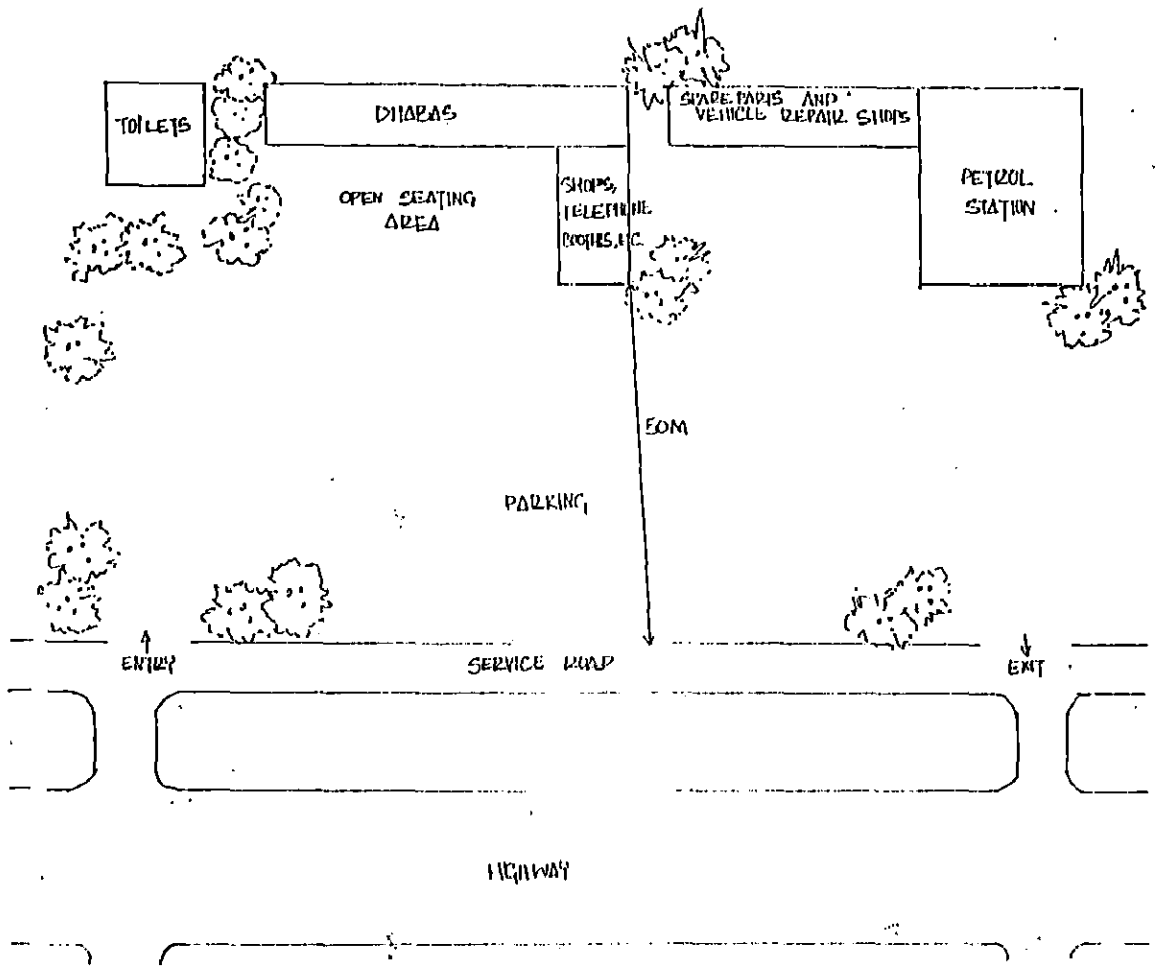
Fig - 22



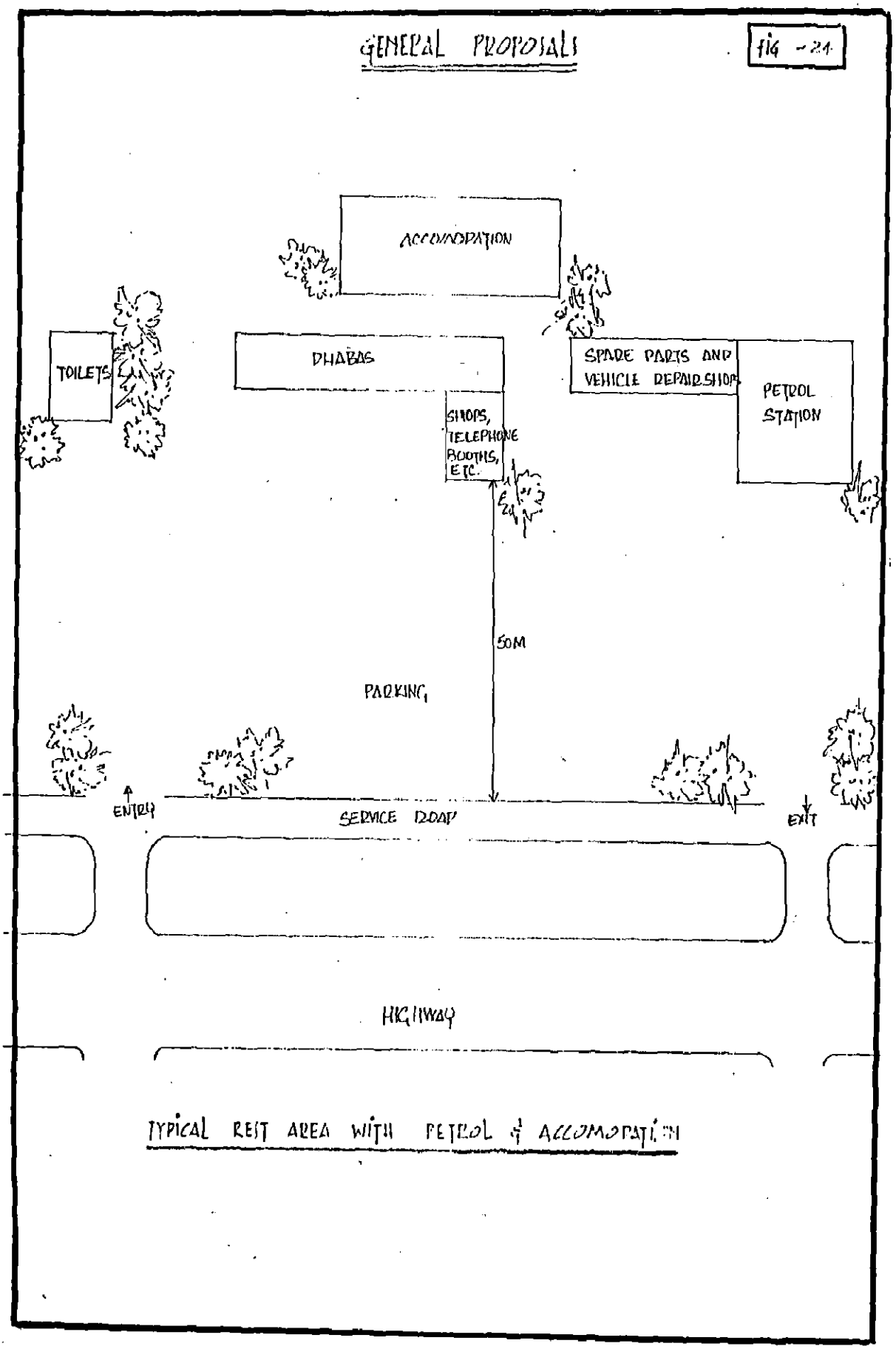
TYPICAL REST AREA

GENERAL PROPOSALS

Fig - 23

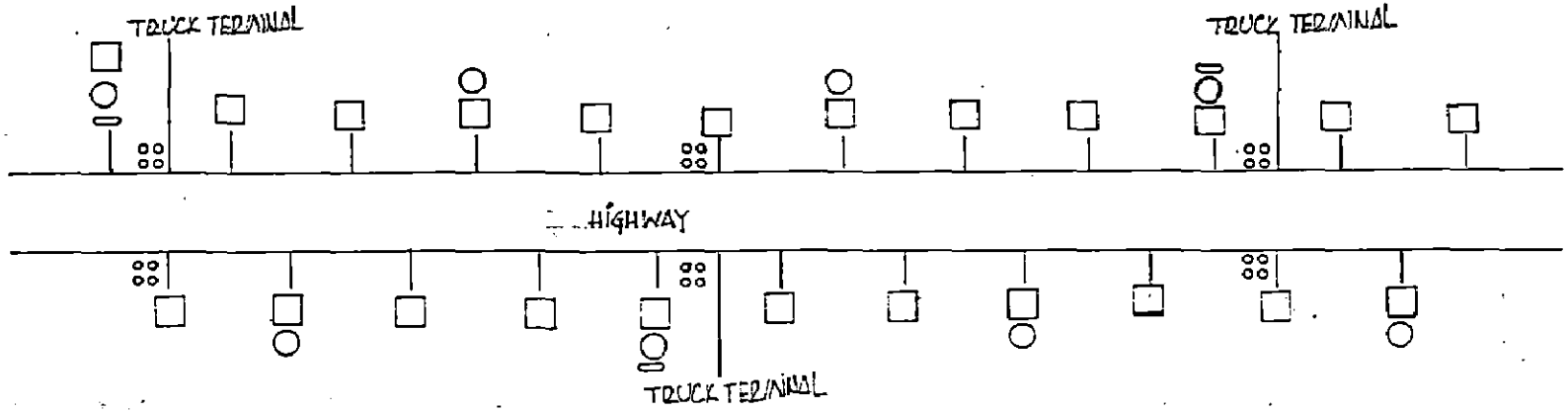


TYPICAL REST AREA WITH PETROL STATION


GENERAL PROPOSALS
fig - 24
ACCOMODATION
TOILETS
DHABAS
SPARE PARTS AND VEHICLE REPAIR SHOP
PETROL STATION
SHOPS, TELEPHONE BOOTHS, ETC.
50M
PARKING
ENTRY
SERVICE ROAD
EXIT
HIGHWAY
TYPICAL REST AREA WITH PETROL & ACCOMODATION

GENERAL PROPOSALS

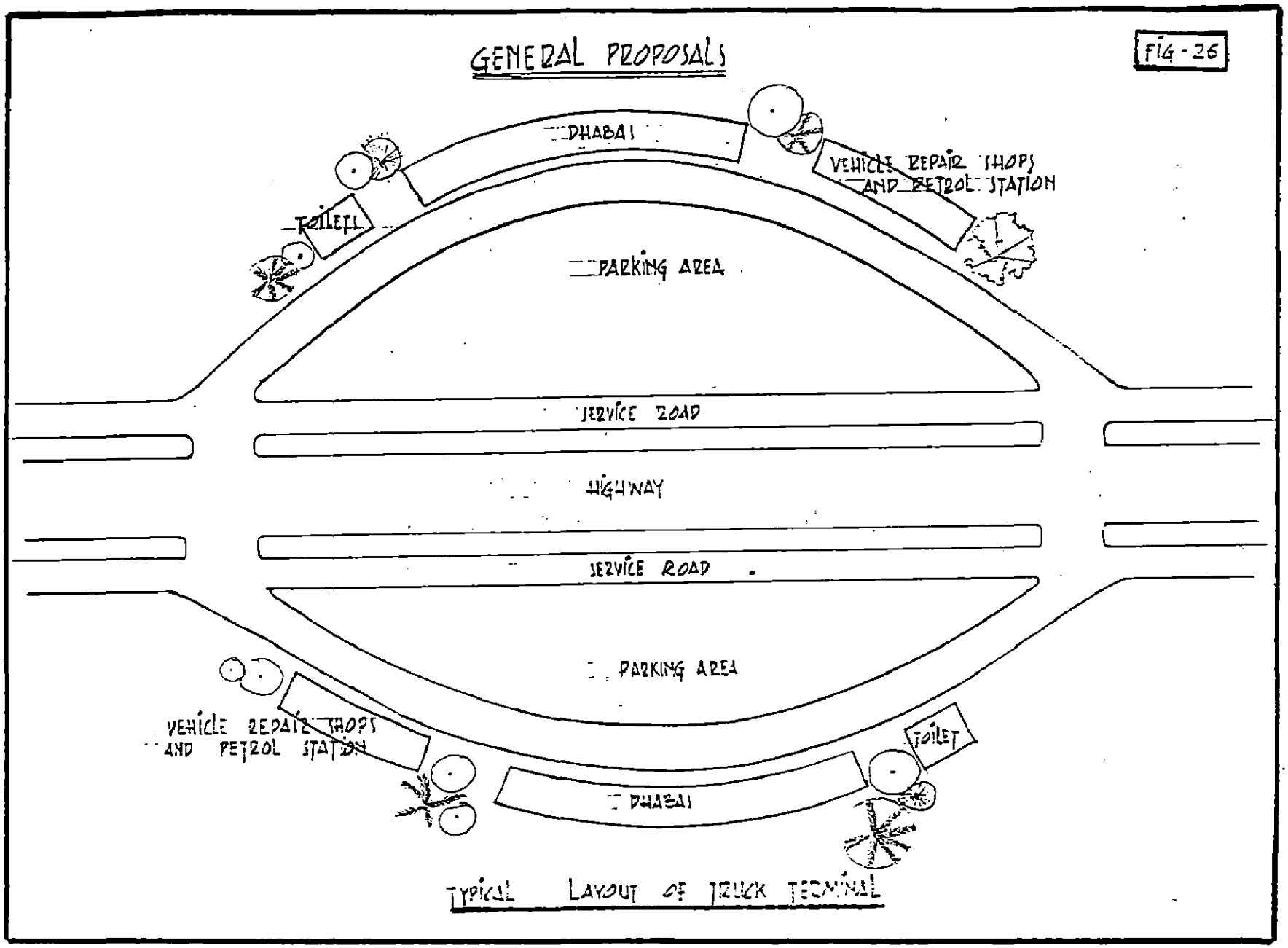
Fig - 25



TYPICAL PLAN OF REST AREAS

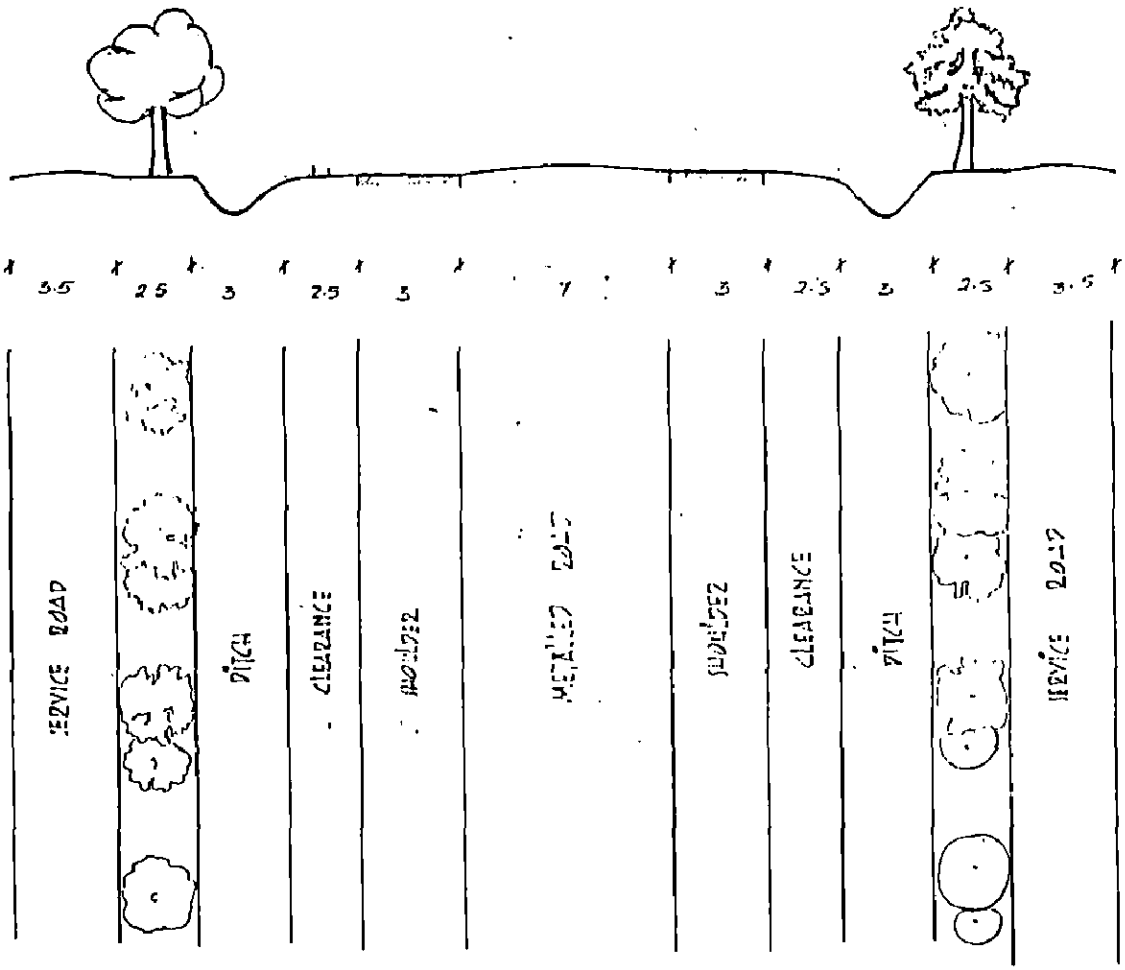
DISTANCE BETWEEN REST AREAS = 10KM
DISTANCE BETWEEN TRUCK TERMINALS = 50KM

- TRUCK TERMINAL
- REST
- PETROL
- ACCOMODATION


GENERAL PROPOSALS
FIG - 26
DHABA
VEHICLE REPAIR SHOPS AND PETROL STATION
TOILET
PARKING AREA
SERVICE ROAD
HIGHWAY
SERVICE ROAD
PARKING AREA
VEHICLE REPAIR SHOPS AND PETROL STATION
TOILET
DHABA
TYPICAL LAYOUT OF TRUCK TERMINAL

GENERAL PROPOSALS

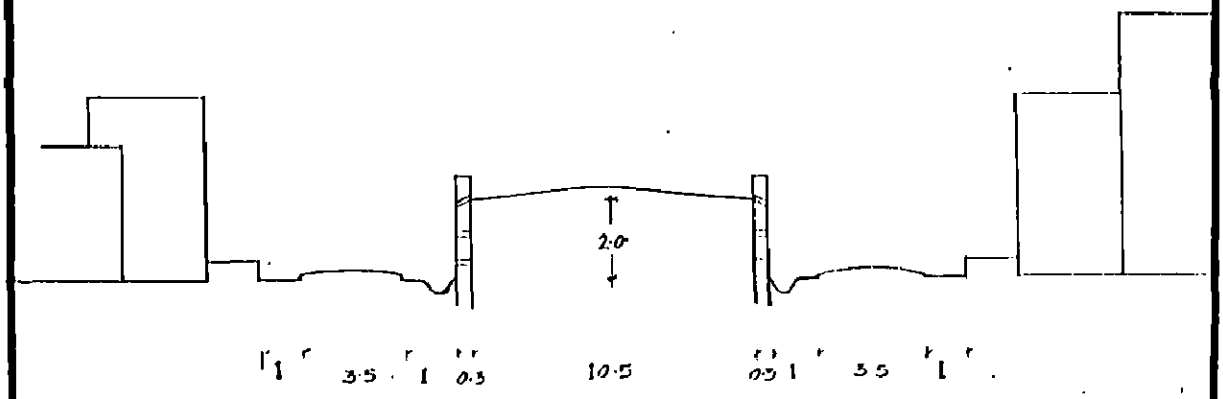
FIG - 27



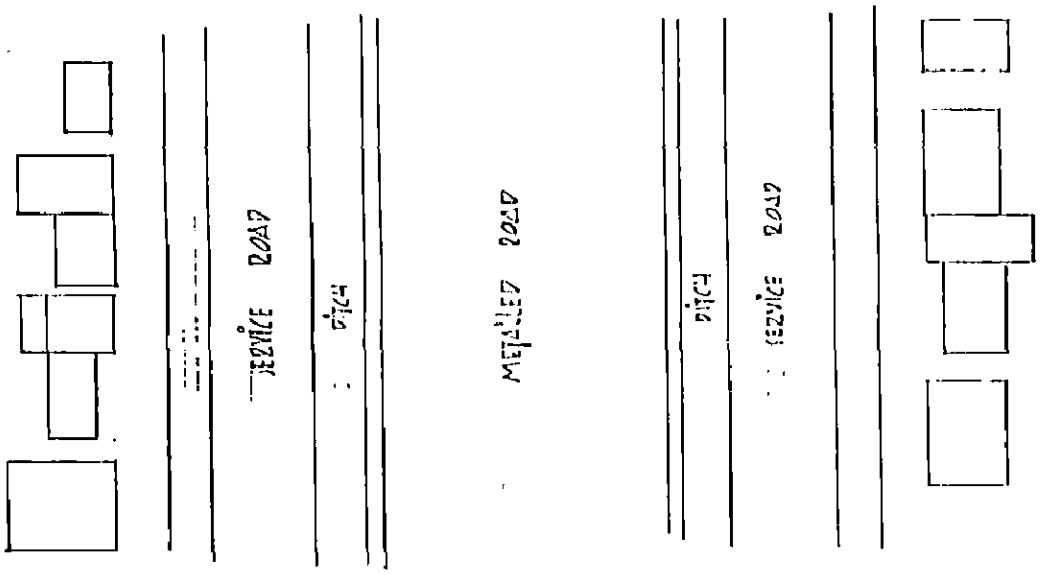
TYPICAL SECTION & PLAN OF HIGHWAY BETWEEN THE SETTLEMENTS

GENERAL PROPOSALS

FIG - 2A



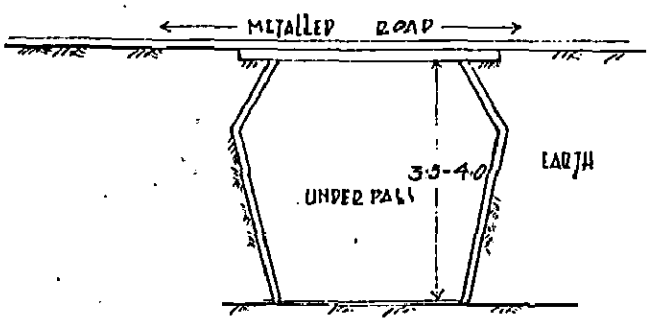
SECTION OF HIGHWAY WITHIN THE SETTLEMENTS



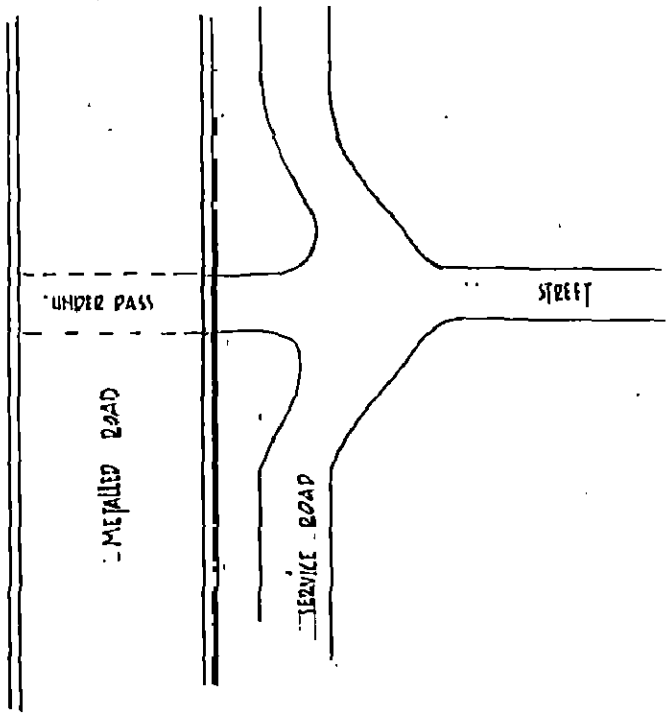
TYPICAL PLAN OF HIGHWAY WITHIN THE SETTLEMENTS

GENERAL PROPOSALS

Fig - 29



SECTION OF UNDERPASS



PLAN

TYPICAL UNDERPASS WITHIN THE SETTLEMENTS

CHAPTER - 7

IMPLEMENTATION OF PLAN PROPOSALS

7.1 Introduction :

At the outset it has to be agreed that neither central government nor state governments have money to even maintain existing roads not to talk of new alignments and new proposals. If at all if some new roads are coming up it is at the cost of maintenance work of existing roads. For example, the Central govt. has earmarked just 0.57 percent of the total plan outlay in the Eighth Five Year Plan for national highways which cover (carry) 40 percent of total road traffic in India.

There is no more social spending policy with the government now-a-days and fortunately now all infrastructure has to self finance or make themselves financially viable. For having highways as visualised in our earlier chapters i.e. 'complete highway' - complete to serve the public, for service and utility, for safety, for economy, and for beauty, it is important that we do not depend on never coming government funds instead go for loans and private participants.

In this chapter, we discuss various aspects of funding the plan proposals in general and suggest implementing agency/authority.

7.2 Funding Prospects :

The various proposals recommended in the previous chapter could be implemented, as, in the present scenario of privatisation of infrastructure building, it

will be open to competent private agencies to build and operate. The govt. can act as a facilitator, coordinator and monitor. Some of the proposals may be attractive to international funding agencies like UNDP, ADB, World bank etc. to fund through govt. and quasi govt. implementing agencies.

7.2.1 Role of private developers : The central govt. has come with new schemes like allowing private investors to take up highway projects on a build-operate-transfer (BOT) basis to develop townships and other real estate on land made available to them by the government on ownership basis(refer appendix 'd').

Though under the BOT conditions, the highways built and operated on a toll basis by private parties will normally have to be transferred to the government after 30 years, townships or other real estate developed by the private parties will not come back to the government; these will be on a 99-year lease.

This has become possible under an incentive package for road projects approved by the Cabinet Committee on Infrastructure (CCI). Further concessions have been allowed to "sweeten" road projects, which have remained the "ugly duckling" of the infrastructure sector.

The land for real estate development will be acquired by the government under the recently enacted land acquisition Act for highway development and given on lease to private parties. The land acquisition under the Act for a "public purpose" cannot be

challenged in a court; there can be disputes only regarding the amount of compensation.

Experts say the fresh incentives will make highway projects highly attractive for private investors, whose response to the BOT policy so far has not been very encouraging. The concept of real estate development is already being tried out along a Bangalore-Mysore highway, a Karnataka government project.

The package treats real estate development as an integral part of the highway project. The private party will be eligible to tax concessions to the extent he ploughs back the income from real estate into highway development. So far, under the road policy announced by the government last year, private parties were only allowed to develop highway facilities like hotels and motels.

The CCI also decided that the government will make direct investments in the road projects which are not viable on toll alone. The rest of the money will be leveraged from private investors. The package approved by CCI also allows duty-free import of more than 10 categories of construction equipment, which are not manufactured in India. At present, these imports are subject to customs duty up to 30 per cent.

On the issue of toll, CCI has decided that a cap will be fixed per car, per truck etc. The toll will vary, based on the paying capacity of the users, from region to region and project to project. The toll will be reviewed every three years.

7.2.2 Incentives for private investment : There are many benefits being offered to private parties. First, the income from highway projects will be non-taxable for five years and for the next five years, 30 percent of the profit will be non-taxable. Second, the major equipment imported for use in such projects will be duty free. Third, in cases where it is perceived that projects are not going to be economically viable, the government will provide a capital grant of up to 40 percent. Also, if the real estate builders invest their income in highways, it will be exempted from income tax. And in cases where there is a shortfall in the flow traffic on a highway constructed by the private operator, the government will provide a loan to cover the shortfall.

Most of these will be tolled highways. As per the statement made by M.D of NHAI to a news paper (refer appendix 'd'), they have already fixed a toll of 40 paise per kilometer for cars and Rs. 1.40 per kilometer for trucks and buses. They plan to levy the first toll on a 90 kilometer stretch of NH-8 between Jaipur and Kotaputali. According to him, the users, in return, will see many new facilities on such highways, like a traffic patrol, sideways stops for buses and trucks and cranes to remove broken-down vehicles. Even in spectacular development of New Bombay in the recent years, the involvement of private agencies in infrastructure building and maintenance has been very significant. Also, some private companies are already working with NHAI to build by-passes etc.

7.2.3 Infrastructure banks and bonds : One more step towards better finance is opening of banks and allowing bonds to be issued for infrastructure. On 13 Dec. 1997,

the first Infrastructure Development Bank has been opened in Chennai by finance minister Mr. Chidambaram. This bank will finance loans for private companies which invest in Infrastructure development including road infrastructure. Similarly the bonds to be floated have tax benefits, high returns in the form of interest and some other benefits. All these will make private investment in roads more attractive and will have willing participators.

7.3 Authority and Implementation :

7.3.1 Creation of executive authority : One of the main causes of rampant encroachments and ribbon development on our highway system is the absence of a competent authority empowered to maintain proper records and take action in erring cases. A legislation to this effect, as already explained in chapter-5 under basis for planning, would enable creation of such an authority :

Speedy implementation of ribbon development controls requires development of an effective enforcement system based on field requirements. The administrative setup as recommended by Mr.R.P.Sikka and J.B.Mathur, experts in transportation matters, in their paper seems to be most suitable for this purpose . The organisational figure is as shown under;

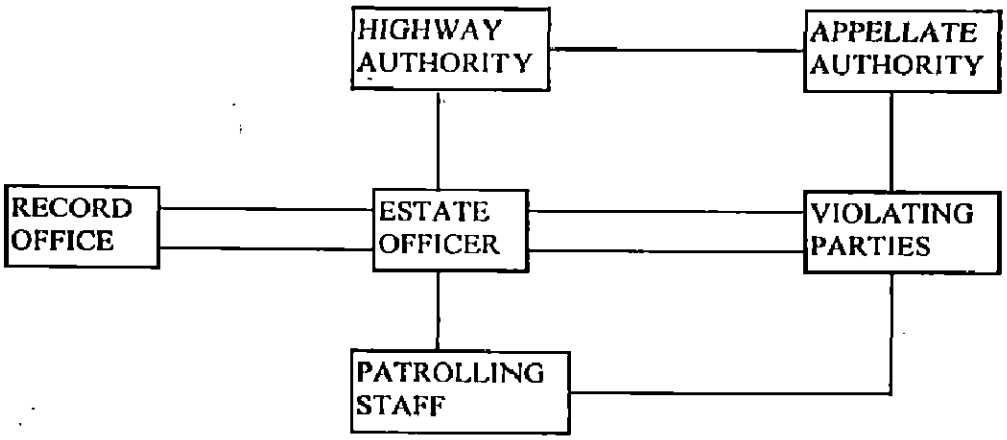


FIG - 30 : SUGGESTED ORGANISATIONAL SET UP

In the context of development and maintenance, this authority is envisaged to be under state authority. It will be networked at national level with national level coordination. Such a setup when established at state level in U.P will take care of development and maintenance of this part of study stretch under taken i.e. Muzaffar nagar to Roorkee.

The system envisages a "Highway Authority" appointed by the Government to look after specified sections of the highways. The Highway Authority shall in turn appoint "Estate Officer" shall have a record office and a number of highway patrols under it. The Estate Officer shall give notice of violations and prosecute violators. Appeal from the decision of Estate Officer shall be with an Appellate Authority working independently under the 'Highway Authority'. The broad essentials of the set-up are given below :

7.3.2 Permanent Record Office : A major obstacles in implementation of the desired controls is absence of authenticated right-of-way maps. This requires creation of an official record office. The record office should not only maintain authenticated records of highway land and the adjacent land use in relation to declared building and control lines, but also be able to make copies of this required from time to time.

The initial task of preparing accurate road land maps is a formidable one. This will require one-time creation of special staff for an year or so. At the same time recourse to modern mapping methods such as low-flying aerial photography can make

the job simpler if large scale application is considered. Further, computerised record/map keeping can help. An additional advantage of this would be that records could be accessed quickly and copies made on demand by press of a button. Subsequently encroachments and ribbon development could be detected easily by periodic updated aerial photography which will provide irrefutable proof of time-dated encroachment.

7.3.3 Powers of Highways Authority : The Highway Authority must be given full authority to patrol, detect, summarily remove and prosecute offending parties. A major cause of continuing ribbon development is the dilatory tactics adopted by the parties concerned in courts of law. This should be changed by creating an Appellate Authority under the Highway Authority itself to hear appeal from orders of executive authority and finalise the matter. A second appeal could then be made to High Court only.

7.3.4 Independence from Revenue Authority : Another cause of frequent delays in keeping the highways clear to ribbon development is the lack of cooperation from revenue staff. To overcome this, the records kept by Highway Authority must not require separate registration and must be treated as authentic unless proved otherwise. Revenue authorities should also not be allowed in interfere with the highway records in anyway.

7.4 Economics of Implementation :

7.4.1 Estimates of costs : Considering the value of assets to be protected, and the high cost of providing alternative traffic corridors, the expenditure on implementing controls on ribbon development will be quite minimal. For example, in the case of National Highways, the value of existing assets is estimated to be Rs. 8000 crores. The cost of enforcing ribbon development controls in their case backed by adequate legislation would be only Rs. 20 crores by way of initial survey cost and Rs. 15 crores per year by way of monitoring costs. This constitutes a very small percentage of the value of existing assets and would be an eminently justified expenditure. In the long run the additional outlay on enforcement will be more than offset by saving in vehicle operating costs and other benefits due to controlled growth along the highways.

7.4.2 Estimates of benefits : If we take the example of the study stretch i.e. stretch from Roorkee to Muzaffar nagar, there may be around 5 km. of 'road passing through the settlements' out of the total stretch of 50 km. At a conservative estimate, the cost of making 1 km. of raised road section as proposed will be around 70 lac. For the total urban stretch of 5 km. the cost works out to be 350 lacs.

On the other hand, there are 5 rest areas and 1 twin truck terminal which have been proposed on this stretch which can accommodate around 70 dhabas and shops, two petrol stations and one accommodation place. As on today each dhaba operator pays Rs 10,000 per month as rent to the building/shack owner. Therefore, 70 dhabas themselves can generate 7 lac rent per month. With other establishments also

contributing, the total rent collection per month itself can be to the tune of 10 lac. giving a return of Rs 120 lac per year.

With simple mathematical calculation it can be seen that even if the interest is taken into account, the loan amount Rs 350 lac can be repaid in under 4 years time. Similar calculations are applicable to other modifications suggested on this specific stretch and also for any other general proposal.

7.5 Conclusion :

From the foregoing studies, it is seen that all planning problems are arising out of existing patterns of development along highway and these can be solved satisfactorily if a comprehensive and realistic approach is undertaken. This "dream" of transforming our existing highways in to a " complete highway" is possible if

- the laws are framed , enacted and implemented,
- there is an integrated planning done,
- financial viability is seen,
- separate but mutually coordinating organisations at national and state level are setup to plan, implement and enforce highway roadside development,
- privatisation is actively involved etc.

Now that the ground work for the entry of private sector has been laid, the government is busy working on feasibility studies and tender conditions. Some MOUs have already been signed for bypasses and bridges and new era of traveling on roads after paying a toll or as worked out in the above (sub para 7.4.2) text, even without a toll does not seem to be too far away.

The

U.P. Roadside Land Control Act, 1945

(UNITED PROVINCES ACT NO.X OF1946 AS AMENDED BY U.P. ACT NO. VI OF 1965 AND U.P. ACT NO. xxii OF 1975)

[Prepared by his Excellency the Governor of the United Provinces in exercise of the powers assumed by him by the proclamation, dated November 3, 1939, issued under Section 93 of the Government of India Act, 1935.]

Received the assent of the Governor of the United Provinces on December 13, 1945, and was published in the United Provinces Gazette, on December 13, 1945.

Preamble.-Whereas it is expedient to regulate in the United Provinces the use of roadside land;

And whereas by the Proclamation dated the third day of November, 1939, promulgated under Section 93 of the Government of India Act, 1935, the Governor of the United Provinces has assumed to himself all powers vested by or under the aforesaid Act in the Provincial is still in force.

Now therefore the Governor in exercise of the powers aforesaid is pleased to make the following Act:

Prefatory Note.-The Statement of Objects and Reasons attached to the Bill is as follows:-

"There is growing tendency to extend building along roads around towns with the consequence that congestion on such roads is becoming acute. Roads intended to enable through traffic to bypass centres of dense population themselves become too crowded. Extra municipal areas adjoining main roads have obvious attraction as building sites, the occupants of buildings in such areas can enjoy many of the amenities of town life without sharing the burden of municipal taxation or being subject to the control required to ensure good sanitation and well-ordered development. At present there is no legal power for the control of such extensions. In 1983, the United Provinces Highways Bill was framed, one of the chapters of which dealt with the regulation of "ribbon development". The Bill, however, could not be enacted by the late Government before it vacated office. The Chief Engineers' Conference held at Nagpur in December 1943, to consider post-war road development in India stressed the necessity for early enactment of legislation to prevent "ribbon development". The problem of "ribbon development' is becoming more serious day by day, and

and with the large programme of post-war improvement of road communication that is now contemplated,it is desirable that the evil should be tackled without further delay.

2. The Bill also includes provision for the regulation of excavitions and approach roads and for the control, by means of licences, of the use of land for brick-fields and kilns. Unregulated excavations, e.g. in connexion with brick-fields, not only result in the creation of breeding places of the land for building purposesimpossible without expensive levelling operations.

3. This Bill enables the necessary control to be exercised over areas adjacent to main roads in the United Provinces, except in cantonment areas. It has been modelled on the similar measures intoduced in 1941 in Delhi Province, whih has so far worked smoothly."

1. **Short title, extent and commencement.**-(1) This Act may be called the Uttar Pradesh Roadside Land Control Act, 1945.

(2). It extends to the whole of [Uttar Pradesh] except cantonment areas.

(3) It shall come into force on such date as the [State Government] may, be notification in the official Gazette, appoint.

2. **Interpretation.**-In this Act, unless there is anything repugnant in the subject or context-

(1) "agriculture" includes horticulture and the planting and upkeep of orchards;

(2) "building" means a house, hut, shed or other roofed structure, for wharsoever purpose, and of whatsoever material constructed, and every part thereof, and includes a wall or masonry platform or masonry ditch or drain, but does not include a tent or other such portable and merely temporary shelter;

(3) "Collector" includes any authority appointed by the [State Government] by notification in the official Gazette to perform all or any of the functions of the Collector under this Act.

(4) "place of worship' includes a temple, church, mosque, imambara,dargha,karbala, takya, idgah, samadhi, math, sati ka than or gurdwara;

(5) "prescribed" means prescribed by rules made under this Act; and

(6) "road" means a metalled road maintained by the State Government, the Government of India or by a local authority or a route demarcated by the State

Government of India or a local authority with a view to constructing along it a metalled road, and includes a national highway].

3. Declaration of controlled area.-(1) The [State Government] may, by notification in the official Gazette, declare any land within a distance of four hundred and forty yards from the centre line of any road to be a controlled area for the purpose of this Act [:]

[Provided that in the case of a national highway, the highway itself shall not be a controlled area]

(2) Not less than three months before making a declaration under sub-section 91), the [State Governments] shall cause to be published in the Official Gazette and in at least two newspapers printed in a language other than English, a notification stating that they propose to make such a declaration and specifying therein is proposed to be made, and copies of every such notification or of the substance thereof shall be published by the Collector in such manner as he thinks fit at his office and at such other places as he considers necessary within the said boundaries.

(3) Any person interested in any land included within the said boundaries may, at any time before the expiration of thirty days from the last date on which a copy of such notification is published by the Collector, object to the making of the declaration or to the inclusion of his land or any part of it within the said boundaries.

(4) Every objection under sub-section (3) shall be made to the Collector in writing, and the Collector shall give to every person so objecting an opportunity of being heard either in person or through a legal practitioner, and shall, if any, as he thinks necessary, forward to the [State Government] record of the proceedings held by him together with a report setting forth his recommendations on the objections.

(5) If before the expiration of the time allowed by sub-section (30 for the filing of objections no objection has been made, the [State Government] may proceed at once to the making of a declaration under sub-section (1): If any such objections have been

made, the [State Government] shall consider the record and the report referred to in sub-section ( ) and may either-

(a) abandon the proposal to make a declaration under sub-section (1), or

(b) make such a declaration in respect of either the whole or a part of the land included within the boundaries specified in the notification under sub-section(2).

(6) For purposes of sub-section (3) a person shall be deemed to be interestedin land if he is a "person interested" as defined in clause (b) of Section 3 of the Land Acquisition Act, 1894 for the purpose of that Act or, where land is occupied by or for the purposes of a place of worship, tomb, cenotaph, graveyard, grave or marghat, if he is a member of the faith to which such building pertains.

[(7) A notification published in the official Gazette purporting to be made under sub-section (1) shall be conclusive proof that the declaration contained in such notification has been duly made in accordance with the provisions of this Act, and unless and until such declaration is withdrawn, that area to which it relates is a controlled area].

[(8) Any notification issued or declaration made under this section with reference to a road which subsequently becomes a national highway under the National Highways Act 1956, shall nothwithstanding the road so becoming a national highway, continue to be valid and to be in force].

4. Plans of controlled areas to be deposited at certain offices.-

(1)The Collector shall deposit at his office and at such other places as he considers necessary,plans showing all lands declared to be controlled areas for the purposes of this Act, and setting forth the nature of the restrictions applicable to the land in any such controlled area.

(2) The plans so deposited shall be variable to the public for inspection free of charge at all reasonal times.

5. Restrictions on building etc., in a controlled area-Nowithstanding anything contained in any other law for the time being in force, no person shalle erect or re-erect

any building,or make extend any excavation, or lay out any means of access to a road in a controlled area except with the previous permission of the Collector in writing.

6. Application for permission to build, etc. and the grant or refusal of such permission.-(1) Every person desiring to obtain the permission referred to in Sectin 5 shall make an application in writing to the Collector in such form and containing such information in respect of the building, exavation or means of means of access to which the application relates as may be prescribed.

(2) On receipt of such application, the Collector after making such enquiry, as he considers necessary, shall, by order in writing either-

(a) grant the permission, subject conditions, if any, as may be specified in the order; or

(b) refuse to grant such permission.

(3) When the Collector grants permission subject conditions under clause 9a) of sub-section (2) or refuses to grant permission under clause (b) of sub-section (2), the conditions imposed or the grounds of refusal shall be such as are reasonable having regard to the circumstances of each case.

(4) The Collector shall not refuse permission to the erection or re-erection of a building, not being a dwelling house, if such building is required for purposessubservient to agriculture, nor shall the permission to erect or re-erect any such building be made subject to any conditions other thanthose whch may be necessary to ensure that the building will be used solely for the purposes specified in the applicantion for permission.

(5) The Collector shall not refuse permission to the erection or re-erection of a building which was in existence on the date on which the declaration under sub-section (1) of Section 3 was made, nor shall he impose any conditions in respect of such erection or re-erection unless it involves the addition of one or more storeys to the building or the original plinth area, or there is a probability that the building will be used for a purpose other than that for which it was used on the date on which the said declaration was made.

(6) If at the expiration of a period of three months after an application under sub-section (1) has been made to the Collector no order in writing has been passed, the Collector's permission shall be deemed to have been given without the imposition of any conditions.

(7) The Collector shall maintian a register with sufficient particulars of all permission given by him under this section and the register shall be available for inspection without charge by all persons interested and such persons shall be entitled to take extracts therefrom.

7. Right of appeal-(1) Any person aggrieved by an order of the Collecter under sub-section (2) of Section 6 granting permission subject to conditions or refusing permission may within thirty days from the date of such order prefer an appeal to the [State Government].

(2) The order of the [State Government] on appeal shall be final.

8. Compensation.-(1) No person shall be entitled to claim compensation under this or any other Act for any injury, damage or loss caused or alleged to have been caused by an order-

a) refusing permission to make or extend an exacavation, or granting such permission but imposing conditions on the grant, or

(b) refusing permission to lay out a means of access to a road, or granting such permission but imposing conditions on the grant, or

(c) granting permission to erect or re-erect a builing but imposing condions on the grant.

(2) When an order has been made refusing permission to erect or re-erect a building any person who has exercised the right of appeal given sub-section (1) of Section 7 may, within three months of the date of the order of the [State Government], make to the [State Government] a claim for compensation on the ground that his interest in the land concerned is injuriously affected by the said order.

(3) On receipt of a claim under sub-section (2), the [State Government] shall either proceed to acquire the land concerned under the Land Acquisition Act, 1894, or transfer the claim for disposal to an officer exercising the powers of a Collector under the said Act:

Provided that in case the [State Government] decide to acquire the land, (i) it shall not be necessary for land occupied by a place of worship, tomb, cenotaph, graveyard, grave or marghat to be included and (ii)the claimant shall be entitled to be repaid by the acquiring authority the amount of expense which he may have properly incurred in connextion with the preparation and submission of his claim for compensation under this section, authority deciding the value of the land in the proceedings under the Land Acquisition Act, 1984.

(4) Nothing in this section shall be deemed to preclude the settlement of a claim by mutual agreement.

9. Compulsory acquisition-If the [State Government] decide to acquire the land under the Land Acquisition Act, 1984, then, nowithstanding anything contained in that Act,-

(i) proceeding under Section 5-A of the Act shall not be required:

(ii) the notification under Section 6 of that Act shall be published within six months from the date of institution of the claim failing which the claim shall be transferred for disposal to an officer exercising the powers of a Collector under that Act.

(iii) the market value of the land shall be assessedin accordance with the provisions of the Land Acquisition Act, 1894(1 of 1894), which shall, for the purposes of this Act, be deemed to be modified as indicated in the Schedule annexed to this Act.

10. Amount of Compensation how determined-(1) When a claim is transferred for disposal under Section 8 or Section 9 to an officer exercising the powers of a

Collector under the Land Acquisition Act, 1894, such officer shall make an award determing the amount of compensation, if any, payable to the claimant.

(2) The amount of compensation awarded under sub-section(1) shall in no case exceed- (a) the amount that would have been payable if the land had been acquired under Section 9, 0r

(b) the difference between the market value of the land in the existing condition having regard to the restrictions actually imposed upon its use and development by the order refusing permission to erect or re-erect a building thereon, and its market value immediately before the publication under sub-section (2) of Section 3 of the notification in pursuance of which the area in which it is situated was declared to be a controlled area, and no compensation shall be awarded under sub-section (I)-

(i) unless the claimant satisfies the officer making the award that proposals for the development of the land which at the date of the application under sub-section (1) of Section 6 are immediately practiable, or would have been so, if this Act had not been passed, are prevented or injuriously affected by the restriction imposed under this Act, or

(ii) if and in so far as the land is subject to substantially similar restrictions in force under some other enactment which were so in force at the date when the restrictions were imposed under this Act, or

(iii) if compensation in respect of the same restrictions in force under this Actor *of substantially similar restrictions in force under some other enactment has* already been paid in respect of the land to the claimant or to any predecessor in interest of the claimant.

11. Saving for other enactments.-Nothing in this Act shall affect the power of any authority to acquire land or to impose restrictions upon the use and development of land under any other enactment for the time being in force.

12. Prohibition of use of any land as a brick-field, etc, without licence.-(1) Notwithstanding anything contained in any other law for the time being in force, no land within a controlled area shall be used for the purposes of a charcoal-kiln, pottery-kiln or lime-kiln and no land within a controlled area shall be used for the purposes of brick-field or brick-kiln except under, and in accordance with the conditions of, a licence from the Collector which shall be renewed annually.

(2) The [State Government] may charge such fees for the grant and renewal of such licences and may impose such conditionsin respect thereof as may be prescribed.

(3) No person shall be entitled to claim compensation under this or any other Act for an injury, damage or loss caused or alleged to have been caused by the refusal of a licence under sub-section (1).

13. Offences and penalties-(1) Any person who-

(a) erects or re-erects any building or makes or extends any excavation or lays out any means of access to a road in contravention of the provisions of section 5 or in contravention of any conditions imposed by an order under Section 6 or Section 7,or

(b) uses any land in contravention of the provisions of sub- section (1) of Section 12, shall be punished with fine which may extend to five hundred rupees and, in the case of a conviction during which he is proved to have persisted in the contravention.

(2) Without prejudice to the provisions of sub-section (1), the Collector may, order any person who has committed a breach of the provisions of the said sub-section to restore to its original state or to bring into conformity with the conditions which have been violated as the case may be, any building or land in respect of which a contravention such as is described in the said sub-section has if been committed, and if such person fails to do so within three months of the order,may himself take such measure as may appear to him to be necessary to give effect to the order, and the cost of such measures shall person as arrear of land revenue.

14. Trial of offences.- No court inferior to that of a Magistrate of the first class shall try any offence punishable under this Act.

15. Protection of persons acting under this Act.- No suit, prosecutin or other legal proceeding shall lie against any person for anything which is in good faith done or intended to be done under this Act.

16. Saving.- Nothing in this Act shall apply to-

(a) the erection or re-erection of building upon land included in the inhabited site of any village as entered and demarcated in the revenue records or upon sites in a municipal, notified or town area that are already built up on the date of the issue of the notification under sub-section (2) of Section 3 of this Act;

(b) the erection or re-erection of a place of worship or a tomb, cenotaph, grave,graveyard or of a wall enclosing a place of worship, tomb,cenotaph, grave, graveyard, or marghat onland which is at hte time a notification under sub-section (2) of Section (3) is published by the 11[State Government], occupied by or for the puposes of such place of worship, tomb, cenotaph,grave, graveyard, or marghat;

(c) excavations (including well) made in the ordinary course of agricultural operations;

(d) the construction of an unmetalled road intended to give access to land solely for agricultural purposes.

17. Power to make rules.- (1) The 12[State Government] may make rules to carry out the purposes of this Act.

(2) In particular and without prejudice to the generality of the foregoing power such rules may provide for all or any of the following matter, namely-

(a) the form in which applicatins under sub-section (1) of Section 6 shall be made and the informatin to be furnished in such applications;

(b) principles according to which applicatins under sub-section (1) of Section 6 shall normally be desallowed by the Collector;

(c) the regulation of the laying out of means of access to reads; (d) the fees to be charged for the grant and renewal of licences under Section 12 and the conditions governing such licences.

(3) All rules made under this section shall be subject to the condition of previous publiction in the official Gazatte and the date to be specified under clause (3) of Section 23 the United Provinces General Clauses Act,1904, shall be less than two months from the date on which the draft of the proposed rules was published.

UTTAR PRADESH ROADSIDE LAND CONTROL RULES,1964*

1. Short title and commencement.- (i) These rules may be called "The Uttar Pradesh Roadside Land Control Rules,1964".

(ii) They shall come into force at once.

2. In these rules unless there is anything repugnant in the subject or context,-

(a) "Act" means the U.P. Roadside Land Control Act,1945 (Act No.X of 1945) ;

(b) "Health Officer" means the District Medical Officer of Health or the Municipal Medical Officer of Health having jurisdiction within the area concerned; and

(c) "Government" means the Government of Uttar Pradesh.

3. Application to erect or re-erect etc.-Every person dessiring to obtain permission to erect or re-erect any building or make or extend any excavation or lay out any means of access to a road in acontrolled area shall make an application in writing to the Collector in Form I.

4. Documents to accompany application to erect or re-erect building .- In cases of an application to erect or re-erect a building, the applicant shall submit with his application:

(a) Certified extracts from village records showing the names of the owners, tenants and other particulars of the land to which the application relates;

(b) A site-plan fulfiling the following requirements-

(i) it shall be drawn to a scale of not less than 1/16th of an inch to a foot in case of sites exceeding one acre but not exceeding 10 acres and 1/64th of an inch to foot in case of sites exceeding ten acres;

(ii) it shall be prepared with sufficient accuracy to enable the site being identified and shall be submitted in triplicate in cloth backed ferro-prints or tracing;

(iii) the plan shall show-

(1) the scale,

(2) boundaries of the site,

(3) direction of the north point to the plan of the building or proposed building, and

(4) streets or roads adjoining the site with their width clearly mentioned, all existing roadside trees, lampposts, aerial electric line, if any, other features or structures likely to affect the approach to the building or proposed building,

(5) levels of the site and of plinth of the building or proposed building in relation to those of neighbouring road or roads by an elevation section,

(6) all existing building in outline within a distance of 20 feet from the boundaries of the site in relation to the boundaries and the building or proposed building and, if known, the names of owners of adjoining house and premises or vacant land,

(7) surrounding buildings in outline within a distance of 20 feet from the boundaries of the site inn relation to the boundaries and the building or owners of adjoinging house and premises or vacant land,

(8) area occupied or to be occupied by the building or proposed building,

(9) area of the courtyard of the building or proposed building or the open space about the building or proposed building.

(e) The building plan on a scal of not less than1/8th of an inch to foot. It shall be submitted in triplicate in cloth-backed ferroprints or tracing, and shall show-

(1) the scale;

(2) the direction of the north point to the plan;

(3) a plan of the ground floor and other floors of the building or proposed building with front elevation and one other elevation and typical section;

(4) the plinth level of the building or proposed building with reference to the level at the centre of the street towards which the building or proposed building is th be drained;

(5) the level of the courtyard and open space in the building or proposed building in relation to the level of the centre of the street towards which the building or proposed building is to be drained;

(6) the proposed method of drajning the building or proposed building, the position anddimensions of all privies , urinals, drains, stables, dhobighats, cattle sheds, wells, compound wall, gate pillars and other appurtenances and the method of disposal of sewage, sullage and storm water;

(7) the size of doors, windows, openings and other method of ventilation of each room;

(8) the means of access to the building or proposed buildign an its several floors;

(9) the number of storeys of the building of proposed building.

note.-In the case of a proposed addition to or alteration of an existion building or proposed building the new work shall be indicated on the building plan in distinctive colour, a key to the colours being given on the plan.

(d) Specification of the proposed constructions should be given in details, such as-

(1) purpose for which the building or proposed building is intended to be used;

(2) materials to be used in the construction;

(3) number of storeys;

(4) position and dimennsions of all doors, windows and opening of ventilation;

(5) number of persons for which accommodation is intended to be provided in the building or proposed building;

(6) particulars of wells , latrine, etc.to be provided;

(7) whether the site was previously built upon,if so, the nature of the former constructions.

5.Documents to accompany application to make or extend excavation, etc.-In the case of an application to make or extend an excavation or laying out means of access to a road, the applicant shall submit with his application-

(a) certified extracts as menttioned in Rule 4(a);

(b) drawing and specifications, sufficient to enable the intention of an applicant ot be readily and unmistakably understood;

(c) where an open drain is to be covered, a plan and section showing clearly how it is proposed to cover the drain in question and where a culvert is to be built showing the exact tunnel size of culvert.

note.-The plans shall conform to the requirements of Rule4(b)(i) .

6. Register of application.- On receipt of an application under Rule 3, the Collector shall cause it to be entered in aregister ot be maintained in his office in From II.

7. Principles on which permission will be granted.-In determining the grant of permission on an application , the Collector shall take into consideration the following :

(1)(i) Bus stads should be set back sufficiently from the general building line limit prescribed for the road so as to permit of a service road subject to a minimum distance of 100 feet from the centre of the road. Access to the stand should be limited to one point on the main road.

(ii) Construction of buildings shall not be allowed within the building lines, i.e. within the distances specified below from centre line of any road of the description given in the following table:

table

Ser1.No. 1	Categories of road 2	Open and agricultural areas 3	Urban and industrial areas 4
1.	National provincial highways	75	60
2.	Major District roads	60	45
3.	Other district roads	50	30
4.	Village roads	20	20
5.	Cement Concrete tracks	30	30
6.	Motor Roads (in hills)	50	Question does not arise
7.	Bridle roads (in hills)	25	Ditto.

(2) The opening of sullage towards the road shall not be permitted .

(3) The approach should be in such a manner as not to interfere with or endanger the flow of traffic on the road.

(4) No construction or excavation likely to affect public health shall be allowed within the controlled area except after obtaining the advice of the Health Officer.

8. Restriction on grant of permission on kilns,etc. - No licence shall be granted for the establishment of any charcoal kiln, pottery-kiln, lime-kiln or brick-kiln or brick-field within the double limits of the building lines specified in Rule 7(1)(ii).

9. Application for licences.- Subject to the provision of Rule 14,every person desiring to use any land within a control area for the purpose of brick-field or brick-kiln,lime-kiln,charcoal kiln, or pottery-kiln shall make an applicition in Form III to the Collector and shall furnish the following particulars-

(a) a full and clear description of the land in which the brick-field or kiln is proposed to be established with the name of the district,pargana and the mauza in which the land is situate and the field numbers,if any, along with an extract from the latest village maps;

(b) the number of kilns which are proposed to be set up in the brick-field and the location of each;

(c) the total period for which it is expected that the brick-field or kiln will be in use;

(d) any other information which the Collector may require to be furnished.

Note.- Before considering the application, the Collector may require the applicant to demarcate the boundaries of the proposed brick-field or kiln at the site.

10. Grants of licence.- (1) Before making an order in From IV on any application, the Collctor may obtain the opinion of-

(a) the Health Officer wheather the proposed site is suitable withregard tothe maintenance of the health of the public generally and wheather the sanitary arrangements proposed to be made are adequate; and

(b) the Executive Engineer, P.W.D. concerned or the local body inchanrge oftheroadwithaviewtoascertaining the requirements of traffic including its needs for future expansion.

(2) The Collector shall refuse to grant a licence if the land on which it is proposed to establish the kilns or brick-field, is situate at a place less than 1,000 feet from an inhabited site or site likely to become inhabited.

11. Conditions of Licence.- Every licence granted under these rules shall be deemed to be granted subject to the conditions set forth in the Second Schedule except in so far as those conditions may be modified by the Collector in any case, and subject ot any further conditions which the Collector may consider it desirable to attach with a view to securing the safety, health or convenience of often as he may think fit.

1[13. fees.- (1) The following fees shall be payable in advance for licences issued under these rules:

A- Brick-kilns and Brick-fields-

(a) For the initial grant of a licence for a brick-field including not more than one brick-kiln of standard size.- Rupees Fifty a year .

(b) For the renewal of a licence for each year of renewal-Rupees Twenty-five.

(c) Additionalfeepayable foreveryadditional brickkiln after the first-Rs.25

(d) Additional fee payable in respect of any brick kiln which exceeds standard size- Rs.25 a year.

B-Charcoal-kiln, Pottery-kiln:

(a) For the initial grant of a licence of a-

	Rs.
Charcoal kiln	.. 25.00
Pottery kiln	.. 10.00
Lime kiln	.. 50.00

(b) For the renewal of the same for each year of renewal-a year

Charcoal kiln	.. 15.00
Pottery kiln	.. 5.00
Lime kiln	.. 25.00

The renewal fee is payable at the above rates for a licence if the application for renewal is preferred to the Collector not less than one month before the date when the licence is due to expire; if the application for licence is preferred at any later tiem the fees for renewal shall be the full fee as for a new licence.

(2) The fees setforth in sub-rule (1) shall be payable in full before application is taken into consideration, but if the grant or renewal of the licence is refused, half of the fee shall be refunded.

(3) For the purpose of this rule, a brick-kiln of standard size means a brick-kiln containing not more than thirty-two chambers each capable of burning twenty-five thousand bricks at one loading.

(4) In addition to the fees set forth in sub-rule(1) of this rule the Collector may also require an applicant for licence for a brick-field to deposit a sum not exceeding one hundred rupees for each acre included in the area of the proposed brick-kiln field as security for the fulfilment of Condition IV in the Second Schedule appended to these rules , and if that condition is not fulfilled to his satisfaction, the Collector may himself have the necessary works excuted and pay the cost of the same from the amount deposited. When any expenditure is thus made from deposit money while brick-field or kiln is still in use, the holder of the licence shall on demand of the Collector deposit a further sum equal to that expanded.

(5) The licence fee setforth in sub-rule (1) A and B and the security money setforth in sub-rule (4) of this rule shall be deposited by the applicant in the Government Treasury under the Receipt Head "065-Other Administrative Services-C-Other services-20-Other Miscellaneous Receipts" and the duplicate of the treasury challan sent ot the Collector along with the application].

14. Brick and pottery making in villages.-No written licence shall be required in the case of bricks made out of the earth dug from village ponds or for brick fields in which small quantities of burnt or sun-dried bricks are made by the residents for their

own use for small pottery kiln of the kind popularly known as "A was" which are used to prodeuce pottery or tiles on a small scale:

Proveided that if the Colloctor is of the opinion that any such brick-field or kiln is being used (for making bricks) on a large commercial scale or is being operated in such away or in such aplace as to cause inconvenience to the public, the Collector may at any time serve a notice on the owner or tenant of the land in which the brick field or kiln is situated requiring him to apply for a licence under the Act and from the time of service ofthe notice the brick field or kiln shall be deemed to be one which is unlicensed and for which a licence is necessary.

15. The Collector shall inform the Chief Engineer, Public Works Department or any officer designated by him in this behalf, of all permissions granted by him and conditions imposed, if any, under clause(a) of sub-section (2) of Section 6 of the Act.

16. The Collector shall inform the Chief Engineer, Public Works Department or any officer designated by him in this behalf and the Health Officer, of all licences granted by him and the condition imposed, if any, under Section 12 of the Act.

APPENDIX 'C'

REFERS TO PARA 6:1

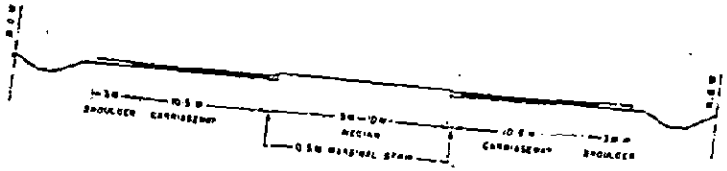


FIG. 1 EXPRESSWAY
(6-LANE DIVIDED)

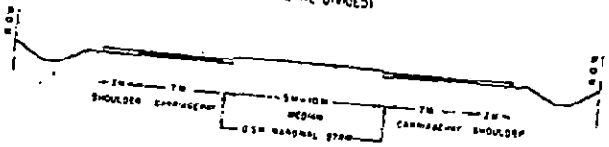


FIG. 2 EXPRESSWAY
(4-LANE DIVIDED)

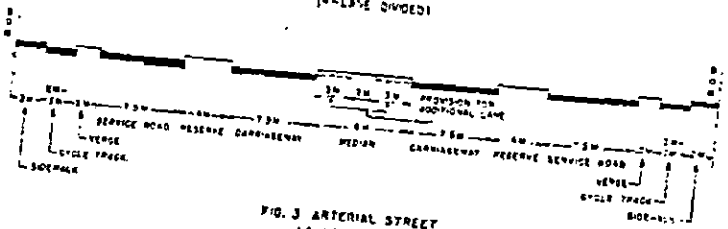


FIG. 3 ARTERIAL STREET
(4-LANE DIVIDED)

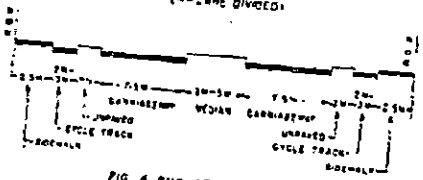


FIG. 4 SUB-ARTERIAL STREET
(4-LANE DIVIDED)

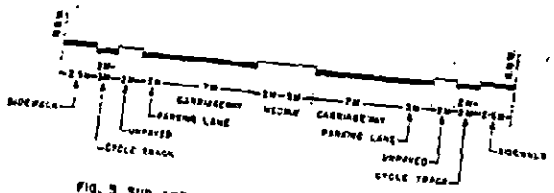


FIG. 5 SUB-ARTERIAL STREET WITH EXTRA PARKING LANE
(4-LANE DIVIDED)

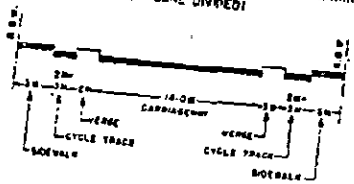


FIG. 6 COLLECTOR STREET
(4-LANE UNDIVIDED)

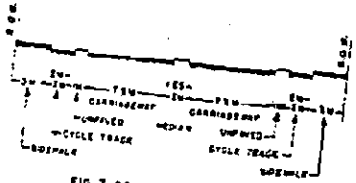


FIG. 7 COLLECTOR STREET
(4-LANE DIVIDED)

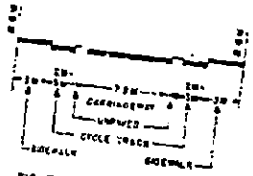


FIG. 8 COLLECTOR STREET
(2-LANE)

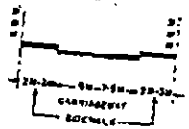


FIG. 9 LOCAL STREET WITH SIDEWALK ADJACENT TO CARRIAGEWAY

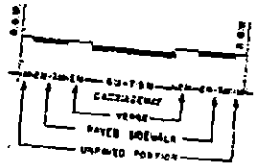


FIG. 10 LOCAL STREET WITH SIDEWALK AWAY FROM CARRIAGEWAY

FIG. 11 LOCAL STREET (CUL-DE-SAC)

NOTES:

1. THESE ARE ONLY TYPICAL CROSS-SECTIONS. SOME OF THE LIGHTS AND INDIVIDUAL ELEMENTS OF CROSS-SECTION MAY VARY ACCORDING TO WIDTH AND DESIGNATIONS IN PARA 6 OF THE STANDARD.
2. POSITION OF ROADSIDE TREES AND LIGHTING POLES ETC. IS NOT SHOWN. THESE CAN BE SUITABLY FITTED ACCORDING TO SITUATIONS

TYPICAL CROSS SECTIONS OF URBAN ROADS

THE TIMES OF INDIA, NEW DELHI, THURSDAY, JUNE 5, 1997

Road developers will be allowed real estate rights

By Vinay Pandey
Business Times Bureau

NEW DELHI: In a major policy decision with far-reaching implications, the government has decided to allow private investors taking up highway projects on a build-operate-transfer (BOT) basis to develop townships and other real estate on land made available to them by the government on ownership basis.

Though under the BOT conditions, the highways built and operated on a toll basis by private parties will normally have to be transferred to the government after 30 years, townships or other real estate developed by the private parties will not come back to the government; these will be on a 99-year lease.

This has become possible under an incentive package for road projects approved by the Cabinet Committee on Infrastructure (CCI) on Monday. Further concessions have been allowed to "sweeten" road projects, which have remained the "ugly duckling" of the infrastructure sector, highly-placed official sources said.

The land for real estate development will be acquired by the government under the recently enacted land acquisition Act for highway development and given on lease to private parties. The land acquisition under the Act for a "public purpose" cannot be challenged in a court; there can be disputes only regarding the amount of compensation.

Experts say the fresh incentives will make highway projects highly attractive for private investors, whose response to the BOT policy so far has not been very encouraging. The concept of real estate development is already being tried out along the Bangalore-Mysore highway, a Karnataka government project.

The package treats real estate development as an integral part of the highway project. The private party will be eligible to tax concessions to the extent he ploughs back the income from real estate into highway development.

So far, under the road policy announced by the government last year, private parties were only allowed to develop highway facilities like hotels and motels.

The CCI also decided that the government will make direct investments in the road projects which are not viable on toll alone. The rest of the money will be leveraged from private investors.

The package approved by CCI also allows duty-free import of more than 10 categories of construction equipment, which are not manufactured in India. At present, these imports are subject to customs duty up to 30 per cent.

On the issue of toll, CCI has decided that a cap will be fixed per car, per truck etc. The toll will vary, based on the paying capacity of the road users, from region to region and project to project. The toll will be reviewed every three years.

INDIAN EXPRESS
OCT 26 1997

"We'll charge 40 paise per km, per car, on national highways"

The NHAI has taken upon itself the daunting task of improving the country's national highways and attracting private investment for this effort. Deepak Dasgupta, its chairman, unveils his plans and lists his problem areas to Navneet Anand

OUT of the total road length of about two million kilometres in India, the national highways (NHs) account for about 2 per cent (34,000 kilometres), but bear 40 per cent of the traffic. The Central Government has, however, earmarked just 0.57 per cent of the total plan outlay in the Eighth Five-Year Plan for national highways. This is reflected in the poor maintenance of most highways. Added to this is the problem of growing congestion. Most highways have only single or double lanes, which is a major obstacle to the easy flow of traffic.

Naturally, the challenge before the National Highways Authority of India (NHAI) is stupendous. This, however, doesn't seem to have bothered Deepak Dasgupta, its chairman, who has his plans firmly chalked out.

"Our immediate task is to convert 20 per cent of the NHs into four-lane highways," says Dasgupta. "We are working hard to achieve this target, but it will take us at least seven to eight years. There are plans also to convert the rest of the single-laned NHs into double-laned ones," he adds. The existing number of the four-laned NHs is only 5 per cent.

Giving details of the first major assignment of his organisation, Dasgupta says, "about 6,000 kilometers of NHs will be converted into four-laned roads, and this will require an investment of Rs 17,000 crore." The expansion work will be carried out on NHs 2, 4, 5 and 8.

Funding the project, of course, will not be an easy task. But Dasgupta is tapping many sources. "We are trying to mobilise funds from multilateral agencies like the World Bank and Asian Development Bank (ADB) and their response has been quite positive," he says. He adds that the World Bank has already agreed to fund a project on NH-2, and the ADB is likely to bankroll similar work on NH-4 and NH-8.

Executing such projects is not an easy job, admits Dasgupta. "The work involved is enormous and will require the involvement of agencies with requisite resources."

Having served the Government of India for more than 30 years now, Dasgupta readily acknowledges the changing scenario. Or so it seems from his appreciation of the move of the GoI to invite private capital into what was hitherto the State's preserve. "It's a very good step," he says. But private operators have shown reluctance in responding. "They had some genuine apprehensions and we have addressed them. We will give them the projects on a Build-Operate-Transfer (BOT) basis."

NARESH SHARMA

HIGH HOPES: With the many concessions being granted to corporates, the BOT scheme is bound to succeed, says Deepak Dasgupta

Dasgupta lists some of the many benefits being offered to private parties. First, the income from highway projects will be non-taxable for five years and for the next five years, 30 per cent of the profit will be non-taxable. Second, the major equipment imported for use in such projects will be duty free. Third, in cases where it is perceived that projects are not going to be economically viable, the government will provide a capital grant of up to 40 per cent. Also, if the real estate builders invest their income in highways, it will be exempted from income tax. And in cases where there is a shortfall in the flow of traffic on a highway constructed by the private operator, the government will provide a loan to cover the shortfall.

Most of these will be tolled highways. "We have, in fact, already fixed a toll of 40 paise per kilometer for cars and Rs 1.40 per kilometer for trucks and buses. The first toll will be levied on a 90 kilometer stretch of NH-8 between Jaipur and Kotputali," informs Dasgupta.

To allay the apprehension of the road users, Dasgupta assures, "the users, in return, will see many new facilities on such highways, like a traffic patrol, sideways stops for buses and trucks and cranes to remove broken-down vehicles."

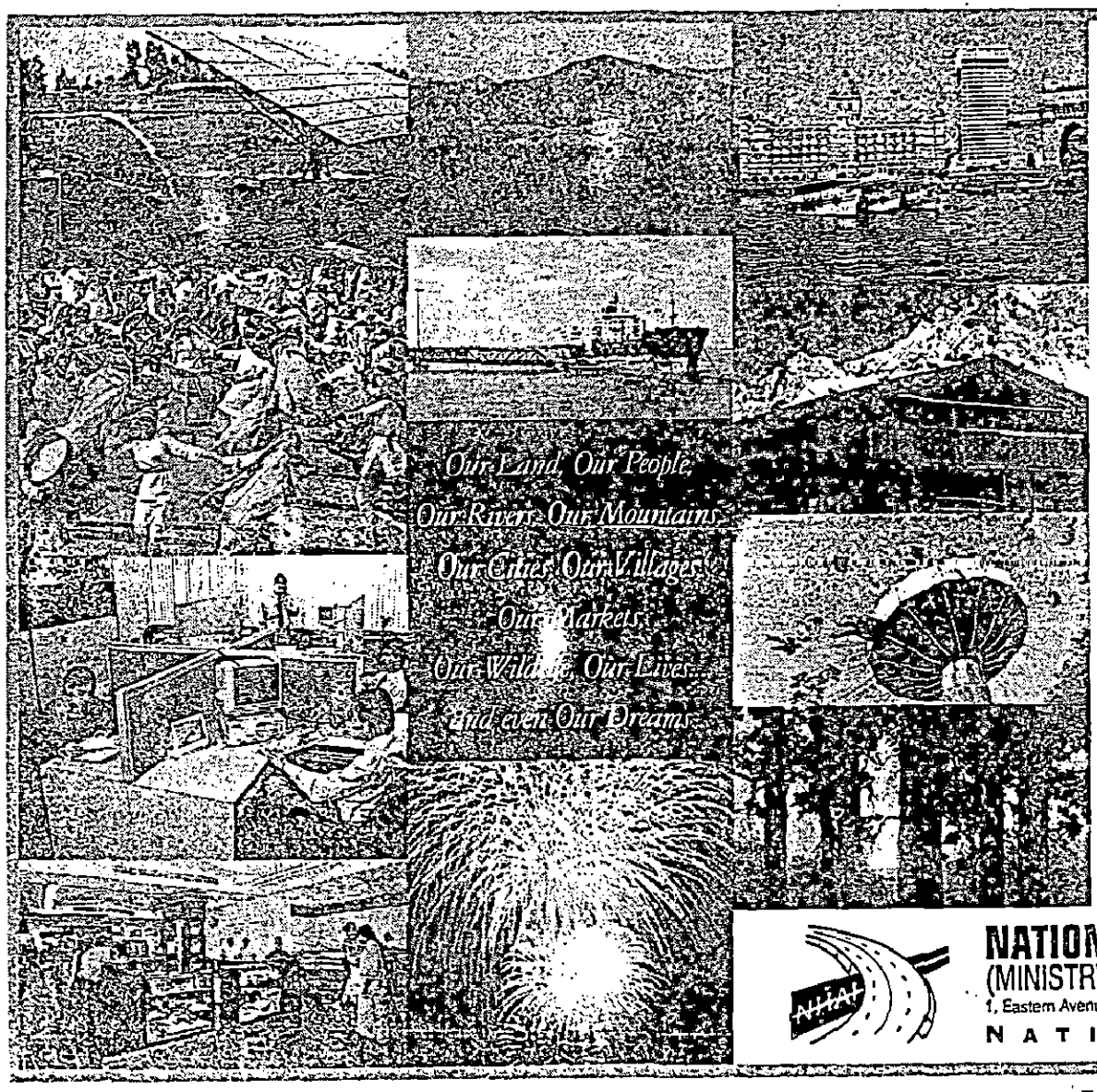
The response from private operators till now has been quite encouraging and companies like Larsen & Toubro and Reliance have responded positively. "In fact, some private operators are already working with us to build bypasses," says Dasgupta, who looks determined to give a facelift to the fast-eroding highways.

The companies for the BOT scheme have already been shortlisted and "as soon as the concession agreement is ready, we'll invite bids. From the intensity of interest shown by private operators, it can be said that they will invest substantially in BOT projects."

Over the years, there has been a rapid growth in the volume of traffic on the Indian roads and according to estimates, it's as high as 10 per cent per annum. This is, quite natural, given the pace at which our economy is growing. "With each 1 per cent rise in the gross domestic product (GDP), there is a corresponding increase of 2 per cent traffic on the national highways. This calls for a greater stress on road networking and proper maintenance of the existing roads," points out Dasgupta.

Added to this is the shift of traffic—both freight and passenger—from the railways to roadways over the years. Dasgupta quotes some data to explain this. In 1951, while the railways accounted for 72 per cent of the total passenger movement in the country, roadways had a mere 28 per cent of the load. On the contrary, in 1995, the share of the railways went down to 20 per cent while roadways bore 80 per cent of the total passenger traffic.

Containing such swallowing traffic naturally required massive investment and a vigilant supervisory authority. The NHAI was established owing to such compulsions as the Central Government, which earlier looked after the affairs related to the NHs, felt the need to institute an exclusive agency for this. The road ahead for the head of this agency—a 1966 batch IAS—appears quite tortuous!



They all come alive with our National Highways

The National Highways Authority of India (NHAI) was operationalised in 1995 for the maintenance, upgradation, strengthening and development of the country's 34,298 kilometers of national highways. To achieve the objective, an estimated Rs. 80,000 crores would be required over the next 10-15 years.

Apart from direct funding, NHAI also welcomes private participation on a Build-Operate-Transfer (BOT) basis. Incentives for private participation include capital subsidy upto 40% of the project cost, equity upto 30%, traffic guarantee, duty-free import of high capacity equipment for highway projects, income tax benefits and attractive incentives to financial institutions to enhance credit flow.

A beginning has been made on November 5, 1997 with a Rs. 70 crore Durg bypass project through private sector participation.

The mandate of NHAI, inter alia, is for four laning the golden quadrilateral which includes NH-8 (Delhi to Mumbai), NH-4 (Mumbai to Chennai), NH-5 (Chennai to Calcutta) and NH-2 (Calcutta to Delhi). A cluster of financing packages including multilateral aid, placement of tax free bonds, direct borrowing and BOT packaging are envisaged to help achieve the above.

Other projects, currently on BOT offer list, are Jaipur-Kishangarh on NH-8, Hosur - Krishnagiri on NH-7, Chingalpet - Tindivanam on NH-45, besides, 5 major bridges and some bypasses.

Hon'ble Prime Minister
Shri I.K. Gujral

Hon'ble Union Minister for Surface Transport
Shri T.G. Venkataraman

Let us build better highways
Let us lead on the path of progress

NATIONAL HIGHWAYS AUTHORITY OF INDIA
(MINISTRY OF SURFACE TRANSPORT)
1, Eastern Avenue, Maharani Bagh, New Delhi-110065
NATION'S LIFE LINE

BIBLIOGRAPHY

Foreign

1. Highway Research Board special report-17 - Roadsides, their use and protection- published in 1954, Washington D.C
2. Master plan for Right- of -Way, Wayne county- published by Wayne county road commission, December, 1969.
3. The general plan for the city of Santa Meria, California, street and highway plan, November, 1964.
4. Master plan, city of New Brunswick, N.J- By the city planning department, New Brunswick, N.J, 1963.
5. 'Transportation', A county comprehensive plan study by Berks county planning commission, 1963.
6. 'Major streets' city of Davenport, Iowa by city plan commission, February, 1946.
7. 'Arial streets' Spokane, Washington by city plan commission, April, 1964.
8. 'Roadside Design Guide' - developed by American Association of State Highway and Transportation Officials (AASHTO).

Indian

9. 'Road development plan for India (1981-2001)' published by Indian Roads Congress, New Delhi, 1984.
10. 'Compendium of Highway Statistics' Published by Indian Roads Congress, New Delhi.
11. 'India 1995' A reference annual published by publications division, Ministry of Information and Broadcasting, Government of India.

12. 'Ribbon Development along Highways its Prevention' - Indian Roads Congress publication No.15 ,1996 (revised).

13. 'Economic Impact of Encroachment of Delhi Roads'- C.R.R.I., New Delhi report, September, 1995.

14. 'Problem of Ribbon Development : Can we save our highway system ?' - by R.D.Sikka and J.B.Mathur (A paper).

15. 'Highway Engineering' - by S.K.Khanna and C.E.G.Justo.

16. 'Control on Access Roads' - I.R.C. publication.

17. 'Guidelines on accommodation of underground utility services along and across roads in urban areas' - I.R.C. publication No.98 - 1988.

18. 'Recommended practice for location and layout of roadside motor- fuel filling and motor filling - cum- service stations'.- I.R.C. publication No.12, 1983.

19. 'A policy on roadside advertisements' - I.R.C. publication No.46, 1972.

20. 'Compendium of Transport Statistics', planning commission, January, 1993.

21. Hand book of management information, December, 1992, Ministry of Surface Transport, Transport Research Division.

22. Basic Road Statistics of India 1987-88, Ministry of Surface Transport, Transport Research Division.