

Regional Plan

ONAL CAPITAL REGION

THE APPROACH TO PLANNING IN THE
NATIONAL CAPITAL REGION.

The genesis of the National Capital Regional Plan can be traced to the Master Plan for Delhi which in 1962 had recommended that not only the Delhi Metropolitan Area but also a larger region comprising several districts contiguous to Delhi should be planned as a composite unit. It had also recommended that with the development of Delhi there should be a synchronous development of the 'ring towns' around Delhi. Taking cognizance of this recommendation in the Draft Master Plan for Delhi the Government of India had set up in 1961 a High Power Board, with the Union Minister for Home Affairs as its Chairman and the Chief Ministers of Haryana, U.P. and Rajasthan among others as members for the co-ordination of town and regional planning activities in the region, so as to secure the collaboration of the concerned Governments in the formulation and implementation of a Regional Plan. Between 1965 and 1967 the High Power Board met three times to discuss the common problems of water supply, flood control, drainage, recreational facilities, unauthorised colonies and a revolving fund for development.

In the meantime the problems created by the complex situations arising out of the metropolitan growth have been mounting and an increasing necessity had been felt for a regional plan which will be in the best interest of the overall growth of the Region, ensuring not only the orderly and rational growth of the National Capital but also the rapid development of the

Region as a whole. On a directive by the High Power Board, the Town & Country Planning Organisation in consultation with the Town Planning Departments of the State Governments concerned prepared this Draft Regional Plan. Agricultural development, building up of an adequate infrastructure for selective decentralisation of industry, trade and commerce and govt. office employment together with re-structuring of transport network proposed in the draft Plan should be able to make a breakthrough in building up an effective metropolitan structure. The proposed physical and functional hierarchy of the metropolis, cities, towns and villages in the Region, with adequate economic and physical linkages will set the pace for a better integrated framework.

I would however like to draw attention to the regional imperatives brought to focus by the draft Plan. No doubt, the Draft Plan is essentially a metropolitan plan but all aspects of problems facing this rapidly developing Region have been studied, including the technological and organisational limitations in building up a complex metropolis and the 'green revolution' ushered in by agricultural technology in the rural areas of the Region, in order to project an efficient, prosperous and socially acceptable metropolitan fabric for the future. The Region has been taken as a composite unit with inter-

linked problems and inter-dependent functions which have an impact on each other. The proposals made have taken into consideration that the projects implemented in one sector or in one Sub-region will have wide ramifications in other sectors and sub-regions. Hence, the proposals made in the Regional Plan are comprehensive in nature having taken into consideration all the relevant variables extended over the space of the entire Region during the time period of the Plan.

The Plan is comprehensive from another point of view. The National Capital Region is only a part of a much larger complex of settlements encompassing the whole country. Hence, national policies have been taken as the starting point in offering solutions to the metropolitan problems. Goals for the Region have been set in consonance with national policies and thereafter the objectives to be achieved to serve the goals have been identified and the method of realising the objectives have been enunciated. This makes it obvious that the national, economic and urbanisation policies of maximising growth with social justice and decentralising economic activity and population concentration in a more rational and balanced manner should be more purposefully implemented in the country as a whole, but particularly in the four States adjoining Delhi as far as this Region is concerned. Unless this is achieved at the macro level, there would be acute

imbalance between the NCR and the adjoining regions and between Delhi and the other towns in the NCR.

The Central theme of the Regional Plan is dispersal of new economic activities in the Region and consequent redeployment of human resources. Towards this end, the Plan advocates synchronous action in restructuring economic activities, population agglomerations and the transport system. Past experience in the Delhi Plan has shown that planning and implementation of only urban development in isolation has not led to a realisation of plan objectives, but in fact has accentuated the problems and has caused severe imbalances, like concentration of population, social problems, traffic bottlenecks and severe economic strains. This is the kind of situation that has to be avoided in this Regional Plan. Therefore, it is not feasible to accept only certain aspects of the Plan without a firm commitment to the implementation of the hard core of the plan proposals. It would be a grave error to only accept the urban development part of the Plan and try to implement it. The Plan has to be considered in its totality; the location of economic activities the transport network and the integrated development of services etc. Thus any planning or implementation of only one element of the plan would only lead to unsatisfactory results. It is very necessary that the comprehensive nature of the plan proposals

are recognised and steps taken to implement them in a coordinated manner.

Implementation of national and regional level policies brings us to planning and implementation at the sub-regional level, namely by the concerned State Governments. The pivotal role of sub-regional policies in urban development, location of economic activities and building up of a transport network cannot be over-emphasised in guaranteeing the success of the Regional Plan. Central to this policy is land use and development control. In the interest of the overall benefit of the Region and the Sub-regions, the concerned State Governments will have to strictly adhere not only to the physical pattern outlined in the Regional Plan but also to a rational use of urban land and prevention of haphazard development of land for agro-based and consumer industries. Industrial development should form an integral part of urban centres where adequate housing and other community facilities have to be provided. Residential densities in Delhi as well as in the Regional towns have got to be optimised as they have significant bearing on lessening the demand on agricultural land and in lending economic support for the policy of dispersal.

In order to maximise the benefits of planning, it is essential to have an integrated development programme for providing the infrastructure at the right places, with the stipulated priorities, that could ensure optimum

development - physical as well as economic. The problems are of an inter-state nature and cannot effectively be tackled by any one State. Previous attempts at finding solutions to the water requirements, drainage problems, housing requirements, etc., solely in the interest of the State, have proved short term palliatives, but counter productive in the long run. The Central Water and Power Commission has been trying though not very successfully to coordinate the activities with regard to irrigation, drainage, flood control and power. The problem of drinking water should also receive concerted efforts, as in our opinion, water supply is the critical factor in future urbanisation in the NCR. Similarly, housing, regional recreational needs, and community facilities should also receive the attention they deserve in their role as catalytic agents for economic growth and in their relationship to employment centres. As the proposals in the draft Plan in this respect are more or less broad-based, therefore, follow-up action to prepare functional, sub-regional and detailed project plans to elaborate and detail the broad policies enunciated in the Plan would be an urgent task.

Follow-up action on the Plan proposals by a wide range of action agencies - central, state and local have to be coordinated. But in the present framework, implementation

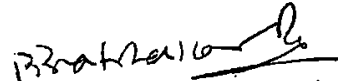
of the Plan proposals with regard to radically restructuring the physical and economic frame to bring about the desired results envisaged in the Plan would be indeed unsatisfactory if not totally impossible. Clearly, greater tasks lie ahead. It is this compulsion that makes it necessary to have an institutional framework for plan formulation and plan implementation. In this respect the draft bill for the setting up of the National Capital Regional Planning Board and a Revolving Fund are important tools in energising the Plan and are vital for its success.

It has to be stressed that the Plan must be geared to the changing future demands and patterns of life and activities in the Region. It is the beginning of a process of guidance and evolution. It follows then that planning as well as the control mechanism and plan evaluation must be continuing phenomena. Large scale investment will be required to decisively influence the metropolitan structure. The political, economic and physical pattern will continuously be changing, some very slowly and subtly, but others radically. This will require constant evaluation and review of the Plan for which there should be adequate feedback data. Large amount of fresh data would be available from the 1971 Census which has to be processed and the Plan proposals already made will have to be reviewed in its light. The Regional Plan should not be considered as

a static Plan but as a dynamic one with continuing action in all its facets to meet the current needs of the complex metropolitan structure and the challenges of the future.

The coming decade will be a crucial one for the National Capital Region. Just as the Delhi Master Plan was a pace-setter for comprehensive urban development, the National Capital Regional Plan could not only guide and mould this metropolitan structure but could also be a model for other developing metropolitan regions in the country.

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New Delhi

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THE NATIONAL CAPITAL REGIONAL
PLAN

SUMMARY OF RECOMMENDATIONS.

1. The Need for Planning the Nation
Capital Region:

1. The factors responsible for the rapid growth of Delhi-the National Capital-are the spurt of jobs in government and semi-government offices, the increasing concentration of the transport network and of whole sale trade and commerce in the city and the concomitant growth of service and consumer industries. These coupled with the 'push factors' operating in the rural areas, have been responsible for the rising crescendo of in-migration to Delhi which have posed physical, social and economic problems not only for the metropolis but for the hinterland as well. National policy requires that a curb be put on the rapid growth of metropolitan cities and to carry out a balanced development of the region around. In the case of the National Capital, where it is imperative to have orderly growth, this can only be done by planning a large area around it with social and economic interaction and inter-dependence, wherein effective decentralization of economic activity and population distribution can be effected.

2. Goals, Scope and Strategy of Regional
Planning in the NCR:

2.1 The National Capital Region, an inter-state region with an area of 29,800 sq. kms. and an estimated population of about 140 lakhs in 1970, has been delimited with the help of a number of indices. Keeping in mind the broader premises of national policies,

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goals for the planning of the Region have been enunciated to deal effectively with the problems of the Region. The goals envisage maximising growth by a planned development of the National Capital Region and also to mould and refashion the Region, both physically and economically, for a fuller realisation of wider and deep social values. The prerequisites for this are an orderly growth and proper use of land and balanced physical, social and economic development of the Region.

2.2 In order to move purposefully in the direction of achieving the goals, it would be necessary to consider alternative physical frameworks for the proper organisation of economic activity, population distribution and their inter-relationship. The Regional Plan has considered five models. The 'Radial Corridor Pattern' and Multi-town Pattern' are favoured from social, economic and technological considerations. These new development concepts require a new direction and shape to be given to current trends of development. The pattern envisaged would involve the restructuring of the transport network, dispersal of economic activity away from Delhi and greater developmental efforts in the medium-sized towns located on the radial corridors and coordinated and integrated development of water supply, drainage, flood control measures, irrigation, power etc. in the NCR.

3. Major Urban Settlement Pattern:

3.1 In proposing a settlement pattern the past trends have been studied. These reveal that if corrective measures are not taken, Delhi would grow rapidly to become still more un-manageable, with perhaps a population of hundred lakhs by the year 2000 A.D. Most of this growth would be at the expense of the regional towns. This imbalanced growth is fraught with frightening social and economic consequences. On the one hand is the limited holding capacity of Delhi due to serious constraints of land, water, transport, power and the enormous high cost of developing a metropolitan city like Delhi. On the other hand there are a number of regional towns with enough growth potential which can be developed at lower costs and a more satisfying social pattern of living. A choice has to be made now. However, neither Delhi nor its Region can grow in isolation. This calls for a national spatial development strategy which should be put in operation outside the NCR, whose central theme should be decentralization of economic activity to check the rural exodus. To facilitate this, the development of linkages between metropolitan cities, medium sized towns and the rural hinterland is of the utmost importance.

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3.2 The strategy of urban development in the NCR recommended by the Regional Plan is to keep within manageable limits both the population and area of Urban Delhi, so that recourse does not have to be taken to either too much of horizontal expansion requiring too much of land and long service lines, or very high density and high-rise development requiring sophisticated technology and organisations and a pattern of living socially not acceptable. What is recommended is to build a compact urban structure in Delhi for a population of 53 lakhs by 1981. To enable this to be done, population concentration has to be purposefully diverted to seventeen regional towns along the radial corridors identified in the Regional Plan. These have to be well connected to Delhi by diesel/electric, railway and express-way road system and direct dialing telephone services. These towns, which could accommodate about 31 lakhs by 1981, are not to be mere ribbon developments along highways without social cohesion but are envisaged as compact towns with medium densities, more or less self-contained in matters of work places and residences but having intense trade and commerce and social and cultural relationship with Delhi. They will also have to have circumferential transport connections which will open up the entire Region, encourage inter-action amongst the towns and prevent a major transport bottleneck at Delhi. The agriculture revolution in the NCR presents the possibility of development of 'growth centres' all over the rural area and could accommodate about 8 lakhs of population by 1981 out of the 93 lakhs

estimated in the urban sector. These will have to be identified as 'central place' villages and towns in a functional hierarchy of settlements and adequate infrastructure including road linkages are to be provided to service the surrounding rural hinterland, wherein by 1981, about 118 lakhs of people will live constituting 56% of the total population of 211 lakhs estimated for the Region. This will build up the human settlement structure and environment from bottom upwards to keep the pace of the rural-urban continuum and promote an industrialisation of the Region with a stable urban structure that can truly benefit from the dynamic growth of the National Capital. Thus restructuring of the settlement pattern will have a great impact on social living and provide a major break-through in metropolitan and regional planning, which if successful at the micro level can well be followed in the wider macro level of the entire country now confronted with the bug bear of gigantic cities. But success will depend on the extent concerted and coordinated action is taken to restructure the economic base and the transport network of the NCR.

4. Selective Dispersal of Economic Activities in the NCR:

4.0.1 The NCR with a total population of about 211 lakhs and an urban population of 93 lakhs by 1981 would have a total working force of 80 to 84 lakhs out of which 31 to 33 lakhs would be in the Urban sector. The

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success of the Regional Plan will lie in the creation of jobs in the various occupations in a balanced manner so as to lend stability to the economy, as well as take advantage of the dynamic quality of the urban concentration in and around the National Capital. The endowments of the Region have to be exploited to their maximal potential. These are human resources, material resources, mainly agricultural, and social and physical resources which include a good communication network. While strengthening agriculture, secondary and tertiary activities will have to be promoted in order to provide job opportunities. National policies and the overall interest of the Region suggests that action should be taken to put a curb on the concentration of jobs in Delhi and to make a selective dispersal and decentralisation of economic activities.

4.1 Development of Agriculture:

4.1.1 Agriculture forms an important part of the economy of the NCR. Roughly 85% of the total area of the Region is used for agriculture and its allied activity; and 65.6% of the total population of the Region lives in rural areas. Agricultural development in the Region is not even. From an analysis, the NCR can be broadly divided into three areas from the point of view of agricultural development. The strategy for development in each of these areas may be different. The areas of comparatively higher level of agricultural development are recommended for urbanisation,

growth of non-agricultural activities and modernisation of agriculture. The development of growth centres, in the form of small towns, well linked with the surrounding villages and important towns of the Region may be done on priority basis. Tehsils included in this area are Sardhana, Baghpat, Meerut, Hapur, Ghaziabad, Mawana, Rohtak, Gohana and Panipat. The areas of average level of agricultural development are recommended for development of agriculture and urbanisation side by side. Increase in irrigation in this area may lead to change in cropping from coarse cereal to fine cereal and cash crops. There should also be emphasis on provision of economic and social infrastructure for the development of growth centres and central place villages. Tehsils included in this area are Anupshahr, Rewari, Sonapat, Bulandshahr, Gurgaon, Behror and Jhajjar. The areas of comparatively low level of agricultural development, in the first instance, are recommended for the development of agriculture. Tehsils included in this area are Mandawar, Nuh, Kishangarh, Sikandrabad, Ballabgarh, Khurja, Alwar, Tijara, Palwal, Ferozepur-Jhirka and rural areas of the Union Territory of Delhi. Development of central place villages and road links connecting them to the basic villages and to the State highways and Districts Roads should form an integral part of agricultural development.

4.1.2 Forest forms a meagre proportion of the total area in the Region. The area under forest in the Region should not only be protected jealously, but efforts should be made

to increase this area as far as possible, especially in the south-west of the Region under the influence of the Rajasthan desert winds. Emphasis should be laid on dispersed forests wherever possible. Systematic attempt should be made for the growth of a large number of trees on community land in each village. There should be plantation of trees in multiple rows on the major road net work and canals in the Region. Land not available for cultivation is increasing at an average of 2,500 hectares per year mainly due to urbanisation. The rational and planned use of land for non-agricultural purposes thus becomes a matter of primary importance. Land not available for cultivation is also conspicuous in a few tehsils where urbanisation is low but barren land is high; these tehsils need special attention in agricultural planning. Uncultivated land in the Region is largely noticed in the tehsils of Jhajjar, Panipat, Bulandshahr, Khurja and Alwar. Since bulk of this land is being utilised for grazing purpose, it would be appropriate to develop pastures. However, certain water logged and saline areas in Jhajjar and Panipat tehsils are suggested to be reclaimed for cultivation. Net sown area which forms the highest proportion in the Region need to be protected as far as possible. Land subject to floods which is to the extent of 7,21,721 hectares, constituting 24.15% of the total area in the Region, may be fully utilised after adopting flood control measures.

4.1.3 Around 50 per cent of the net sown area in the Region has assured irrigation. The U.P. Sub-region has comparatively better irrigation facilities. Many schemes to improve irrigation in the Haryana Sub-region have been envisaged in the Fourth Five Year Plan. These include Rewari lift scheme, Beas Project, Gurgaon canal project and installation of tubewells in many places. Others like the Keshau Project are under consideration. Construction of tanks to collect rain water in water logged areas of the Region, provision of power and easy credit facilities to the farmers are very important for extension of irrigation facilities in the Region.

4.1.4 The Region has a large cattle wealth. Cattle and buffaloes alone constitute 80% of the total livestock in the Region. To meet the increased requirement of milk in future, various measures to improve animal husbandary and fodder supply are necessary. In addition to this, planned dairies in the Region should be installed. Sheep and goats are available in good number in the Rajasthan and Haryana Sub-regions and Panipat has developed a wool industry. Co-ordinated development of sheep and wool industry is, therefore, possible in the Region. Development of piggery and poultry also has much scope in the Region.

4.1.5 Main crops of the Region are: Wheat, bajara, jowar, barley, sugarcane and oilseeds. The Region is not found self-sufficient in its cereal requirements. It is estimated that by 1981 requirement of cereal will be between

3,082 to 3,688 thousand metric tonnes; as against this, the production of cereals in 1981 is estimated at 3,017 thousand metric tonnes. Thus there would be a deficit of cereals in the Region between 65 to 671 thousand metric tonnes. This can be wiped out through crop planning, better irrigation facilities, use of fertiliser and H.Y.V. seeds.

4.1.6 The rural part of the NCR is showing clear signs of its inability to provide gainful employment to its fast growing population. Those who find it difficult to make a living in villages mostly migrate to Urban Delhi. It has been estimated that about 71 percent of the total migrants from the rural parts of Bulandshahr, Rohtak, Gurgaon, Karnal, and Alwar districts have gone to Urban Delhi in 1961. Since there is not much scope of bringing additional area under cultivation in the Region to provide job opportunities to the increasing number of unemployed, it is important to plan for alternative economic activities for the majority of the surplus rural population. The following important activities which can generate employment should be under-taken. To facilitate this process, rural electrification and provision of banking facilities are important.

Agricultural mandi towns: Such towns channelise surplus rural produce to urban areas and urban consumer goods and agricultural inputs to rural areas. These places are expected to flourish more in those parts of the Region which are agriculturally better

off, such as Sardhana, Baghpat, Hapur, Meerut, Ghaziabad, Mawana, Palwal, Rohtak, Gohana and Panipat tehsils. Emphasis in these tehsils should be on providing the social and economic infrastructures. In other areas efforts in the first instance should be made for the development of agriculture and livestock.

Supply centres of milk, eggs, fruits and vegetables: These centres also have a good potential of growth in the NCR. Many of these are related to some existing towns of the Region and will provide impetus to their faster growth. Important vegetable centres in the Haryana Sub-region are: Kharkhoda, Sonapat, Behadurgarh, Panipat, Palwal, Sonapat, Gurgaon, Faridabad and Ballabgarh. Many of the large towns in the U.P. Sub-region also act as vegetable supply centres. In addition to these, there are 16 milk collection centres of the Delhi Milk Scheme. The development of all these centres would induce economic activity in the Region. Organisation of agricultural marketing through co-operatives can play a crucial role in meeting the growing demand for perishable goods for urban areas.

Agro-based industries: There are around 229 registered agro-based industries in the Region. Most of these are located in important towns of the Region. A few sugar mills, however, are located in the rural areas of the U.P. Sub-region. Expansion of agro-based industries especially in the small towns of the rural areas would create employment opportunities. These industries are: sugar

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and sugar based industries, edible oil, cotton ginning, processing, conversion and storage of other agricultural produce, industries based on animal husbandary and forest produce and the manufacture of agricultural implements.

Growth Centres: Rural development process may be stimulated through centrally located growth centres in various parts of the Region. These may be considered in three tiers of hierarchy. On the bottom there could be centrally located villages serving cluster of village communities; in the middle these would be usually towns or large villages; then on the top there are the large towns of the Region, and the metropolis. Main emphasis for rural economic development will be on the first two levels, especially on the middle level which should be planned to provide a college, bank, post and telegraph office, dispensary, cinema, planned market, community centre, industrial sheds/estate, planned bus stand and adequate water and power supply. All these centres should have effective communication links with each other and with the villages. There are 49 towns in the NCR which perform certain important economic and service functions. These are well dispersed in the Region, (except in the south-west). With the average density of the Region at 251 persons per sq. km., many of these towns may act as growth centres and serve an area of 400 to 600 sq. kms. and a population varying from one to one and a half lakhs. Besides these, a few more large villages particularly in the south-west may be selected and developed

as growth centres. However, selection of growth centres, in these two tiers may be made after conducting detailed surveys, as part of the sub-regional plans. Such integrated approach in rural planning would result in balanced development of the Region. On the top, 17 large towns of the Region have been identified in the Regional plan, and have been proposed for development to specialise in certain economic activities to the larger hinterland.

4.2 Industrial Policy in the Region:

4.2.1 In 1961 in the NCR, there were 3 lakh workers in 'manufacturing industries' and 3.1 lakh in 'household industries'. There were 2.6 lakh house-hold industrial workers in the rural areas, where as there were 2.2 lakh manufacturing industrial workers in the urban areas, showing the predominance of the two types in the two areas. Delhi and 17 important towns accounted for 2.7 lakh workers in the total industrial sector, of which 1.6 lakhs were concentrated in Urban Delhi, industrial workers constituted 22.4% of the working force. In the 17 towns they ranged from 5.4% to 72.5% with an average of 22.4%. Towns with more than 25% of the working force in industries in 1961 were: Meerut, Ghaziabad, Panipat, Faridabad, Sonapat, Khurja, Rewari, Sikandrabad and Modinagar. In 1968 Delhi had 76,600 workers in 'registered sector' industries. Faridabad-Ballabhgarh with about 27,000 workers in the

in the 'registered sector industries', Ghaziabad with 12,800 and Modinagar 12,200 were the three towns in the NCR with a large industrial base. The Regional Plan advocates an industrial policy to disperse industrial activity with a view to not only maintain the National Capital character of Delhi but also to provide balanced development of the Region.

4.2.2. The Industrial policy for the Region should take into account the impact of the various proposals made in the Regional Plan regarding settlement pattern, transport structure, and agricultural development. Moreover, it should be an integrated policy for the NCR as a whole and should be pursued at the sub-regional level so as to effectuate the broader objectives of the Regional Plan. It should have the twin objectives of fostering rapid industrial growth and achieving balanced development of the Region. There should be a definite attempt to change the basic character of the regional economy of the NCR from agricultural and pre-industrial to a more diversified one in order to raise the earning capacity of the people. By 1981 nearly 44% of the population would be living in urban areas. This would entail the creation of more jobs in non-agricultural occupations than at present. For this purpose there should not only be an injection of additional activities in existing and new centres outside Urban Delhi but also development of agro-based industries in the rural areas in order to support urbanisation on the one hand and to stabilize the rural economy on the other.

4.2.3. In the Region, land is generally good for agriculture and hence selection of sites for industries should be done judiciously. There is a general shortage of potable water in the Region and paucity of power is also a factor to be reckoned with in the future. These should be considered in the location of heavy industries in the Region since these are the prerequisites for the location of such industries. Also, since the Region is getting to be highly urbanised, the location of noxious industries in the Region will have to be under controlled conditions. But on the other hand, consumer and service industries are suitable for location in the Region because of the availability of transport network, large markets and skilled labour.

4.2.4. In Urban Delhi, the Master Plan industrial policy of exclusion of large scale and heavy industries from developing and shifting of non-conforming industries either to new industrial areas of the city or to the 'ring towns' of their choice should be more vigorously pursued. But those industries required for feeding and servicing the population envisaged, as well as to provide adequate employment without in any way changing the basic character of the National Capital should be given every encouragement. On the other hand the policy of dispersal of industries has to be effected over a wider area of the NCR. Some of the 'ring towns' such as, Faridabad, Ghaziabad, Modinagar, Sonapat and Bahadurgarh have shown a great spurt of industrial acti-

vity. These should be consolidated by providing housing, community facilities and developing other sectors of the economy because the present imbalanced growth if allowed to accentuate will retard further industrial growth in these towns. Twelve other regional towns have been identified as having good potential for growth, many of which are suitable for intensive industrial development. Moreover new focal points may also have to be developed based on sound criteria in order to reduce the disparity between the developed and undeveloped areas of the Region. A suitable programme of development of industries and industrial housing has to be drawn up by the concerned State Governments for the optimum development of the Region as a whole.

4.2.5 In Urban Delhi, small scale industries have to be encouraged. In Narela, Faridabad-Ballabgarh, Sonapat, Panipat, Meerut, Ghaziabad, Modinagar, Khurja and Alwar, medium and large scale industries may be encouraged with the proviso that in some of them the further rapid growth should be attempted only after consolidation of the present growth. In Hapur, Bullandshahr, Sikandrabad, Rohtak, Gurgaon, Bahadurgarh, Rewari, Palwal and Khairtal, some small scale industries are already thriving due to one reason or other. These may be encouraged and new ones started. However, these are not mutually exclusive fields or areas but there should be a fair mixture of both small scale and medium scale industries in each town. In order to diversify the economy of the rural areas development of agro-based industries

in an organised manner has to be encouraged in rural areas especially 'central place' villages and small towns with growth potential thereby reducing the disparities in the level of economic development between the rural and urban areas.

4.2.6 The regional transport programme envisages, not only better road and rail connections between Delhi and the regional towns, but also inter-linking of the towns themselves. A phased programme of converting the metre gauge to broad gauge, first up to Rewari from Delhi and then further beyond has also been proposed. All these would help in industrial development. Railway booking for goods is now done at Delhi. In the first instance such centres like Ghaziabad, Faridabad, Sonapat and Partap Pur near Meerut should be provided with these facilities as also railway sidings for bigger industries and industrial areas.

4.2.7 There is a need for streamlining not only the fiscal and other incentives given by the various State Governments but also the tax structure for industries and industrial products in the NCR. It should be also possible to rationalise the octroi and other taxes in Delhi and in the various towns for the mutual benefit and in the overall interest of the Region. This will also enable a free flow of goods and encourage industrial development. There are other aspects to this matter, such as, the liability of industrial firms to pay taxes depending on the location

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of their registered head offices. These and other related matters of mutual interests should be sorted out by an Industrial Co-ordinating Committee of the States concerned. This Committee could also undertake feasibility studies for the location of different types of Industries at suitable industrial centres, in order to assist private industries in their locational decisions which at present are based on insufficient data. It could also lay down minimum standards of development and for providing basic amenities in industrial areas, such as, godowns, transport booking office, telephone, post and telegraph facilities etc.

4.3 Selective Decentralisation of Wholesale Trades:

4.3.1 In the NCR the development of Trade and Commerce is of a higher order as compared to the country as a whole. In the Urban areas of the Region, Trade and Commerce provided employment to 19.5% to the working force in 1961. While the figure for Delhi was 19.36%, it varied from 8.61% to 27.23% in 17 important towns of the Region, Rohtak, Khurja, Bulandshahr, Rewari and Palwal had more than 25% of their working force in Trade and Commerce. However, facilitated by the transport network, large scale godowns facilities, availability of large investment and a ready consumer market, Delhi's wholesale trade has a dominant role in the whole of northern India. This inhibits the growth of Trade and Commerce in the Region. The imbalanced growth and the

continuing concentration has to be met by determined corrective action.

4.3.2 In Delhi there are above one lakh persons now working in the wholesale trades. The wholesale markets located mostly in the Old City have reached a stage when dis-economies have begun to appear. The transport structure under the strains of congestion and bottleneck is gradually being decentralised. The Regional Plan has proposed a new transport structure not only to by-pass Urban Delhi with a view to avoid the bottleneck but also to open up the Region. Regional Policy requires that the tax structure as well as allied measures should be adopted to effect decentralisation of selected wholesale trades from Delhi.

4.3.3 In certain trades the 'trade transaction' should continue to be located within Delhi, whereas 'material handling' such as, warehousing should be shifted to suitable regional towns. After careful depth studies, based on criteria for the healthy development of the trades as well as in the overall interest of the Region, selected trades may also be decentralised from Delhi. In Delhi itself trades performing urban functions as against a regional function should be allowed to expand by improving their working conditions, as part of 'urban renewal' of the Old City. In the regional towns infrastructure should be provided to facilitate the growth of wholesale trade in such fields as food and vegetables, dry fruits, spices

and herbs, cloth trade, hosiery, bicycle trade, motor parts and machinery, iron and steel and fuel oil. Existing markets in the regional towns in food-grains, timber, furs, skin and wool, fodder, pulses, drugs and pharmaceuticals, surgical instruments and agricultural implements should be strengthened. In addition to the development of suitable markets in the regional towns, adoption of mutually beneficial fiscal and other measures will go a long way in the decentralisation process.

4.4 Government and Quasi-governments Office Employment:

4.4.1 In 1961 Delhi had about 160 thousand workers in public sector Offices, which constituted 18.7% of the working force. This has risen to an approximate figure of 21.7% by 1967. Employment in all Government and Semi-government Offices has risen from 2.32 lakhs in 1961 to 3.62 lakhs in 1967 which constituted a rise from 3.3% to 3.8% of the All India figure. Considering only Central Government employment in Delhi, it increased from 6.9% in 1961 to 7.4% in 1967. But if the Railways and Post and Telegraphs are excluded, the percentage of Central Government employment concentrated in Delhi in 1961 was 22.3% of the All India figure. The Delhi Master Plan had recommended that there should be a decentralisation of Central Government Offices from Delhi and that some of the offices that have to be in Delhi can function from the 'ring

towns'. The rising crescendo of in-migration to Delhi caused by the 'multiplier effect' of concentrating such a large number of employment in the Central Government has to be checked and a policy of decentralisation has to be followed.

4.4.2 The policy of decentralisation has not met with much success in the past. From 1961 to 67, there has been an increase of 1.4 lakh employment in the Government Sector in Urban Delhi. The total employment in Faridabad is about 2,000 workers and in Ghaziabad about 1,400 workers, whereas about 50,000 workers were to have been decentralised in the 'ring towns' by 1981 according to the Delhi Master Plan. This requires a more vigorous implementation to effectuate the policy of decentralisation. Decision in this regard has to be taken at the highest level by the Union Government. For this purpose a Cabinet Sub-Committee may be set up. This is a continuing task and the Cabinet Sub-Committee should be assisted by a small Committee of Secretaries in the Cabinet Secretariat with the object of shifting selected offices and putting a restraint to the extent possible on the expansion of the existing and the setting up of new Central Government and Quasi-government offices in the Capital.

4.4.3 Some offices which have to have day to day contact with the main Ministries could be located in the 'ring towns'. The land acquired for this purpose in Ghaziabad 380

hectares and Faridabad 90 hectares should now be fully developed and Government offices and residential units should be built with a definite programme to shift some of the existing offices and to cater to the needs of new offices. Further, additional land to the extent of 160 hectares may be obtained in Faridabad and developed in accordance with the Master Plan for Faridabad. Besides this, programmes may also be drawn up for locating Central Government offices in the other towns of the NCR such as Gurgaon, Ballabhgarh, Sonapat, in Haryana and Hapur and Meerut in Uttar Pradesh.

4.4.4 City Compensatory Allowance, House Rent Allowance, and Central Government Health Service facilities should be extended to all these towns within a radius of 65 kms from Delhi, so as to make living in the 'ring towns' more attractive and to give a fillip to house building activities in these towns.

5. Restructuring of the Transport Structure:

5.1 Transportation has played a major role in accelerating the rapid growth of Delhi in the past. Its role in any future restructuring of economic activity in the NCR to achieve regional goals will be of vital importance. An analysis of the existing transport system reveals increasing traffic bottleneck, both intra-urban and inter-regional, at Urban Delhi, lack of transport links between areas east and west of the river Yamuna, as well as among the regional towns, and growing inadequacy of facilities for movement of

passengers between Delhi and the regional towns. All these call for a strategy to restructure the transport network in a manner that can effectively meet the future demands of the Region.

5.2 The prerequisites for a sound transport structure for the NCR is a physical plan for human settlement with a system of road linkages between the mother city, the regional towns, the 'central place' villages and small towns and the clusters of basic villages. The web and lattice road pattern recommends itself to accomplish this linkage. Development of north-south and east-west expressways, development of inner and outer grids involving the construction of bridges over the river Yamuna and construction of some missing road links and integration of the intra regional road network with the intra-urban network of Delhi and other urban centres are recommended in the Regional Plan.

5.3 Interim measures to optimise the existing rail network have to be expeditiously undertaken. Long term measures for Railways in the NCR include doubling, dieselisation and electrification of all regional rail route sections; a new line to by-pass Urban Delhi by way of Khurja, Palwal, Rewari, Rohtak and Panipat; a new railway marshalling yard at a suitable location south of the by-pass line; development of a mass transportation system for Urban Delhi and its integration with

the intra-regional rail network; and conversion of the Delhi-Ahmedabad metre gauge line to broad gauge.

5.4 Transport planning in the NCR should be on an integrated basis, with taxes, laws and restrictions on the movement of commodities being equalised or at least rationalised for the mutual benefit of the three concerned States and the Union Territory of Delhi. Similarly, functional and project plans have to be drawn up after surveys and studies, with alternative alignments of highways and cost benefit analysis. The development programme given in the Regional Plan will have to be implemented by the various agencies in a co-ordinated manner to obtain maximal benefits.

6. Regional Land use Policies and Legislative Measures:

6.1 A clear enunciation of a land use policy for the Region has been advocated by the Regional Plan in the face of competing demands for land by agriculture on the one hand and urban uses on the other. There are various factors in operation which are a cause of change in the use of land for agriculture. A rational policy has to be pursued, such as, utilisation of land available for agriculture by means of irrigation, reclamation of land by flood protection works, and most important of all improvements and modernisation of agricultural production itself.

6.2 Within the overall urbanisation strategy envisaged by the Regional Plan, steps recommended to rationalise the use of urban land are of great importance. Especially, there should not be haphazard development of land for industry, which should form an integral part of urban centres, where adequate housing and other community facilities have to be provided. Residential densities in Delhi, as well as in other towns of the Region have to be optimised, as they have a significant bearing on lessening the demand on agricultural land and lowering the cost of urban development which would lend economic support for the policy of dispersal. Since only public agencies can take up large scale urbanisation, land should be publicly acquired and developed and for this purpose suitable agencies will have to be set up. Measures have to be initiated to prevent large scale despoilation of land, air and water. For this purpose organisations charged with the quality control of water supply and sewage disposal and industrial nuisance control will have to be set up. Standards and regulations on a uniform basis for the whole Region will have to be drawn up and enforced. Provision of large recreational areas, together with preservation of existing flora and a vigorous afforestation policy would provide the needed environmental freshness.

6.3 While recommending the creation of a statutory Regional Board as the next step, the Regional Plan suggests ways and means of using the existing legislative framework and

Organisational set up. Several measures for the prevention of speculative and unauthorised sub-division of land have been suggested. But the more important task is to make the 'Planning and Implementation Committee' of the present advisory 'High Power Board' an effective instrument in co-ordinating the preparation of functional and detailed plans in conformity with the Regional Plan and their implementation. The Committee should also make efforts to incorporate the detailed plans in the State Five Year Plans and Annual Plans and provide the funds by treating this Region as a 'special area' requiring more than ordinary accommodation on the part of the Planning Commission, Ministries of the Government of India, as well as the State Governments..

7. Coordinated and Integrated Development of Regional Services and Facilities:

7.0.1 Integrated and co-ordinated development of housing, water supply for drinking purposes and irrigation, flood control and regional drainage, power supply and regional recreation and community facilities within the broad regional framework are necessary to maximise development in the NCR.

7.1 Drinking Water Supply:

7.1.1 Water supply for drinking purpose is a critical factor in this development and it is imperative to draw up a long range programme for the development of the sources of

water supply such as, the Ramganga Project the Beas-Sutlej Link Project, Dhauj Kot Water Reservoir Project and the Keshau Project. There are other sources like tubewells, which may yield water to the smaller towns (and to the bigger towns for the interim period) but as a long term measure the available sources of water supply have to be developed & efficiently distributed on a unified basis between Delhi and the towns of the Haryana Sub-Region to the east of the river Yamuna. Supply of water to the towns west of the Yamuna in Uttar Pradesh should also be co-ordinated. The requirements of drinking water for the NCR have been assessed at about 2700 million litres per day by 1981 with 225 litres per capita per day assessed for Urban Delhi, 181 litres for the Regional Towns, and 68 litres for the rural abadis. Adequate funds for this programme have to be made available to begin with in the Fourth Five Year Plan and thereafter in subsequent plans.

7.1.2 It would be necessary to set up an Authority or a Board to plan, design, implement and maintain all water supply and sanitation scheme in an integrated manner for the National Capital Region with suitable powers to execute the plan in a phased manner. The Board should also ensure purity of drinking water supply by preventing water pollution which is tending to become a regional problem. Adequate treatment of industrial wastes and human sewage before disposal, protection of

fish in reservoirs, lakes and rivers are some of the other tasks to which the Regional Board should pay attention.

7.2 Irrigation:

7.2.1 In the NCR about 50% of the cultivated area is served by irrigation with the help of canals, wells and tubewells. At present the canal system which is well established irrigates nearly 46% of the total irrigated areas and the remaining 54% by wells, tubewells and other means. Meerut and Bulandshahr districts have more than 75% of the cultivated area under irrigation. But in the rest of the Region irrigation facilities are inadequate due to various reasons. A number of schemes, some of them continuing ones are being implemented; the major ones being the Ramganga Project, Remodeling of the Western Yamuna canal, Gurgaon canal, Beas I & II projects, the Bhakra Nangal project.

7.2.2 In large parts of the NCR, irrigation is available for only one crop. If adequate irrigation facilities are made available, potentialities of multiple cropping are great. Hence a perennial irrigation system is the prime need of the Region. Augmentation of the present water supply, as well as an improved irrigation network, economic use of water, both in the distributory system and by the farmers and the development of a cropping pattern best sui-

ted to the available water and other factors are essential elements in the irrigation development of this Region.

7.3 Drainage and Flood Control:

7.3 The NCR comprises ~~of~~ three major drainage zones viz. The Yamuna, the Ganga and the Najafgarh Drain. The depressed low land being drained by the Najafgarh drain presents a major problem as it comprises 44% of the three drainage basins of which 29% are subject to floods. The area subject to floods in the Yamuna drainage basin is 31.5% and in the Ganga 21%. The extent of the floodable areas and the annual damage caused, failure of the past efforts which were mainly piecemeal planning and interim relief measures and the inter-state nature of the problem calls for a comprehensive study and the preparation of a Master Plan for improved drainage and flood control measures in the NCR. A separate agency may be entrusted with the work of finding a permanent solution to the chronic flood problem of the NCR.

7.4 Power Supply:

7.4 At the moment, the overall position of power supply in Delhi and other urban centres within the NCR seems to be satisfactory, though there are breakdowns, low voltage and restrictions on new connections and problems of distribution. For the proper development

of the regional economy, it is very necessary to assess the availability of power resources, their exploitation and their present and future utilisation within the Region. In view of the higher growth rates envisaged not only for urbanisation but also for industries, agricultural production and allied economic activities, the need for development of adequate future power supply within the NCR is a matter requiring urgent consideration. Also power transmission layout plans to adequately meet the requirements of the Region in the various sectors as envisaged in the Regional plan will have to be worked out and implemented in a phased programme.

7.5 Housing Development :

7.5.1 There is a tremendous back-log of housing in the NCR. With the average size of households diminishing, the total number of new housing units for a population 211 lakhs in 1981 would be of the order of 23 lakhs of which 60% would be in the urban sector and the rest in the rural sector. This would require an annual programme of more than one lakh houses per year. With other economic activities competing for priorities, housing development will have to be maximised within the resources available.

7.5.2 Housing development in the NCR should be used as an important tool in guiding urbanisation and accelerating economic development. The overall policy should be

to relieve the housing shortage in Delhi, especially in the low-income group; in the seventeen priority towns a more vigorous housing development should be dovetailed with efforts to create new employment opportunities and decentralisation of economic activity away from Delhi; in the rural areas instead of spreading housing too thinly it should be located in 'growth centres' where it would act as a catalytic agent and make an impact on the economy. Technological progress in housing may effectively be used in reducing the housing cost. The funds that may be made available by the Housing Finance Corporation recently set up by the Government of India and other financial agencies as well as allocation from the Five Year Plans should be used as a Revolving Housing Development Fund by the various Sub-regions on an unified basis and as part of a phased programme of regional development. Only then can quick results be achieved.

7.6 Regional Recreation Facilities:

7.6.1 In view of the rapid development and increasing urbanisation of the Region both from the environmental and need point of view, the provision of regional recreational facilities assumes great importance. The Regional Plan has identified a number of historical monuments, natural and scenic areas both existing and potential, forest land, river fronts etc., for development

as a regional facility. It is necessary to conserve the existing flora and fauna in extensive park areas and develop them to provide for the physical and social needs of the people. Afforestation, planting of trees along canals and highways and protection of rivers and lakes from pollution will help in ensuring the freshness of the environment.

7.6.2 Park development agencies should be set up by the concerned State Governments which should make surveys and studies on requirements of recreation and draw up a comprehensive recreational plan to develop facilities in a phased manner. Zoning regulations and administrative action should be made use of to prevent land required for recreation being misused. The required land should ultimately be acquired. Funds for regional park development should be made available from the State Five Year Plans. To supplement these funds, steps should be taken for enhancing revenue from parks and recreational facilities. The help of other agencies, especially of tourism, should be sought in building up the infrastructure necessary for a system of regional recreational facilities.

7.7 Regional Community Facilities:

7.7 Community facilities when provided on a regional basis would not only be more viable but will also constitute the basic socio-cultural infrastructure of the Region. At present Delhi offers a wide variety of these facilities. In keeping with the

Regional Plan objective of a balanced development and a self-sustaining community life, universities, professional and technical colleges, hospitals, markets and shopping centres should be provided in suitable towns of the Region to cater to the needs of the various sub-regions.

8. Development Programme and Priorities:

8.1 The urban concentrations in and around the National Capital display great vitality and hold the potential for tremendous growth. These have to be channelised into orderly growth and balanced development of the Region. The Regional Plan has therefore, envisaged the dispersal of population growth and economic activity over a wide area. The NCR has to be planned as a composite unit. Past experience makes it imperative that there should be coordinated and synchronous action to develop both the physical and economic structures to achieve maximum results. This can only be done if inter-related development programmes are implemented in a time scale.

8.2 In metropolitan region, such as the NCR, urban development programmes are the most crucial and have to be given the highest priority. The strategy here is to develop urban centres along the radial corridors, generally the centres nearer to Delhi in the first phase, and the further away ones in the latter phases. But what is equally important is to

develop the related communication network and the bulk services and facilities to ensure that economic growth will take place hand in hand with urban and housing developments. In the Regional Plan, agricultural development is given importance as it will support industrialisation and urbanisation.

9. Long Range Perspective and the Next Steps:

9.1 The Regional Plan has a ten year perspective and is advisory in nature. But in a dynamic metropolitan region, it would be necessary not only to have a long range perspective but also to institutionalise the planning process. The present drift in the field of regional and urban development has to be corrected and a new shape and direction given towards a more desirable pattern of metropolitan growth in which gainful employment has to be provided in the various sectors. The magnitude of the problem can be gauged by the fact that by the year 2000 A.D., the MCR is likely to have a population of 320 lakhs with 50% living in urban areas. There would be many and varied demands on the metropolitan economy which makes it necessary to maximise growth and conserve resources. But equally important is the constant review of the relationship of the mother city, the other urban centres and the rural areas: Moreover, the regional plan should respond to the changes in the economic growth, social values and technological capabilities. The compulsions are easy to see, namely, the institutional and organisational set up necessary for this task have got to be created soon.

9.2 The metropolitan organism in the Region is beset with many problems but before long it is likely to get more complex, presenting a continuing challenge which can only be met if legislative backing is given to plan making, enforcement and implementation. What is recommended as the next step is the setting up of a National Capital Regional Planning Board charged with the responsibility of promoting orderly growth, proper use of land and balanced development of the Region. The coming decade should be one of development and the key to its success is the provision of funds to the Statutory Board. The metropolitan economy cannot be given direction without financial investment in the critical sectors at the proper time in order to decisively influence it. Thus it is imperative to provide both legislative and financial support to the Plan. Only then can the benefits of planning be fully realised and the maximal welfare of the people achieved. This is a consumation for which the next steps have to be taken now - the building up of a new metropolitan structure - physical, social, economic, financial and institutional.

CHAPTER - I.

THE STATE OF THE NATIONAL

CAPITAL - DELHI.

Population Growth:

Very few cities in India or for that matter even in the world have grown so fast as Delhi, the National Capital of India. From 1901 to 1941, that is within a span of 40 years, the population had increased from 2 lakhs to a modest total of about only 7 lakhs. But between 1941-51 it almost doubled its population to 14 lakhs which was largely due to the influx of refugees after partition. Delhi's population in 1961 rose to 23 lakhs, recording an increase of 64% which was the highest growth rate witnessed for any metropolitan city in India. (Table 1.1., also see Map 1.1). During the decade it meant an addition of roughly 1 lakh persons per year to the population of the city. Estimates of post 1961 growth indicate a net addition of over 1.5 lakh persons per year and the present population of Urban Delhi is estimated at about 38 lakhs.

Factors Responsible for Rapid Growth:

The causes for this rapid growth are many and for a proper assessment of the problems resulting from this growth, it would be necessary to examine the factors that have contributed to this growth. As a National Capital, Delhi's influence extends throughout India and indeed throughout the world. In the performance of the capital functions, in addition to housing embassies, foreign missions and trading offices, Delhi has become the centre for a large number of cultural and/service activities. Employment in Government Offices, industry, trade and commerce have increased manifold bringing in their wake massive in-migration.

Table 1.1

Growth of Population in Metropolitan Cities:

Name of the City/Area	(Figures in Lakhs)			
	Population 1951	Population 1961	Population increase 1951-61	Percentage increase over 1951
Delhi Town Group	14.37	23.59	9.22	64.17
Greater Bombay (M.C.)	29.67	41.52	11.85	39.95
*Calcutta	31.32	34.40	3.08	9.82
Madras (M.C.)	14.16	17.29	3.13	22.11
All India Urban	622.77	788.36	165.59	26.58
All India	3610.88	4392.35	776.83	21.51

*Calcutta includes population of Municipal Corporation of Calcutta & Howrah Municipality.

Source: Census of India 1951-61.

Large scale migration: In the population explosion migration has played a dominant role in accelerating the growth of population in Urban Delhi. The contribution of net migration to the population growth of Delhi has always been more than that of natural increase; these being

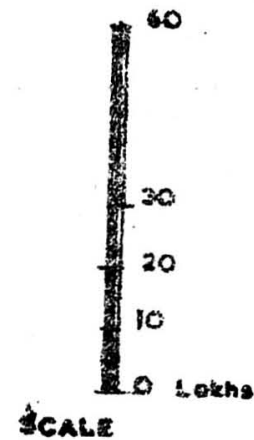
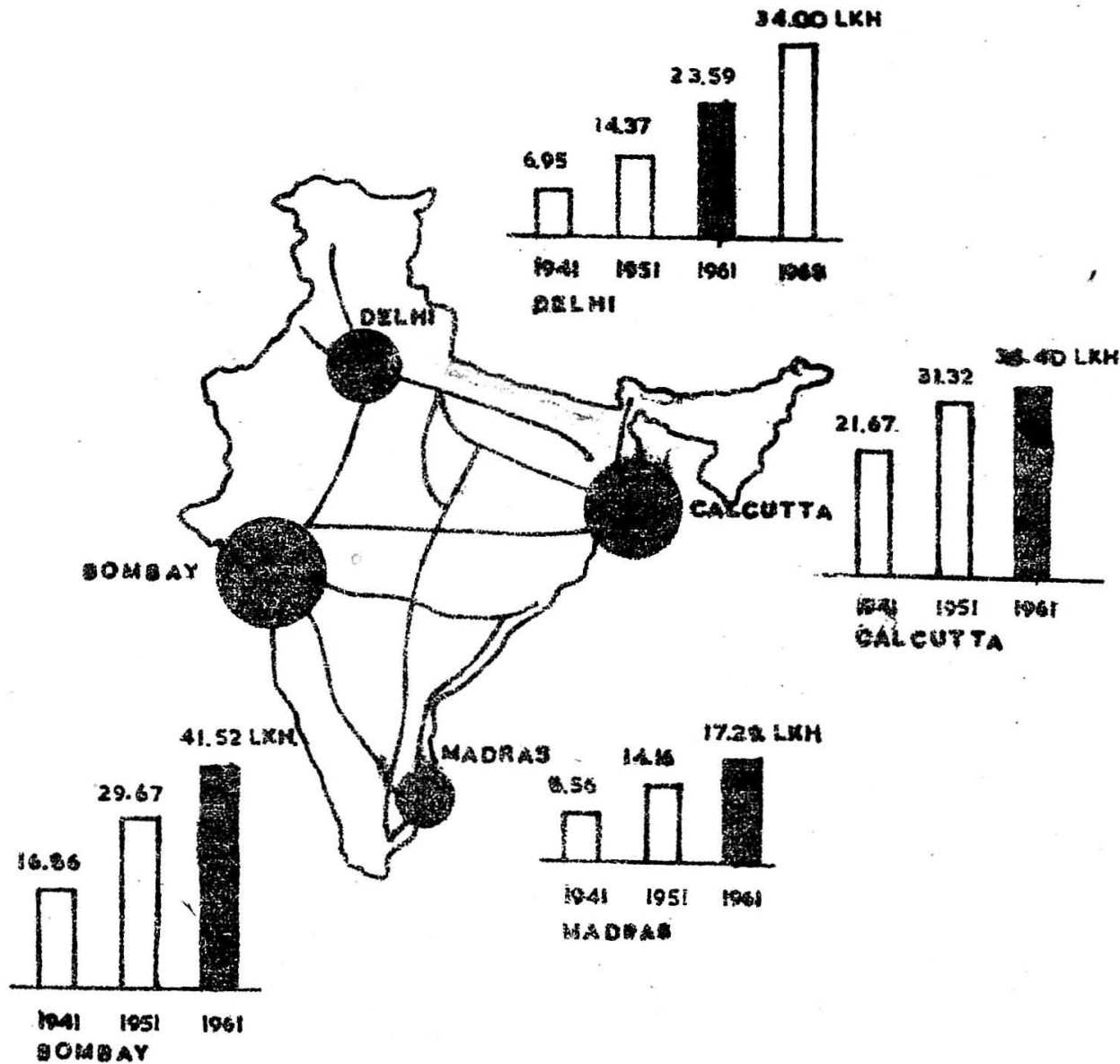
in the ratio of 60 to 40. It is estimated that in 1965 net migration was as high as 83,000 persons.

While no detailed study on migration is available an analysis* of the Census figures on migration reveal that in 1961 the total number of migrants in Urban Delhi from the rest of India was 8.98 lakhs. (Also there were 5.16 lakh migrants from outside India including Pakistan). Bulk of these were from the three adjoining States accounting for 87.20% of the total; the contribution of U.P. being 43.43%, Punjab including Haryana 33.38%, and that of Rajasthan 9.73%. Districts within a radius of 70 miles have been sending comparatively higher number of migrants to Urban Delhi and it is significant that 5 districts around Delhi have sent more than 26% of the migrants coming from the whole of India. (Table 1.2).

Job opportunities main cause of migration to Delhi: Migrants in the age group 15 to 34 constitute about 50% of all migrants whereas the percentage of this age group in the total population of Delhi is only about 37%. It also revealed that among the migrants less than 36% were illiterates as compared to 44% in the total urban population of Delhi. The largest number of migrant workers was in other services constituting about 48% of the total migrant workers, followed by those engaged in 'manufacturing industry' and 'trade and Commerce' etc.

*"A Diagnostic Study of Migration to Delhi", National Capital Regional Plan study by Town and Country Planning Organisation, 1969.

POPULATION GROWTH FOUR METROPOLITAN CITIES



Source: Census Of India
(1968 Estimated)

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H.F.P. W.H. & U.D.

Table 1.2

Migrants to Urban Delhi - 1961:

Sl. No.	Source of Migrants (Place of Birth)	Total Migrants (enumerated in Urban Delhi-1961)	Percentage to total
1	2	3	4
1.	From all places	1,414,432	100.00
2.	From outside India (including Pakistan)	515,993	36.48
3.	From within India	898,439	63.52
4.	Uttar Pradesh	390,226	(43.43)
5.	Punjab including Haryana	299,847	(33.38)
6.	Rajasthan	87,437	(9.73)
7.	Rest of India	120,929	(13.46)
	N.C.R. (estimated)	238,741	(26.57)

Note: Figures within brackets denote percentage of migrants from within India.

Source:- Census of India 1961, compiled by T.C.P.O.

each accounting for 19% of the total migrants workers. An important finding is that all the districts of the three States adjoining Delhi, having comparatively higher number of workers in the tertiary sector and larger urban and literate population, have sent larger number of migrants to Urban Delhi by 1961. Also districts in close proximity to Delhi which have comparatively higher per capita income have sent higher proportion of their people to Urban Delhi by 1961 than those which have relatively low per capita income and are situated farther away. Results of certain other studies also make it apparent that among the economic factors inducing migration into Delhi the job opportunities created by the expanding economy of Delhi is the most important. As stated earlier, net migration to Delhi in 1965 was about 83,000 and currently might have reached the one lakh mark annually.

Spurt of jobs in public offices in Delhi: The above findings lead us to a study of the economy of the districts adjoining Delhi as well as the economic base of the city. A recent study* of public sector offices in Delhi reveals that there has been continuing rapid growth of government office employment in Delhi. Delhi's share of public sector office employment in the All India employment

*"Growth Pattern of Public Sector Offices - Delhi and Environs" a National Capital Regional Plan Study by T.C.P.O. 1969.

increased from 3.3% in 1961 to 3.8% in 1967. If employment in the Railways and Post & Telegraphs are excluded, 22% of all Central Government office employment in India is located in Delhi. Taking all public sector offices into account (such as, Central Government, Delhi Administration, local bodies and public sector offices) employment increased from 2.32 lakhs in 1961 to 3.72 lakhs in 1968 of which 2.02 lakhs were in the Central Government offices alone. (Table 1.3). So within the short span of 7 years 1.4 lakh jobs were created in the public office sector, showing more than

Table 1.3

Employment in Public Services:

Sector	(Figures in Lakhs)			
	'Employment in 1961	'Employment in 1968	'Growth from 1961-68	'Percentage growth over 1961.
1	2	3	4	5
Central Government	1.44	2.02	0.58	40.27
Delhi Administration.	0.26	0.43	0.17	65.38
Quasi Government	0.22	0.40	0.18	81.82
Local Bodies	0.40	0.87	0.47	117.50
Total	2.32	3.72	1.40	60.34

Source: E.M.I. Unit, Employment Exchange Delhi State, Delhi. Compiled by T.C.P.O.

60% increase. These are reflected in the migration of urban and literate migrants from the hinterland as stated earlier. This in turn had its "multiplier effect" in creating other service jobs to cater for the public sector employees and their families bringing in rural illiterate migrants.

Growth of industrial sector: In 1951, 18.2% of the working force in Delhi was engaged in manufacturing and household industry. In 1961 this figure rose to 22.5% and there were 1,67,783 workers in the same category. (Table 1.4). Whereas in 1951 employment in registered factories was 50% of the total working force in manufacturing and household industry, it reduced to 39% in 1961 showing a predominance of the small scale sector. Thus employment in the registered sector industries increased from 42,000 in 1951 to only 60,000 in 1961 and is around 76,000 in 1968. This slow growth is partly explained by the policy decision in the Delhi Master Plan to discourage large scale and heavy industries from Delhi and proposals to shift non-conforming industries either to new industrial areas of Delhi or to the 'ring towns' of their choice, as well as the proviso of not allowing expansion of existing large and medium industries. Though the exact employment in manufacturing and household industries at present is not known, it is stated that in 1969 there were about 25,000 industrial units in the Union Territory of Delhi having risen from 8,000 in 1951 and 19,000 in 1965. This shows a big spurt in industrial employment, especially in the small scale sector. Currently, employment in the industrial sector is estimated to be even somewhat less

Table 1.4

Urban Delhi : Working Force Distribution 1951-61.

Category of Workers	No. of Workers			Percentage growth (1951-61)	Percentage new workers added 1951-61
	1951	1961	Difference 1951-61		
1	2	3	4	5	6
As cultivator. (I)	1,785 (0.3)	5,178 (0.7)	3,393	193.0%	1.5%
As agricultural labour (II)	295 (0.0)	1,242 (0.2)	947	321.0%	0.4%
In mining, quarrying, livestock, forestry, fishing, hunting, plantations, orchards, etc. (III)	1,835 (0.4)	5,446 (0.7)	3,611	196.8%	1.6%
In manufacturing including household industry. (IV + V)	93,792 (18.2)	167,783 (22.5)	73,991	78.9%	31.9%
In construction (VI)	57,048 (11.1)	32,540 (4.4)	(-)24,508	(-)43.0%	(-)10.6%
In trade and commerce (VII)	126,535 (24.5)	143,809 (19.2)	17,274	13.7%	7.4%
In transport, storage and communications. (VIII)	33,742 (6.6)	47,387 (6.3)	13,645	40.4%	5.9%
In other services (IX)	200,159 (38.9)	343,430 (46.0)	143,271	71.5%	61.9%
Total	515,191 (100.0)	746,815 (100.0)	231,624	44.9%	100.0%

Source: Census of India 1951-61.

than 22.5% of the working force, which was the figure in 1961.

The Master Plan for Delhi advocated that for a balanced economic growth 25% of the working force should be provided with jobs in manufacturing and small scale industries by 1981. This entails an industrial component of 4.40 lakh jobs in Urban Delhi by 1981 for a population of 46 lakhs. However, since the total population is heading for a higher figure it would be necessary to create more jobs in the industrial sector if Delhi is to attain some sort of balanced growth. The Delhi Master Plan made adequate provision of land for industrial growth. However due to failure to develop adequate sites in inlying locations for service and consumer goods industries, in addition to unauthorised industries coming up in residential areas, there is a tendency on the part of even small scale industries to locate in the 'ring towns'. The former is a threat to the orderly growth of Delhi, while the latter may not prove to be altogether an unfavourable trend from the point of view of slower industrial growth of Delhi but may give a greater preponderance to the other sectors of the economy and also perhaps raise the cost of industrial products and the cost of servicing in Delhi. So it is evident that industry has been one of the main factors for the rapid increase of population, though the growth of industries in relative terms has somewhat tapered off since 1962, but in absolute terms it is still a big factor to be reckoned with.

Dominance of Delhi in wholesale trade: Delhi plays a dominant role in trade and commerce facilitated by the following important deter-

mining factors namely:

- (i) the spatial location of Delhi in the hub of the transportation net work of the north-western India where many railways and highways converge.
- (ii) the agricultural and urban resources available in Delhi and its environs.
- (iii) the functional specialisation of Delhi.

The location of Delhi in one of the most fertile and agriculturally important areas of northern India has provided Delhi with agricultural commodities and a hinterland which has been a rich source of migratory labour. The partition of the country brought in refugees from Pakistan who with their skills and entrepreneurship not only gave a good fillip to industries in Delhi but also made an impact on the wholesale and commercial sector. Delhi improved its position as a centre of distributive trade in northern India as Lahore the only other competing centre was now in Pakistan and Amritsar the other possible centre was too near the international border. The huge population of Delhi also provided a big consumer market. Besides being the centre of political and administrative power, national and regional cultural and service activities, the concentration of banking activities, godowns, transport and communication facilities including railway marshalling yards have all combined to help the growth of wholesale trade in Delhi which now ranks as the third biggest distributive centre in the country next to Bombay and Calcutta* only*.

* See also "Master Plan for Delhi work studies" Delhi Development Authority 1962 p.49-50.

In 1951 Delhi had about 24.5% of its working force in trade and commerce which was second only to the services sector. In 1961 however trade and commerce ranked third in order, next to 'services' and 'industries'. The percentage of workers in this sector reduced to 19.2% of the total and number of workers increased from 1.27 lakhs to 1.44 lakhs during the period. (Table 1.4). It is now estimated that Delhi has strengthened its trade & commerce sector with the large increase of population.

Delhi has been performing a distributive function not only for its own area but also for the metropolitan area and for other States in northern India. A survey in 1959 revealed that in many commodities the share of sales in Urban Delhi was only 20 to 40% except in spices and provisions where it was 66%. A survey* in 1968-69 revealed that Delhi now performs a stronger function for the region than in 1959 in such commodities as cloth, dry fruits, spices and herbs, hosiery and general merchandise. In bicycles, fresh fruits and vegetables, furs, hides and skins and wool, motor-parts and machinery and iron and steel, Delhi also has a very large share in the regional market. The notable exception where Delhi has lost a bigger market is in foodgrains. Before the creation of the food zones 50% of Delhi's distributive function in foodgrains was for the adjoining districts. In timber, glass sheets, fodder, iron scrap, junk and cotton, Delhi

*"Dominant Role of Delhi as a Distributive Centre - a case for decentralization", a National Capital Regional Plan Study by T.C.P.O. 1969.

only has a small share in the distributive trade of the Region. It is estimated that there are about 70,000 people engaged in the wholesale trade in Delhi, of which about 21,000 are engaged in the cloth trade alone. Other major areas of trade employing large number of workers are in dry fruits and spices, motor-parts and machinery, iron and steel each of which employ nearly 8,000 workers. The Master Plan for Delhi contains proposals for the redevelopment of the wholesale markets but the problems have clearly out-paced the efforts in this direction.

In view of this, it has now to be considered whether the economy of scale of operation of the wholesale trade concentrated in Delhi, mostly in the Old City, facilitated by the transport net work, large scale godowns, availability of large investment and a ready consumer market has reached a point of diminishing returns. It is apparent that dis-economies have already set in due to the over loading of the transportation net work, parking problems, lack of godown facilities and large scale obsolescence of the residential areas of the city. The effect of the concentration of wholesale trade on the overall regional perspective will be dealt with later, suffice it to say that constant fire outbreaks in the wholesale markets, restrictions on truck operations in the day time and on parking in certain localities of the city, shifting of the delivery point to Tughlakabad for certain commodities from the Delhi Main Station are some of

the indicators showing that the continued growth of the wholesale trade in Delhi is under severe strain.

Bottleneck in the hub of the transport

network: Delhi has a commanding position in the transport networks of northern India. (See Map 1.2). Being the hub of the network it is a major bottleneck at present. The daily commutation of a large number of people from nearby areas, the import and export of considerable quantities of goods and the passing of the inter-regional traffic through Delhi have strained the traffic routes to the utmost and are sometimes choked causing delays. The commuter traffic into Delhi both by road and rail has been steadily increasing. While in 1957 the commuter traffic coming into Delhi by railways was about 30,000 it has increased to 40,000 by 1968. This traffic by the roadways has also more than doubled from about 20,000 in 1959 to about 42,000 by 1968. The intensity of usage of all the railway lines converging on Delhi is reaching the saturation point. For example the Delhi-Ghaziabad section has on an average a total of 60.0 trains per day as against a capacity of 63. The Delhi Main and the New Delhi terminals which serve as originating and terminating points for goods traffic, long distance passenger traffic and daily commuter traffic have also reached their saturation point. The total number of trains received per day at Delhi Main are 78 and 53 at New Delhi, in addition to 61 trains which originate at Delhi Main and 18 trains at New Delhi. Though these stations were also the main yards for goods traffic, recently measures have been taken to divert some of this traffic to Tughlakabad. However, the

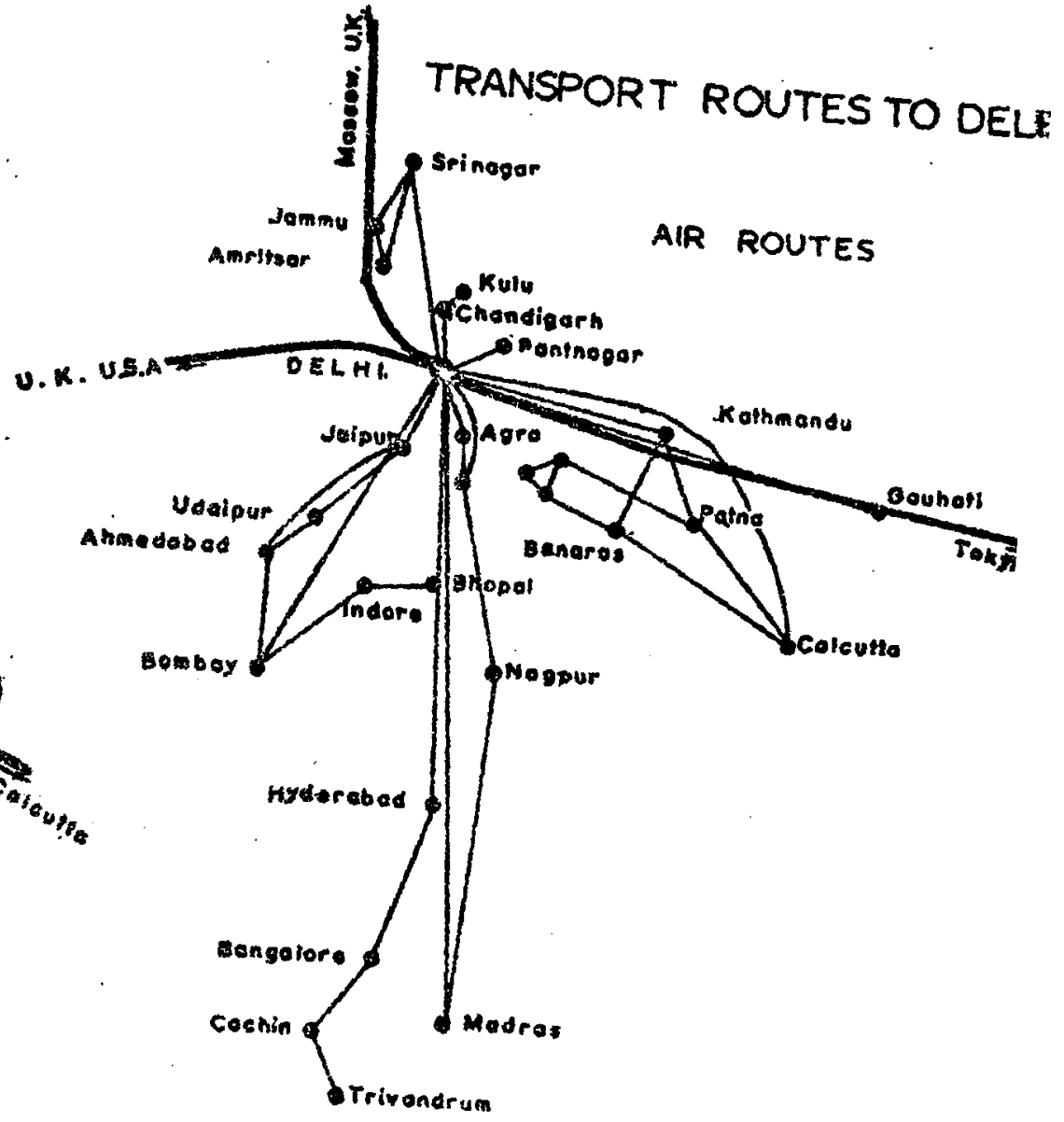
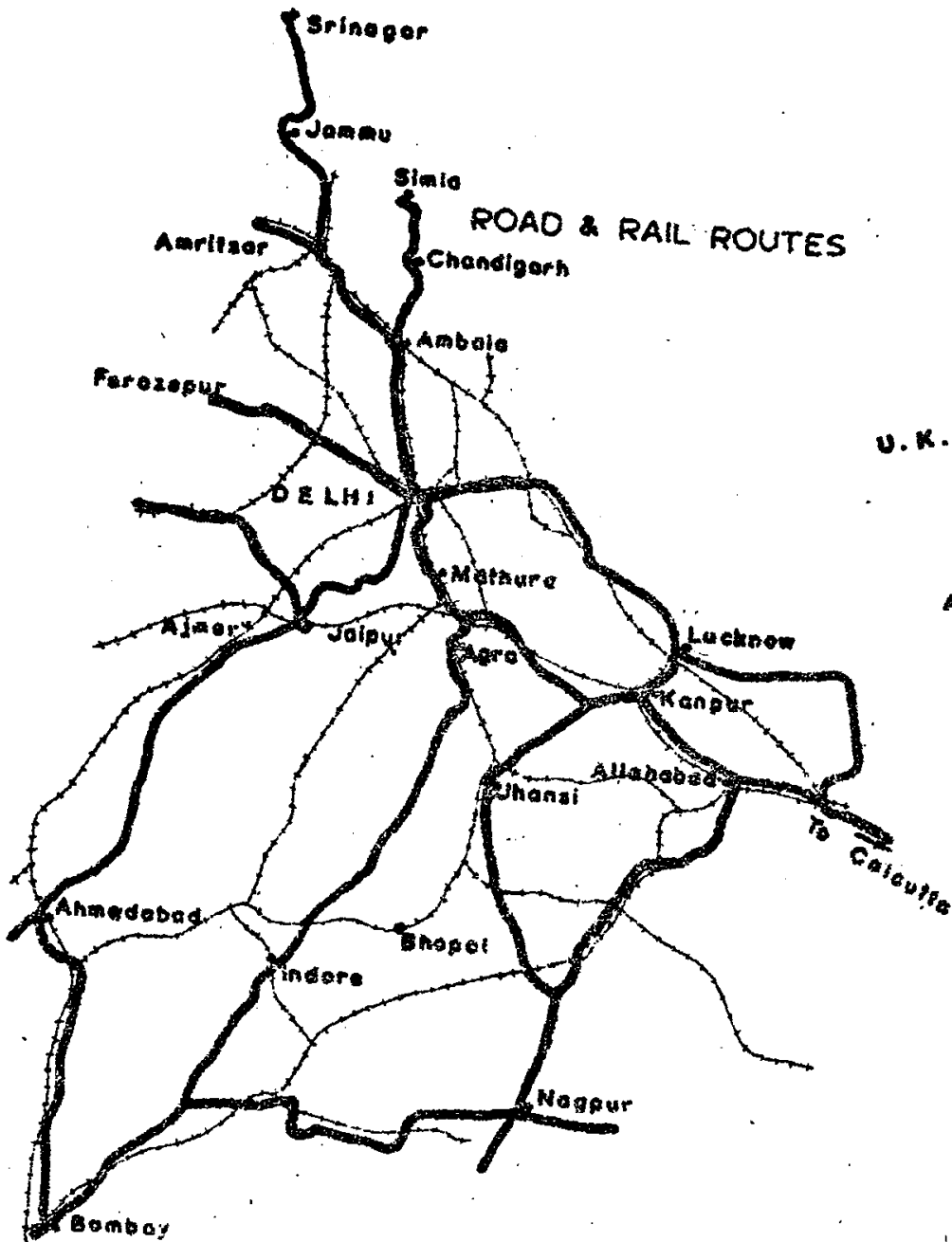
increasing passenger traffic and the lack of prospects of further expansion has put the operation of these two terminals to severe strain and is a bottleneck in the transportation system*.

Five national highways converge on Delhi and there is no effective road system for inter-regional traffic to by-pass the Union Territory of Delhi. In fact, the river Yamuna is a great barrier for inter-state traffic between U.P. and Haryana. All the bridges over the river are in Urban Delhi. The bridge on the river towards the north is near Panipat nearly 80 kms. away and in the south at Mathura nearly 135 kms. away. This necessitates all goods traffic to pass through Delhi with the concomitant delay due to mixing up with urban traffic as well as octroi posts and other fiscal difficulties.

Problems Due to the Rapid Growth.

It has been sufficiently brought out that the rapid growth of Delhi is due to the continuing concentration of economic activity abetted by the Delhi-oriented transportation system. The population explosion has resulted in lack of housing, water supply, and other community facilities like schools, hospitals etc. To the large number of slum areas in the city have been added dozens of squatter colonies where conditions of living are inhuman. It is

* See two National Capital Regional Plan Studies - "Traffic and Transportation-Roads" and "Railways" by T.C.P.O. 1969.



NATIONAL CAPITAL REGION

estimated* that the shortage of housing in Delhi has increased from 1.5 Lakhs in 1958-59 to 3.4 Lakhs in 1968. Even a large scale construction programme cannot wipe out this deficit and also cater for the increase in the population if it goes on at this rapid pace. The cost of living in Delhi is among the highest among Indian cities reflected in high cost of house rents, transportation, and commodities. The question to be answered is that even if the requirements of the city can be met but at what cost?

The Economic and Social Cost of Metropolitan Growth:

The city has already expanded to a radius of about ten miles and the cost of distribution of water from the water works, as well as drainage and sewerage over long distances are enormous**. So too, the present transportation by buses has been found inadequate and expensive and a further rapid in-

* "Seminar Report and Recommendations: National Capital : Planning and Development"; Seventeenth Annual Town & Country Planning Seminar, New Delhi, October 1968, Institute of Town Planners, India.

**The per capita expenditure in Delhi is Rs.43 compared to Rs.36 in Bombay, Rs.24 in Calcutta and Rs.23 in Madras. Key address by Dr. S.Chandrasekhara, Union Minister for Health, F.P., and U.D. at the plenary session of the Seventeenth Annual Town and Country Planning Seminar, New Delhi, October, 1968. Institute of Town Planners, India.

crease in the population size would at once call for the construction of a sub-way or some sort of rapid transit system for the city which would require huge investment which the nation has not been able to build for bigger and more densely built up cities like Calcutta and Bombay. Due to the high land values, high development and construction costs, partly necessitated by the fact that these have to be at a level appropriate in the National Capital, the investment required for housing the future population would be a huge figure. The cost of industrial plots are three to four times those in nearby towns. The cost of construction of commercial building and government offices in multi-storeys is enormous in Delhi. On the other hand in medium size cities two to four storey structures can be put up economically.

There are bound to be great social tensions arising out of long waiting hours for buses, lack of time and opportunities for recreation because of the journey time involved to one's place of work and very high fares for taxis and scooters which are outside the common man's reach for everyday purpose and also because in a place like Delhi one gets frustrations due to disparities in income levels and the inability to afford the luxuries which are in abundant display in the Capital. Moreover, there may be clamour for the setting up of a large number of industries to provide services and consumer goods in spite of the recommendation of the Master Plan for Delhi to restrict their growth. If this takes place, then the problems of noise, dust, smoke and industrial effluent would increase manifold. Also

the possibility of industrial unrest which is inherent in any industrial city having a large industrial component is real.

The year 1981 is not the end of time and the population of Delhi will continue to grow but the rapid growth between now and 1981 will not give us enough breathing time to consolidate the present services, nor do we have the high level technology and organisation to provide the infrastructure in a rational way and to run efficiently a city of Delhi's size. This situation will lead us into making wrong decisions regarding the desirable pattern of density of population which can be planned more rationally only when the economic strength of the country is able to handle the situation. With more economic activity being concentrated in Delhi, the rising crescendo of in-migration will continue. The cost of providing the infrastructure in Delhi being very high, it would not be possible to provide even the barest minimum of living conditions. The prospects are frightening that people will have to live in the most appalling conditions in the far-flung colonies, in city slums, in jhuggis and in un-authorised colonies. This surely is not the image of the National Capital one would like to project. "This city must be articulated as the capital of a democratic society with guarantee of the minimum civic amenities to the humblest citizen.....the grace and assurance of democracy still remain to be unambiguously proclaimed".*

*Key address by Shri Ashok Mitra, Secretary to the Govt. of India, Ministry of Information & Broadcasting; at the Plenary Session of the Seventeenth Annual, Town & Country Planning Seminar, New Delhi, Oct., 1968. Institute of Town Planners, India.

National Policy to Discourage Big Metropolitan City Growth:

At the national level there is a great disparity in economic development between the big city and its hinterland let alone the backward areas of the country. Even otherwise the cost of servicing of big cities is enormous. It has been estimated that a public sector investment of Rs.12,000* is required for every person employed. Hence even to maximise return from investment there should be a breaking away from the development of big cities. Hence at the national level policy decisions have been taken that in future, growth of large metropolitan cities should not be encouraged and that industries and other work centres should be located away from the existing

* " A study made by the Gokhale Institute of Politics and Economics, Poona, has revealed that for every worker who is going to be employed in the Greater Bombay area, the community will have to incur an expenditure of Rs.12,000 by way of civic amenities." "Wanchoo Committee" Report of the Working Group, Fiscal and Financial Incentives for Starting Industries in Backward Areas, April, 1969.

CITIES AROUND DELHI

RADIUS — 250 MILES

POPULATION

1961

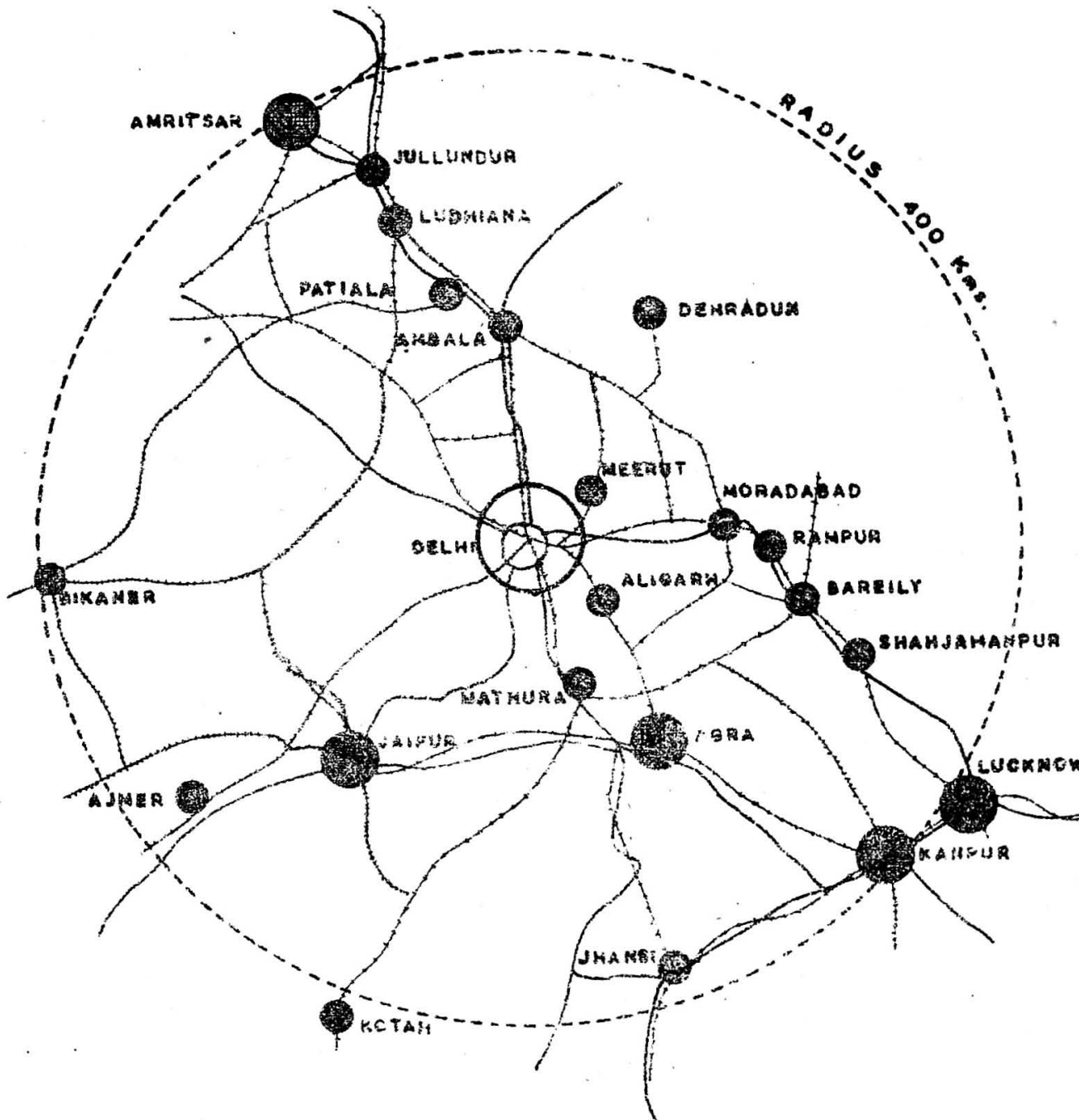
LEGEND



Town Above Three Lakh Population



Town From 1 to 3 Lakh Population



Source : Census Of India



NATIONAL

CAPITAL

REGION

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MINISTRY OF H. F. P. W. H. & U. D.

14

metropolitan cities*.

In the Shadow of Delhi:

At this stage it would be pertinent to go a little bit into urbanization and economy of the districts around Delhi and the problems faced by them in view of the rapid growth of Urban Delhi. There are no large cities within 200 mile radius from Delhi. Some of the medium sized cities are Meerut, Agra, Jaipur and Bareilly. (See map 1.3). The percentage of urban population is 13.7% in Rohtak district, 16.3% for Gurgaon district, 22.6% for Meerut district, and 12.6% for Bulandshahr district, while the national average is 17.97%. As stated earlier about 25% of the migrants that have come from all over the country are from these 4 districts. While Delhi added a population of 7.4 lakhs and 9.2 lakhs in the two decades 1941-51 and 1951-61, the corresponding increase for 17 important towns

*"Not only the social costs but also the economic costs of servicing large concentrations of population are prohibitive. Beyond a certain limit, unit costs of providing utilities and services increase rapidly with increase in the size of the cities. In the ultimate analysis, the problem is that of planning the spatial location of economic activity throughout the country. Immediately a beginning must be made with delimiting the problem of larger cities and taking positive steps for dispersal through suitable creation of smaller centres in the rest of the area". Fourth Five Year Plan, Planning Commission - 1970 p.399.

around Delhi is only 2.1 and 2.3 lakhs. (See Table 1.5 and also Map 1.4). However, it may be stated that in pursuance of the policy decision in the Delhi Master Plan industrial activities have been diverted from Delhi to Faridabad and Ghaziabad. But in the absence of house building activities in these towns the growth of resident population in towns around Delhi is negligible compared to the growth of Delhi. In Delhi about 21,900 hectares (54,000 acres) of land were notified for acquisition and nearly 75% has already been acquired and large areas have been developed by public authority. Except for some development in Ghaziabad and Faridabad very little development has taken place in the other towns. Similarly, on the one hand economic activities continue to be concentrated in Delhi, on the other hand, except for some industrial activity, very little non-agricultural has taken place in the Region. This has mounted the pressure of land in the most undesirable directions. While in Delhi thousands of unauthorised sub-divisions and constructions have taken place, in U.P. and in Haryana, mostly along the highways, land speculators have subdivided the land in the most haphazard manner. Thus the seeds of future slums and chaotic urban sprawl have been sown which only the most drastic measures can now set right.

The Need for a Regional Plan:

In such a situation the planning of Delhi in isolation is meaningless. The regio

Table 1.5

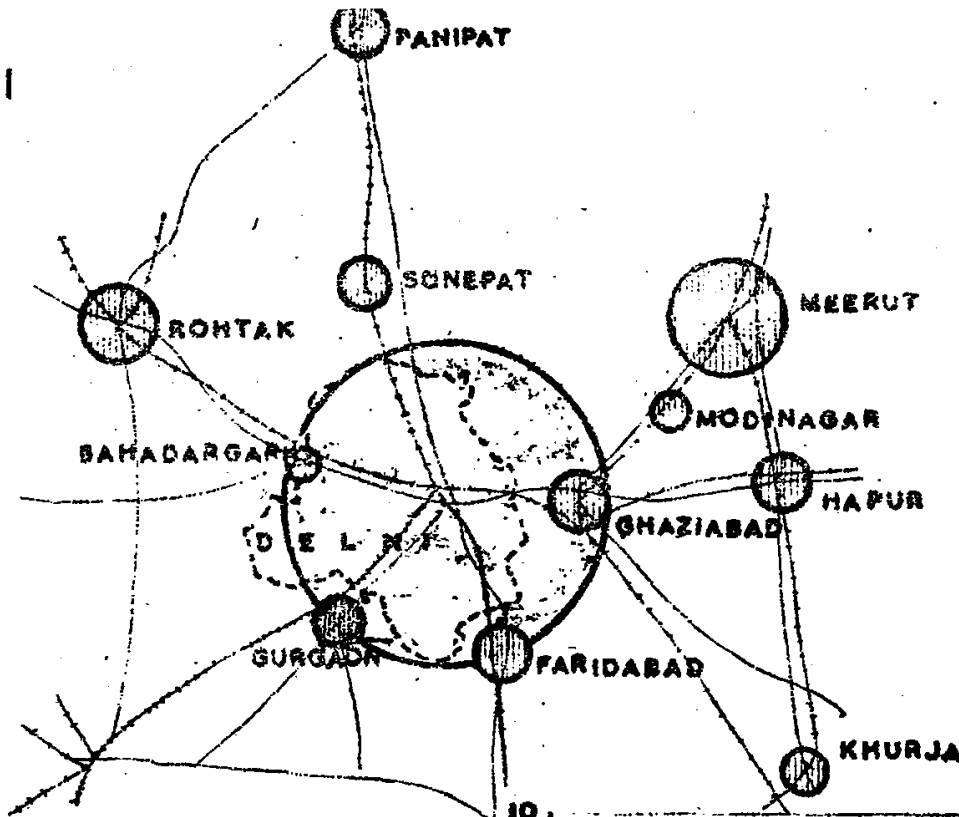
Decadal Increase in Population (laks) Delhi & 17 important Towns of N.C.R.

Towns	1941	1951	1961	1941-51		1951-61	
				Net 'Inc- 'rease'	Perce- 'ntage	Net 'inc- 'rease'	Per- 'cen- 'tage
Delhi	6.96	14.37	23.60	7.41	106.58	9.22	64.17
Meerut	1.70	2.33	2.84	0.64	37.74	0.51	21.79
Ghaziabad	0.24	0.44	0.70	0.20	83.54	0.27	61.02
Hapur	0.34	0.49	0.55	0.16	45.93	0.06	12.16
Bulandshahr	0.30	0.38	0.44	0.08	26.24	0.07	17.78
Khurja	0.35	0.39	0.42	0.03	8.72	0.03	7.88
Sikandrabad	0.23	0.24	0.26	0.01	22.32	0.02	9.18
Modinagar	-	0.12	0.24	-	-	0.12	97.22
Rohtak	0.48	0.72	0.88	0.24	49.34	0.16	22.66
Panipat	0.38	0.55	0.67	0.17	45.31	0.12	21.91
Faridabad	0.11	0.37	0.59	0.26	225.86	0.22	57.89
Sonepat	0.18	0.30	0.46	0.12	69.78	0.16	51.98
Gurgaon	0.10	0.19	0.38	0.09	87.35	9.19	103.45
Rewari	0.31	0.34	0.37	0.03	11.11	0.03	8.54
Palwal	0.14	0.14	0.28	0.03	2.27	0.14	100.24
Bahadurgarh	0.08	0.11	0.15	0.03	36.12	0.04	34.13
Alwar	0.54	0.58	0.73	0.04	6.88	0.15	25.64
Nerula	0.08	0.10	0.13	0.02	19.20	0.03	32.06
Total (Except Delhi)	5.55	7.78	10.09	2.11	37.98	2.28	29.69

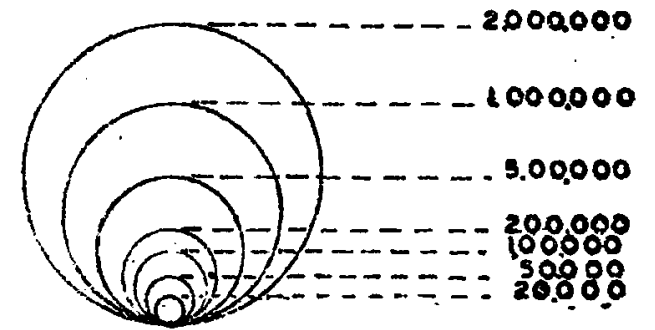
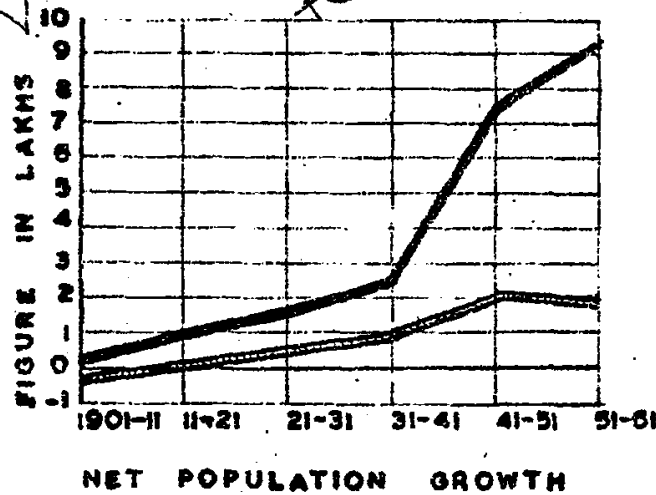
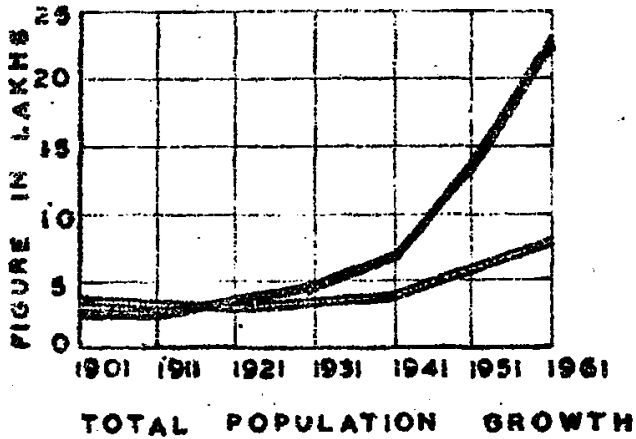
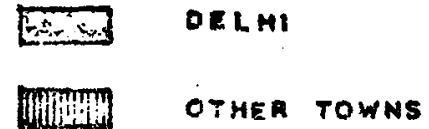
onal imperatives were stressed in the Delhi Master Plan. It has been the experience all over the world that a larger area of social and economic inter-action and inter-

dependence around the metropolitan city has to be planned as one unit, so that the concentration of economic activity in the metropolitan city which has a great potential for the advancement of the rapid growth of the national economy should not be allowed to impoverish the hinter-land but its beneficial effects should trickle down and spread into the economy of the Region. This leads us to the delineation of the planning region around Delhi described as the National Capital Region, wherein effective decentralization of economic activity and population distribution can be attempted in a more rational way to ensure balanced regional development within the socio-economic policy framework of the national plan.

1961



POPULATION GROWTH
URBAN DELHI AND ELEVEN
SURROUNDING TOWNS



Source: Census Of India

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN
MINISTRY OF H.F.P.W.H & U.D.

Delineation of the National Capital Region:

In the Master Plan for Delhi it was noted that Delhi exerted its influence on adjoining areas in varying degrees. It had appreciable influence on towns within a radius of 20 to 30 Kms. The area bounded by these towns had been defined as the Delhi Metropolitan Area in the Master Plan for Delhi. Further it was also noted that there existed a second zone of influence wherein there was a high degree of economic inter-dependence between Delhi and the towns of the Region, but the agricultural area as well. This was termed as the National Capital Region. In drawing up a regional plan, inter-action and inter-dependence is no doubt a major criterion to be taken into consideration but only by considering a large area as a unit of planning would it be possible to effectively decentralize economic activity and attempt a balanced distribution of population. With this end in view the National Capital Region has been delineated. The various indicas that were used in the delineation come under three broad categories:

1. Demographic characteristics of the Region.
2. Inter-action between Delhi and the surrounding areas.
3. An efficient framework for urbanisation and the provision of infrastructure.

CHAPTER - II.

THE PLANNING OF THE NATIONAL
CAPITAL REGION

Criteria for Regional Delineation*:

For the purpose of delineation 45 tehsils around the Union Territory of Delhi were studied in respect of ten criteria. The datum selected for the demographic characteristics to be included in the Region is the average of the 45 tehsils. With regard to the criteria on traffic and telephones, from a study of the data available, the datum fixed as the break/was even point in each case. (See Map 2.1 series).

1. Population growth rate: 22% (+) tehsil-wise growth rate in the decade 1951-61.
2. Migration: 24,000 (+) district-wise migrants to Delhi by 1961.
3. Density: 250 (+) persons per square km. in 1961 (640 persons per square mile).
4. Economic activity: 35% (+) non-agricultural workers to total workers in each tehsil in 1961.
(See Table 2.1 wherein mean values of indices used in the delineation criteria are given).
5. Milk Supply Zones: The area of supply of milk to the Delhi Milk Supply Scheme in 1967.
6. Supply zone of vegetable and fruits: Supply area in 1967.
7. Communication: 75(+) telephone calls per day from Delhi in 1967.

* For details of the technique used please refer to Interim Report on the Planning of the NCR, TCPO, 1967. p.11.

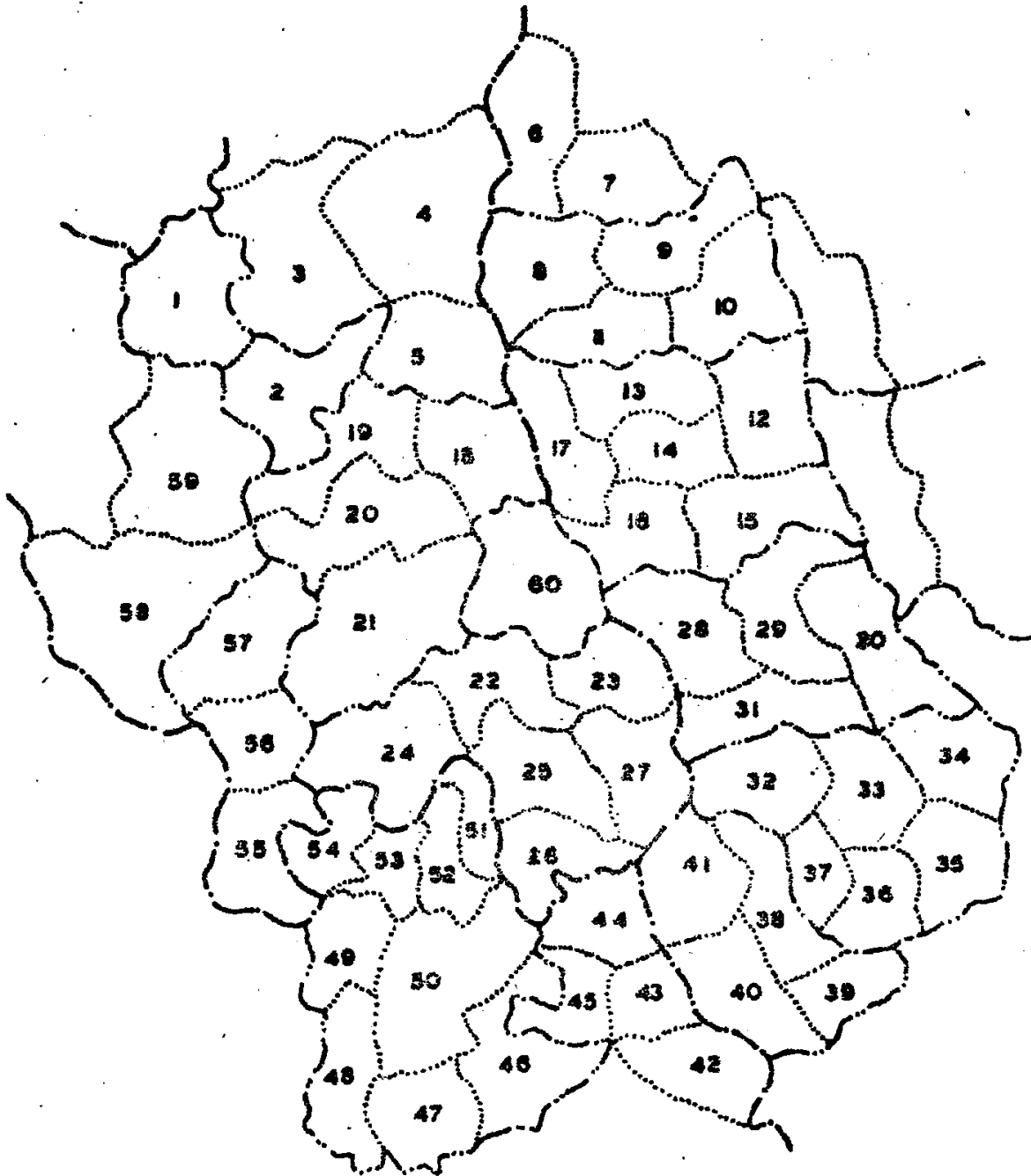
8. Physiography: The drainage basins of rivers - the Yamuna, the Ganga and the lakes Najafgarh - Jahajgarh.
9. Traffic: 1,000 (-) Daily passengers by bus to and from Delhi in 1966.
10. Traffic: 250 (+) Daily passengers by rail to and from Delhi in 1966.

Taking the above ten criteria into consideration, a super imposition technique has been used for the delineation of the Region. Out of ten criteria used 15 tehsils satisfy 5 and more of these criteria. However, in the final determination of the boundary of the NCR certain other factors have also been taken into consideration. For administrative reasons, when most of the tehsils of a district have satisfied the criteria, the area of the whole district has been included in the final delineated area. Similarly for the sake of contiguity, certain pockets excluded as not satisfying the minimum number of criteria, have been included. Other considerations are integrated development of the Region in matters of flood control and prevention of water pollution, supply of water and power, the influence of other counter-magnate cities, such as, Aligarh, Muzaffarnagar and Jaipur. Taking all these factors into consideration the National Capital Region has been delineated to include the Union Territory of Delhi and 26 tehsils described below. Map 2.2 shows the general location of the NCR.

The Extent of the National Capital Region:

The National Capital Region, thus,

DELINEATION STUDY



STUDY AREA & ADMINISTRATIVE BOUNDARIES

JIND		ROHTAK		MATHURA	
1	Narwana	21	Jhajjar	41	Chetta
2	Jind	GURGAON		BHARAT PU	
KARNAL		22	Gurgaon	42	Sherat Pur
3	Kesthai	23	Belloah Garh	43	Dig
4	Karnal	24	Rewari	44	Kaman
5	Panpat	25	Nuh	45	Nagar
SAMARAN PUR		26	Firozpur Jhirka	ALWAR	
6	Nakaur	27	Palwal	46	Lochman Garh
7	Deoband	BULAND SHR.		47	Raj Garh.
MUZZAFFAR NGR.		28	Sikandra bad	48	Thana
8	Kairana	29	Bulandshahr	49	Bansur
9	Muzzaffar nagar	30	Anup shahr	50	Alwar
10	Gasnath	31	Khurja	51	Tijara
11	Budhana	ALIGARH		52	Kishan Garh
MEERUT		32	Khair	53	Mandawar.
12	Mawana	33	Algerh	54	Bahrur
13	Sardhana	34	Atrauli	MAHENDRA	
14	Meerut	35	Sikandra Rao	55	Narnaul
15	Hapur	36	Hathras	56	Mahendra Ga
16	Ghaziabad	37	Igias	57	Dadri.
17	Baghpat	MATHURA		HISSAR	
ROHTAK		38	Math	58	Shiwani
18	Senpat	39	Sadabad	59	Hansi
19	Gohana	40	Mathura	60	Delhi Union T
20	Rohtak				

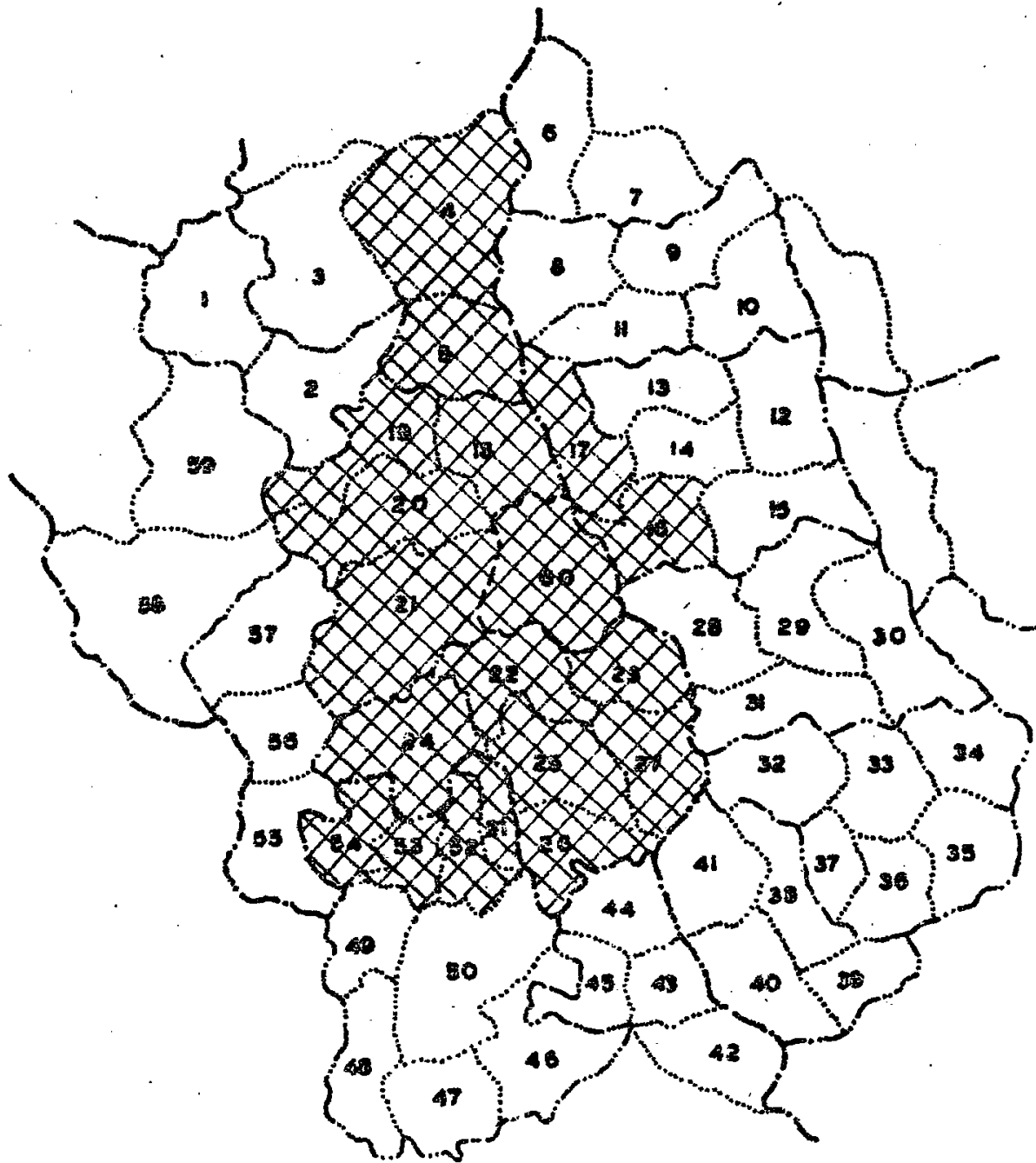
Boundries. STATE U.T. DIST. TWSIL




NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., P., W.H. & U.D.

DELINEATION OF PHYSIOGRAPHY



LEGEND.

 Drainage Basins, Yamuna, Johaj Gof and Najaf Gerk Lakes.

Boundaries. STATE U.T. DIST. TREAD



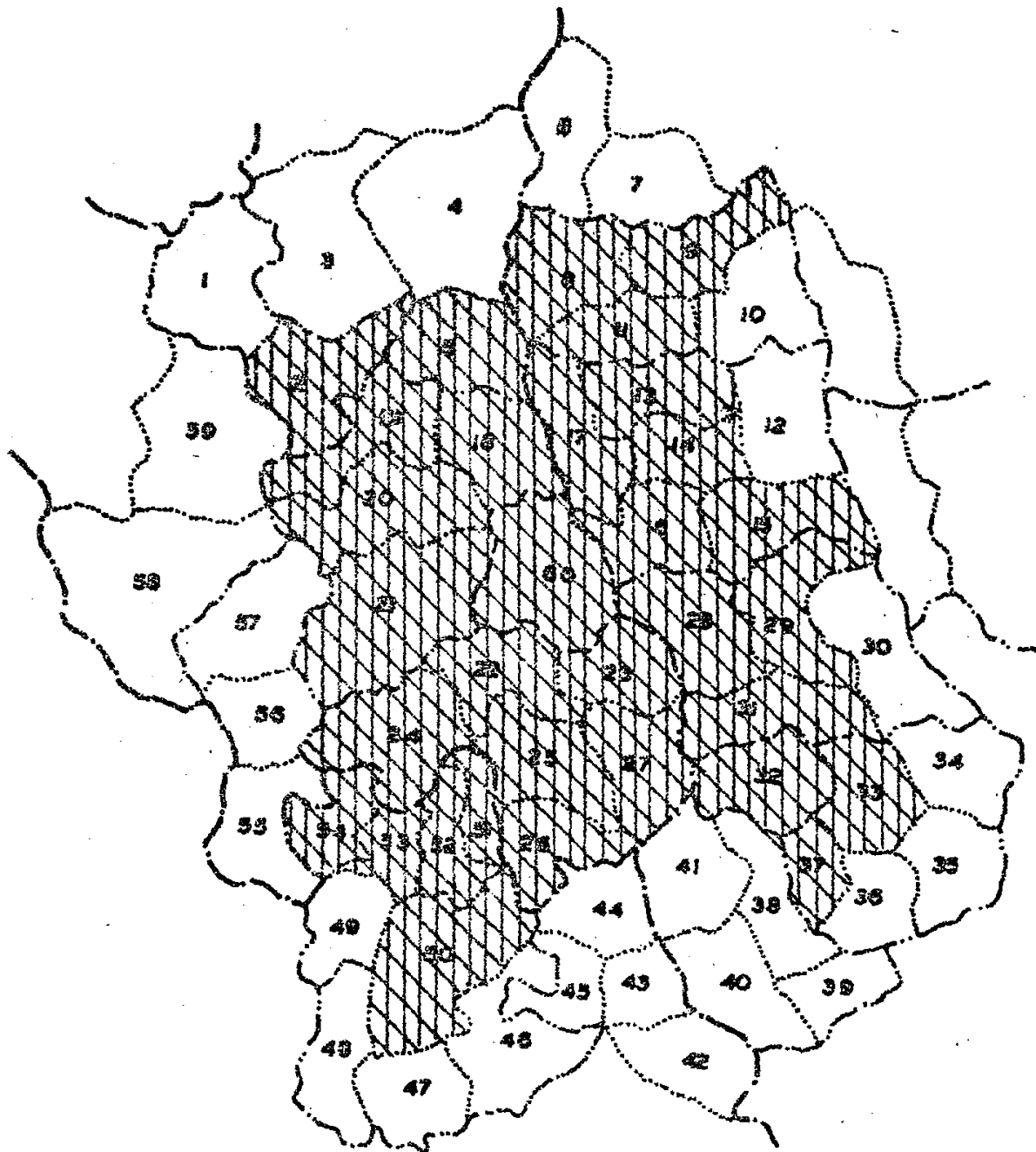
NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H. & U. D.


DELINEATION STUDY

COMMUNICATION — TELEPHONES

1967.



LEGEND.

 75+ Telephones Calls / Day
From Delhi.

Boundaries. STATE U.T. DIST. THERIL

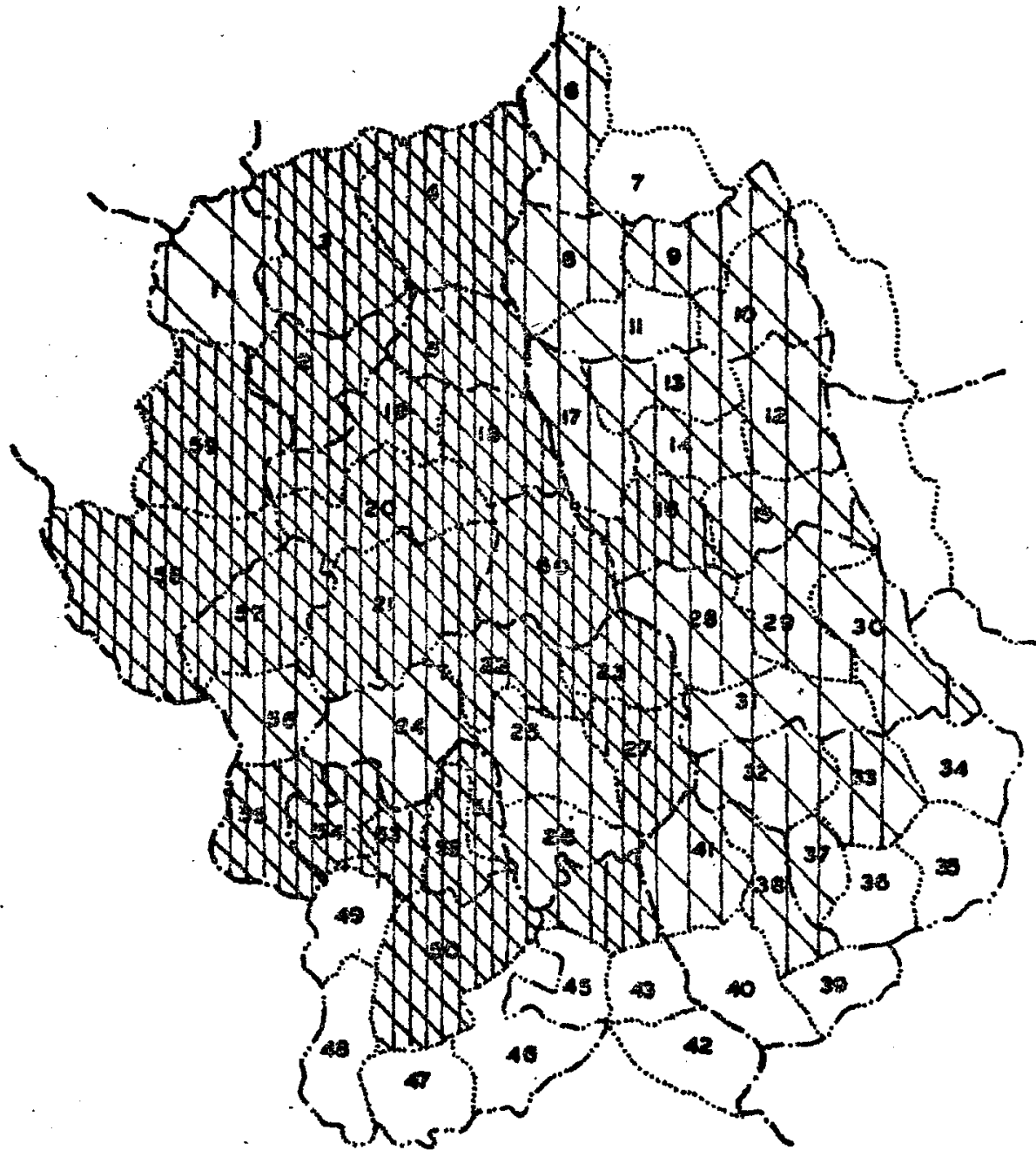


TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H. & U. D.

NATIONAL CAPITAL REGION




DELINEATION STUDY

POPULATION GROWTH 1951-61



LEGEND.

TEHSIL-WISE PERCENTAGE GROWTH

-  Less Than 15 %.
-  15 % TO 22 %.
-  Above 22 %.

Boundaries. STATE U.T. DIST. TEHSIL

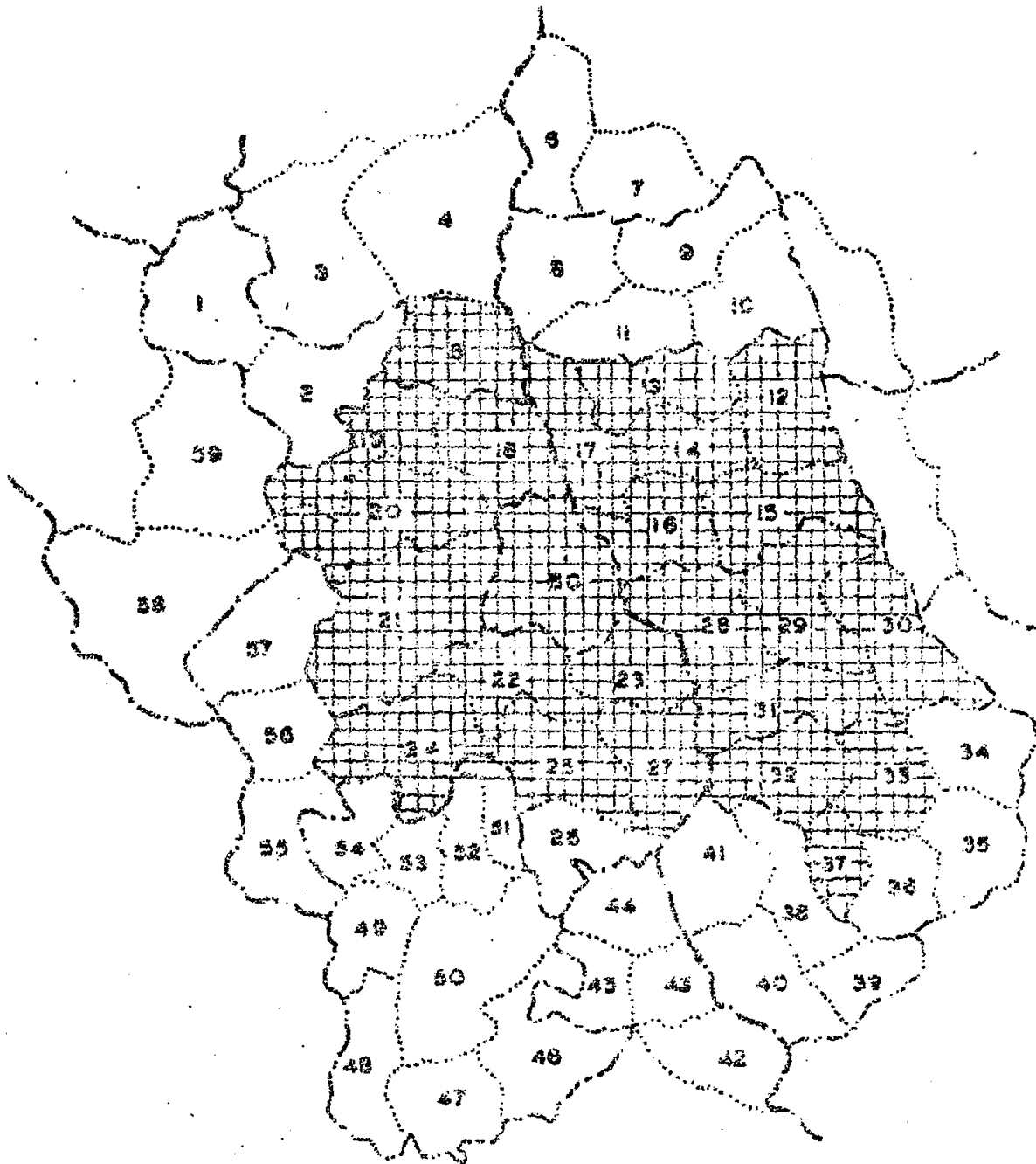


NATIONAL CAPITAL REGION

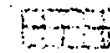
TOWN & COUNTRY PLANNING ORGN.
 MINISTRY OF H., F. P., W. H. & U. D. 2.1.

DELINEATION STUDY

PASSENGER MOVEMENT BY RAIL

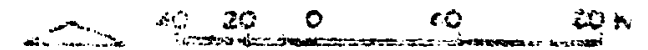


LEGEND:

 Area Of Effective Daily Commutation 250 & Above Passengers Per Day.

Average Of Passenger Movement For 1965, 66 & 67.

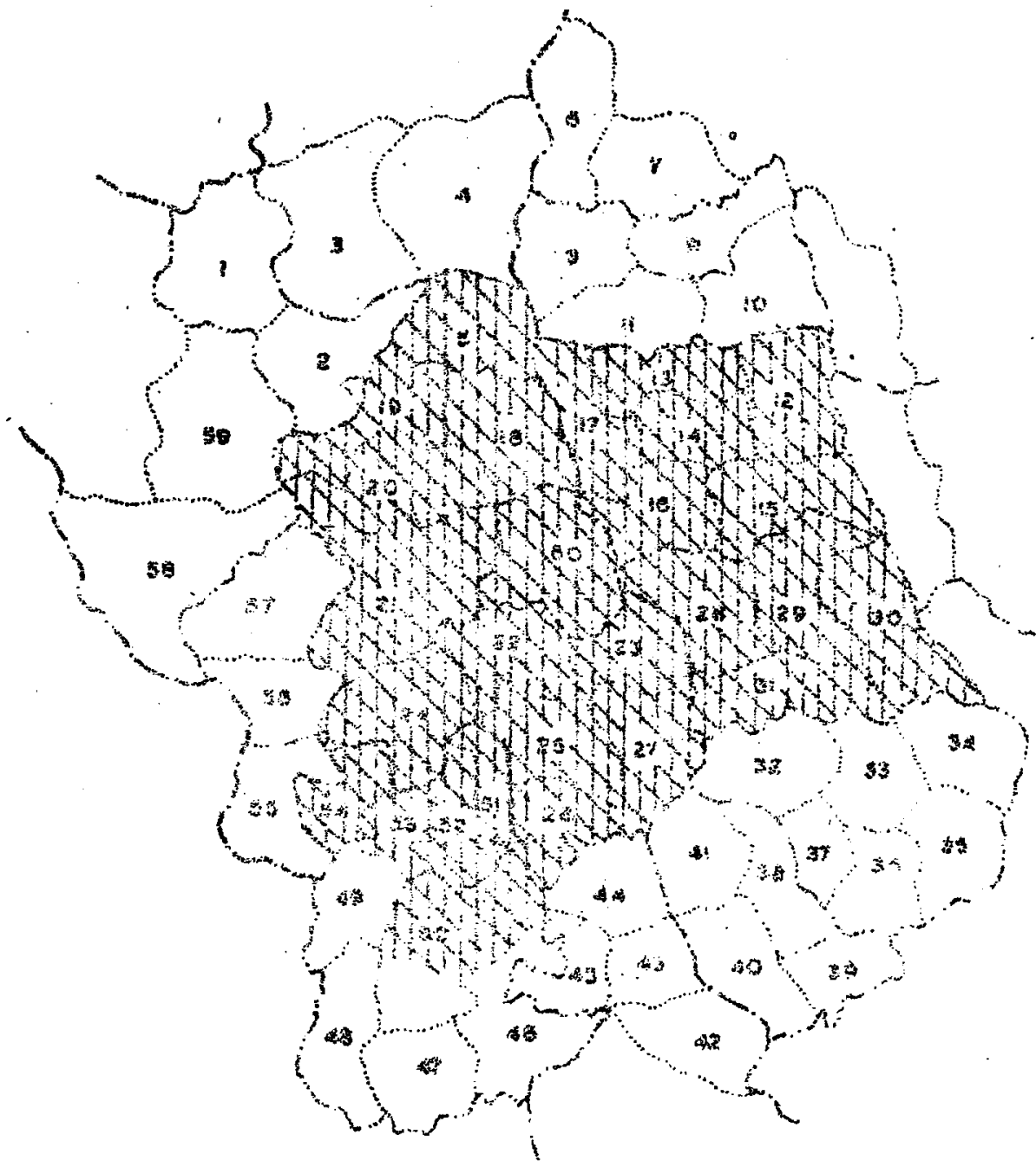
Boundaries. STATE DIST TERR




TOWN & COUNTRY PLANNING DEPT.
MINISTRY OF H.P.R.W.H. & U.D. 2.

NATIONAL CAPITAL REGION

THE NATIONAL CAPITAL REGION
 DELINEATED REGION FOR PLANNING



LEGEND.
 The Region.

Source: STATE DIST 1955

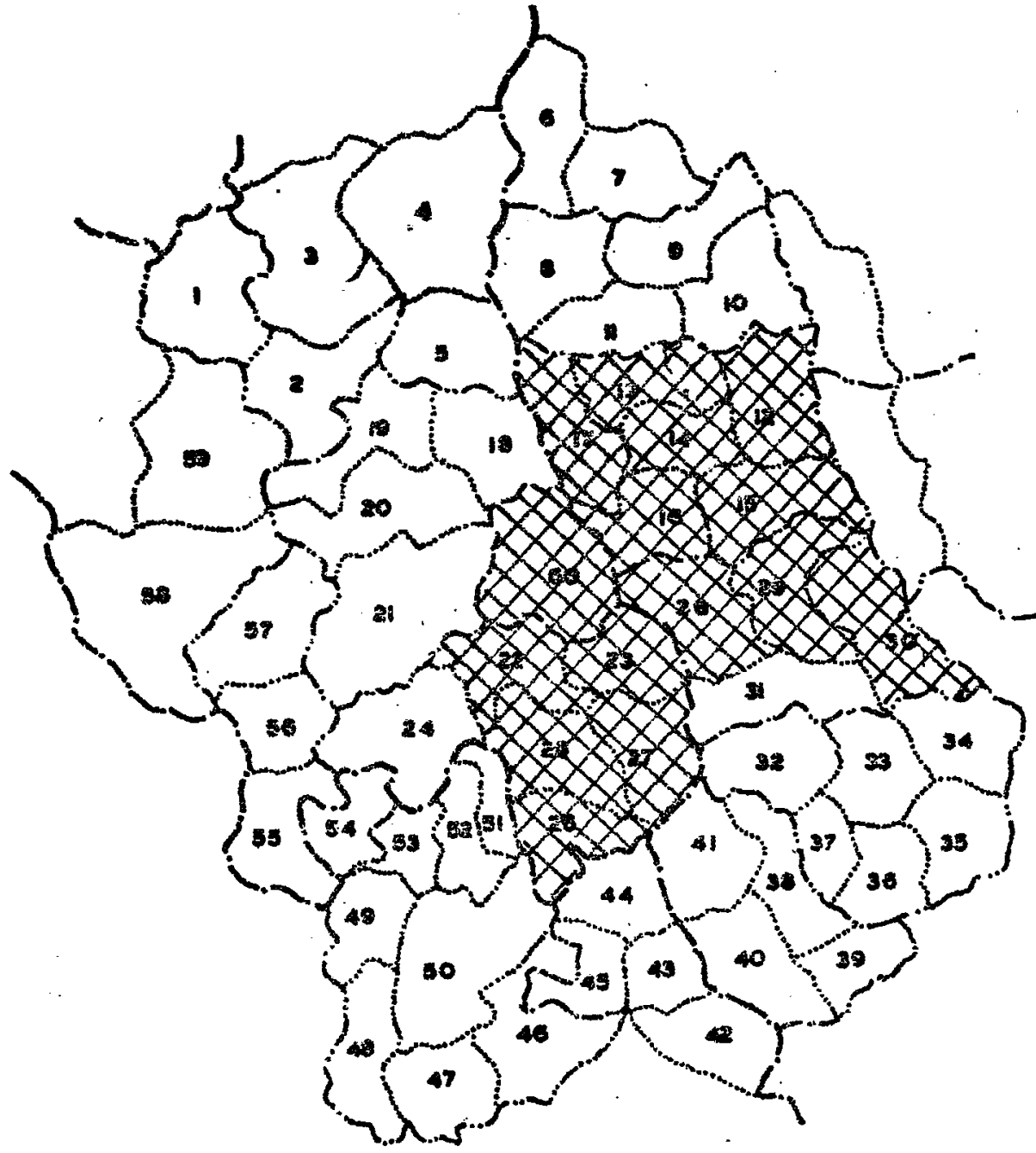


NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
 MINISTRY OF C.P.P., P.W.D. & U.D. 211

DELINEATION STUDY

MILK COLLECTION CENTRES (DMS) 1967



LEGEND.

 Milk Supply Area.

Boundaries. STATE U.T. DIST TMS

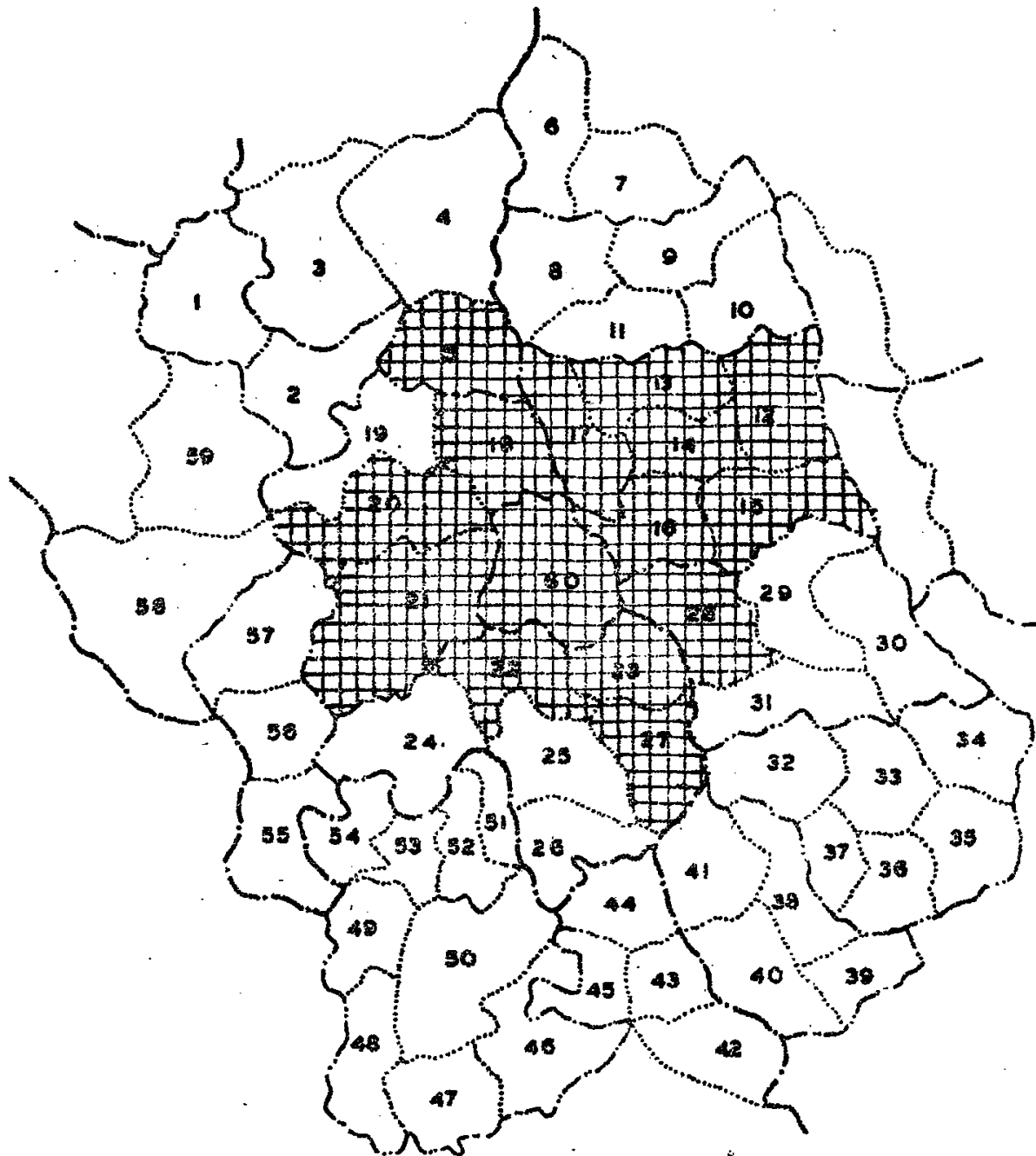


NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., P., W.H. & U.D. 2.1

DELINEATION STUDY

SUPPLY OF VEGETABLES
AND FRUITS 1967



LEGEND.

 Vegetable & Fruits Supply Area.

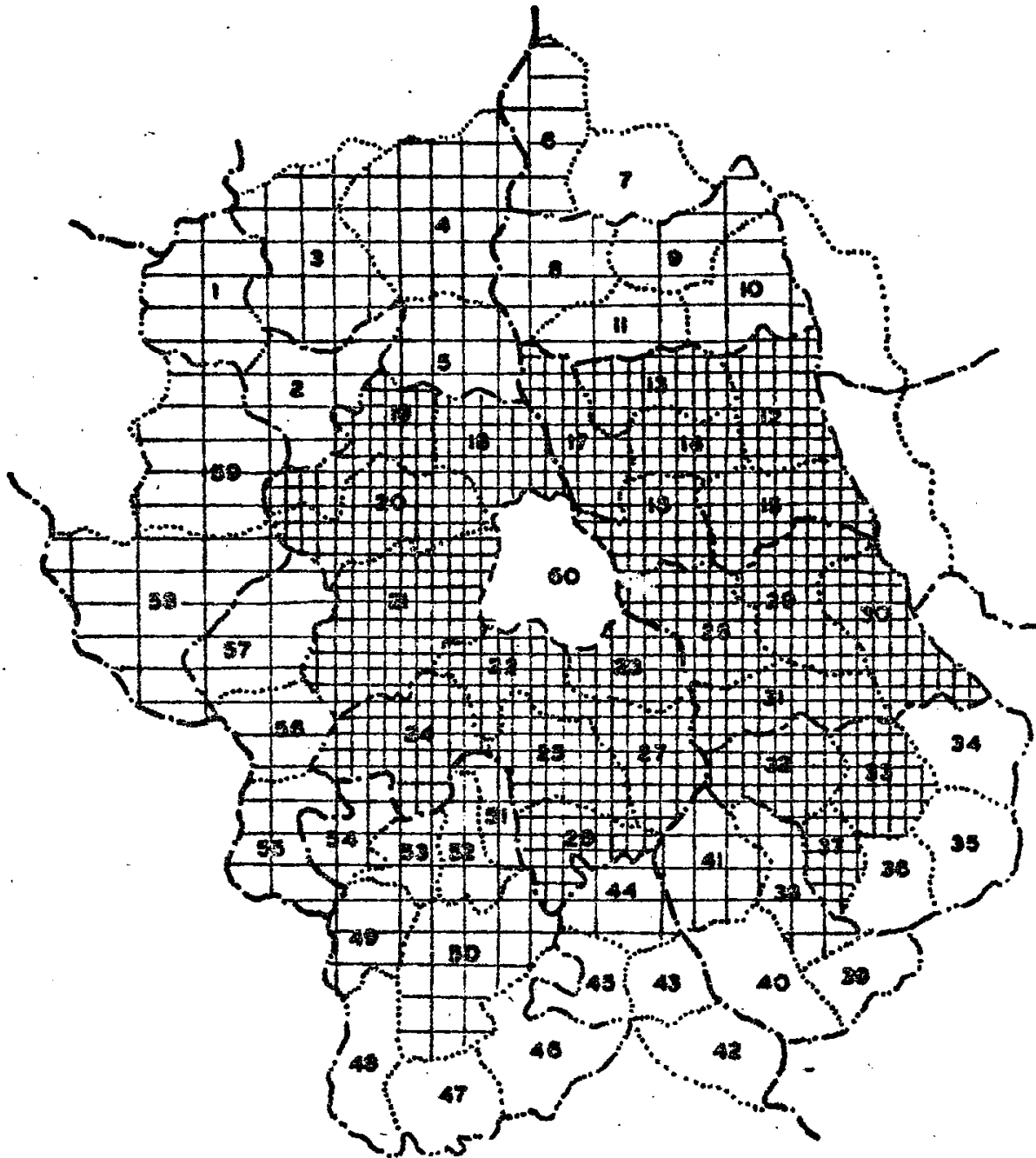
 40 20 0 40 80 Kms.

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H. & U. D. 2.17




DELINEATION STUDY

MIGRANTS TO DELHI 1961



LEGEND.

DISTRICT-WISE TOTAL MIGRANTS

-  Less Than 10,000 Persons.
-  10,000 TO 24,000 Persons.
-  Above 24,000 Persons.

Boundaries. STATE U.T. DIST. TMS



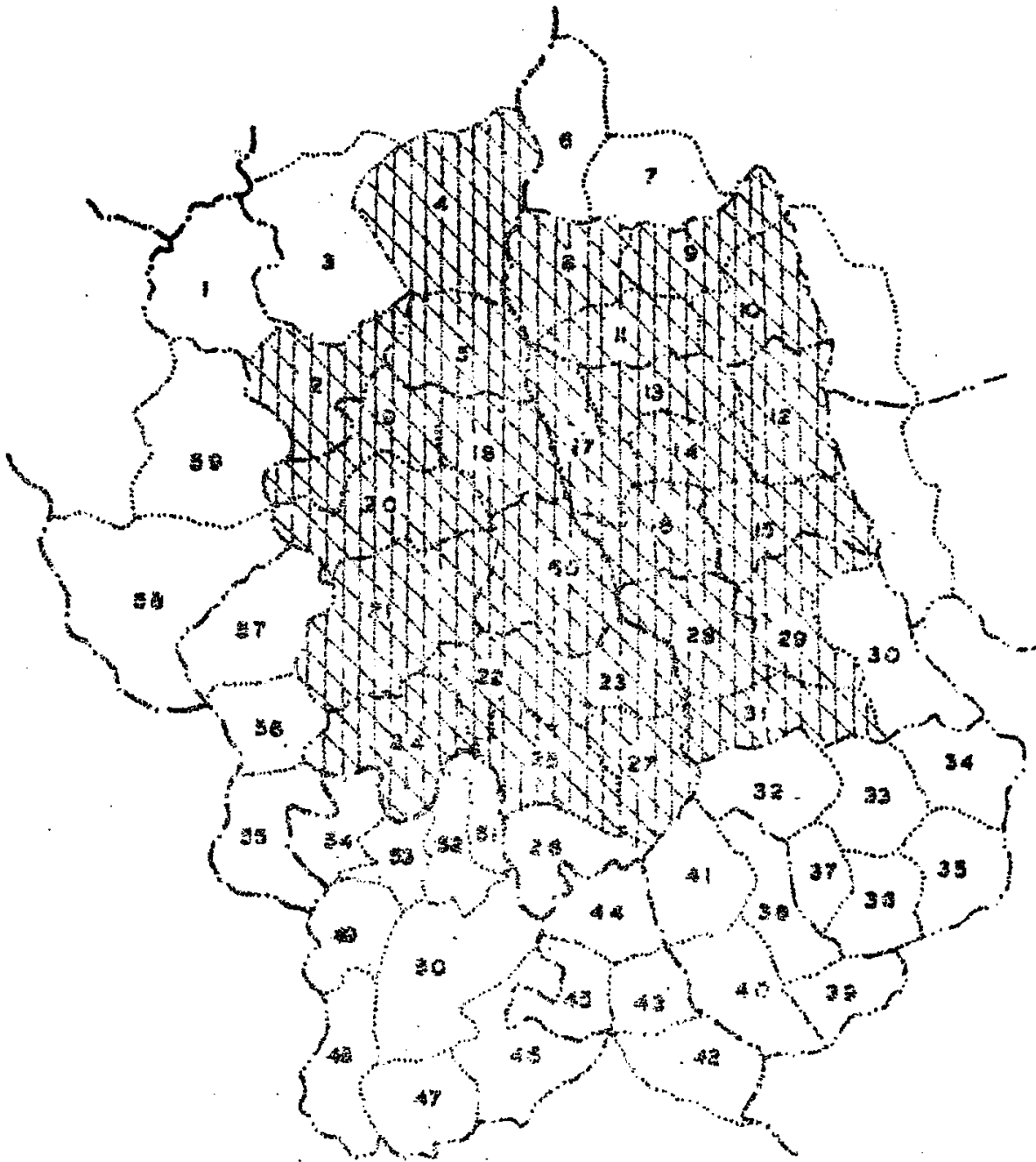
NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., P., W.H. & U. D.

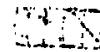
DELINEATION STUDY

PASSENGER MOVEMENT BY ROAD

1967.



LEGEND.



Area Of Effective Daily
Commutation 1000 & Above
Passengers Per Day.

Boundaries: STATE UT DIST PESH.



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H.P.P., W.H. & U.D.

DELINEATION STUDY

STUDY AREA & ADMINISTRATIVE BOUNDARIES

JIND		ROHTAK		MATHURA	
1	Narwaha	21	Jhajjar	41	Chette
2	Jmd		GURGAON		SHARAT PUR
KARNAL		22	Gurgaon	42	Bharat Pur
3	Kaithal	23	Safidabad	43	Dis
4	Karnal	24	Rewari	44	Komen
5	Panpat	25	Nuh	45	Nagar
SAHARAN PUR		26	Firozpur Jhirka		ALWAR
6	Nakaur	27	Palwal	46	Lehman Garh
7	Deoband		BULAND SHR.	47	Raj Garh
MUZZAFFAR NGR.		28	Sikandra bad	48	Thana
8	Karana	29	Bulandshahr	49	Bansur
9	Muzaffar Nagar	30	Anup shahr	50	Atwar
10	Guanath	31	Khurja	51	Tijara
11	Budhana		ALIGARH	52	Kishan Garh
MEERUT		32	Khair	53	Mandawar.
12	Mawana	33	Aligarh	54	Behrur
13	Zardhana	34	Atrauli		MAHENDRA GARH
14	Meerut	35	Sikandra Rao	55	Narnaul
15	Hapur	36	Hathras	56	Mahendra Garh
16	Ghaziabad	37	Igles	57	Dadri
17	Baghpat		MATHURA		HISSAR
ROHTAK		38	Math	58	Shiwani
18	Sonapat	39	Sodabad	59	Hansi
19	Gohana	40	Mathura	60	Delhi Union Terr
20	Rehtak				

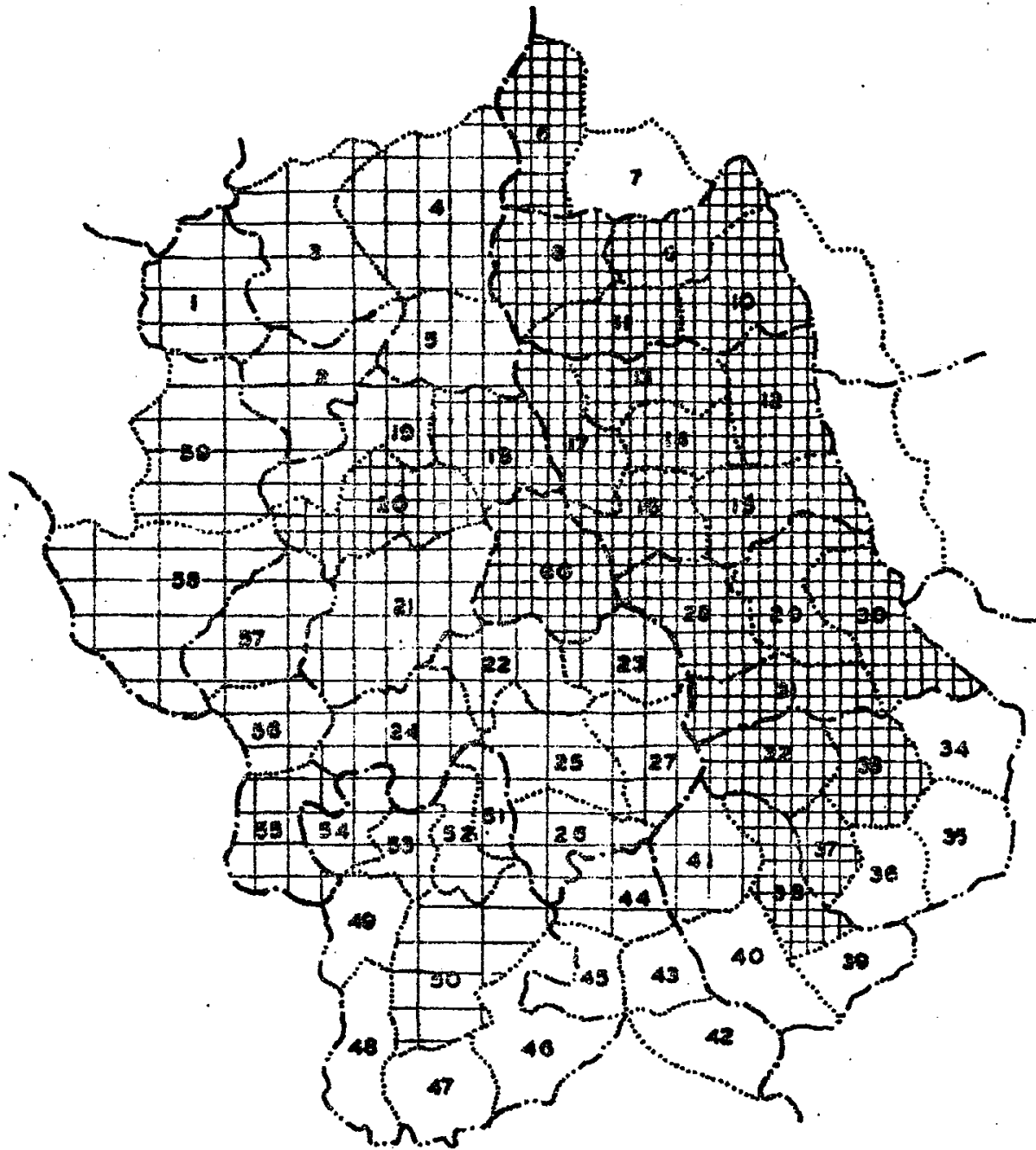
Boundries. STATE U.T. DIST. THERIL.



NATIONAL CAPITAL REGION




DELINEATION STUDY

DENSITY 1961



LEGEND.

TEHSIL-WISE PERSONS/SQ.Kms.

-  Less Than 200.
-  200 TO 250.
-  Above 250.

Boundaries. STATE U.T. DIST. TEHSIL.



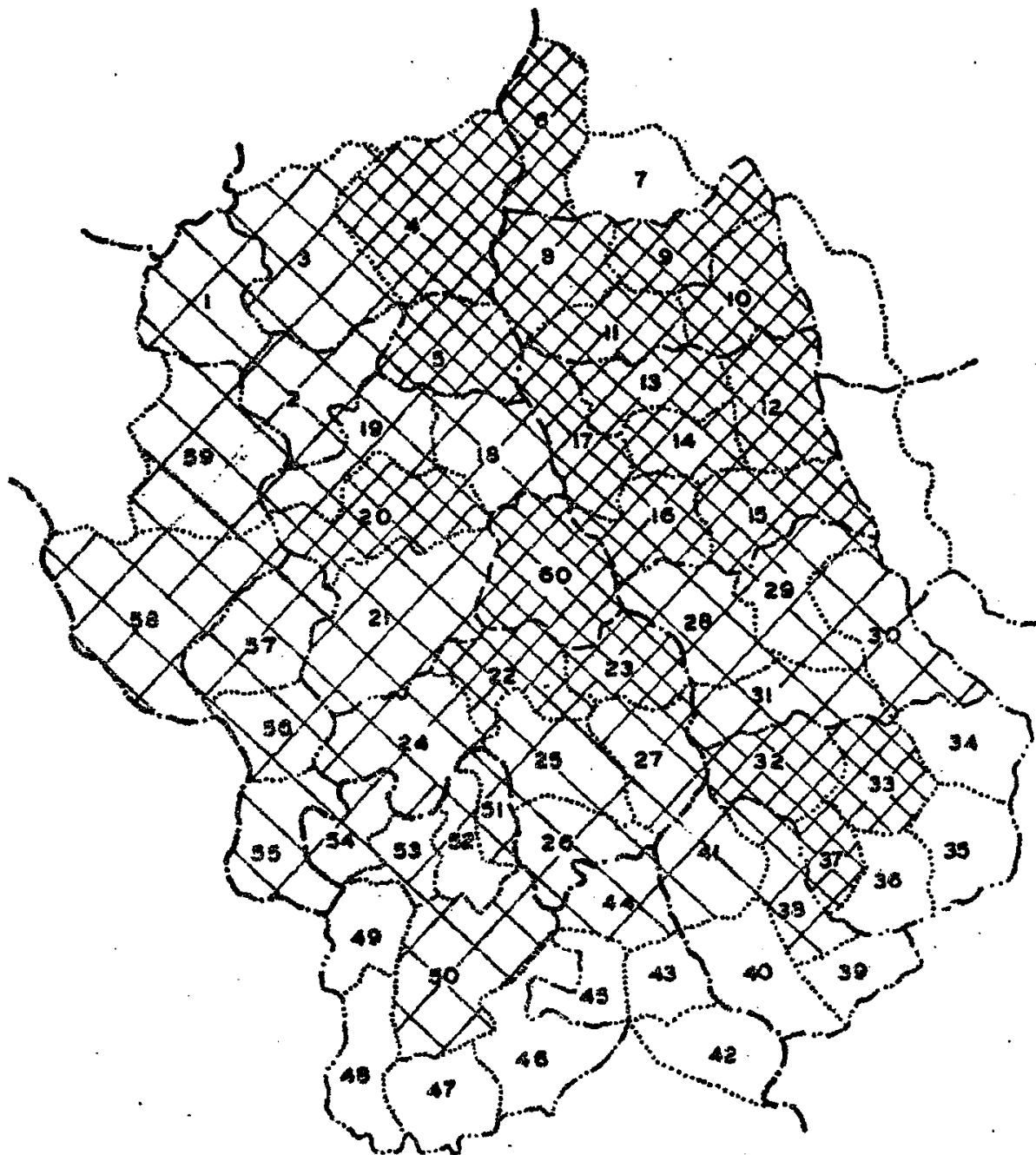
NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H., & U. D.

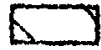
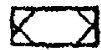

2.1.1

DELINEATION STUDY

ECONOMIC ACTIVITIES



LEGEND.

- TEHSIL-WISE % of NON AGRICULTURAL WORKERS.
-  Less Than 20 %.
 -  20 % TO 35 %.
 -  Above 35 %.

Boundaries. STATE U.T. DIST. TEHSIL

40 20 0 40 80 Kms

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H. & U. D. 2.12

Table 2.1

Demographic Indices used in the NCR Study:

	Area sq. Km.	Population 1961	Density per sq. Km. 1961	% Urban Popula- tion 1961	% Popula- tion Growth 1951-61	% of non- Agri. w.f. to total w.f. 1961
1	2	3	4	5	6	7
1. All India	3,053,597	4,39,235,082	144	17.97	21.50	30.50
2. Haryana	29,438	7,590,543	165	20.13	25.56	35.12
3. Uttar Pradesh	294,364	73,746,401	250	12.85	16.66	24.22
4. Rajasthan	342,274	70,155,602	59	16.27	26.20	20.49
5. NCR Study Area (including Delhi, Meerut)	49,526	15,157,917	306	29.28	26.37	45.02
6. NCR Study Area (excluding Delhi & Meerut)	47,327	11,914,208	251	13.70	22.01	34.56
7. NCR Delineated Area (Delhi & 26 Tehsils)	29,800	10,681,835	351	34.40	28.12	49.50
8. Delhi Union Territory	1,484	2,658,612	1,791	88.92	52.44	91.65
9. Calcutta Metropolitan Area	1,266	6,720,806	5,377	89.73	25.10	97.10
10. Bombay Region.	16,990	6,865,589	403	69.44	32.21	97.10

Source : 1. Census Publications, 1961.
 2. Basic Development Plan, C.M.D.
 3. Bombay Metropolitan Region Plan
 4. Computed from Census Reports by T.C.P.O.

delineated comprises areas contiguous to the Union Territory of Delhi, forming parts of the States of Haryana, Rajasthan and Uttar Pradesh as stated below:-

1. Union Territory of Delhi.
2. Haryana: District of Gurgaon, comprising tehsils Gurgaon, Ferozepur-Jhirka, Nuh, Palwal, Rewari, Ballabgarh and District of Rohtak, comprising tehsils of Rohtak, Jhajjar, Gohana, Sonapat and Panipat tehsil of district Karnal.
3. Rajasthan : The tehsils of Behror, Mandawar, Krishangarh, Tijara of Alwar district and part of Alwar tehsil comprising the area bounded in the north by the tehsil boundaries of Mandawar and Krishangarh, in the east by the boundaries of tehsil Ferozepur-Jhirka of district Gurgaon, Haryana, and Alwar tehsil, in the south by the Barah river right up to Umran lake in the west and then following along the southern boundaries of Umran lake upto the junction of Umran lake and the state highway from Alwar to Bairaut, and from then on west-north-west across the ridge upto the junction of the tehsil boundaries of Alwar and Bansur.
4. Uttar Pradesh: District Bulandshahr comprising tehsils of Anupshahr, Bulandshahr, Khurja, Sikandrabad and District Meerut comprising the tehsils of Baghpat, Ghaziabad, Hapur, Meerut, Mawana & Sardhana.

Urbanisation and Economic Picture in the NCR:

The total area of the National Capital Region thus delineated is about 29,800 sq.km. (11,500 sq.miles) with an average radius of about 100 km. (65 miles) from the core of Delhi. The total population of the Region was 83.40 lakhs in 1951 and 106.8 lakhs in 1961. The population of Urban Delhi was 14.37 lakhs in 1951 and 23.59 lakhs in 1961 whereas the population of the 49 towns in 1951 was only 10.32 lakhs & 13.17 lakhs in 1961. Meerut with a population of 2.8 lakhs is the only other city with a population of over one lakh. The urban population (including Delhi) constituted 34.4% of the total population of the Region, while the percentage of urban population of the Region excluding Delhi was only 16.43. In the Region excluding Delhi not only urbanisation is poor but the secondary and tertiary sectors have not developed sufficiently to provide non-agricultural employment.

This lop-sided development will be further aggravated if the present trends of planned urban growth in Delhi and meagre developmental efforts in towns of the Region continue. It has been estimated that the population of the Union Territory of Delhi will reach a figure of 67 lakhs by 1981*. The corresponding projection for the rest of the Region is about 144 lakhs giving a total population of 211 lakhs for the Region. Also if the present trends continue, it is estimated that the ur-

* Please refer to Chapter III for a full discussion of population estimates.

ban population in Delhi and in the rest of the Region is likely to be of the order of 64 lakhs and 27 lakhs respectively by 1981. This gives an urban component of 43.3% for the whole Region. By 1981 about 70 percent of the total urban population would be concentrated in Urban Delhi and the districts of the Region would have an average of only 18.86% of urban population to total population. Thus, the districts around Delhi would have neither adequate urban growth nor enough non-agricultural economic activity which could provide employment to the surplus labour whose number would further swell due to increase in mechanisation and other developments in the agricultural economy of the Region, where the push factors will be relentlessly at work.

Earlier in Chapter-I, the concentration of employment opportunities in Delhi has been discussed, especially, in those sectors which have given a big boost to the population growth. It was also stated that the growth of Delhi has posed many problems for the Region. Table 2.2 gives some of the indicators of growth in the Region. It shows that all districts in the NCR have a very high density except Alwar district, the average density being 284 persons per sq.km., as against the All India figure of 144. (in 1961). The percentage growth of population in Meerut and Bulandshahr Districts are 18.9 and 15.9 respectively for the decade 1951-61 as against the national average of 21.5%. This can only be explained by large migration to Delhi as otherwise the districts are agriculturally prosperous. The percentage of urban population to total population in all the districts except Meerut district and Panipat tehsil are

well below the national average of 17.9% which clearly shows that in the shadow of the metropolis the growth of urban population has been very slow.

Table 2.2

Indicators of Growth in the Districts of NCR:

District	Density per sq.km. 1961	Percentage growth of pop. 1951-61	Percentage of urban population to total 1961	Migration to the Union Territory in 1961 census
Meerut	451	18.9	20.68	66,041
Bulandshahr	353	15.9	12.65	52,819
Rohtak	235	26.6	13.69	64,323
Gurgaon	208	28.2	16.57	49,067
Alwar (part of district)	138	27.05	11.54	5,800
Panipat tehsil	236	24.40	23.77	2,700
Total N.C.R. (Excluding the Union Territory of Delhi).	284	21.52	16.43	2,40,750

Source : Census of India. Compiled by T.C.P.O.

Table 2.3 gives the working force in major categories in sixteen important towns of the NCR in 1961. This shows that the secondary sector is prominent in many of the towns whereas the tertiary sector is predominant in most of the towns. In the smaller towns the primary sector is also quite significant.

Agriculture has reached a very high degree of development in the districts around Delhi, especially in Meerut and Bulandshahr districts where the percentages of irrigated area to sown area are 80.81 and 75.92 respectively, while on an average it is nearly 50%. The percentage of double crop to sown area is

Table 2.3

Working Force in Major Categories in Sixteen Important Towns of NCR 1961.

Towns	Primary	%	Secondary	%	Tertiary	%	Total	%
Meerut	3,202	3.8	24,767	28.7	58,389	67.5	86,358	100
Ghaziabad	496	2.8	6,939	35.0	12,340	62.1	19,775	100
Modinagar	40	0.4	6,995	77.4	2,243	22.2	9,278	100
Hapur	1,284	8.5	3,479	22.8	10,543	68.6	15,306	100
Bulandshahr	776	5.8	3,110	23.4	9,412	70.8	13,298	100
Khurja	984	8.1	3,335	28.5	77,403	63.3	11,722	100
Sikandrabad	1,466	17.8	2,624	31.8	4,136	50.4	8,226	100
Faridabad/Ballabgarh	1,262	7.0	9,761	54.2	6,970	38.7	17,993	100
Gurgaon	233	2.6	2,175	22.0	7,511	75.3	9,919	100
Rewari	357	3.8	3,110	33.0	5,955	63.2	9,422	100
Rohtak	1,802	8.1	5,443	24.4	15,059	67.5	22,304	100
Sonepat	1,116	8.8	4,546	35.8	7,027	55.3	12,689	100
Bahadurgarh	948	21.8	1,074	24.7	2,344	53.4	4,366	100
Panipat	1,787	8.7	9,146	44.8	9,465	46.4	20,398	100
Palwal	1,236	16.3	1,948	25.8	4,370	57.8	7,554	100
Alwar	1,849	9.0	5,464	26.6	13,184	64.3	20,497	100
Total	18,838	6.5	93,916	32.5	176,351	61.0	2,89,105	100

Source : Census of India. Compiled by T.C.P.O.

also over 45 in the districts of Meerut, Bulandshahr and Rohtak and even the average percentage is as high as 34.61. (See Table 2.4).

Table 2.4

Irrigated and Double Crop Areas: NCR.

District	(Area in '000)				
	Total sown area (hectares)	Total irrigated area (hectares)	Irrigated to sown area (%)	Double crop area (hectares)	Double crop to sown area %
1	2	3	4	5	6
Meerut	461.5	372.9	80.81	214.7	46.52
Bulandshahr	372.1	282.5	75.92	179.3	48.20
Rohtak	485.0	178.7	36.85	222.9	45.97
Gurgaon	460.0	121.3	26.36	72.1	15.68
Panipat tehsil	79.5	53.9	67.76	24.0	30.16
Alwar (part)	283.8	50.8	17.91	28.2	9.95
Total	2141.8	1060.1	49.49	741.3	34.61

Source : District Revenue Department of the State Govts. Compiled by TCPO.

As regards the secondary sector, the policy followed in the Master Plan for Delhi has resulted in diverting some of the industrial activity to the 'ring towns' located in the Region especially Faridabad - Ballabgarh and Ghaziabad where there was a spurt in industrial activity. (Modinagar is another town which has witnessed a rapid industrial growth but for a different reason). This may be seen in Table 2.5 which shows the employment in the registered sector industries. On the other hand the growth of industries in the other towns of the Region has not been very significant. The increase of employment in registered sector industries from 1952 to 1968 i.e. over a period of 16 years for some of the towns are given in

Table 2.5

Registered Sector Industrial Employment Growth:

Towns	1962	1968	Increase 1962-68	%
Faridabad-Ballabgarh	11,102	26,965	15,863	142.9
Ghaziabad	5,872	12,770	6,898	117.5
Modinagar	7,797	12,161	4,364	55.9
Total	24,771	51,896	27,125	

Source:- Chief Inspectors of Factories of U.P. and Haryana. Compiled by T.C.P.O. Tables 2.5, 2.6 and 2.7

Table 2.6. The largest number of increase in employment being in Sonapat of about 3,700.

Table 2.6

Registered Sector Industrial Employment Growth:

Towns	1952	1968	Increase 1952-68.
Bulandshahr	130	756	626
Khurja	61	580	519
Hapur	376	781	405
Meerut	3,795	3,835	40
Gurgaon	828	2,653	1,825
Bahadurgarh	-	1,664	1,664
Rohtak	179	1,933	1,754
Sonapat	153	3,888	3,735
Panipat	474	2,959	2,485
Total	5,996	19,049	13,053

As stated earlier that due to the Delhi Master Plan policy three towns showed significant industrial development during the period 1962-68 but in the previous 10 years the growth was comparatively not high in these towns.

Between 1952-62 the increase in registered sector industrial employment given in Table 2.7 shows only a moderate increase in employment as compared to the growth between 1962-68.

Table 2.7

Registered Sector Industrial Employment Growth.

Towns	1952	1962	Increase 1952-62
Faridabad- Ballabgarh	535	11,102	10,567
Ghaziabad	1,578	5,872	4,294
Modinagar	4,768	7,797	3,029
Total	6,881	24,771	17,890

As regards trade and commerce it constituted the third most important category, since about 20% of the working force in the towns were engaged in this activity in 1961.

In all the towns especially in the bigger towns - Class III and above more than 30% of the workers are found in the services and they constitute the highest proportion of the working force. This is to say that functionally speaking they are administrative centres or otherwise service centres. It is only when we come to class IV and below that on an average both "services" and "industries" account for a similar proportion with industries having a

slight edge over the services, but they are mostly household not factory industries. (See Chapter on Economic Base).

Problems of Regional Drainage and Floods:

The perennial system of natural surface drainage covers only a little over 50 per cent of the total area included within the boundary of the National Capital Region. Their catchment covers the flood plains of the Yamuna itself including the Najafgarh drain and its three tributaries, namely, the Hindon Nadi, the Patwaha Nadi, and the Karwan Nadi in Meerut and Bulandshahr districts. The Kali Nadi and the Neem Nadi which form tributaries of the Ganga river and drain the eastern half of Meerut and Bulandshahr districts also add upto the catchment areas under perennial system of drainage in NCR.

The remaining portion of the NCR which lies west of the Yamuna river exhibits total absence of any organised system of natural surface drainage to operate during all weather conditions. The existing streams like Sahibi and Kaswati in Rajasthan which flow northwards, the Badshahpur drain flowing north-westwards from Fatehpur Beri (Delhi) and a number of long and short drains having their flow southwards from Punjab and Haryana find their 'dead ends' in Najafgarh - Jahajgarh depression which covers an area of approximately 567 sq.kms. (219 sq.miles). The pattern of surface drainage in Haryana sub-region, converge in a pan-like depression and do not pose serious drainage problems during the dry weather season because many of these rivers and drains are parched and dry. But during the rainy season this low

lying depression receives water from the local catchments as well as from areas as far south as Jaipur and as far north as Karnal, which get pooled up in these depressed low lands due to the converging pattern of surface drainage conditions. The accumulation of large amounts of water during the rains results in serious drainage congestion in this area giving rise to large scale flooding with consequent damage to the village abadis and agricultural land. The areas which face the danger of submergence due to flood cover one-fourth of Rohtak district, and the adjacent parts of Gurgaon district in Haryana sub-region, as well as the Najafgarh Block in the Union Territory of Delhi.

The problem of regional drainage congestion in Haryana and the Union Territory of Delhi has not so far been approached with a view to eradicate the total problem from these depressed low lands. However, several committees were set up by the problem in order to save the Union Territory of Delhi from the hazards of flood and drainage congestion. These committees have generally suggested useful measures for improved drainage, regulated flood discharge and strengthening of flood protection bunds throughout the Union Territory of Delhi. The total eradication of the existing hazards of flood and drainage congestion in these depressed lowlands require to be tackled in an unified manner for the concerned areas of Haryana Sub-region and the Union Territory of Delhi on a regional level for overall development within the framework of the National Capital Region.

Problems of Regional Water Supply:

The existing sources of water supply which meet the water requirements for drinking, irrigation (agricultural) and industrial units in areas under the National Capital Region include the two perennial rivers, namely, the Yamuna and the Ganga, as well as, the sub-surface water tapped through tubewells wherever the conditions are favourable. The National Capital Region receives hardly 45 to 75 cms. of rainfall in portions east of the Yamuna and less than 45 cms. rainfall west of the Yamuna and does not contain areas having sufficient reservoirs of sub-surface water. On the other hand, substantive areas are those where evaporation of sub-soil water through capillary action is generally prominent giving rise to higher saline contents in the porous layers underground, which, in turn, increase the salinity of the sub-surface water. The large extent of areas which have brackish sub-surface water, cover almost all the areas in Rohtak, Gurgaon and Panipat Tehsil of Haryana with very localised and significantly small reserves of potable water encountered nearer the Yamuna flood plains. In Meerut and Bulandshahr districts of Uttar Pradesh which is included in the National Capital Region, the sub-surface water is mostly potable with few exceptions of small localised reserves of brackish water in areas lying within the flood plains of the Yamuna and the Ganga. The exploitation of the available resources of water supply from the rivers as well as the tubewells for the adequacy of water supply in the National Capital Region, requires inter-state co-operation and will have to be tackled on a regional basis.

(a) Drinking Water Supply: At present Delhi is the only city within the National Capital Region where approximately 618 million litres per day (136 mgd) of water is directly tapped from the Yamuna river for drinking purposes. There appears to be sufficiently large scope for investigating ways and means to augment the supply from the Yamuna and the Ganga in order to meet the existing deficit as well as the growing demand of drinking water supply within the periphery of the National Capital Regional Study.

Tubewells generally form the main source of drinking water supply to the urban areas and the village abadis in the National Capital Region except Delhi. The portion of the NCR located east of the Yamuna river in Uttar Pradesh are totally dependent on tubewell supply for drinking purposes. Since the sub-surface water is generally sweet in Meerut and Bulandshahr districts, the supply of drinking water through tubewells have so far proved cheaper and satisfactory, except in cases where augmentation in the capacity of supply is needed. In Rohtak, Gurgaon and Panipat Tehsil of Haryana as well as the Union Territory of Delhi, the sub-surface water is mostly brackish rendering it difficult to depend upon tubewells for drinking water supply. The areas where pockets of sweet water are available, namely, Panipat, Sonapat, Faridabad, etc., are located nearer the course of the existing Yamuna river. The demand of drinking water supply is, presently, being met in these areas through tubewells. Apparently the reserves are small and with the growing demand, the tubewell supply in these areas may not be able to cope with the situation.

Under the existing circumstances the development of areas of the National Capital Region for cushioning the dispersal of activities from Urban Delhi, require the formulation of schemes for a unified network of drinking water supply system throughout the areas covered under the NCR.

(b) Water Supply for Irrigation: The agricultural areas (particularly under cultivation) of the National Capital Region generally receive water for irrigation from Eastern Yamuna Canal, Western Yamuna Canal, Western Ganga Canal and partly from Agra Canal. Tubewells also play a substantial part in supplementing the agricultural water supply particularly in Uttar Pradesh (NCR) where water is non-saline and favourable for crops.

The existing irrigation networks are well established and have been in use since several decades. Further augmentation of irrigation schemes in the portion of Uttar Pradesh falling in the National Capital Region are generally of the nature of strengthening the protective bunds to save agricultural areas from inundation, extending the distributories of the existing canal systems and reclaiming the low lying areas for agricultural purposes. For the areas located west of the Yamuna river, which suffer from conditions of extreme drought and receive very little amount of rainfall. The Western Yamuna Canal, its branches and distributories form the life-giving lines for agricultural as well as urban consumption.

(c) Water Supply for Industrial Units: Water supply for the industrial units in the important centres (both existing and contemplated) Industrial

pose problems similar to the drinking water supply and water supply for irrigation. Industrial units consume generally soft water and reservations for adequate supply of soft water to important centres which are developing as industrial nodes in the National Capital Region required to be worked on a regional basis and the supply assured within the framework of the National Capital Region.

Power Supply in the Region:

At the moment, the position of power supply in Delhi and other urban centres, within the National Capital Region seems to be satisfactory. For the future requirements power grids on a regional basis will have to be worked out so that growing needs of the agricultural sector as well as village abadis on the one hand and the fast growing urban sector (which will constitute in 1981 about 44% of the total population of this region) could be adequately met. Hence the problem will be mainly of integrated distribution within the NCR.

Objectives of Planning in the National Capital Region:

The National Capital Region has a dynamic potential for growth. Its plan should maximise output from scarce financial resources and provide the environment in which there is scope for the expression and application of diverse faculties and urges of the people in the Region. Thus, the task is not only to maximise economic activity but to mould and refashion the Region in such a way that its people contribute effectively to the realization of wider and deep social values. Keeping in mind these

premises, goals for the planning of the National Capital Region may be stated as follows:-

1. Well organised urban places in the National Capital Region in a physically efficient pattern and socially desirable environment, with effective participation of the local units, that will sustain dynamic growth in keeping with national goals.
2. Rational and orderly growth of Delhi as the beautiful National Capital, symbolizing the life and aspirations of the Nation.
3. Integrated and co-ordinated development of the transport system, sources of water supply, flood control, measures, drainage and power supply of the Region, within a broad regional framework.
4. Healthy rural-urban relationship and protection of the freshness of air, water and land in the Region.
5. Sustained development planning of the Region and effective implementation of the plan in close integration with the economic development of the country.

Scope of Regional Planning in the NCR:

In order to achieve the goals, Regional Planning will have to ensure orderly growth and proper use of land and strive for balanced, physical social and economic development. Hence the major elements of the National Capital Plan

include the following:-

1. In conformity with national and regional goals, a policy statement outlining in broad terms the desirable distribution of economic activity to achieve balanced development in the Region.
2. Keeping in view the demographic projections and rural urban migrations, a spatial plan best suited for the Region from social, economic technological considerations.
3. A policy statement on the location of industries and their broad distribution within the Region.
4. An overall transportation plan for the projected needs of the Region.
5. A broad framework for the integrated and co-ordinated development of the source of water supply, flood control measures, drainage and power supply.
6. Phasing of the various development programmes and integrating them into the Five Year and Annual Plans.
7. Legal and administrative framework for plan preparation, Plan implementation & control measures to regulate all development in accordance with the Regional Plan.
8. Adequate organisational set-up to enforce the provisions of the Regional Plan.

Table 2.8

Corridor Towns in the NCR with Population and Working Force - 1961.

Corridors	Towns	Population in Corridor Towns '000's	% to Urban Population	Working Force in Corridor Towns '000's	% to Urban Working Force.
I.	Ghaziabad, Miradnagar, Modinagar, Meerut, Kankarkhera.	397.8	30.7	120.7	31.3
II.	Pilkhawa, Hapur, Garhmukhteshwar.	80.0	6.9	24.3	6.3
III.	Dadri, Sikandrabad, Bulandshahr, Khurja.	120.6	9.1	35.7	9.2
IV.	Faridabad, Ballabgarh, Palwal, Hodel.	97.5	7.4	28.9	7.4
V.	Gurgaon, Pataudi, Bawal.	48.0	3.6	12.7	3.3
VI.	Sohna, Nuh, Ferozpur-Jhirka, Alwar.	89.1	6.7	25.3	6.5
VII.	Bahadurgarh, Rohtak, Meham.	112.5	8.5	29.2	7.6
VIII.	Sonepat, Panipat.	112.9	8.5	33.1	8.6
IX.	Baghpat, Baraut.	31.3	2.3	8.9	2.4
Total		1,089.7	82.7	318.7	82.7

Note : The total number of towns in NCR in 1951 and 1961 were 49 as against 30 in the Corridors above.

Source: Compiled from the Census of India by T.C.P.O.

9. Priority action on pressing problems within the framework of the Regional Plan.

The Pattern of Urban Development in the NCR:

The goals and scope of Regional Planning in the NCR have been enunciated. In order to move purposefully in the direction of achieving the goals, it would be necessary to consider alternative physical frameworks for the proper organisation of economic activity, population distribution and their inter-relationship.

Present Growth Trends:- At the outset the existing pattern of settlements have to be analysed. The trends show that these are concentrated in towns along the radial corridors, along highways and railway lines. These have been identified, and Table 2.8 indicates the extent of concentration of population and economic activity along the corridors. (See also map 2.3). It shows that 82.7 per cent of the total urban population of the NCR as well as 82.7 per cent of the total urban working force are concentrated in the corridor towns. The Delhi-Ghaziabad - Meerut corridor in 1961 had 31.7 per cent of the total urban population and 31.30% of the total urban working force which entitles it to be called the Grand Corridor. Table 2.9, also reveals that the corridor towns had a growth rate of 38.2 per cent in the decade 1941-51 and 30.7 per cent in 1951-61, as compared to 4.6 per cent and 22.6 per cent respectively in other towns of the NCR. However these percentages have no comparison with the growth rate of Urban Delhi which was 106.6 per cent and 64.2 per cent respectively in the two decades.

Table 2.9
Corridor Towns - Comparative Growth of Population (1941-1961).

Towns	Population in '000's urban NCR			Growth	
	1941	1951	1961	1941-1951	1951-1961
Corridor Towns of NCR (30 Towns)	6,030	8,336	11,897	280.5 (38.2)	256.2 (30.7)
Other Towns in NCR (19 Towns)	1,784	1,866	2,288	8.2 (4.6)	42.3 (22.6)
Urban Delhi	6,957	14,371	2,359.4	742.4 (106.6)	922.3 (64.2)

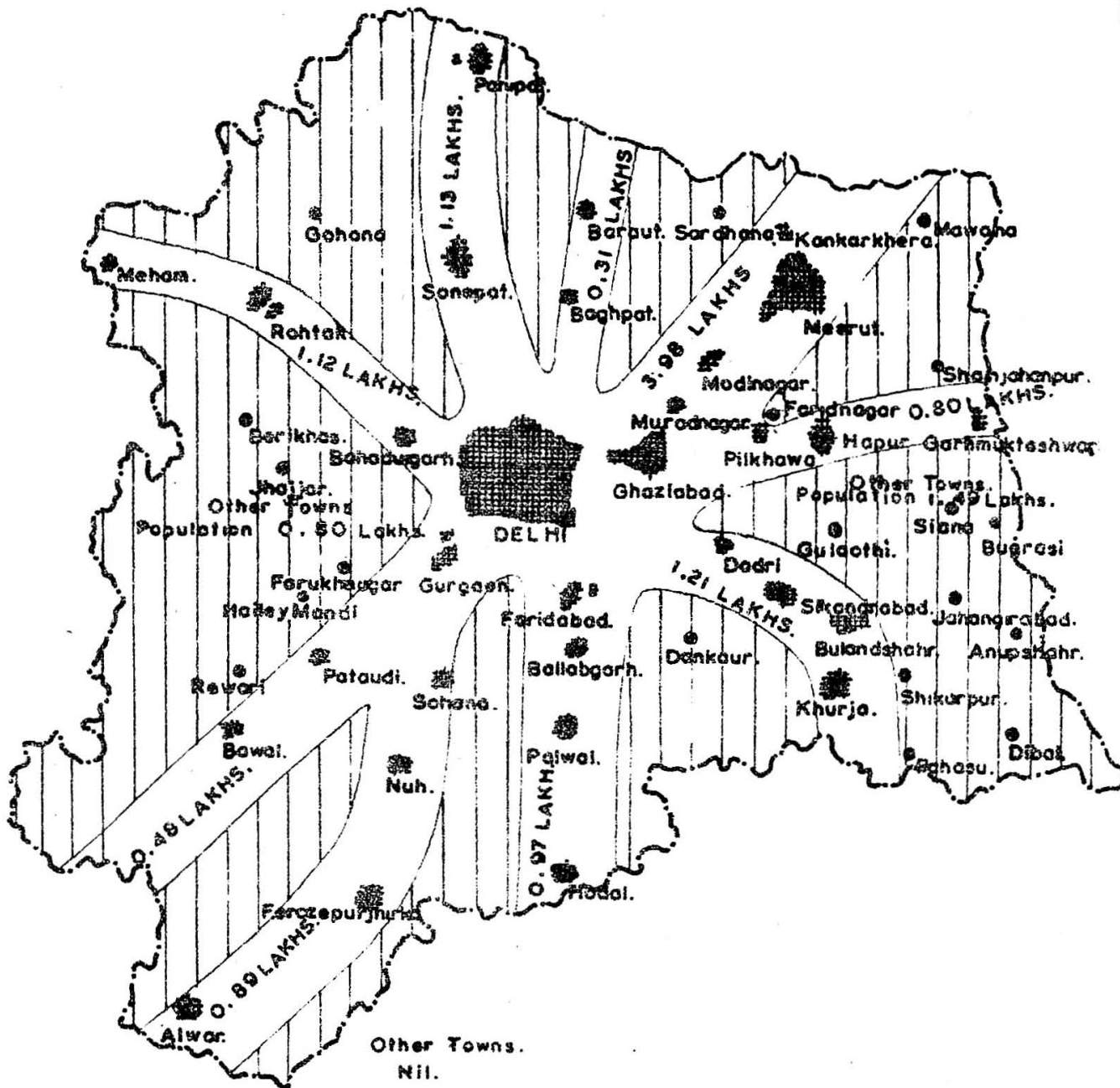
Alternative Growth Patterns:

Apart from the existing growth trends of other considerations in selecting a pattern are:-




- (a) Cost factor.
- (b) Technology likely to be available.
- (c) Social considerations.

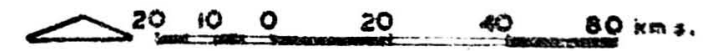
For an analysis of the above considerations certain physical patterns which are taking place in metropolitan growth all over the

POPULATION IN RADIAL CORRIDORS - 1961.



LEGEND.

-  Corridor Towns.
-  Corridors.
-  Other Towns.



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world have to be considered. On the basis of projections already indicated for the Region, by 1981, the urban population would be of the order of 95 lakhs. Of this, if present trends continue, 64 lakhs would be concentrated in Urban Delhi. Taking this factor into consideration Table 2.10 gives five possible alternative models in which urban population distribution is made among Urban Delhi, Meerut which is a big city, other Class-I cities and other small towns. (See maps 2.4 series). These models are analysed for the above three considerations.*

(a) Cost considerations: The global cost of the entire physical system given in the five models is not worked out but the cost differential which would determine the final choice has been worked out. These have been worked out under three main headings.

(i) Cost of acquisition of land and development: Including the provision of infrastructure such as water supply, drainage and local roads have been worked out. These also include recurring expenditure on running the utilities. It assumes cost differential in the acquisition of land; higher densities in bigger size cities as well as a higher standard of development.

(ii) Traffic and Transportation Costs: These are worked out under two counts, city transport and inter-city communication. The basic assumption here is that the city of Delhi would require a rapid transit system when it begins to attain a population of six million and the provision of extra lanes for fast traffic along the main arteries. In all the models, electrification/dieselisation of the

Table 2.10

Alternative Models of Urban Population Distribution in NCR 1981.

Pattern of growth 1981	(Population in Lakhs)				
	'Delhi'	'Meerut'	'Class-I Cities'	'Other Towns'	'Total'
1. Satellite town Plan	65	8	15	10	98
2. Addl. Metropolitan Centre Plan.	58	5	15	10	96
3. Finger Plan	60	8	15	15	95
4. Multi-town Plan.	53	12	18	15	95
5. Radial Corridor Plan.	52	10	22	14	98
1961 Population.	24	3	5	4	36
1968 (estimated population).	36	5	7	6	54

railways, increasing the number of railway lines, improvements of signals, construction of railway stations will be required and are more or less the same for all the patterns under consideration.

*"A Search for a Development Pattern in the NCR" a National Capital Regional Plan Study, TCPO, 1968.

(iii) Housing Costs: In working out the cost many assumptions have to be made. Housing in Delhi and Meerut City would be on an average four storey construction while in the other towns two storey construction have been assumed in order to achieve the particular density suitable to the city. The cost of four storey construction is assumed higher than two storey construction. The average area per dwelling unit is assumed as 55.6 sq. metres (600 sq. feet) and the size of the family 4.5 persons. Also certain assumptions on the percentage of housing to be built by public agencies have been made and only cost differential of public housing has been taken into consideration.

Investment Analysis: Table 2.11 gives the investment in alternative patterns of growth showing the cost differential in the five modes. The Satellite Pattern and the Finger Plan Pattern require the highest investments. These are the two patterns that will emerge if the present trends are allowed to perpetuate. The Additional Metropolitan Centre Pattern, if pursued will entail moderate savings in investment. However, it is the Radial Corridor Pattern and the Multi-town Pattern which if purposefully developed would result in a saving of more than 30 crores in a period of 12 years. This is a considerable figure being about ten percent of the total public sector investment.

(b) Technological Considerations: At the present critical stage of the country's economic development, it would be futile to conceive a system that will require capital intensive projects with highly sophisticated technical skill and organisational patterns, all of

Table 2.11

Tentative Cost Differential Between Various Patterns of Urban Development in NCR 1961-81

Pattern	(Rs. in Lakhs)				
	'Land & 'infra- 'struc- 'ture	'Recur- 'ring	'Hous- 'ing (Pub- 'lic 'Sec- 'tor)	'Traf- 'fic 'net 'work	'Total
Satellite	184,73	12,66	61,68	56,50	315,57
Additional Metropolitan Centre	177,48	12,53	65,90	52,71	308,62
Finger	171,84	12,38	58,91	69,21	312,34
Multi-town	159,88	12,08	62,80	48,35	283,11
Radial Corridor	166,81	12,13	55,14	53,46	281,54




which are lacking in India at the moment. What is possible is the application of intermediate technology at all the levels; planning, development and construction, as far as possible.

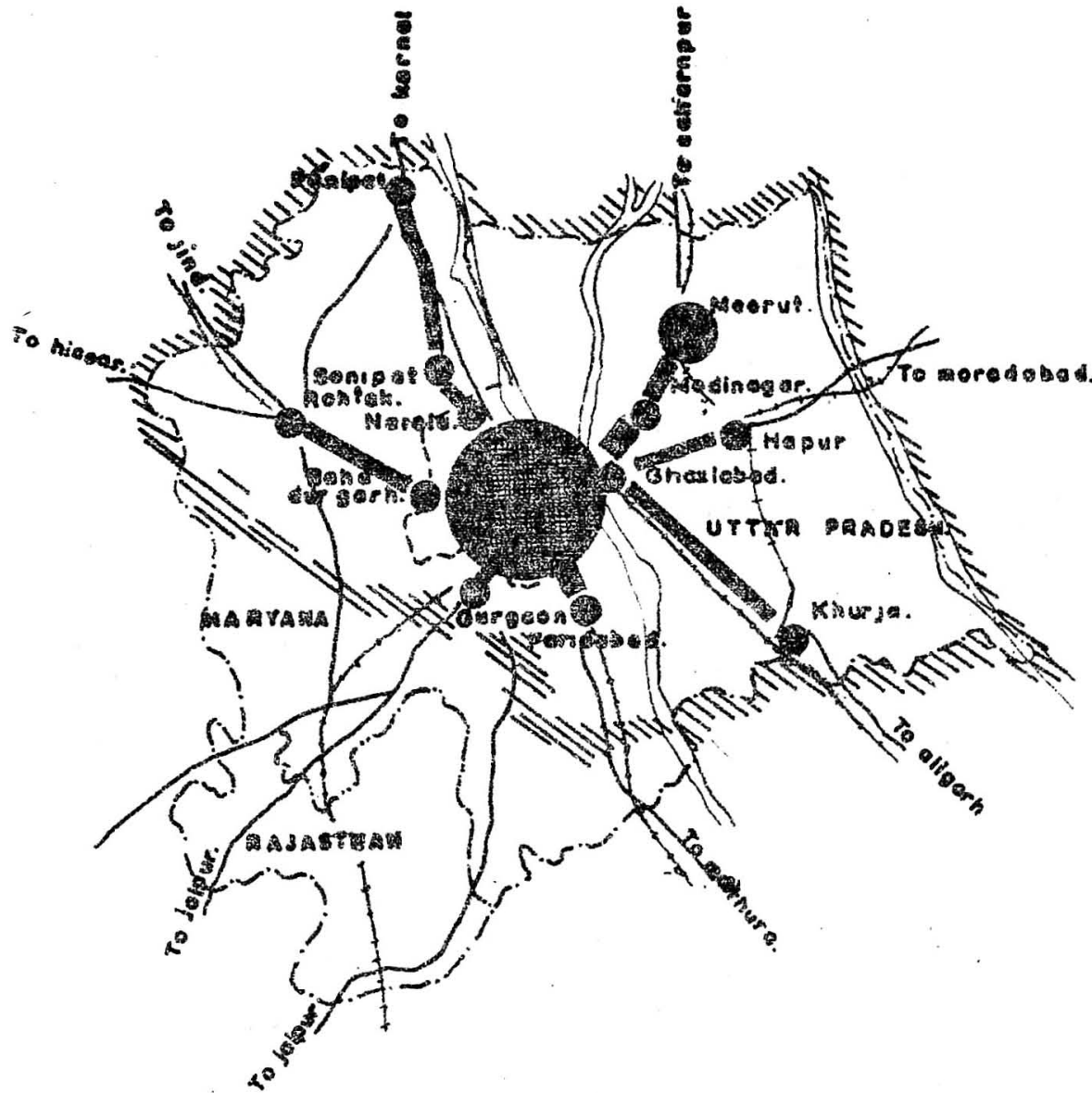
From various considerations it would be difficult to execute a project of underground rapid transit for Urban Delhi within the next 10 years. This can be avoided by keeping down the size of Delhi, but on the other hand use can be made of the electrification of the radial railway lines converging on Delhi to have

ALTERNATIVE URBAN GROWTH PATTERN


SATELLITE TOWN CONCEPT

LEGEND

-  Main Urban Area.
-  Traffic Arteries.
-  Area Of Higher Urbanisation.



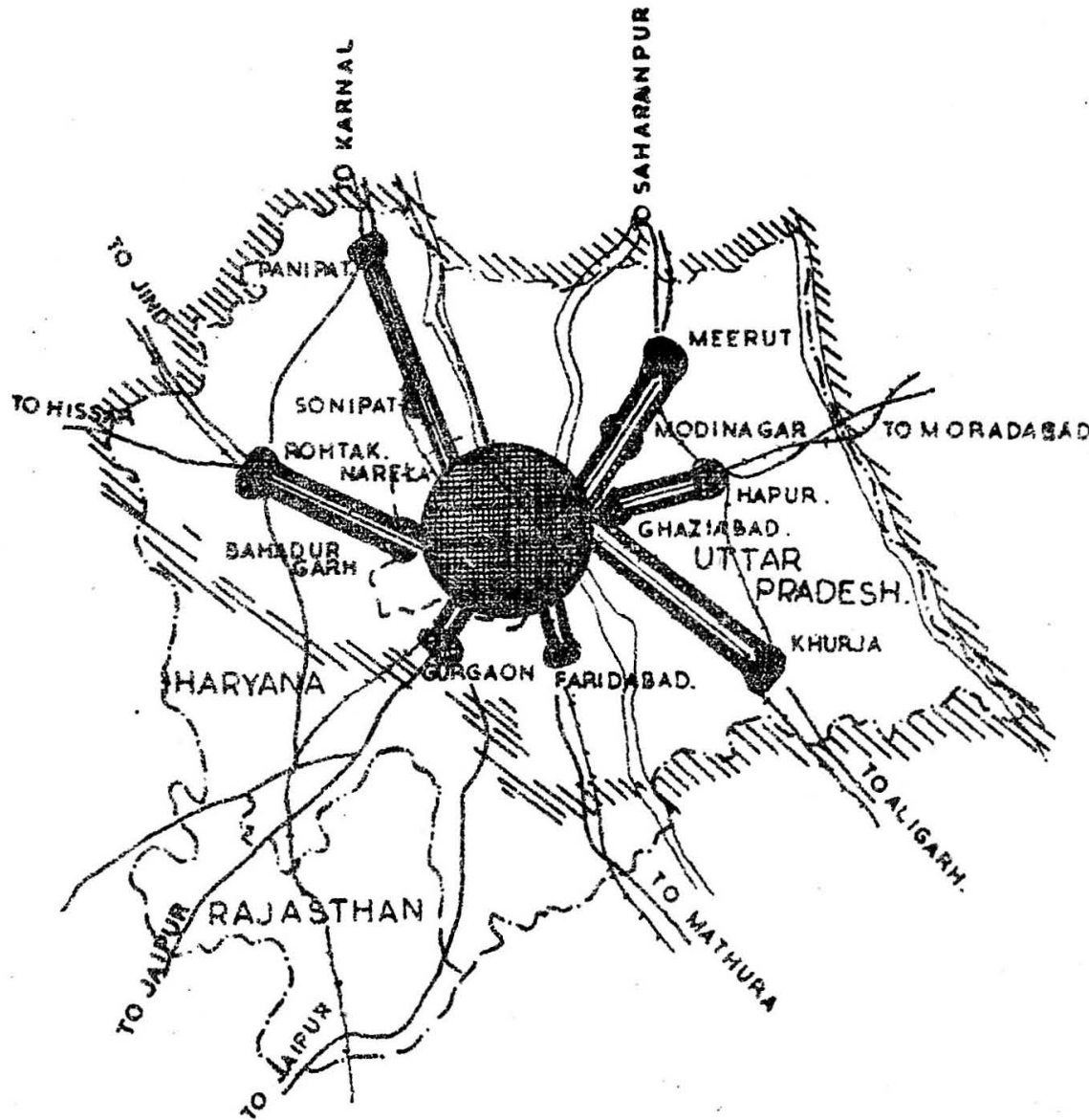
Boundaries. N.C.R state U.T.

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

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ALTERNATIVE URBAN GROWTH PATTERN

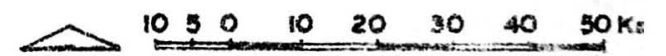
FINGER PLAN



LEGEND.

-  Main Urban Area.
-  Traffic Arteries.
-  Area Of Higher Urbanisation.

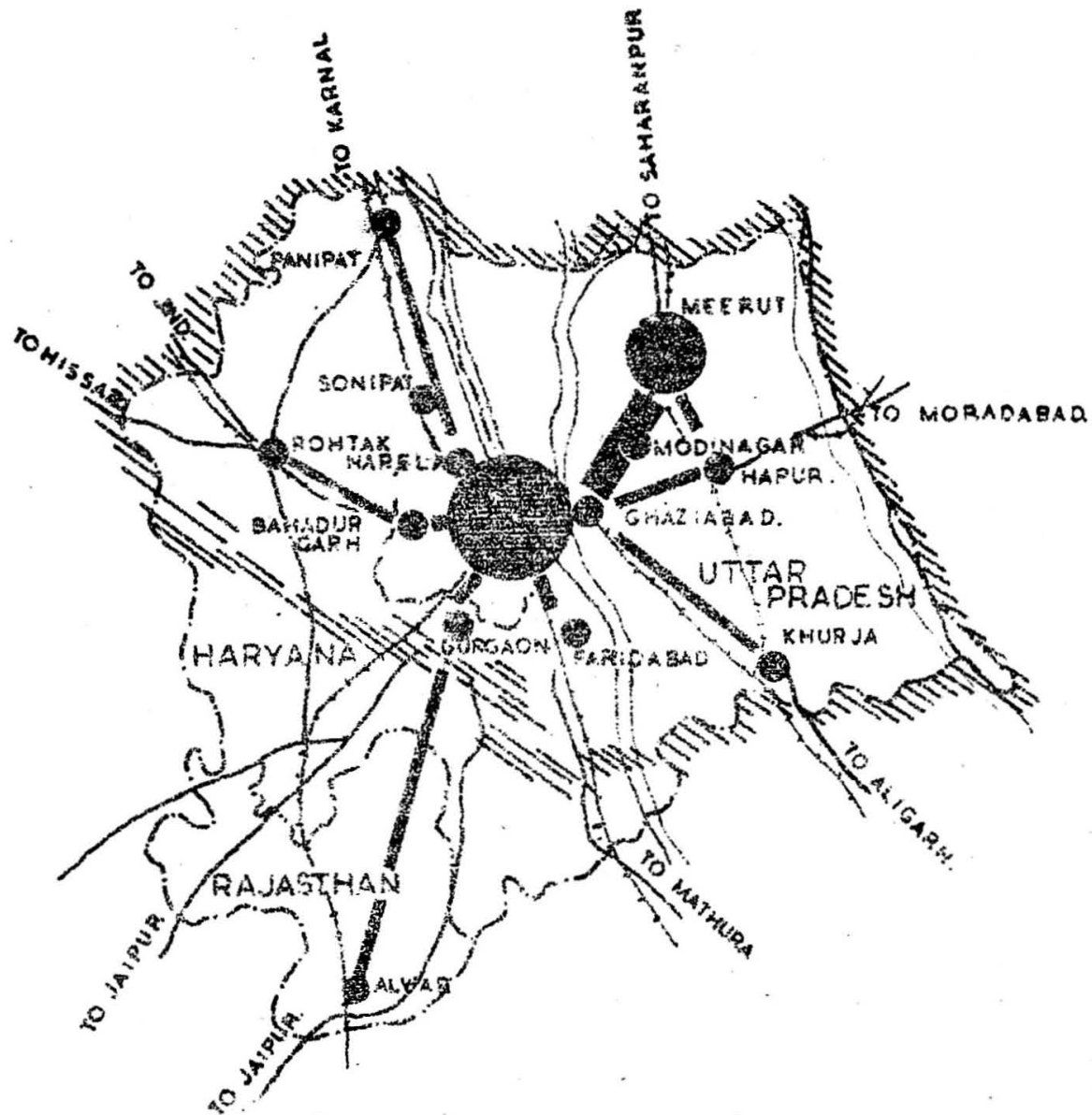
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

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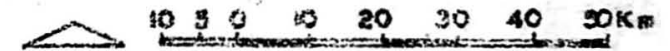
ALTERNATIVE URBAN GROWTH PATTERN ADDITIONAL METROPOLITAN CENTRE



LEGEND.

-  Main Urban Area.
-  Traffic Arteries.
-  Area Of Higher Urbanisation.

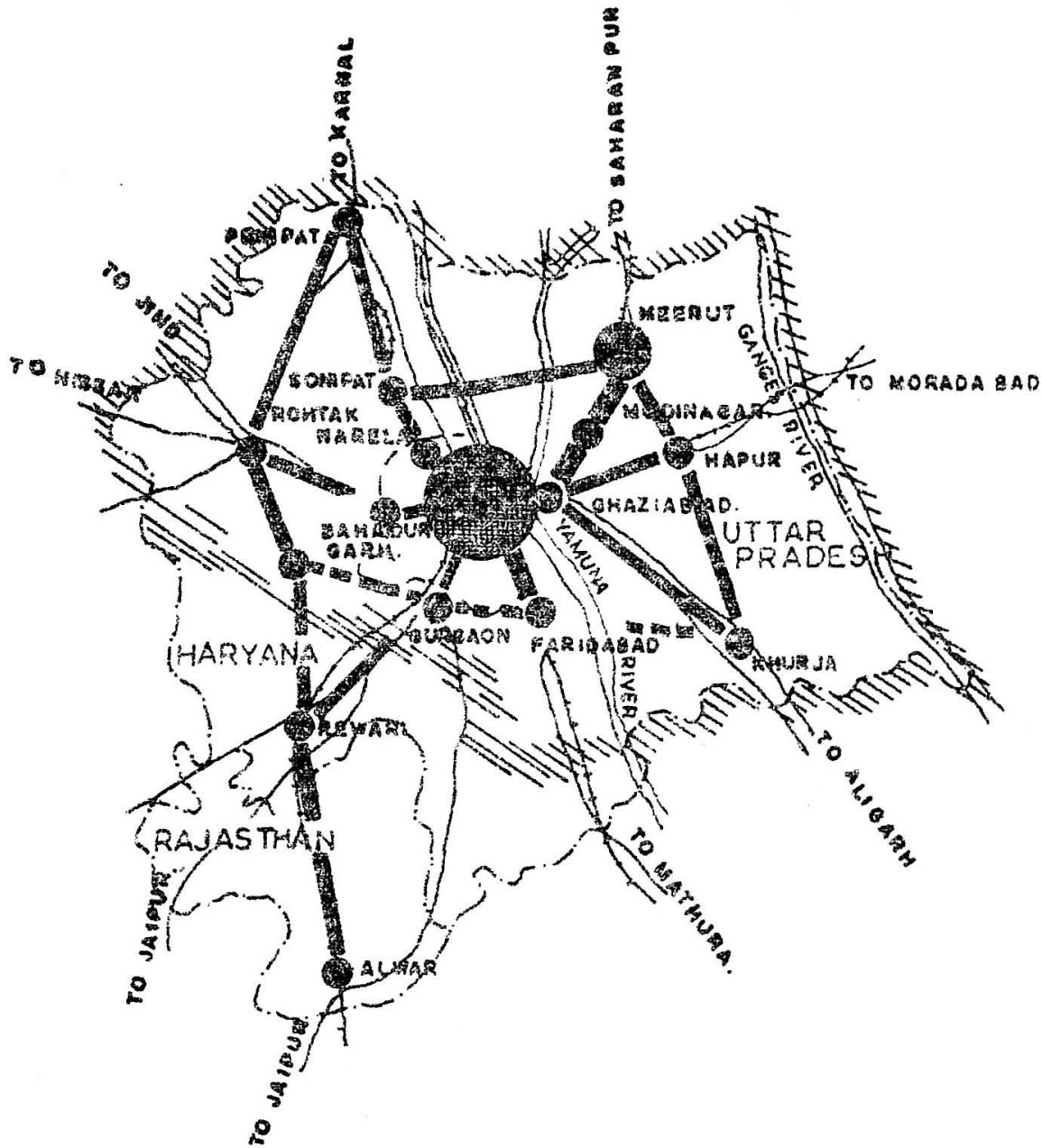
Boundaries. N.C.R. State H.T.






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ALTERNATIVE URBAN GROWTH PATTERN

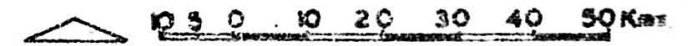
MULTI-TOWN PATTERN



LEGEND.

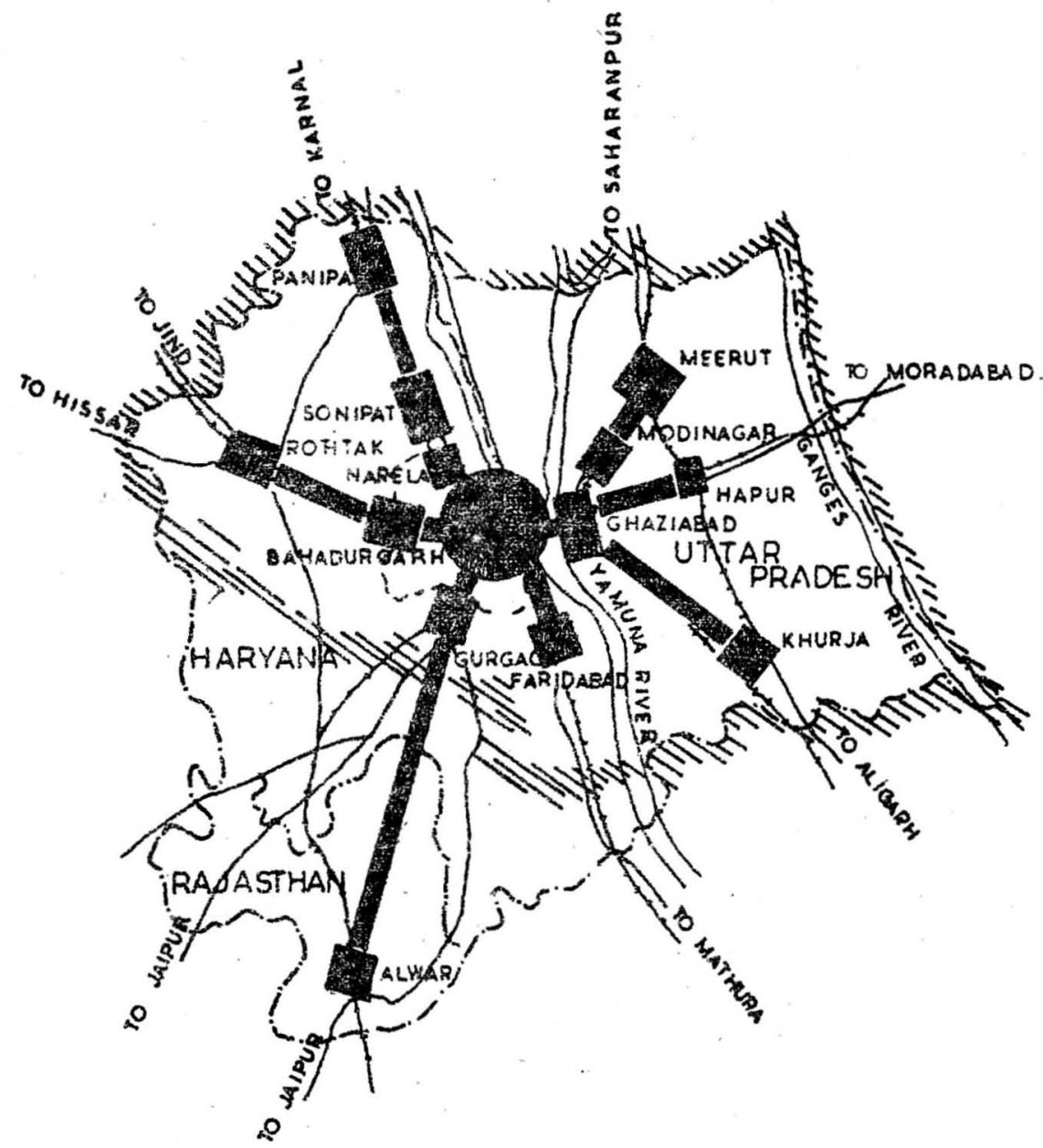
-  Main Urban Area.
-  Traffic Arteries.
-  Area Of Higher Urbanisation.

Boundaries. N.C.R. State U.T.






ALTERNATIVE URBAN GROWTH PATTERN

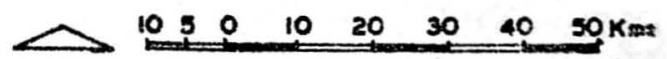
RADIAL CORRIDOR PATTERN



LEGEND

-  Main Urban Area.
-  Traffic Arteries.
-  Area of Higher Urbanisation.

Boundaries. N.C.R. state U.T.



TOWN & COUNTRY PLANNING ORGN.
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NATIONAL CAPITAL REGION

a dispersal of major economic activity, as well as of population. The high capital cost of development in Delhi as compared to other towns is evident from the development cost. Intermediate technology can go well in smaller towns, like temporary houses for low income groups in sub-standard developments instead of multi-storey permanent constructions, which will be necessary in metropolitan Delhi. From these considerations the Radial Corridor and the Multi-town Patterns are favoured.

(c) Social Considerations:- From the social point of view the system should provide the people with an identifiable base, that is, the city or town or the neighbourhood which they can call their own and over whose identity it is possible to feel some measure of personal control and responsibility. A gigantic city overwhelms a person-its problems are too large to comprehend let alone to be solved. The average man feels lost and is apt to lose his identity. Even a leader among people feels that he cannot initiate and carry out actions designed to benefit the people through organisations run by the people themselves. Hence, social concepts lead us to consider the maximum dispersion of population centres, a decentralisation of the function of a metropolitan region and an active interest of the citizen in his own welfare which is best fostered in a series of medium sized cities. This precludes any pattern which makes Delhi grow out of proportion or the development of Meerut as a second big metropolitan centre without any definite change of keeping down the growth of Delhi. It also does not favour the Finger Plan which leads to fragmentation of authority in a linear pattern it

without providing defineable limits, other than on a map, for the individual to identify himself with. In the Multi-town Pattern the specialisation function assigned to different towns is not conducive to the development of a social and cultural atmosphere, which comes naturally with diversified activity and a more balanced development.

This leaves us with the Radial Corridor form, as offering the maximum chances of achieving the social goals. It offers a fair chance for the protection of the identity of the various towns and villages. It will provide the right environment for living in all the cities of the Region and will lend itself to a more healthy rural-urban relationship because of the fillip to be given for the growth of the towns of the Region which will have an appreciable impact on the rural areas around them.

The Choice of the Physical Pattern: The Radial Corridor Pattern recommends itself from social, economic and technological considerations. However, from the point of view of balanced development the Multi-town concept has also great merits where in the inter-action between the medium sized towns in the corridor themselves must be fostered for their economic growth. The inter-city linkages will be considered fully when the restructuring of the transport network is proposed. In any case in the above study it becomes apparent that the decentralisation of economic activity away from Delhi has to be attempted, because not only the capital cost, but the socio-economic overheads of servicing an increased urban population in Delhi itself, is very heavy. On the other hand there

is substantial economy in developing the medium sized towns in the Region, especially those along the radial corridor. Also it will enable the use of intermediate technology in building up the traffic network, land development and house construction. It will also help to move towards the social goals.

The Radial Corridor concept modified by the Multi-town concept should provide the framework for developmental action in anticipation of growth. These would involve the restructuring of transport pattern, location of industrial activities in the medium sized towns in the radial corridors and the shifting and opening up of new Central Government and Quasi-Government offices as well as opening up of subsidiary wholesale trade activity to serve the hinterland. It is important that the present drift is not allowed to continue because if it gets ingrained in the coming years it would be difficult to give a new direction and shape, especially towards the envisaged desirable pattern. If the new concept is accepted and acted upon it can avoid the many frictions of unregulated growth and the overheads caused by belated action. Therefore, the coming decade is a crucial one for the National Capital Region and it is imperative that the Development Pattern recommended here should be chosen now and implemented.

Having accepted the direction in which the physical pattern has to be developed, particular policies required to move in that direction will have to be followed. The Regional Plan spells out this programme for effectuating the new pattern. However a word of

caution in this connection is necessary. There should be some flexibility of approach in the future. It is possible that in a decade with increased economic prosperity, changes in social values and in technological capabilities, a change in course of action now decided upon may become necessary. Hence, the need for flexibility and adaptation to changing factors. The Radial Corridor Pattern envisaged is capable of this flexibility.

Population Estimates of the Region:

The National Capital Region delineated earlier in the report has an area of about 29,800 sq.kms. and a population of 106.8 lakhs in 1961 to which it increased from 83.38 lakhs in 1951 by 28.1%. The growth rate of the Union Territory of Delhi and the Region excluding Delhi were 52.5% and 21.7% respectively during the same period.

CHAPTER - III.

MAJOR URBAN SETTLEMENT

PATTERN IN THE NCR

The population estimates of the Region and its sub-units quinquennially upto 1981 have been arrived from the Statewise projections worked out under the guidance of the Expert Committee set up by the Planning Commission. The methodology adopted was to work out the percentage of population of the districts to population of the State based on the ratios that existed during 1941-61. (In the case of part of a district, percentage of that part to the whole district has also been projected on the basis of 1941-61 trend). The quinquennial percentages so arrived at have been applied to the official projections of the respective States. The estimates are given in Table 3.1. They indicate a growth rate of 44.0% in 1961-71 and 37.2% in 1971-81 for the NCR.

Urban Population Estimates of the Region:

The urban population of the Region was 36.76 lakhs in 1961 or 34.4% of the total population, out of which 23.59 lakhs were in the Union Territory of Delhi and 13.17 lakhs in the other districts of the Region. There were 49 towns in the Region including Delhi, their distribution being 14 in District Meerut, 13 in the District of Bulandshahr, 1 in Alwar District,

Table 3.1

Population Estimates of NCR by Statistical Trends - 1981.

District'	(In lakhs)					
	Population in					
	1951	1961	1966	1971	1976	1981
Delhi	17.44	26.59	34.08	43.76	55.27	67.24
Meerut	22.81	27.13	31.30	35.75	40.76	45.45
Bulandshahr	15.00	17.37	20.17	22.82	25.80	28.50
Alwar (5 tehsils)	4.96	6.30	7.27	8.42	9.64	10.79
Rohtak	11.22	14.20	17.43	20.95	24.37	28.86
Gurgaon	9.68	12.41	15.11	18.11	21.44	24.81
Karnal (Panipat tehsil only)	2.27	2.82	3.42	4.06	4.76	5.46
Region excluding Delhi.	69.94	80.23	94.70	110.11	127.27	143.38
Total Region	83.38	106.82	123.73	153.87	182.54	211.13

Sources: Computed by ICFO from estimates of the Experts Committee of the Planning Commission. 1951 & 1961 population are from the Census of India.

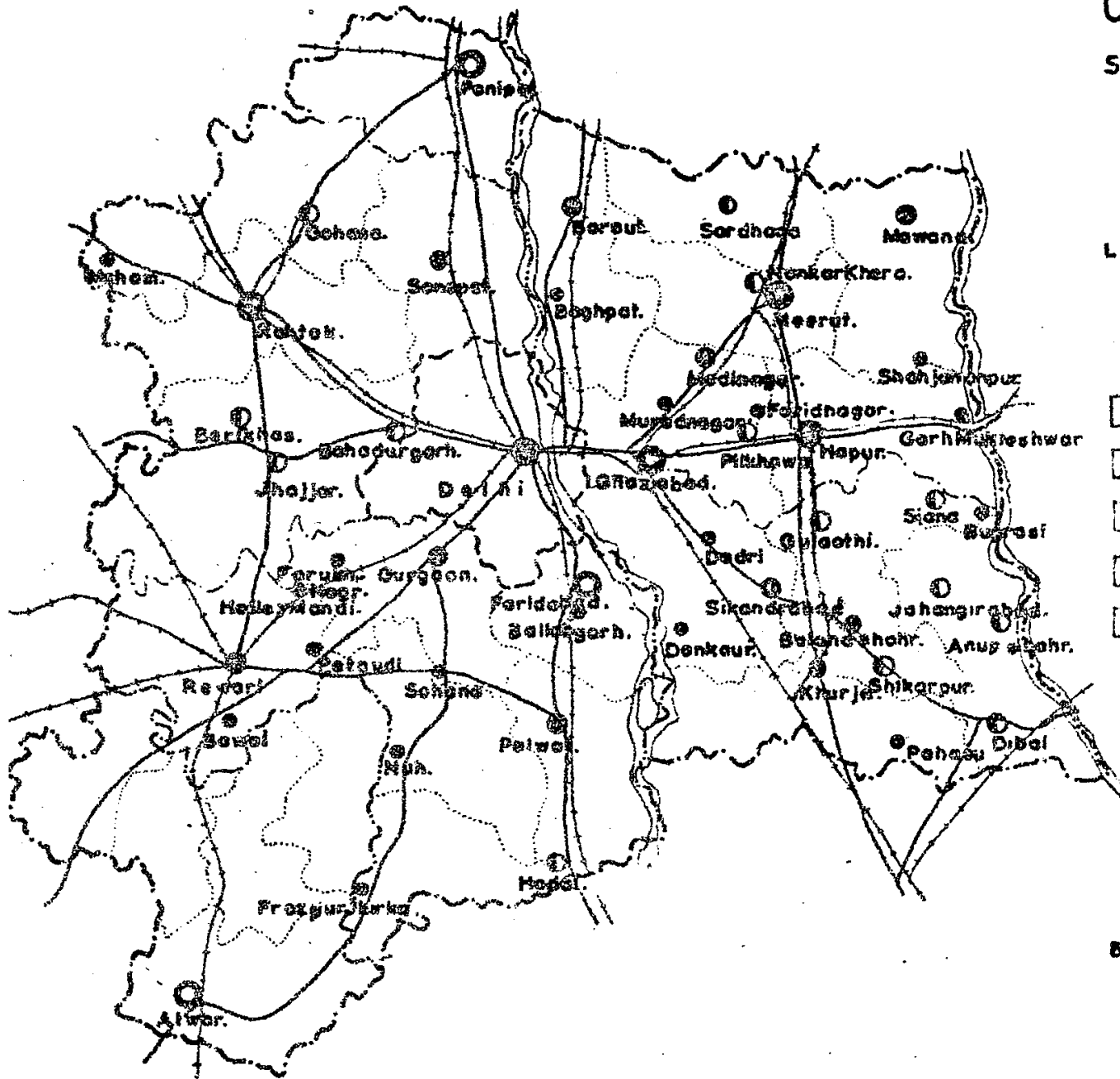
7 in District Rohtak, 13 in District Gurgaon and 1 in Panipat tehsil. (See Map 3.1). The percentage of urban population to total population in the different sub-units in 1961 were 38.7 in Delhi, 20.6 in Meerut, 12.6 in Bulandshahr, 11.6 in Alwar, 13.7 in Rohtak 16.7 in Gurgaon and 23.8 in Panipat tehsil. In the Region excluding Delhi, the percentage of urban population was only 16.4, though in the Region as a whole it was 34.4.

The phenomenal growth of Urban Delhi has been discussed in Chapter I. The salient features of urban growth in the rest of the Region are given below:-

- 1) About two thirds of the towns registered their highest growth rates during the decade 1951-61, as compared to earlier decades. But the other one third, among which are some important towns like Meerut, Ghaziabad, Faridabad, Sonapat, Rohtak, Panipat etc. had registered a higher growth rate during the decade 1941-51.
- 2) Towns within a radial distance of 45 kms. from Delhi, generally registered higher growth rates (over 30%) during 1951-61, than those located farther away from Delhi.
- 3) Thirteen towns had 30% or more of their workers in the Household and Manufacturing industries. Of these, 5 towns are located within a radial distance of 45 kms. from Delhi. These are Ghaziabad, Faridabad, Ballabgarh, Modinagar, and Sonapat.

URBAN CENTRES

SPATIAL DISTRIBUTION 1961



LEGEND.

CENSUS CLASS.	POPULATION (1000)	NUMBER OF CENTRES.
---------------	-------------------	--------------------



I	100 & Above	2
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II	50 - 100	5
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III	20 - 50	10
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IV	10 - 20	14
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V & VI	1 - 10	19
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TOTAL		50
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Boundaries. STATE DIST. TOWN

20 10 0 20 40 10 Km

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H.F.P.W.M. & U.D.

Thus it appears that apart from the 'ring towns' of Delhi, other towns at a greater distance from Delhi have also an industrial bias. Some of these are Panipat, Rewari, Pilkhawa, Faridnagar, Khankar-Khera etc.

- 4) The spatial distribution of urban centres are along the radial corridors emanating from Delhi where 82.7% of the urban population is concentrated. The south and south-western part of the NCR is an area of very low urbanisation.

For estimating the urban population of the Region, the percentages of urban population of the sub-units in 1961 were increased corresponding to the increase of urban component of the respective States, as estimated by the Expert Committee. The population of the 49 towns have also been projected independently by fitting a second degree curve on past census data. Thereafter the estimates so arrived at have been corrected for consistency on the basis of estimates of mid-year population calculated from the voters' list in the General and Bye-elections. The urban population of Delhi is estimated at 64 lakhs for 1981 and is the same as given in the Report of the Expert Committee. The estimate for the rest of the Region is 27 lakhs and is given in Tables 3.2 and 3.3. These estimates, show an urban population of 43.3% in the Region - the proportion for the sub-units being 95.7% in the Union Territory of Delhi, 23.5% in Meerut District, 14.7% in Bulandshahr District, 12.6% in Alwar District, 16.9% in Rohtak District, 19.4% in Gurgaon District and 27.7% in Panipat Tehsil. The urban compo-

nent would then be 13.9% in 1981 as against 16.4% in 1961 for the Region excluding Delhi. The All India urban component in 1961 was 18% and is expected to increase to 22% by 1981. In 1961 Urban Delhi constituted 50% of the total urban population. It rose to 64% by 1961 and according to estimates a further rise to 70% is expected by 1981.

Thus if current trends perpetuate in the Region, it is evident that there will be a severe imbalance in the urbanisation pattern. The effort of planning would be to restructure the major urban settlement pattern in order to achieve a more balanced growth of the Region and ensure a rational and orderly growth of Delhi - the National Capital.

Holding Capacity of Delhi:

In Chapter I the problems due to the rapid growth of Delhi and the need to rationalize the growth have been stated. The Master Plan for Delhi had estimated that the population of Delhi would grow to 55 lakhs by 1981. In view of this, it had recommended that provision may be made in the urban plan of Delhi for a population of 46 lakhs and the remaining population of 9 lakhs to be diverted to the 'ring towns'. One of the major reasons, among others, why there has been a rapid growth of population in Urban Delhi, which is now estimated at 33 lakhs, is the continued concentration of economic activity in Delhi on the one hand and very meagre development of the 'ring towns' on the other. In view of this, Urban Delhi will reach the figure of 46 lakhs much before 1981. Further it has been estimated that if current

Table 3.2

Population Estimates of Towns in NCR by Statistical Trends - 1981.

(Population in Lakhs)								
District/Towns	Population		District/Towns	Population		District/Towns	Population	
	1961	1981		1961	1981		1961	1981
1	2	3	1	2	3	1	2	3
Delhi Urban (includes Narela and Najafgarh).	23.50	64.38	23. Khurja	0.41	0.62	49. Ferozpur-Jhirka.	0.06	0.09
Meerut	5.58	9.92	24. Pahasu	0.05	0.11	<u>Karnal</u>		
1. Baraut	0.23	0.40	25. Jahangirabad	0.17	0.34	50. Panipat	0.67	1.21
2. Baghpat	0.08	0.32	26. Dibal	0.14	0.30	In towns of		
3. Ghaziabad	0.70	1.41	27. Anupshahr	0.10	0.16	Region exclu-		
4. Modinagar	0.24	0.58	<u>Alwar</u>	0.73	1.02	ding Delhi.	13.17	23.37
5. Pilkhawa	0.16	0.39	28. Alwar	0.73	1.02	In total		
6. Muradnagar	0.08	0.18	29. <u>Kairthal</u>	-	-	Region.	36.76	87.75
7. Faridnagar	0.06	0.10	<u>Rohtak</u>	1.94	3.44	Note: Khairtal in Alwar		
8. Sardhana	0.17	0.24	30. Meham	0.09	0.11	District has recen-		
9. Meerut	2.84	4.55	31. Gohana	0.11	0.19	tly been declared		
10. Kankarkhera	0.11	0.20	32. Rohtak	0.88	1.58	a town.		
11. Mawana	0.21	0.39	33. Sonapat	0.46	0.81	Source: Worked out by the		
12. Shahjahanpur	0.06	0.08	34. Bahadurgarh	0.15	0.34	TCPO by statis-		
13. Hapur	0.55	0.90	35. Beri	0.11	0.18	tical method.		
14. <u>Garhmukteswar</u>	0.09	0.18	36. <u>Jhajjar</u>	0.14	0.23	1961 population		
<u>Bulandshahr</u>	2.18	4.06	<u>Gurgaon</u>	2.07	3.72	from the Census		
15. Sikandrabad	0.26	0.40	37. Bawal	0.06	0.07	of India.		
16. Dadri	0.09	0.21	38. Rewari	0.37	0.45			
17. Dankaur	0.08	0.17	39. Pataudi	0.04	0.06			
18. Bulandshahr	0.44	0.93	40. Hailey Mandi	0.02	0.03			
19. Shikarpur	0.13	0.26	41. Farukhnagar	0.05	0.06			
20. Siana	0.13	0.22	42. Gurgaon	0.38	0.71			
21. Gulaothi	0.12	0.24	43. Sohana	0.07	0.12			
22. Bugrasi	0.06	0.10	44. Faridabad	0.51	1.21			
			45. Ballabgarh	0.08	0.22			
			46. Palwal	0.28	0.47			
			47. Hodal	0.11	0.17			
			48. Nuh	0.04	0.06			

Table 3.3

Urban Population Estimates of NCR by Statistical Trends - 1981.

(Population in Lakhs)					
District	Urban Pop. 1961	%	Population in 1981 of Towns of 1961	Total Urban population 1981	%
1	2	3	4	5	6
Delhi	23.59	88.7	64.38	64.38	95.7
Meerut	5.58	20.6	9.92	10.68	23.5
Bulandshahr	2.18	12.6	4.06	4.19	14.7
Alwar	0.73	11.6	1.02	1.36	12.6
Rohatak	1.94	13.7	3.44	4.59	16.9
Gurgaon	2.07	16.7	3.72	4.81	19.4
Karnal	0.67	23.8	1.21	1.51	27.7
Sub-total 2-7	13.17	16.41	23.37	27.14	18.86
Total	36.76	34.4	87.75	91.52	43.3

Note: The difference in Col.5 and 6 indicate the accretion to urban population by conversion of villages to new towns and expansion of existing towns.

trends continue it would reach 64 lakhs by 1981. It has therefore become necessary to review the position, as now a much larger population will have to be housed in Urban Delhi. There are several alternative solutions to this problem.

- 1) Absorb the additional 16 lakhs population within the 'urbanisable limits' of the Delhi Master Plan by increasing the density in selected residential colonies and by increasing the work areas.
- 2) Accommodate the additional population beyond the 'urbanisable limits' by extending the urban limits.
- 3) Disperse a part of the additional population into the medium sized towns of the NCR and absorb the rest in the compact urban area of Delhi by a judicious increase of density.

As regards (1) above, most of the areas have been committed for particular development and it would not be easy to alter the density to accommodate 16 lakhs of additional population without gravely jeopardising the standard of development. Moreover, raising of the density beyond optimum level is not desirable at the present level of our economic development when multi-storey construction beyond four storeys presents various difficulties such as provision and construction of lifts, booster pumps, fire equipments etc. There are also social problems due to the rural background of the in-migrants which

will weight against this solution. Also this would be undesirable from the national point of view which is committed to discouraging greater growth in big metropolitan centres as discussed in the Pattern of Urban Development in Chapter-II.

As regards (2) above this would involve the acquisition of more land beyond the 21,860 hectares (54,000 acres) already acquired, where the cost of land beyond the urbanisable limits has already reached a very high level, since many farm houses come up with poultry and other farming activities. In this solution, there will be a need for extending the lines of communication, water supply, drainage and sewerage, thus raising the cost of urbanisation to a very high degree. Besides this, a total population of 62 lakhs in Urban Delhi by 1981 is in itself an unacceptable figure as stated in Chapter-II.

However, some marginal adjustment of density as well as increase of work areas in the Delhi Master Plan is possible which could achieve higher holding capacity for the Delhi Urban Area as suggested in (3) above. This has in fact been worked out in detail and it is entirely feasible that a population of 52 lakhs may be accommodated within the urbanisable limits of 1981. This would, however, involve working out in detail, bulk water and power schemes and their distribution and running of drainage and sewer lines for the increased population. It will also involve the augmentation of the public transport system. All these can be accomplished through advance planning and with better organisation. Now the question

arises, as to whether the regional towns have the grown potential and capacity to absorb part of the population that would otherwise come to Delhi and which will have to be diverted.

Growth Potential and Holding Capacity of the Regional Towns:

As a follow up of the Delhi Master Plan, medium and large scale industries were excluded from Urban Delhi with the result that many of them are now located in the 'ring towns' of Faridabad and Ghaziabad, especially so, after 1962. The present regional policy would be to decentralise offices, trade and commerce and transport nodes. By making these regional towns economically viable it would be possible to divert some of the population to these towns that would otherwise have come to Delhi. The economic base for the Region and steps to be taken to decentralise the employment activities will be fully dealt with in the next Chapter. In the succeeding paragraphs the future holding capacity of 19 priority towns have been discussed*. Table 3.4 shows the population growth in the period 1941-51 and 1951-61. Map 3.2 shows the community facilities available in these towns which is a measure of their development potential.

* For a detailed discussion on the holding capacity and growth potential of individual towns, please refer to studies by the TCPO and Town Planning Departments of the Governments of Uttar Pradesh, Haryana and Rajasthan.

Table 3.4

Population Growth Rates in the 19 Priority Towns of the NCR.

		Population			Growth Rate Percentage	
		1941	1951	1961	1941-51	1951-61
<u>Uttar Pradesh</u>						
1.	Meerut	169,290	233,183	283,977	37.74	21.79
2.	Kanpur-Khera	9,905	6,257	10,856	(-)	36.83
3.	Ghaziabad	23,834	43,745	70,438	83.54	61.02
4.	Hapur	33,756	49,260	555,248	45.93	12.16
5.	Modinagar	-	12,304	24,266	-	97.22
6.	Bulandshahr	29,701	37,496	44,163	26.24	17.78
7.	Sikandrabad	23,307	24,080	26,290	3.32	9.18
8.	Khurja	35,376	38,462	41,491	8.72	7.88
<u>Haryana</u>						
9.	Faridabad	6,367	31,466	50,709	394.20	61.15
10.	Ballabgarh	5,108	5,927	8,330	16.03	40.50
11.	Gurgaon	9,935	18,613	37,868	87.35	103.45
12.	Sonepat	17,781	30,189	45,882	69.78	51.98
13.	Rohtak	48,148	71,902	88,193	49.34	22.66
14.	Palwal	13,606	13,915	27,863	2.27	100.24
15.	Rewari	30,673	34,082	36,994	11.11	8.54
16.	Panipat	37,837	54,981	67,026	45.31	21.91
17.	Bahadurgarh	68,206	11,170	14,982	36.12	34.13
<u>Rajasthan</u>						
18.	Alwar	54,143	57,868	72,707	6.86	25.64
19.	Khairtal	-	-	-	-	-
Total		556,973	774,900	1,007,283	39.12	29.98

Source : Census of India.

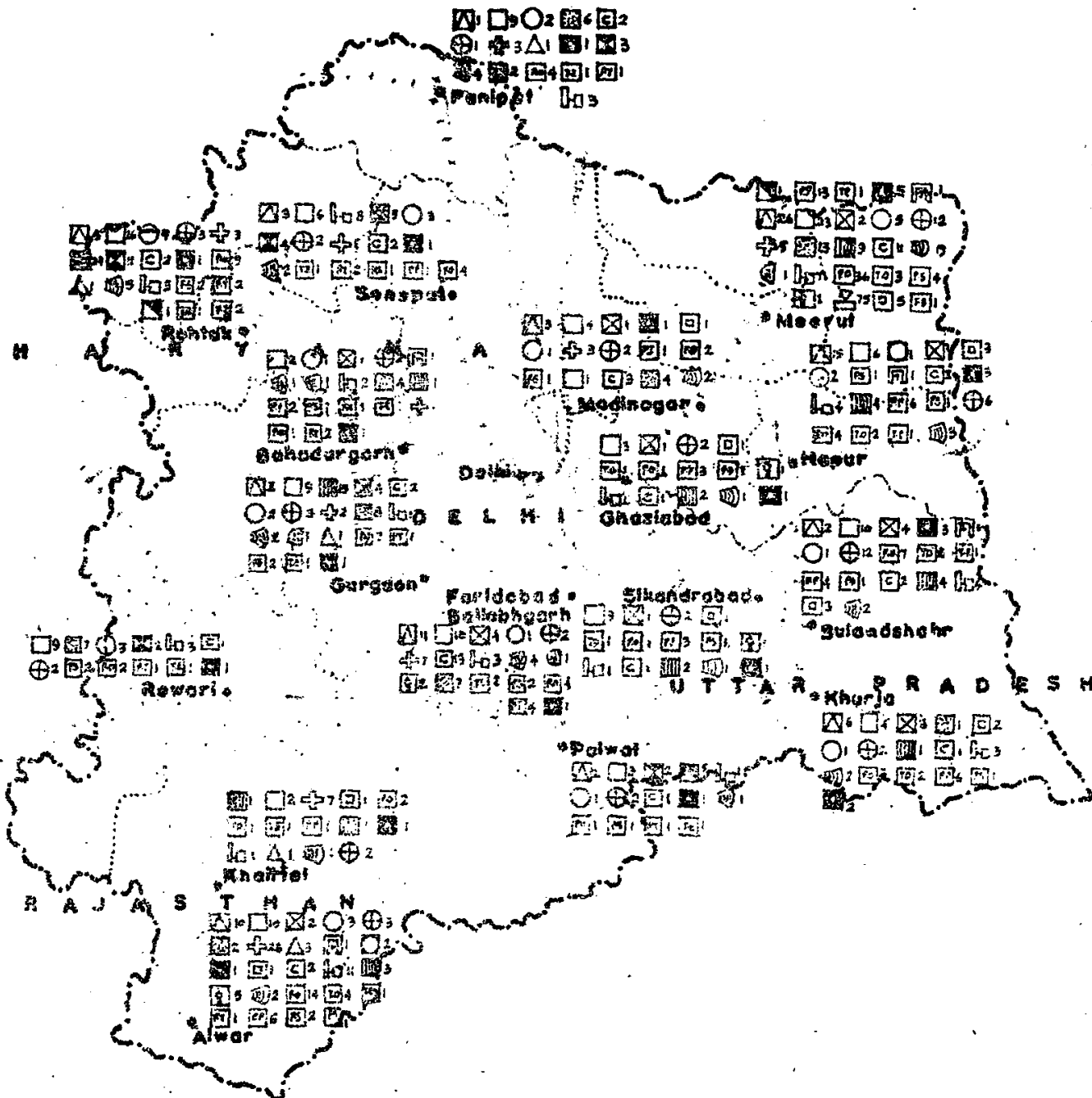
Meerut (including Kankar-Khera).

In 1961 the Meerut Town Group had a population of nearly 3 lakhs. Located close to Delhi at a distance of 66 kms. it is in fact the largest urban centre within a radius of 150 kms. from Delhi. It is the hub of a very wide road network, and is well connected with its hinterland, for which it acts as a regional centre. During the past nine years Meerut Urban Area has been extended because of the growth of Kankar-Khera township (established across Meerut Cantt. Railway Station), the new growth that has taken place around Maliana Sugar Mills and the Food Corporation Godowns on Baghat Road, the establishment of Partapur Industrial Estate on Delhi Road, the establishment of the Meerut University and Medical College campus on Garhmukteshwar Road and the housing development along Mawana Road. It is estimated that at present Greater Meerut has a population of 5 lakhs. The infrastructure available at Meerut, howsoever inadequate, is still by far the best developed among all the towns of NCR outside Delhi. It has good sources for the supply of drinking water. The main sources of water supply being the tube well and the Upper Ganga Canal located at a distance of 11 kms. The water table is at a depth of about 6 metres or so. It may be mentioned that urban water supply would not be a problem in the growth of the town, as more tube-wells can be sunk. Buildable land is another asset of this area because the terrain is flat and there is no rocky land or other physical barriers which could act as constraints to developmental activity.

So far as the town's economy is concerned, it is based on three major activities, namely, services, industries and commerce, in that order of importance. In 1961 these three sectors employed roughly 42%, 26% and 18% of total work force respectively, although in different components of the urban area one or the other was more important. With the passage of time since 1961, the industrial working force of Meerut Area has been increasing slowly but steadily. In terms of absolute numbers, their total is much larger than in any other town of the NCR except, of course in Delhi. This is because about 15000 workers are engaged in the handloom textile industry alone which however is still run in an unorganised manner. Meerut makes certain noted industrial products, such as, scissors, sports goods, and agricultural implements. Most of these are produced on a very small scale or in household industrial units. Recently Meerut has been coming up as a market centre for agricultural machinery and appliances. This is specially on account of the fact that Meerut is situated in an agriculturally prosperous area where the "green revolution" is taking roots. In the registered industrial sector, however, there were only 105 units in 1968 with 3800 workers.

Meerut has a draft Master Plan which envisages a population of 8 lakhs in 1991. This would entail a very slow growth. The same planning area with a little upward revision of the density standards, which is in fact desirable, and with a little stepping up of growth activities and development efforts can have a population more than 10 lakhs by 1991. For the objectives of the Regional Plan, it is necessary to accelerate the growth of Meerut in order to achieve a size of 8 lakhs by 1991. The steps would be:

COMMUNITY FACILITIES IN 17 TOWNS OF N.C.R 1969



EDUCATIONAL FACILITIES

- Universities
- ⊠ Special Training Centre
- Colleges/Professional College
- Mr Sec School/Middle School
- ⊞ Any Other Institution

MARKET FACILITIES

- ⊞ Wholesale Market/Mandi
- ⊞ Retail Market

MEDICAL FACILITIES

- ⊞ Dispensary/Health Centre
- ⊞ Hospital/Clinic
- ⊞ Veterinary Hospital
- △ Family Planning Centre

POST & TELEGRAPH DEPT

- ⊞ Post Office/Telephone Exchange
- ⊞ Telegraph Office
- ⊞ Post & Telegraph Office

OTHER FACILITIES

- ⊞ Police Post/Police Station
- ⊞ Fire Station
- ⊞ Cinema
- ⊞ Open Air Theatre/Club
- ⊞ Library
- ⊞ Park/Play Ground
- ⊞ Picnic Spots Or Monuments

Source: State Town Planning Department



NATIONAL CAPITAL REGION

Meerut (including Kankar-Khera).

In 1961 the Meerut Town Group had a population of nearly 3 lakhs. Located close to Delhi at a distance of 66 kms. it is in fact the largest urban centre within a radius of 150 kms. from Delhi. It is the hub of a very wide road network, and is well connected with its hinterland, for which it acts as a regional centre. During the past nine years Meerut Urban Area has been extended because of the growth of Kankar-Khera township (established across Meerut Cantt. Railway Station), the new growth that has taken place around Maliana Sugar Mills and the Food Corporation Godowns on Baghat Road, the establishment of Partappur Industrial Estate on Delhi Road, the establishment of the Meerut University and Medical College campus on Garhmukteshwar Road and the housing development along Mawana Road. It is estimated that at present Greater Meerut has a population of 5 lakhs. The infrastructure available at Meerut, howsoever inadequate, is still by far the best developed among all the towns of NCR outside Delhi. It has good sources for the supply of drinking water. The main sources of water supply being the tube well and the Upper Ganga Canal located at a distance of 11 kms. The water table is at a depth of about 6 metres or so. It may be mentioned that urban water supply would not be a problem in the growth of the town, as more tube-wells can be sunk. Buildable land is another asset of this area because the terrain is flat and there is no rocky land or other physical barriers which could act as constraints to developmental activity.

As far as the town's economy is concerned, it is based on three major activities, namely, services, industries and commerce, in that

order of importance. In 1961 these three sectors employed roughly 42%, 26% and 18% of total work force respectively, although in different components of the urban area one or the other was more important. With the passage of time since 1961, the industrial working force of Meerut Area has been increasing slowly but steadily. In terms of absolute numbers, their total is much larger than in any other town of the NCR except, of course in Delhi. This is because about 15000 workers are engaged in the handloom textile industry alone which however is still run in an unorganised manner. Meerut makes certain noted industrial products, such as, scissors, sports goods, and agricultural implements. Most of these are produced on a very small scale or in household industrial units. Recently Meerut has been coming up as a market centre for agricultural machinery and appliances. This is specially on account of the fact that Meerut is situated in an agriculturally prosperous area where the "green revolution" is taking roots. In the registered industrial sector, however, there were only 105 units in 1968 with about 3,800 workers.

Meerut has a draft Master Plan which envisages a population of 8 lakhs in 1991. This would entail a very slow growth. The same planning area with a little upward revision of the density standards, which is in fact desirable, and with a little stepping up of growth activities and development efforts can have a population more than 10 lakhs by 1991. For the objectives of the Regional Plan, it is necessary to accelerate the growth of Meerut in order to achieve a size of 8 lakhs by 1981. The steps would be:

- (i) To step up the housing activity by the U.P. Housing and Development Board.
- (ii) Water supply arrangements should be made available in the new settlement colonies of Malyana, Kankar Khara and other developing areas.
- (iii) The sewerage construction programme which is only partially completed may be extended throughout the urban area immediately.
- (iv) Land acquisition for developmental purposes should be immediately undertaken.
- (v) Whole-sale trade (of which there are 14 in Meerut) should be strengthened and enlarged so as to take up some of the activities which are at present concentrated in Delhi.
- (vi) The entire Urban area may be brought under a Corporation, in order to have an integrated system of urban services.
- (vii) Quicker transport facilities (specially by railway) to Delhi should be made available immediately.
- (viii) Procedure for sanctioning house building plans and industrial building plans should be streamlined so that they do not take an unduly long time.
- (ix) Also what is very important is that city compensatory allowance and dearness allowance should be available to Central Government office employees at Meerut on

the same rates as applicable to Delhi and C.G.H.S. may also be made available.

Ghaziabad

Located at a distance of only 16 kms. from Delhi, Ghaziabad main town is one of the most important 'ring towns' of Delhi. Its biggest asset is the railway junction which acts as a gate-way to Delhi in three directions - towards Kanpur - Calcutta, towards Moradabad - Lucknow and towards Meerut - Saharanpur - Ambala - Amritsar. Parallel road systems provide additional connections for Ghaziabad in all these directions. Specially since Ghaziabad had had a Master Plan prepared by the U.P. Government in 1961, its development and growth is taking place in a planned manner. The planning area in which land development is taking place through the agency of the Ghaziabad Improvement Trust, comes up to Delhi border and includes development along the G.T. Road. Thus the planning area of Ghaziabad extends on both sides of the river Hindon.

Ghaziabad's main activity is industrial, in which about 31% of the total workers were employed in 1961. Since 1962 a number of planned industrial areas and new housing colonies have come up in the Ghaziabad Improvement Trust Area. Another asset of this urban centre is that it has a better economic and social infrastructure available than other towns of the NCR except Delhi and Meerut. It has three post-graduate colleges, adequate medical facilities, and new shopping centres are coming up. In this way it is a well-established town. With the completion of the national highway bypass, there will be a speedier flow of traffic between

Delhi and Meerut. This may result in a faster growth of the town thereafter. Even now due to increase in population as well as in area, it is estimated that Ghaziabad has almost doubled its population size since 1961. In all probability the 1971 census would show a population of 1.5 lakhs in this 'ring town'. In the registered industrial sector, there were 181 units in 1968 with about 12,800 workers.

Among the best developed facilities that Ghaziabad would offer to future residents and future industrialists would be its water. Every sector under the Improvement Trust has two tube-wells and the water supply is dependable, continuous and regular. In fact there is surplus water with Ghaziabad and negotiations are afoot to supply this water even to Delhi. It may be mentioned in this connection that on the western side of the river Hindon, the underground water source is both inadequate and saline in quality, and therefore, water has to be brought into this part from the eastern side. That is one reason why the development of housing on this side has been slower so far.

Ghaziabad from a small sleepy town with a population of 11,060 in 1901 has grown to an estimated population of 1.5 lakhs. The Master Plan for Ghaziabad envisages a population size of 5.95 lakhs by 1981. This figure looks to be rather ambitious. On the other hand a population of 4 lakhs could be achieved by 1981 if the following steps are taken to accelerate the growth of economic activity and population size of Ghaziabad. This size of population is recommended in view of the fact/
/that

considerable land has already been developed both for industrial and residential purposes and only require to be constructed upon. The total area proposed to be acquired and notified is about 2000 hectares out of which 1,760 hectares have been acquired. The number of residential and commercial plots developed is 9,853 and industrial plots 1,104. Private colonisers have been allowed to develop plots in 45 colonies.

- (i) The entire machinery concerned with development work at Ghaziabad will have to be geared into full action. For a faster rate of development, schemes will have to be prepared and pushed through with a time schedule.
- (ii) The State Govt. should do its uttermost to advertise and publicise the advantages of location at Ghaziabad, its residential facilities for people. As a residential centre, Ghaziabad offers better facilities than any other 'ring town'.
- (iii) Water supply extensions should be planned and completed in the industrial areas within a short time. At present, general water supply arrangements are lacking in these areas.
- (iv) Drainage extension work should be carried out immediately and completed within a very short time.
- (v) Access roads, power supply lines and telephone connections must be made available in the industrial and new residential areas within a period of a year or so.

- (vi) Quicker and inexpensive transport facilities from Ghaziabad to Delhi should be made available immediately. In this connection, it is imperative that the National Highway Bypass is constructed without delay. At present the road route between Delhi and Ghaziabad has several bottlenecks, namely, the border octroi post, the old Yamuna bridge, and the narrow width of G.T. road. The flow of traffic would be smoother between Delhi and Ghaziabad as soon as an alternative route via the new bridge and the National Highway Bypass is opened.
- (vii) Steps should be taken to have a rational and efficient working of the octroi post at the border of Delhi Territory and U.P.
- (viii) The Central Government should undertake housing schemes for Central Government employees at Ghaziabad. It should build office space at Ghaziabad for shifting some of the Government offices from Delhi and also for opening up of new offices. It has already acquired about 400 hectares (1000 acres of land) a few years ago but development is yet to start. A programme to provide for 20,000 jobs by 1981, should be implemented as recommended in the Master Plan for Delhi.
- (ix) The Central Government rates of Dearness Allowance and C.C.A. should be made available to those who will reside at Ghaziabad as also the provision of Central Government Health Service in order to encourage employees to live there.
- (x) Industrial training institutes and labour training schemes suitable for the types of industries thriving at Ghaziabad are required and should be established.
- (xi) Power break-downs are quite frequent at Ghaziabad. Moreover the rate of power for industrial use is quite high (in any case higher than at Delhi and Faridabad). The rate should be brought at par with the Haryana towns.
- (xii) The Improvement Trust has constructed 777 houses and 108 shops in various sectors and 262 houses are under construction. Also a programme for the construction of 1,500 houses for low and middle income groups has been included in the Fourth Plan. House building activities will have to be stepped up; a time limit should be fixed and enforced for construction of industrial and residential plots so that actual units are established immediately.
- (xiii) The U.P. Industrial Finance Corporation has set up a branch office at Ghaziabad. It should be in a position to give funds from the Ghaziabad branch itself and thus obviate the necessity of industrialists having to go to Kanpur.
- (xiv) The commercial function of Ghaziabad Mandi also needs to be strengthened. Ghaziabad has a good potential for developing it as a wholesale market centre for bicycle trade, steel and

Ghaziabad is ready a good market for mines. iron trade, diesel engines and oil engines. What is required is the physical facilities of showrooms, godowns, etc. in one place, so that prospective buyers do not have to go from factory to factory.

Modinagar:

This is another fast-growing town in the U.p. part of the NCR at a distance of 44 kms. from Delhi. The entire area where industries and residences are coming up is known as Modinagar-Govindpuri Complex. It had a population of over 24,000 in 1961 and the present estimate is in the neighbourhood of 50,000. In fact the day time population of Modinagar is swelled further because of the workers who come from nearby villages and make it around 70,000.

Modinagar, as is very well known, is overwhelmingly industrial in character. In 1961, 72.5% of its total workers were engaged in industrial activities. The present estimated strength of industrial workers in this area is about 12,000 in the registered sector alone with only 20 units. A number of factories at Modinagar employ more than 500 workers, most prominent being Modipon, Modi Steel and Modi textiles. Modinagar is a town of big-sized factories and large scale employment. Although most of the factories are owned and run by the Modis, few other private sector factories are also coming up in the Complex. Unfortunately until recently most of the building activity was along the State highway (connecting Ghaziabad with Meerut). The recent trend has been in favour of introducing some depth on both sides of highway. The housing sector is also shaping well. Housing

is becoming available to an increasingly large number of workers. A very big E.S.I. hospital has recently been established, which will act as a regional medical centre to which cases would be referred from other hospitals in the neighbouring towns and villages. In terms of educational facilities and shopping facilities Modinagar has adequate services. One post graduate college is also located here.

The growth of Modinagar will be very much affected by the plans of the Modi industries. Efforts are being made to establish new industries and to provide facilities commensurate with the population growth. Gradually the transport, commercial and services sectors will also expand, although the town is likely to remain predominantly industrial in character for a long time. There is a need to provide adequate facilities now lacking in this town (water supply extensions and sewerage extensions should be made available in the entire town). House construction activity should be given full encouragement and requisite finances should be made available for the purpose. The town is estimated to have a resident population of nearly 75,000 by 1971 and once the momentum is given to development activity, the potential suggests a size of about 1.5 lakhs in 1981. One of the important measures required for the growth of Modinagar would be Government participation for development of additional land for housing and industrial development purposes, so that subsidiary and ancillary industries can come uptotfeed as well as benefit from the big establishments of the Modi industries. Land for housing may also be made available to co-operative societies. Another thing which is necessary is that the

linear growth of the city should be ended because it is already about seven miles long and creates traffic hazards, congestion and delays. As a first step, service roads should be provided to the State Highway to cater to the development which has come up on either side of the road, and future extension of the town should take place with a depth of one to two miles so that integrated development of residential colonies becomes possible. In fact, a Master Plan should be drawn for this town giving a direction and shape to its future growth.

Hapur:

Having a total population of 55,000 in 1961, Hapur is the third town in Meerut District. Only 20% of its work-force were employed in industries whereas a larger percentage (above 25%) were engaged in trade and commerce. Being a grain Mandi, it is natural that Hapur would have the largest number of its factories in the food products group, among which flour mills predominate. As a grain Mandi it has a name in the entire Northern India and in fact commodity rates prevailing at Hapur have a great bearing on trade. Of late, this town has been growing rather slowly. In 1951 the size of Hapur was bigger than that of Ghaziabad, but in 1961 Ghaziabad showed a larger size because of the induction of industrial activity. By 1971, another town, namely Modinagar might surpass Hapur as precious little has been done to strengthen the economy of this town.

Hapur is located at a distance of 57 kms. from Delhi on National Highway No.24 which comes from Ghaziabad, passes through

this town to Moradabad, Bareilly and goes to Lucknow and beyond. Hapur is also situated on the direct railway line from Delhi to Lucknow. A branch line connects it with Meerut on the one hand and with Khurja and onwards to Calcutta on the other. Being a centre of agricultural produce, Hapur is a place where storage of food-grains is done on a large scale. Hapur is mainly a commercial town. However, because of the system of changing food zones from time to time and specially because Hapur cannot supply foodgrains to Delhi, it has experienced a decline even in the commercial sector. The U.P. Govt. has banned speculative activity and since then a significant number of people who were dependent on this occupation such as brokers and middlemen in the sale and purchase of food commodities are out of employment. A cooperative industrial estate was also established at Hapur in the early sixties but without success.

The present population strength of Hapur is in the neighbourhood of 60,000. The Census of 1971 may reveal a population of about 61,000 or 62,000. At the present rate, in 1981, it may hardly attain a population size of 65,000 to 70,000.

However, locationally Hapur is in an advantageous situation, its transport links with Delhi, Khurja, Meerut, Lucknow, Bulandshahr and Kanpur are sufficiently well-developed. The weakness of the industrial sector is clearly seen from the fact that in 1966 there were only 8 factories registered under the Factory's Act of 1948 and they employed less than one thousand workers. Its only other important function is that of services, as it is a tehsil head-quarter. Warehousing activity for food-

grains is coming upto some extent in Hapur. If the food zones are abolished the grain trade may again become the predominant economic function of this town. Hapur could once again become a centre of supply to Delhi. Hapur is also being put on the STD telephone code with Delhi.

Certain types of industrial activity like the manufacture of sewing machines, making of small agricultural implements, and allied establishments may also create additional employment opportunities. If schemes were prepared to encourage setting up of suitable industries taking advantage of the location of Hapur, this town could show better results and grow to a size of at least one lakh by 1981. Housing activity, water supply, and sewerage have of course to be provided in the town along modern lines.

Khurja:

Until 1951 this was the biggest town of Bulandshahr district, but by 1961 Bulandshahr main town became slightly bigger than Khurja. With a population size of 41,491 in 1961, it does not appear to have grown to its rightful size. It has a much better potential for growth than any other town in the district of Bulandshahr, specially because three important sectors, namely, commerce, services, and industries are more or less evenly balanced and it also has both rail and road connections. The contribution of the industrial sector including both household industries and manufacturing industries was 25.5% of the total working force in 1961, compared to 18.8% at Bulandshahr. This was significantly higher. The present estimated popu-

lation of Khurja is around 50,000 but could be enhanced if sufficient housing was provided to all those who go back to the neighbouring villages in the evening. The day-time population may well be in the region of 60,000. This is so, because during the last nine years two major developments have taken place. One is the establishment of the well-organised Pottery Development Centre. The other is the coming up of a number of units producing electrical goods, (mainly electric switches, porcelain insulators, and other appliances), Chemical products and mineral products are the two most important categories of factories in the registered sector. In 1968 there were 17 registered factories with an employment of about 600. This was only a fraction of the total industrial employment which was around 4,000 or more.

Khurja is at a distance of 97 kms. from Delhi. Being located on the main line from Delhi to Calcutta, Khurja has very good links with cities throughout Northern India. It used to have a direct road link with Delhi but at present the G.T. Road (State Highway No.22) which goes to Calcutta comes via Bulandshahr and then goes to Aligarh and Kanpur. But for this, Khurja would have completely eclipsed the importance and growth of Bulandshahr.

Khurja has two railway stations: one Khurja Junction, slightly away from the main town and the other Khurja City station in the central part of the town. The city station feeds the pottery factories and also the commercial dealers with coal, iron and

steel and other commodities. It is a well connected by road with the important towns of the district and the bus terminal of Khurja bubbles with life and activity.

Another favourable point of Khurja is its educational institutions. It has two post-graduate colleges and one engineering college and a number of higher secondary institutions. In terms of the commercial function also Khurja has special importance. There are about 400 shops in the Mandi at Khurja and pulses are the main commodity. As a matter of fact, there are a large number of milling establishments grinding pulses, although most of them are in the unregistered sector. New growth of industrial activity is taking place along the G.T. Road to Bulandshahr.

If its commercial function as also the industrial activities were to be strengthened and if housing activity could be improved, Khurja could very well grow to be the biggest town of the district. In 1971 it is likely to show a population of around 70,000 and by 1981 it could reach a size of one lakh, provided a Master Plan for Khurja is drawn up immediately and developmental efforts are made to improve the living conditions.

Bulandshahr

Bulandshahr is the district headquarter of the same name. It had a population of 44,163 in 1961. It is mainly a service town and the town environment is generally neat and clean, specially because there are less factory type of establishments here than at Khurja. Various district offices are of course located here. The distance of Bulandshahr from Delhi

is 78 kms. and regular buses ply between the two centre. In 1968 there were only 13 factories in the registered sector with about 800 workers, the biggest sugar mill employing about 600 workers. Other important units dealing in food products are cold storage. Recently hand-pump manufacture and parts making is being established at Bulandshahr. In fact this town appears suitable for specialisation in the manufacture of hand-pump and allied products.

The present population size of Bulandshahr may be about 55,000 or so. In the long run, it may loose to Khurja in the matter of fast growth but if growth was planned properly, Bulandshahr could develop as a much better urban centre, with a planned economy.

If new focal points are to be developed in district Bulandshahr to attract industries away from Delhi, Bulandshahr could be one of them. In fact Bulandshahr can afford a functional industrial estate for the manufacture of hand pumps and parts. Otherwise also, there is scope for a planned industrial area to take care of the problems of land requirements and expansion of the existing units which are operative in congested localities.

Being nearer to Delhi as compared to Khurja it has an advantage over Khurja in terms of road connections. But because it does not have a direct rail link with Delhi, it loses a point in competition with Khurja. However, for its own specialised industrial activity, and for its own neat and tidy town environment, Bulandshahr deserves to grow moderately. If developmental efforts were stepped up, Bulandshahr town could also achieve

eve a size of about one lakh in 1981. The main activity here will of course remain to be that of services (the government offices and cultural activities) and the industrial activities connected with the sugar mill, the cold storage, and hand pump manufacturing.

Bulandshahr and Khurja which are at a distance of only about 20 kms. could be developed to serve complementary functions, one as an administrative and service town and the other as an industrial-cum-commercial town. Together these two towns would act as regional centres from which non-agricultural economic activities would slowly filter down to the other smaller towns of Bulandshahr district which is at the moment predominantly agricultural in economic activity and rural in population composition.

Sikandrabad

Sikandrabad is at a distance of 60 kms. from Delhi on State Highway No.22, from Ghaziabad to Kanpur via Bulandshahr-Khurja-Ali-garh etc. Beyond Ghaziabad it is the first town of considerable size. Since it is closer to Delhi than Bulandshahr it has been selected as a centre with considerable industrial growth potential. Sikandrabad had a population of 26,000 in 1961 and its present population is estimated to be around 32,000. This is indicative of a moderate growth during the past nine years.

As regards industries they constituted 28 per cent of the total employment in Sikandrabad in 1961. It is quite considerable. Out of a total of 2,300 workers in the industrial sector in 1961 1,450 or almost two-thirds belonged to the household industries. Factories

registered under the Factories Act of 1948 are very few and they contributed only an employment of 360 in the year 1961, thus giving 84.4 per cent of the industrial employment to the unregistered sector. The first registered unit was established in 1957 with a total employment of 18 persons and this belonged to the mineral products group. Most of the recent units have been established in the machinery manufacturing group; and are engaged mainly in jobbing work. Being on an important highway, Sikandrabad offers repairing and workshop facilities for trucks and automobiles. The main production consists of small agricultural implements. Electrical machinery and miscellaneous industries have failed at this place. However the KMP Dairy and Farm is an important industrial establishment, which has become known for its ghee and dairy products. Also, ghee and butter making is carried on in a number of small units belonging to the household category.

The average employment per industrial unit in the registered sector in the year 1966 was 72 at Sikandrabad which had 5 units with 362 workers. In 1968 only one unit and 13 workers have been reported from the registered sector.

This town is comparable to Palwal in Haryana in many respects. It has a sizeable housing stock, it has direct bus connections with Delhi, its distance from Delhi is more or less the same as from Palwal, it can take the spill-over of industrial growth from Ghaziabad at a future date just as Palwal can take the spill-over of the industrial growth from Fari-dabad-Ballabgarh complex in the foreseeable future. Sikandrabad has also a semi-urban envi-

ronment and, therefore, workers coming from rural areas who would seek employment in non-agricultural occupations would find it an ideal place for working and living, as an adjustment from the rural ways of life to the semi-urban way of life would be easier at Sikandrabad. The town lacks some basic facilities of the modern type, like sewerage or adequate water supply. But it has adequate schooling and medical facilities. It is also a tehsil headquarter. Piped water supply is available. Moreover, handpumps can be easily installed in any part of the town and if a filter is attached to the hand-pump clean water can be obtained.

At the current rate of growth Sikandrabad is likely to reach a size of about 4,000 by 1981. But, if efforts were made to establish an industrial estate at Sikandrabad and taking advantage of the fact that beyond Ghaziabad it is the first sizeable town in Bulandshahr District and is located on an important highway, if the town is developed, its growth can be of a higher order. The deterrent factor against its faster growth is the nearness of the district headquarter town of Bulandshahr which is only at a distance of 17 kms. and attracts migrants with a greater force than Sikandrabad. However, if employment is created people may prefer Sikandrabad because of its smaller size and because of its lower cost of living. In the district of Bulandshahr besides Khurja and Bulandshahr main town, Sikandrabad is the only town which is so well located and has direct access to Ghaziabad-Delhi on one side and to other important towns of the district on the other side. Sikandrabad can also have its mandi functions strengthened in order to take care of the agricultural produce of the surrounding rural areas. If special schemes were prepared

and concerted efforts were made Sikandrabad could grow to a comparatively bigger size town with a population of 50,000 by 1981.

Faridabad-Ballabgarh

Faridabad-Ballabgarh complex, a significant industrial agglomeration occupies a prominent place in the framework of NCR and plays a significant role not only in the economy of the National Capital Sub-region but in the whole state of Haryana. It is an integrated agglomeration of 3 existing settlements of Faridabad, Ballabgarh and Faridabad New Township.

Although in 1961 this complex with a population of 59,000 was only the third biggest in the Haryana Sub-region, of NCR (Rohtak and Panipat being the two other bigger towns), it is destined to become the most important and the biggest. In 1968, the population of this urban complex was estimated* at 1.17 lakhs and has exceeded that of Rohtak and Panipat.

According to the Master Plan for Delhi, Faridabad Complex was envisaged to provide for 47,000 industrial workers and 15,000 Central Government employees. Already a size of about 30,000 industrial workers has been reached in 1968.** About 21,000 new industrial jobs were added in seven years from 1961-68, or about 3,000 industrial jobs per year. At this rate

* By the Regional Town Planner, Haryana.

**As surveyed by the Regional Town Planner, Haryana. The number of industrial workers in the registered-sector alone is about 27,000 in 1968 according to figures available with the Chief Inspector of Factories.

the size of industrial workers expected by 1981 would be reached within the next five to six years. This indicates that in the urban complex of Faridabad-Ballabgarh industrial jobs are growing faster than expected or planned for. However, in the matter of Central Government employment, Faridabad is lagging behind with only about 2,000 jobs presently. A population of 3.15 lakhs was envisaged for Faridabad-Ballabgarh area in 1981 in the Master Plan for Delhi. Recently Delhi-Mathura Road area has been brought within the control of the Development Plan for Faridabad. This may give some additional area and population to this complex. The result would be that the Urban Complex may well reach a total population size of 3.5 lakhs or even more by 1981.

The total area of Faridabad Complex is 25.74 sq.kms. Lengthwise it extends from 19 kms. to 38.5 on Mathura Road. There is a considerable amount of haphazard and linear industrial development, but gradually it is being brought under town planning control. As the new sectors will be developed by the Administrator of Urban Estates and plots disposed of in a planned manner, practically the entire new growth of industrial activity would develop along planned lines. If developmental activity does not get thwarted due to unforeseen factors and if augmentation of water supply and house building activity keeps pace with the growth of employment activities by way of industrial establishments, there is a hope that the complex may have a total population size of 3.5 lakhs by 1981. In fact, if the Haryana Government puts all its stake in Faridabad, if the Central Government employees housing becomes popular at Faridabad, and if booking facilities for shipment of industrial goods are provided at Faridabad Railway Station, and

the movement of goods and people connected with the transfer of production from Faridabad to Delhi is avoided, the maximum potential of Faridabad can be raised to 4 lakhs in 1981.

There is no doubt that the Development Plan of Faridabad which was prepared for a population of 3.5 lakh persons would be the main instrument in the desired growth of this complex. Lately, there has been a good deal of criticism about the type of growth which has taken place in the Faridabad area. The area has been coming up as an area of employment opportunities, but a substantial number (roughly 40 percent of the working population) has been residing outside the Faridabad Complex - in Delhi and in the surrounding villages. The reason being that housing activity at Faridabad has not been commensurate with the requirements of the working population. Schools, medical facilities, shopping and recreational facilities and other social amenities have also fallen short of the requirement. One of the reasons why a large number of people have been living in Delhi and working at Faridabad has been that these people to begin with were residents of Delhi before getting employment. Even after having been employed they continue to reside in Delhi - because the travel distance is short (for those who live in south Delhi, the distance to Faridabad is only 16 kms. or even less); the bus service between Delhi and Faridabad is quite frequent, dependable, and regular; moreover the fare is reasonably low; also, a number of factories have provided transport to carry their workers and employees to and fro.

However, it is in the nature of developmental programmes in this country that in the initial stages working opportunities grow faster

than housing facilities and the construction of housing and social facilities is by its very nature slow and time-consuming. However, a stage has come when the tempo of house building in Faridabad will have to go up. The reasons for this being, higher prices of land in Delhi, higher rents for houses, shortage of water supply, (mainly in summer) frequent electricity breakdowns, and problem of city transport within Delhi, and simultaneously the availability of cheaper housing and comparatively regular water supply at Faridabad, and as the population of Faridabad expands a better social life in the town.

Industry which constitutes about 50 per cent of the working force in 1961 will definitely continue to be the most important activity in this Complex in 1981 and even in 1991. The proportion might gradually come down, but the absolute number of workers will continue to increase. A certain type of industrial environment has set in at Faridabad that prospective industrialist try to recruit labour from Faridabad for their factories. Faridabad's biggest factories of national importance such as Escort Tractors, Bata Shoe Co., Hyderabad Asbestos, Gedore Tools, Goodyear Tyres, Kelvinators, etc., are examples of big factories on which a multitude of small factories depend. General and electrical machinery, textiles, motor cycles, rubber goods, refrigeration equipment are bringing a name to this Complex and its name attracts more and more investors. Some industries moving out of Calcutta and wanting to locate in Delhi but cannot locate there for various reasons also think of a location at Faridabad. Thus, for new industries which would like to avail of a planned site at a reasonable price and be close to Delhi, Faridabad offers locational attractions,

advantages, and availability of industrial services to help them grow.

The following action is immediately called for in order to achieve the desired growth of the Complex:-

- (i) Fast and reliable train services from Faridabad to Delhi and vice-versa should be provided.
- (ii) As the Complex extends over a length of 19 kms. on the Mathura Road and has three distinct townships, there is a need for intra-city transport.
- (iii) There is an immediate need for setting up a unified development agency like the Capital Project in Chandigarh which should be exclusively incharge of development within the Complex.
- (iv) Positive steps should be taken to provide the minimum facilities such as water supply, drainage, sewerage and other community facilities including recreational facilities so that primitive and deplorable sanitary conditions are improved.

Although the maximum potential for Faridabad-Ballabgarh Complex can be mentioned to be 4 lakhs in 1981, the realizable potential can be put only between 3 and 3.5 lakhs, because every now and then the development and building process can slow down due to various reasons. This also points out the danger that if sustained efforts are not made, the tempo of construction activities is slowed down, Faridabad-Ballabgarh Complex may have a population of only

2.5 lakhs or even less in 1981 and the targeted size of 3.5 lakhs may not be reached. . . by 1991 and that of five lakhs by the year 2000. But efforts have to be made in view of the fact that Faridabad is by far the best industrial centre in the Haryana area of the NCR and offers maximum advantages of a good location near Delhi and well planned industrial sectors. Specially as there is no bottlenecks between Delhi and Faridabad (like the Yamuna Bridge as in the case between Delhi and Ghaziabad) the traffic between Delhi and Faridabad can flow even faster and in a much smoother manner. All this requires an awareness on the part of the State Government to the possibilities and prospects of development and growth at Faridabad. As is obvious, this complex holds an absorbing capacity for additional migrants from rural areas and offers the best scope for substantial increase and concentration of urban population in Haryana.

Gurgaon

Gurgaon town is located on National Highway No.8 at a distance of 30 kms. (19 miles) from Delhi, but from the Delhi border it is hardly 10 kms. In 1961 it had a population of around 38,000, which was more than double the population of 1951 when the Master Plan for Delhi was prepared, the 1961 population figures were not available and the growth taking place at Gurgaon was not fully appreciated, with the result that the Plan envisaged a population of only 48,000 in Gurgaon by 1981. This assessment was based on the acute scarcity of water. However, there has been rapid growth even after 1961 and the assessment of population is of the order of

67,000 in 1969*. This however includes the population of the enlarged municipal limits which was effected recently. Thus, the 1981 figure has long been surpassed. As a matter of fact, it is this continued growth at a rapid pace that encourages one to safely estimate that the population of Gurgaon will reach the one lakh mark by 1981.

However, this optimistic picture of Gurgaon, it is hoped, will continue because of the policy pursued by the Delhi Master Plan, and also due to its nearness to Delhi. Gurgaon will continue to witness fast growth. More than that house construction at Gurgaon has been very popular. A substantial number of home-owners at Gurgaon are people from Delhi who found it cheaper to build at Gurgaon, to live there, and to commute to work to Delhi.

Significant components of the towns' economy are the service sector, trade and commerce, manufacturing and household industries and transport. However, Gurgaon is mainly a service town with 40.5% of the total working forces in 1961 engaged in various 'services'.

Although the metre gauge railway line is a handicap to industrial growth at Gurgaon, in practice it does not have an adverse effect, because of the town's proximity to Delhi and proper road connections. Manufactured goods are generally shipped out of Gurgaon by trucks whereas delivery of raw-materials is taken at Delhi and then transported by trucks to Gurgaon. In this respect Gurgaon firms are slightly at a disadvantage than firms in Delhi which also have to

* Estimate by Regional Planner, Govt. of Haryana on the basis of information compiled from the Municipal office Gurgaon.

transport raw-materials from the railway station to the industrial sites in trucks and have to cover sizeable distances in this movement.

Industries in Gurgaon have the large urban market of Delhi on their doorstep whose banking, engineering, technical and managerial services can always be availed of. In 1968 there were 53 registered industries with about 2,700 workers.

Gurgaon has a Development Plan although it is not yet been finally approved by the State Government. New residential and industrial areas are being developed by the Administrator of Urban Estate, Haryana, which means that efforts for the planned growth of these two sectors are already on hand. Moreover there is a possibility that the broad-gauge line which comes up to Palam may in the very near future (perhaps in the Fourth Plan) be extended up to Gurgaon - a distance of a mere 14 kms.

Gurgaon has direct rail links on the metre gauge with Delhi on the one hand and with Jaipur-Ahmedabad on the other. Almost the entire Rajasthan and Gujarat States can be reached by rail from Gurgaon, if necessary, for marketing its industrial products. Besides this the National Highway connects Gurgaon with all these areas.

The physical limitations to the growth of Gurgaon are: (i) shortage of water supply, (the only source of drinking water being tube-wells); (ii) no possibility of expansion in the south because of floodability and towards the east or the west because of being surrounded by "Defence" lands.

These two major constraints can slow down the growth of Gurgaon. However enough area is

available for development within the municipal limits. At present it is a district headquarter and a dormitory town, where many who work in Delhi live. Industries such as opticals, potteries, food preservation, refractories, and metal goods have come up well in this town as they do not require much water in their processing.

In the final analysis it may be mentioned that although Gurgaon may not become a big city of Haryana comparable to Faridabad, it will be an important town and an industrial town of some magnitude. If land development is taken up, if the drinking water problem is tackled in earnest, if living conditions could be improved by the provision of sewerage and drainage, and if its connections with Faridabad, Rohtak etc., could be improved, and if the commercial and transport functions could also be strengthened, Gurgaon can very well grow to be a Class-I city by 1981. There is a case for a wholesale market for kitchen appliances, opticals, glass sheets and processed food-stuffs being created in this town. Some may say that Gurgaon has suffered because it is under the shadow of Delhi; but in fact it is the pressure of population in Delhi that has given a boost to this town by creating additional employment opportunities and better living conditions here. The situation has to be further exploited in developing this town to an optimum size.

Sonepat

This town was not designated as a 'ring town' in the Master Plan for Delhi as it was not in the inner ring, being at a distance of 44 kms. from Delhi. But its potential was recognised and it was recommended that Sonepat

should also be adequately developed. In the decade 1941-51 there had been a 70% increase of population due to the influx of refugees. Since then there has been a slower growth of population. Between 1951-61 there was 52% increase. Its population rose from 46,000 in 1961 to only 53,000 (estimated for 1968) thus recording a growth of 16.4 per cent in 7 years. The reason for this is that although it is located on the main railway line running from Delhi to Ambala and Amritsar, it lies at a distance of more than 6 kms. from the National Highway (G.T. Karnal Road). A substantial amount of industrial activity was set up along the National Highway in a number of scattered pockets such as Kundli, Rai, Murthal, etc. Sonapat town derived only a limited benefit from these industrial pockets and in the long run industrial activity will suffer due to the slow growth of the town. Also the land acquisition programme did not make much progress in these un-coordinated activities. Lack of drinking water supply is the greatest snag.

But in recent years the Government of Haryana has become aware of the need and wisdom of developing New Sonapat Town between G.T. Road and Old Sonapat Town as a proper 'ring town' where industrial activity and town growth should be integrated. An urban area with a population of 2 lakhs is expected to come up here; already beginnings have been made and some land has been acquired for industrial and residential purposes in this area.

With the possibility of the construction of a new bridge on the River Yamuna connecting Sonapat in Haryana with Baghpat in Uttar Pradesh during the Fourth Five Year Plan, there will be a distinct change in the locational advantage and

growth prospects of Sonapat as it will act as a gateway for inter-state trade. The State Government has at long last realised that it would not be desirable in the long term interest to have a continuous industrial belt from the border of Delhi towards Panipat, on both sides of the National Highway. The nearest town of considerable size on this Highway is Sonapat which is in need of planned development for healthy living and adequate employment opportunities.

There were 57 registered factories with about 3,900 workers in 1968. Sonapat has made a name because of the Atlas Cycle Works and a few chemical and rubber industries that have been set up there recently. Rightly it is being proposed that Sonapat should be developed for large and medium scale industries and encouragement is being given to prospective industrialists.

At present the highly paid engineers, supervisors, technical and managerial personnel working in factories of Sonapat reside at Delhi and commute daily. It is important that housing facilities be provided at Sonapat and only then would the growth of the town as a whole be speeded up as commercial and service activities would receive a fillip.

The Govt. of Haryana, has declared the area around Sonapat as a 'Controlled Area' under Section - 4 of "the Punjab Scheduled Roads and Controlled Area Act." Industries have been allocated areas near G.T. Road and the new residential areas are to come up contiguous to the existing town. In order to make developed plots available to the intending industrialists

and the resident population respectively, about 80 hectares (200 acres) for industrial purposes and about 60 hectares (150 acres) for residential purposes have already been acquired by the Urban Estate Department. If the tempo of development is raised and the infra-structure at Sonapat is augmented and specially if the basic facilities, like drinking water supply is provided and if sewerage, drainage, and roads are improved, the entire township as extended towards G.T. Road can accommodate 2.0 lakhs of population by 1981. On the other hand it has to be noted that from 1968 to 1981 at the growth rate of post 1961 years (i.e. 16.4 per cent in seven years), the growth would hardly be about 33 per cent. This would mean that from over 53,000 in 1968 the population would go up to only about 72,000 to 2 lakhs by 1981. But the objectives of the Regional Plan require that this town should be developed to a size of 2 lakhs for which efforts should be made by Haryana State. The wholesale market activities will also have to be improved along with the growth of industries to strengthen the economy of Sonapat. The rail services to Delhi should be improved particularly during peak hours.

Bahadurgarh

This is another 'ring town' of Delhi situated just outside the Delhi border on National Highway No.10, which goes to Ferozepore via Rohtak and Hissar. The distance of Bahadurgarh from Delhi is about 36 kms. As compared to Gurgaon, Faridabad/even Sonapat the/and town presents a substandard environment. It has the look of an over-grown village. Although an industrial estate has been established here recently and a good number of industrial enterprises have come up in the Estate, they genera-

lly produce inferior quality goods. The main products for which Bahadurgarh is gradually acquiring a name are sanitaryware, tiles, glass products, small metal products, pottery, & some rubber products. Before the modern industrial estate was set up, a nucleus of industrial activities was developed by the State Industries Department on the Hissar Road, as part of a rehabilitation project. The main attractions at Bahadurgarh are cheap land and easy means of communications with Delhi on one side and with the western part of Haryana and Punjab on the other. It also has a direct rail link (broad-gauge) with Delhi and Ferozepur.

From a population of almost 15,000 in 1961, Bahadurgarh grew to a size of 28,000 in 1968. There has been almost a 100 percent growth in seven years. The percentage increase of total workers at Bahadurgarh is of a slightly higher order, because of the growth of economic activities specially industrial activities at Bahadurgarh. There were 41 registered firms in 1968 with about 1,700 workers. As social infrastructure, such as, schools, medical facilities, and recreational services is not properly developed in Bahadurgarh, large number of workers and their families have to reside at Delhi. This explains that if social infrastructure at Bahadurgarh could be improved the town as a whole could grow even faster and give a boost to further industrialization. Commercial activity which has been declining of late has also got to be strengthened.

The most important drawback of Bahadurgarh town is its inadequate water supply. However, the State Government is alive to the situation and has prepared schemes to bring water to Bahadurgarh from the Western Yamuna Canal which flows

at a distance of 15 kms. This is in order to meet the demand of water for medium and large scale industries which would like to come here for various reasons. The Haryana Government is at present considering development proposals for the area around Bahadurgarh which has been declared a "Controlled Area". Keeping in view the growth trends and the fact that the existing population (1970) is already more than 30,000 it can be hoped that as soon as the water supply problem is solved it should not be difficult to attain a population of 75,000 by 1981.

The Master Plan for Delhi had proposed that Bahadurgarh should grow to a size of 28,000 by 1981. However Bahadurgarh has already reached this size. Consequently, on a re-appraisal, a size of 75,000 should be attainable by 1981. This is possible because industries requiring little water and those which depend on Delhi's market and otherwise also can gain from being located close to the existing industries of Bahadurgarh (because of their nature of production) have already come to Bahadurgarh. This process will continue. But for future rapid growth, the pre-requisites are water supply and planned development. This is necessary to benefit the Regional Plan objectives.

Rohtak

According to the 1961 census figures, Rohtak is the third biggest city in the NCR next to Delhi and Meerut. However estimates of population in various towns of the NCR suggest that Rohtak has lagged behind Ghaziabad and Faridabad in population and area because of which today it appears to be the fifth town in

the Region. The population figure in 1961 was 88,000 and is estimated around 1,08,000 (as in 1969).

Although it will be difficult for Rohtak to compete with Ghaziabad or Faridabad in the matter of growth (because both these towns are witnessing planned development and have a greater potential for growth because of the attractions they hold for new industries), Rohtak does have the potential for a moderate growth, as it is the seat of administration of the District, it has an important mandi for grains and raw-cotton, and because a few important institutions like the medical college have recently been established here.

Rohtak has also been considered as a potential site for the new capital of Haryana as it is quite centrally located and is only about 70 kms. away from Delhi on the National Highway No. 10 going to Ferozepore. However, Rohtak would not be able to attract many industries because Bahadurgarh in the same district, which has already an up and coming industrial centres is located on the same Highway and is closer to Delhi. Rohtak, on the other hand is better situated in relation to road transport as it is a converging point of the road network. In 1968 there were 59 registered firms with about 1900 industrial workers.

One of the problems at Rohtak is that of drainage. Due to the low-lying area in which Rohtak is situated, flooding is a common feature during the rains. Proposals to solve this are under implementation. Hence the greater problem is the water shortage for drinking purposes which affects not only industrial growth but also the living environment of this town.

A comprehensive Development Plan for Rohtak is yet to be prepared. If this could be done in the next two or three years and the Plan is finalised and executed during the next decade, Rohtak may witness better growth than the sixties. Its commercial function has to be strengthened by improving the timber market, the vegetable market, and above all enlarging the scope of the raw-cotton market. Government institutions are likely to multiply in this town as it is a regional centre of Haryana. Moreover the restructuring of the regional transport net work proposed in this Plan will give a big fillip to the growth of this town and it is imperative that it should be developed to a size of 2 lakhs by 1981. However, continuous neglect can cause continuous stagnation and the town may not grow beyond 1.5 lakhs by 1981. There is the possibility that other towns of the Region such as Alwar and Sonapat may attract all the activities that ought to go to this town and Rohtak may remain a small town having a limping growth and gradually falling behind other towns of comparable size. Its advantages are many and its existing infrastructure are not inconsiderable. Serious thought must be given to the fact that among the existing communities it is still a sizable town and deserves better developmental efforts to attain the desired size of 2 lakhs.

Rewari

This town had a population of 37,000 in 1961 and was, thus, of about the same size as Gurgaon. Its growth, however, is slower than that of Gurgaon. The present estimated population is around 45,000 or so. Rewari has the biggest railway junction on the metre gauge line in India. Trains go from here in as many as five directions, thus connecting it to various places in Haryana, Pun-

jab, Rajasthan etc. The main line passing through Rewari runs from Delhi to Jaipur-Ajmer-Ahmedabad. In terms of roads also it is well connected with the surrounding areas. The National Highway running from Delhi to Jaipur is at a distance of only 13 kms. from Rewari. This town, commands good transport connections and this therefore is its biggest asset. The distance of Rewari from Delhi is approximately 83 kms.

Traditionally Rewari has been an industrial centre. Even in 1961, it was next to Sonapat in terms of industrial working force; the proportion of industrial to total workers was more than 30 per cent; however, there were only 16 units in the registered sector as late as 1968 with only about 500 workers. This is because most of the industrial activity at Rewari is carried on in small household units. The biggest and most important units belong to utensil making. Then there are numerous establishments producing leather goods. Metal containers, steel trunks and saw-mill production are the notable products of industries of Rewari.

The place looks unimportant and unimpressive so far as the level of modern industrialisation and or representation of diversified groups of industries is concerned. Being at a greater distance from Delhi, Rewari has lagged behind Bahadurgarh and Gurgaon in terms of industrial growth and consequently in terms of town growth also, as the employment potential and growth prospects in the small household industries are limited.

Water supply is again the main problem at Rewari and water consuming industries cannot be located in the foreseeable future. Underground

water is found at a depth of 30 to 90 metres but its quality is doubtful. Unfortunately the Haryana Government has not included Rewari as a focal point of industrial development, nor has an effort been made to tackle the water problem. The Town and Country Planning Department has also not attempted any Master Plan.

The existing footwear (jutti making) units and metal goods producing establishments can be modernised and their number increased. Stone products also have a good scope in this town. Rewari is an important mandi too and its transactions in grains are sizable. Utensils also have an important market at Rewari. The production of Rewari caters to the demands of rural population in Gurgaon District and in the surrounding districts of Haryana and Rajasthan. Besides, the colleges at Rewari admit students from the neighbouring places and even from the State of Rajasthan.

Rewari's locational advantages because of its road and rail connections have not been exploited for industrial development purposes. Its mandi is also in a state of neglect. It is a tehsil headquarter but the administrative functions alone cannot keep it going. What Rewari needs is a recognition as a growth centre for future industrialization in a backward area. The present town can be made to grow to a bigger size. If the present trends continue it may attain a size of only about 55,000 to 60,000 by 1981; but if Rewari had a Development Plan and if its locational assets were to be fully exploited, it has a potential to grow to a size of 75,000 or more by 1981.

Panipat

According to the Census of 1961 Panipat was the second biggest town in the NCR part of Haryana (next only to Rohtak) and had a population of 67,000. Its working force consisted of more than 20,000 persons, among whom 41.6 per cent or nearly 8,500 were engaged in industrial activities of various kinds. Thus, the employment pattern was heavily tilted in favour of the industrial sector. However, it may be noted that an overwhelming proportion of the industrial employment in Panipat is engaged in household industry. This explains why in spite of large number of industrial units and industrial workers Panipat does not have the appearance of the modern industrial town. The most notable industry of Panipat is the manufacture of textiles comprising mainly woollen mills, of which there were seven units in 1957 in the registered sector. The number of registered factories are 99 in 1968 with about 3,000 workers.

The present population size of Panipat is estimated at about 80,000. The growth has not been impressive because of a greater attention being paid by the Haryana Government to the development of Faridabad-Ballabgarh, Gurgaon, Sonapat, Bahadurgarh, etc., which are closer to Delhi. This is the main reason why in spite of being a bigger town than Sonapat and having a better position in regard to water supply, Panipat is gradually losing to other centres. The fact that the office of the District Industries Officer for Karnal District is located at Panipat and various training institutes are also located here has not been adequate to create

proper growth in this town. Industry is the main economic activity and the scope of other activities are limited. Panipat has become a market for handloom textiles, as also for textile machinery.

An important asset of this town is its Industrial Area which is well located, at a distance of only 2 furlongs from the G.T. Road, and is easily accessible. Out of 90 hectares in this area only 48 hectares have been developed and allotted and the remaining industrial land has still to be allotted. This can be possible if the industrial area is that of drainage. An organised sewerage scheme should be prepared for the Panipat Industrial Area and also for the town, as a whole. At present the flush system is available only in one residential colony, namely, Model Town. The internal roads also have to be constructed in the industrial area. Moreover there is no provision for street lighting or water supply. Farmers are in illegal possession of some of the industrial lands. The main thrust, therefore, should be on making full use of the industrial area, provision of labour colonies for housing workers and those incentives as are available to "focal points" to the industries being set up at Panipat. Adequate godown and storage space needs also to be provided.

Being at a distance of 85 Kms. from Delhi, as compared to Sonapat or other industrial pockets that have come up along the G.T. Road close to the Delhi border, so far, the characteristic haphazard growth of industrial activity, along the National Highway has not taken place in Panipat.

It has a great potential in terms of industrial growth prospects which will ultimately re-

sult in the growth of the town, specially as it is an older and better established town than most of the towns of the Haryana Sub-region. Recently, on account of the construction of a new bridge on the river Yamuna connecting Panipat in Haryana with Muzaffarnagar in U.P., Panipat can derive an additional benefit because it can draw upon labour and raw material supply from the adjoining parts of U.P., and can, thus, provide working opportunities to skilled and unskilled persons seeking employment. Panipat's commercial activity would also be strengthened because of this new connection; its market now extends into western U.P. All this portends well for its future. What is required is a realisation that Panipat cannot continue to be neglected; it is a prospective centre for considerable industrial growth. The size of population which it can attain by 1981 depends very much on the efforts of the departments concerned. If the present trends continue, it is likely to reach a population size of only 1.25 lakhs by 1981. But the Regional Policy requires that this town should be developed to a size of 2 lakhs by 1981 and all efforts should be directed towards that end.

Palwal

This was a town having a population of about 28,000 in 1961, of which about 7,500 constituted the working force. It is not an industrial town as would be clear from the fact that industrial workers constituted only 21 per cent of the working force in 1961. The distance of Palwal from Delhi is about 65 kms. It is connected both by the Bombay-Agra-Mathura Road going to Delhi (National Highway No.2) and by the railway line running from Mathura to New

Delhi. Palwal has intimate connections with Delhi. This is obvious from the fact that four shuttle trains run from Palwal to Delhi in the morning and four return shuttles in the evening. This indicates that Palwal is gradually becoming a part of the Delhi Metropolitan Area as it contributes commuting office workers and commercial workers and to some extent industrial labour to Delhi. Palwal is preferred for residential purposes by those who would like to live in a semi-urban environment. It provides a good stepping stone between the rural and urban way of life. Palwal is also a tehsil headquarter and therefore, has a considerable service population.

Although located on the National Highway going to Mathura-Agra and Bombay, Palwal is not very important so far as the industries in the registered sector are concerned. In fact, the picture of industrial growth in Palwal in the registered sector shows a declining trend and it had only about 30 workers in 1968.

Most of its industrial activity is confined to the unregistered sector, to very small size industries operating in small workshops or as household industries. A large number consists of saw-mills and the rest manufacture the smaller parts of transport equipments. A few units in the food products group are also located in this town.

As industrial development along National Highway No.2 is expanding southward, the next focal point beyond Ballabgarh for such growth can only be at Palwal. It already has bus and train connections with Delhi. Because of its rural character many rural workers who get a job in Delhi, Ballabgarh or Faridabad would prefer to reside at Palwal.

Its present population estimate is around 35,000. It may well achieve a size of about 45,000 by 1981 at the current rate of growth. But it could be made into a very attractive centre of urban services for the surrounding countryside. It could reach a maximum of 60,000 population in 1981 if it were declared a new focal centre and if schemes were prepared to strengthen its economic base by injecting suitable industrial activity and by strengthening its commercial functions also. A case can be made for having a sub-centre for wholesale trade in timber and possibly for other commodities, at Palwal. There is also a case for an industrial estate at Palwal. Also, the residential facilities need to be augmented and improved. Specially because Palwal can be developed as a place where rural workers may get their first non-agricultural job or have their first non-village residence (it would be cheaper to build houses for such requirements). It is with this end in view that Palwal should be developed and it should not be difficult to attain a size of at least 50,000 by 1981. It has the potential for growth because of its special situation and because of the type of living and working environment it can provide. There is a special case for being taken up as a town for planned growth in future.

Alwar

This is the most important town in the Rajasthan Sub-region of the NCR and is located at a distance of 166 kms. from Delhi on the State Highway (formerly National Highway No.8).

The 1961 Census showed a population of about 73,000, thus making it the fourth biggest town of the NCR (after Delhi, Meerut and Rohtak).

The present population estimate is close to one lakh. Some of the reasons for substantial growth during the present decade, has been the establishment of a Cantonment at Alwar, the coming up of new industrial activity on Delhi Road, as well as the establishment of the Government Bacon Factory.

According to the 1961 Census, the proportion of working force to total population was as low as 28 per cent. Alwar has been more important as a service and trading centre, especially, because it is situated in the midst of Rajasthan's fertile and productive areas. Being earlier the capital of a princely state and now the seat of the District Administration, Alwar has the advantage of a well laid out town with palatial buildings, a good number of cultural and educational institutions, and adequate medical facilities and an environment conducive to good living.

Alwar is also a tourist centre with tourist attractions like Siliserh lake and Sariska Game Sanctuary. Industries are based on food and allied products, agricultural implements, metal products, and above all chemical industries. In 1968, there were about 600 workers in the registered sector. Alwar District is rich in a number of mineral resources such as barytes, felspar, and quartz which create a base for the ceramic industries. Moreover, Alwar District is very productive and agriculturally prosperous & provides agricultural raw-materials for industrial purposes. Alwar is a rail-head on the metre gauge line running from Delhi to Jaipur-Ahmedabad being midway between Delhi and Jaipur.

Land use analysis reveals that only 34 per cent of total developed land is under residential

use but additional area is being added to this. The housing situation in Alwar is satisfactory, both quantitatively and qualitatively. Moreover, there are three main hospitals and eight dispensaries, besides an Ayurvedic and a Military Hospital. About 400 beds are provided in the three hospitals, which works to 5 beds per thousand population excluding the Cantonment.

The number of educational institutions are also large, consisting of forty five primary schools, ten middle schools, eight higher secondary schools, three colleges, and one I.T.I.

Drinking water is being supplied at the rate of 63 litres per head per day and is at a higher level than in the towns of Haryana. The scheme known as "Gurja Water Supply Scheme" is being launched to provide an additional supply and very shortly 113 litres per head, per day, would be available to the town. The supply of power is mainly from the Chambal Grid and is adequate.

It may be seen that because of having been a princely town, Alwar has adequate infrastructure which can support a higher population than heretofore. At the normal rate it would reach a population size of atleast 1.25 lakhs by 1982. But here is a town, which has so far not been adequately developed although it has a better potential for it. The industrial area needs proper development. Also, Alwar being the main town in the NCR part of Rajasthan, it needs to be developed as a second order counter-magnet for the migrants from Rajasthan who otherwise flock towards Delhi in search of employment. There is no reason why Alwar cannot be planned for a higher population and the facilities provided for this purpose. Various community faci-

ilities and urban amenities and services can be augmented at minimal cost to support a much higher population. This is all the more reason why the planning target in terms of size of population for Alwar should be 1.5 lakhs in 1981. This is a target that could be realisable with very little investment.

Khairtal

In the Rajasthan Sub-region, Khairtal is next to Alwar in importance as an urban area of considerable potential. It is located at a distance of only 27 kms. by train and 45 kms. by road from Alwar. From Delhi its distance is 130 kms. by train and 133 kms. by road. The National Highway No.8 (Delhi-Jaipur-Ahmedabad) is 41 kms. from here.

In 1961 it had a total population of 6500 and was still a rural area. Only during the past one year it has been declared as an urban area and a municipal board has been set up. The population estimate at present is around 10,000. Anand Nagar Colony has come up only during the last 8 years or so. Thus, the present decade has witnessed high rate of growth in this area. This is also clear from an observation of house building activity. In 1961 there were one thousand houses in Khairtal. During the nine years or so new house construction has taken place in this order: 400 in Anand Nagar Colony, 400 in Khairtal Village, 100 in Mandi, and 100 in other villages. In the year 1969-70 alone a total of 150 new houses were built. Today the housing stock is about 1900.

The number of houses in Khairtal municipal area has almost doubled during the past nine years. Out of nearly 1,900 houses now existing in

Khairtal, almost 1,500 are pucca and the remaining are kutcha. This is an indication of good living conditions at Khairtal in so far as housing is concerned. The rent for one room is usually Rs.20 to 25/- per month in Anand Nagar Colony; but it could be as much as Rs.40/- in the Mandi, although in the Village Khairtal it will be available only for Rs.10/-. This shows variations in the rental structure and is also indicative of differences in the living environment within the same municipal area.

Khairtal is known at present mainly for its Mandi which occupies about ten acres of land. It houses 110 wholesale shops and 190 retail shops. Three main commodities handled by this Mandi are : mustard, wheat and gram. Every season 10,000 quintals of mustard alone are marketed. It comes mainly from the nearby tehsils of Alwar District. Another commodity coming into this Mandi from Uttar Pradesh is gur.

Protected water supply is not available in Anand Nagar Colony where hand pumps are being used (there are 250 hand pumps in Anand Nagar, and sweet water is available at a depth of 10 to 12 metres. In other areas piped supply is available. The supply is from two main wells fitted with pumping sets. There are 150 pipe connections (domestic connections) and 30 public hydrants. The water rate is Rs.6/- per month per connection. The supply is given for five hours a day - three hours in the morning and two hours in the evening. In addition there are open wells giving water from a depth of 50 ft.

The town has adequate electric supply; it comes from the Bhakra system. The rate for

domestic lighting is 40 paise per unit and the duty on electricity is 8 paise per unit (total of 48 paise per unit) which is rather high; but power is available at a reasonable rate of 13 paise per unit. As many as 800 homes out of 2,000 have electricity connection. The total number of telephone connections in the municipal area is 80.

In a population of nearly 10,000 in the municipal area today, the number of workers are about 3,000, out of whom 2,500 are males and 500 are females. The largest number of workers (about 500) is engaged as labourers on the fields. Then there are 300 farmers, 250 factory workers, and 250 office-employees. Out of the remaining 100 are transport workers and another 100 are construction workers. This gives a position regarding male workers only. Female workers are engaged as weavers or spinners or as labourers.

The biggest factory in Khairtal is Jai Bharat Oil Mills where the employment inclusive of casual labour is reported to be 100. Then there are three other oil mills which are very small. Other types of industrial establishments include saw-mills (10 in number) flour mills (10 in number), and printing press (1) metal goods (2), other workshops (8), and brick kiln (1) and lime kilns (2). A total of about 250 workers is employed in all these establishments. This shows that industrial activity, though on a very small scale and of the household type, is quite diversified.

Khairtal was declared a municipality on June 9, 1969, and now has an elected municipal body which is very active and enthusiastic about creating better conditions in the Khairtal

Urban Area. Specially in terms of economic growth and employment, the municipality is trying to set up an industrial area in the town. They are very keen to prepare a development plan for Khairtal, so that the town grows in a planned manner. They are also aware of the need for a college at Khairtal. The number of school going children today is nearly 2,500. There is one Higher Secondary School for boys, one Secondary School for girls, and five primary schools. So many schools can definitely support a college as well.

Khairtal lacks adequate medical facilities. It has only one dispensary having a doctor, two compounders, one nurse and four beds. There is a great need for one maternity hospital. There is one Ayurvedic Hospital in Khairtal manned by a vaid and a compounder; it generally suffers from shortage of medicines. The number of private doctors and v aids is only seven. There is no veterinary hospital at Khairtal. The municipal area has 400 cattle and animals. The closest veterinary hospital is at Kesharganj which is a distance of 10 kms.

The above description of the problems of Khairtal has been given to highlight its problems and its potentials. Economic activities today depend mainly on commerce conducted in the Mandi which is the mainstay of this town. But the fact that there are two banks, two post and telegraph offices, and one telephone exchange shows that modern facilities have come to this town. The main exports from Khairtal are mustard oil, raw mustard, onions, carrots, milk etc. Khairtal does not possess adequate shopping facilities and people have to go to Alwar for their daily needs. But for major shopping they have to go as far as Delhi. Now that it is a new

urban area of Alwar District and the municipality is keen to develop the urban area economically and environmentally, industrialisation is being thought of as a source of employment and also as a method for diversification of the occupational and production structures. The best hope lies in starting industries like the use of vegetable preservation and iron foundry and making extensions to the Mandi, which can be very successful. The house-building activity is a sign of prosperity in the town.

Being the second most important urban area in the Rajasthan Sub-region of the NCR and being closer to Delhi than Alwar, Khairtal is being selected as a growth centre of considerable importance. Specially because the residents of Khairtal are enthusiastic about its growth and development, it can be expected that the town would grow to a sizable urban centre in 1981. The Census of 1971 is likely to show a population between 10,000-12,000 in the municipal area of Khairtal. In 1981 this can easily go up to 20,000 or more. Khairtal is situated in an area of low urbanisation. It is necessary to create non-agricultural activity in this part of the Region. Hence serious efforts will have to be made to accelerate the tempo of development, so that the town could reach a size of 50,000 by 1981. This will be a very good example of a town which will provide the services to a large hinterland and where people from the surrounding rural areas will have their first taste of a semi-urban living environment and possibly of a non-agricultural job. In this respect it can be compared to Palwal of Haryana and Sikandrabad of Uttar Pradesh in the NCR.

Proposals for Major Urban Settlements:

The factors influencing any proposal for a major urban settlement pattern are the holding capacity of Delhi by 1981, the growth potential and capacities of the towns of the NCR in view of the population increments they will receive by the dispersal of economic activities away from Delhi and the economic development of the Region vis-a-vis the other regions of the country. These are conditioned by the national policy which has clearly laid down the need for dispersal of economic activities, especially away from big metropolitan centres such as Delhi. The central factor to this national policy is a national spatial development strategy with linkages between the metropolitan cities, medium sized towns and the rural hinterland: More specifically in relation to the National Capital Region, the development of medium size towns in the group 1 lakh to 3 lakhs* within a *When coupled with emerging industrial pattern in cities of different size, observed in the field study, this cost finding suggests that search for opportunities for industrial agglomeration may start in cities around 130,000 to 300,000. Such a policy would take advantage of the phase of increasing benefits to agglomeration in places where these benefits are not yet countered by possible social costs of the largest cities".

"...evidence from Industrial statistics and field interviews suggests that steps to encourage industrial agglomeration may be effective in selected cities around 130,000 to 300,000. Some cities in this size range have begun to generate manufacturing activities that promote diversified labour skills and other external economies favourable to industrial growth".

radius of 250 miles from Delhi assumes great importance. This could hold back excessive urban migration that is now taking place into the city of Delhi and which could also absorb the rural migration in the hinterland of these towns. In the strategy for development it would be necessary to concentrate on such towns which are on the traffic arteries, having the necessary infrastructure and which are capable of being augmented (especially drinking water supply and power).

A national urbanization strategy has been indicated above which will have an impact on the NCR. The future strategy on population structure in the NCR will have to take care of the following factors:

1. A physical framework for settlement pattern to keep the rural urban continuum at its pace with adequate linkages between the rural and urban areas, specifically market towns/the and central place villages with provisions for handling of agricultural produce and other necessities for the agricultural economy. In this scheme of things rural electrification, water supply and road net work at the sub-regional level are the most crucial aspects.

2. The future urbanisation pattern indicates that there is an area of higher urbanisation along the corridors where also incidentally the "Costs of Urban Infrastructure for Industries as Related to City Size in Developing Countries - India Case Study" pp 10 & 352. A joint study by Stanford Research Institute, Menlo Park, California, School of Planning & Architecture, New Delhi, Small Industry Extension Training Institute, Hyderabad, October, 1968.

'green revolution' has made an impact. Concomitant to this, in the south and south-west there is an area of somewhat lower order of urbanisation where the agricultural development is also of a lower order. Different strategies will have to be followed in the two areas.

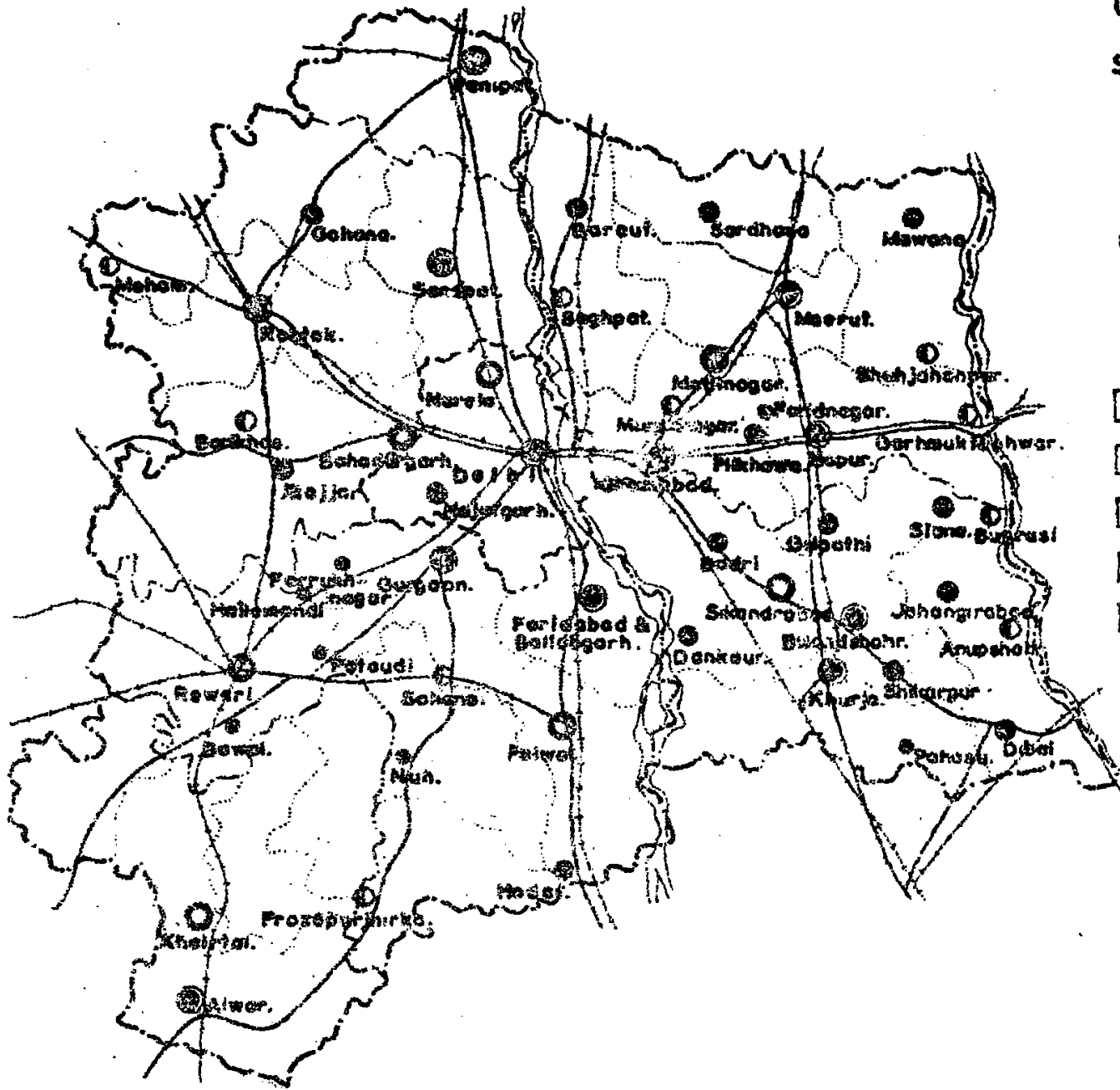
3. In the area of higher urbanisation the strategy should be to provide a physical framework which will carry forward the beneficial effects of the 'green revolution'. This will also be the area where the future major economic activities in the non-agricultural sector will be located. Efforts will have to be concentrated on the development of medium sized towns as well as a second tier of rural towns and central place villages. The provision of linkages to medium size towns with the rural hinterland as well as inter-urban linkages would be of utmost importance in the future set up of this area.

4. In the area of lower urbanisation it is essential to concentrate on the development of agriculture by providing such facilities as water for irrigation and power, supply of fertilizers and seeds and roads at a lower order, in order to raise the economy of the area to a higher order.

5. This strategy presumes that in the future the dispersal of major non-agricultural economic activity will be first carried fourth to the area of higher urbanisation from the metropolis and subsequently to the area of lower urbanisation. This is required in view of the resistance on the part of entrepreneurship to move away from the metropolis into far away locations where the necessary infrastructure is

URBAN CENTRES

SPATIAL DISTRIBUTION 1961



LEGEND.

CENSUS CLASS.	POPULATION (000)	NUMBER CENTRES
I	100 & Above	13
II	50 - 100	6
III	20 - 50	15
IV	10 - 20	10
V & VI	1 - 10	7
TOTAL =		51

Estimates for 1961 Urban Centres :-

Boundaries. STATE DIST



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORG.
MINISTRY OF H.P., W.H. & U.D.

not available and the cost of providing these in very small towns is higher than those in towns which have developed some infrastructure. This is borne out by the present trend wherein Ghaziabad, Faridabad and to some extent Bahadurgarh have attracted industrialisation as compared to towns farther away from Delhi such as Rohtak, Rewari, Hapur, Meerut etc.

A. Population Distribution in the NCR:

Added to these factors is the earlier choice based on cost, technological and social considerations from among the five alternative patterns of physical development, wherein the Radial Corridor pattern coupled with the Multi-town pattern was recommended. Taking all these into consideration it is proposed that the estimated 1981 urban population will be distributed in four tiers of urban centres* in the following manner (see tables 3.5, 3.6 and 3.7 and map 3.3 for spatial distribution),

1. The compact Urban Area of Delhi should be developed for a population of 52 lakhs. Together with Narela and Najafgarh a population of 53 lakhs would be accommodated in Urban Delhi by 1981.

*".....future planning must be oriented towards stabilisation of population at a desirable optimum figure and towards planning suitable new centres in the Region for the likely spill over. In this context, the potentialities of developing existing small towns in the area need to be fully explored. Unless such positive approach in relation to growth of population in our bigger cities and smaller towns is adopted now, it will be difficult to control the situation later" p.398 Fourth Five Year Plan 1969-74, Planning Commission, Govt. of India, New Delhi.

2. In the NCR nineteen towns have been identified as having good potential for economic growth and consequently for population distribution. By 1981 it is proposed to accommodate 31.5 lakhs in these towns. There will be twelve Class I towns in this Region among these.
3. In 1961 there were another thirty one towns in the Region which had a population of about 3 lakhs. Natural increase as well as some developmental efforts will be able to accommodate about 6.5 lakhs in these towns by 1981. Some of these will act as market towns for the surrounding rural areas and will provide services as well.
4. In 1961 there were more than fifty villages with a population of more than 5,000. It can be safely presumed that many of them will get urbanised. Some of them will get absorbed in other urban areas in items 2 and 3 above. It is estimated that about 2 lakhs can be accommodated in these villages which are likely to be urbanised by 1981. Some of these will constitute the central place villages which will provide the nuclei for starting non-agricultural economic activity triggered by the 'green revolution' and will have to be identified in the Sub-regional Plans.

The holding capacity of Delhi and the potential of the nineteen towns have been discussed earlier in the Chapter. Also from overall considerations, it is estimated that the remaining 31 towns of the Region would have by 1981 a population of 6.5 lakhs. It would be essential to obtain the spatial structure of these towns in 1981, to understand the future

Table 3.5

Proposed Urban Population Structure in the NCR 1981.

		(In Lakhs)	
City/Town		Proposed size 1981	% to NCR Pop.
	Delhi	52.00	
	Narela 'Delhi	0.60	
	Najafgarh 'Urban	0.40	
A.	Sub-total	53.00	56.98
1 & 2	Meerut (including Kankar-Khera)	8.00	
3.	Ghaziabad	4.00	
4.	Modinagar	1.50	
5.	Hapur	1.00	
6.	Khurja	1.00	
7.	Bulandshahr	1.00	
8.	Sikandrabad	0.50	
9 & 10.	Fariabad-Ballabgarh	3.50	
11.	Sonepat	2.00	
12.	Panipat	2.00	
13.	Rohtak	2.00	
14.	Gurgaon	1.00	
15.	Bahadurgarh	0.75	
16.	Rewari	0.75	
17.	Palwal	0.50	
18.	Alwar	1.50	
19.	Khairtal	0.50	
B.	Sub-total 1 to 19	31.50	33.89
C.	Other towns in NCR		
	31 towns	6.50	6.99
D.	Villages, likely to be urbanised in 1981.	2.00	2.14
	Sub-total B.C.D.	40.00	43.02
	Grand Total	93.00	100.00

Note: 93 lakhs urban population will be 44% of the total projected population for 1981 of 211 lakhs.

pattern of growth. The methodology worked out to arrive at the future estimated population for these 31 towns is given below. However, this will have to be worked out in detail in the Sub-regional Plans.

In the decade 1951-61, the absolute growth of population in the 31 towns was 61.3 thousands.

District.	000's	%
Meerut	27.3	44
Bulandshahr	18.9	31
Gurgaon	7.2	12
Rohtak	7.9	13
	<u>61.3</u>	<u>100</u>

Observing the spatial location of the 19 priority towns, it is noted that Meerut district has a substantial share of urban population in its four priority towns as compared to the other districts in the Region. With a higher component of growth in the priority towns, the smaller towns in that district would develop comparatively at a slower pace as compared to the other districts especially, Bulandshahr in the U.P. Sub-region. In the Haryana Sub-region the present pattern of growth is more or less related to the availability of urban water supply. However with progress in integrated urban water supply and irrigation facilities in that sub-region, it is expected that trend in the future will be progressive. Based on these assumptions, the anticipated future population growth between 1961 and 1981 would be :

<u>District</u>	<u>000's</u>	<u>%</u>
Meerut	115	34
Bulandshahr	138	41
Gurgaon	42	12
Rohtak	45	13
	<u>340</u>	<u>100</u>

An analysis of the absolute growth in individual towns during 1951-61, indicates that the maximum growth was of the order of 6,000. In the coming two decades - a faster growth is expected; but much of this growth would be due to the dispersal of economic activities away from Delhi. The bulk of this impact would be felt in the 19 priority towns which will have an accelerated population growth. However, the share of the rest of the 31 towns in the total urban growth would be equally important in the overall growth pattern.

Considering the population estimates for the Region and the absolute growth during 1951-61, on a rough basis, the individual towns could expect a population increment 4 to 6 times the absolute growth in the period 1961-81. Based on this analogy, Table 3.6 indicates estimated population for individual towns. However, these are only indicative. The growth potential of all these towns as well as the rural - urban frame work will have to be worked out in detail in Sub-regional Plans.

The urban structure as proposed above will provide an urban population of 93 lakhs by 1981. This is about 1.5 lakhs more than what has been estimated at current trends in table 3.3. This would give an urban component of 44% in a total population of 211 lakhs. This may be compared with the percentage of urban population of 28.9 in 1951 and 34.4 in 1961. (See Table 3.7).

It will be noticed that a major restructuring of the urban hierarchy has been proposed. It was stated earlier in the Chapter that if current trends perpetuate, it is estimated that the urban population of Delhi would be 64 lakhs constituting 70% of the total urban population of the Region and only 27 lakhs of 30% of the population would be in the other urban areas of the Region. In the hierarchy now proposed, Delhi Urban Area will constitute 57% of the urban population of the Region, the nineteen towns 33.9%, the thirty one towns 7% and some of the present villages which are likely to be urbanised by 1981, about 2.1%. Thus all towns of the Region excluding Delhi will constitute 43% of the urban population. Only this redistribution of population can ensure a balanced regional development, wherein, Delhi will be contained within the urbanisable limits for which land has already been acquired and the nineteen regional towns will be developed by decentralising economic activity away from Delhi and the rest of the smaller urban centres will provide urban services to the rural areas.

Table 3.8

Proposed Size of Towns in the NCR 1981.

	<u>1961</u>	<u>1981</u>
Class I	2	13
Class II	9	5
Class III	8	14
Class IV	13	11
Class V & VI	18	6*
Total	<u>50</u>	<u>49**</u>

* A number of villages will move into the category of Class VI towns by 1981 but not been included here. **Two towns will merge in bigger towns and one village will be developed as a town.

Table 3.6

Population Estimates of 31 Towns of NCR - 1981.

Towns	Estimated additional growth 1961- 1981. 000's	Estimated population 1981(000's)	Towns	Estimated additional growth 1961- 1981. 000's	Estimated population 1981(000's)
A. Meerut District			C. Gurgaon District		
1. Baraut	26	48.8	20. Hodal	13	23.6
2. Mawana	21	41.7	21. Sohana	10	16.9
3. Pilkhawa	18	34.0	22. Ferozpur-Jhirka	6	11.8
4. Sardhana	16	32.6	23. Nuh	4	7.7
5. Baghpat	10	19.4	24. Bawal	3	8.9
6. Muradnagar	9	17.3	25. Pataudi	3	7.2
7. Garhmukteswar	9	17.7	26. Halleymandi	2	3.7
8. Shahjahanpur	4	10.2	27. Farrukhnagar	1	5.9
9. Faridnagar	2	8.3			
	<u>115</u>	<u>230.0</u>		<u>42</u>	<u>85.0</u>
B. Bulandshahr District			D. Rohtak District		
10. Dankaur	25	33.0	28. Jhajjar	23	37.2
11. Siana	19	31.7	29. Gohana	12	23.1
12. Gulaothi	19	31.5	30. Moham	5	13.9
13. Jahangirabad	17	34.1	31. Beri	5	15.8
14. Shikarpur	15	27.9			
15. Dadri	14	22.7			
16. Dibal	11	25.0			
17. Buggasi	8	13.5			
18. Anupshahr	7	17.2		<u>45</u>	<u>90.0</u>
19. Pahasu	3	8.4			
	<u>138</u>	<u>245.0</u>	Grand Total	340	650.0

Table 3.7

Summary Table Showing Existing and Proposed Urban Population 1951-1981.

Sl.No.	Name	1951		1961		1981 Proposed	
		Population (Lakhs)	%	Population (Lakhs)	%	Population (Lakhs)	%
1.	Delhi Urban	14.37	58.19	23.60	64.18	53.00	56.98
2.	19 Towns of NCR	7.75	31.71	10.07	27.42	31.50	33.89
3.	Remaining 31 Towns of NCR	2.01	10.10	3.10	8.40	6.50	6.99
4.	Villages likely to be urbanised by 1981.	-	-	-	-	2.00	2.14
5.	Sub-total of 2,3,4	9.76	42.77	13.18	35.82	40.00	43.02
6.	Grand Total	24.13	100.00	36.78	100.00	93.00	100.00
	Percentage of urban to total population.		28.94		34.42		44.08
	Total population in NCR		83.38 lakhs		106.82 lakhs		211.00 lakhs

Note : In 1951 and 1961 there were 18 towns in item No.2 while the 1981 figure on population covers 19 towns including Khairtal.

3. The Strategy of Development in the NCR.

The proposals made regarding the major urban settlement pattern presumes that in the next decade there would be a continuing rapid growth of urbanisation in the National Capital Region due to both population increase and rural migration. It also presumes that as a result of the national policy on urbanisation, a national spatial development strategy would be pursued by which other urban centres, especially in the neighbouring States of Uttar Pradesh, Rajasthan, Haryana and Punjab would be developed which over a decade would reduce the immigration into the NCR.

In tackling the urbanisation problem in the NCR, we are confronted with a number of alternative patterns of development. The major constraint in adopting any one of these are: lack of resources, technological and organisational limitations and social attitudes based on rural upbringing. The constraint on resources are many - land, water and finances. These are, however, inextricably involved in the low level technology, at the most intermediate technology, available at the moment, and the lack of superior organisation both in metropolitan management as well as in the management of large scale services for water and power supply, sewerage facilities and transport etc. Given the major constraint of land, Asian metropolitan cities like Hongkong and Singapore have gone in for multi-storey construction in a big way. Japan has restructured the urban pattern on high speed transport. But these are not evidently suitable for the NCR because of the many constraints indicated above. On the other hand, notwithstanding the constraints, we have in the NCR the National Capital,

Delhi, occupying the hub of the transport network, with several major and minor arterial roads and rail lines radiating towards, more or less virgin unbuilt land, rich in agriculture and with abundant migratory rural labour - a challenging situation, calling for a vigorous development strategy.

In a situation like the NCR, many Metropolitan regions have implemented a radial corridor development pattern. A variety of urban centres are strung like beads in a necklace along the radial corridors at varying distances along lines of high speed communication. It is proposed to follow this pattern of development in the NCR. At the present time 82% of the urban concentrations in the NCR are along the radial corridors. In this stage of development many of these urban centres are not self-contained but have intense home to work commuting between Delhi and the towns which is a two-way traffic for many purposes. Thus, there are a large number of workers commuting from Delhi to Faridabad because a large number of industries are located there but the town is lacking in housing and other facilities. On the other hand though there are a large number of industries also in Ghaziabad and Modinagar, the commutation to these towns from Delhi is much less. There is considerable commutation to Delhi from Ghaziabad and Gurgaon which offer residential facilities. The passenger traffic to Delhi from Meerut, Rohtak, Sonapat and Panipat is not of the commuter type but is more for trade and commerce.

The strategy of urban development in the NCR is to keep within manageable limits, both the population and area of Urban Delhi, so that resource is not taken to either too much of horizontal expansion requiring too much of land and long ser-

vice lines, nor very high density and high-rise development requiring sophisticated technology and organisations but a compact urban structure is built up. On the other hand, population concentration has to be purposefully diverted to the regional towns along the radial corridor which have to be well connected to Delhi by diesel/electric railway and expressway road system and direct dialing telephone services. These towns are not to be ribbon developments without social cohesion but are envisaged as compact and viable towns with medium densities, more or less self-contained in matters of work places and residences but having intense trade and commerce and social and cultural relationship with Delhi. They will also have circumferential transport connection in order to encourage inter-action between the towns as well as open up the whole Region. They will have to function as centres to service the rural districts into which the rural area will have to be grouped. The present stage of the agriculture revolution in the NCR is conducive to the development of rural growth centres all over the rural area. These will have to be identified in Sub-regional Plans as "central place" villages and towns, wherein adequate infrastructure including road linkages is to be provided so that they can effectively provide services to a cluster of basic villages. Thus the development strategy is also to build up the human settlement structure and environment from bottom-upwards to keep the pace of the rural-urban continuum and to build up an industrialization pattern that can truly benefit from the dynamic growth of the National Capital.

This restructuring of the settlement pattern will have a great impact on social living and provide a major breakthrough in metropolitan and regional planning, which if successful at the micro level can well be followed in the wider macro level of the entire country now confronted with the bug bear of gigantic cities. But success or failure will depend on as to what extent concerted and co-ordinated action is taken to restructure the economic and transport structure of the NCR- These are dealt within the succeeding chapters.

Salient Features of the Economic Base:

Delhi, the central city of the Region, in addition to its being the National Capital is also the third largest city in the country. The economic base of the National Capital Region, (though largely agricultural) is conditioned by the character and role of the mother city. Being the seat of the Government of India, one of its basic functions is to govern the country and supply the services of the Central Government to the entire nation. This is enhanced by the administrative functions of a Welfare State. Wholesale trading and banking services for the whole of Northern India is another primary activity. Though less pronounced, but still important, manufacturing industries play an important role in the economy of the NCR. In the performance of these functions its greatest asset is the transport system. This has made Delhi the servicing centre for a network of urban places in Northern India and in this sense it performs many of the central city functions appropriate to such a centre, in such functions as commercial, transport, professional and cultural activities. Delhi is now the prime political, diplomatic and cultural centre of the entire nation with many embassies, high commissions, international and national socio-cultural organisations.

The influence of Delhi over its region is similar in many respects to that of the Mother City in the metropolitan regions around Bombay and Calcutta; but the unique role of Delhi has imparted a certain special character to the NCR. Moreover, Delhi has grown into a big city only in the past three decades and the Region around has not yet had time to get stabilised under its

CHAPTER - IV.

THE ECONOMIC BASE OF THE REGION.

economic influence. Table 4.0.1 compares the NCR with the other metropolitan areas which reveals that in area as well as in population, the NCR is much larger than the metropolitan areas of Calcutta and Bombay; the density per sq.km. for each of the three Regions is 358, 5,377 and 403 persons respectively whereas the All India figure is 144 persons. The population growth of 28.1% for NCR during 1951-61 was more than that of Calcutta Metropolitan District but less than the Bombay Metropolitan Region, and much higher than the All India figure of 21.50%. While the percentage of urban to total population in the country was as low as 17.97 in 1961, the figures for NCR were 34.42. The corresponding figures for the other two Regions are much higher. This shows the large rural component of the NCR as compared to the CMD and the BMR. This is also reflected in the percentage of non-agricultural workers to total workers, which is 49.5% in NCR as compared to 97.1% both in CMD and BMR, but is much higher than the figure of 30.5% for All India.

Table 4.0.2 shows the past trends of growth of total and urban population in the NCR and All India. The total population growth of 28.12% in the NCR for the decade 1951-61 is at a rate which is nearly 4% higher than in the previous two decades, whereas the All India figure of 21.50% has been about 7% higher for the same periods. The percentage growth of urban population in the NCR has fallen to 41.92% from the all time high of 59.71% in 1941-51 which is also reflected in the All India figures of 26.38% and 42.43% for the decades 1951-61 and 1941-51.

Table 4.0.1

Comparison of the NCR with other Metropolitan Areas.

Region	Area in 'sq.kms.' '000's	Pop. 'in lakhs' '1961	Den- 'sity' 'per sq. km.	Pop. 'gro- 'wth' '51- '61' %	Urban 'to 'total' 'pop.' '1961' %	Non 'Ag. 'wor- 'kers' 'to' 'total' 'wor- 'kers' '1961' %
National Capital Region (NCR)	29.8	106.8	359	28.12	34.42	49.5
Calcutta Metropolitan District (CMD)	1.3	67.2	5377	25.10	89.73	97.1
Bombay Metropolitan Region (BMR)	17.6	68.7	403	32.21	69.44	97.1
All India	3953.8	4392.3	144	21.50	17.97	30.5

Source:- Census of India & CMD and BMR reports. For NCR compiled by TCPO from the Census of India.

Table 4.0.2

Percentage Growth of Urban and Total Population NCR and All India.

	Percentage Growth					
	Urban Population			Total Population		
	1931-	1951-	1961-	1931-	1951-	1961-
NCR	49.46	59.71	41.92	23.74	23.91	28.12
All India	31.97	41.43	26.38	14.22	13.31	21.50

Source: Compiled by TCPO from Census of India

Table 4.0.3 shows the percentage of urban population to total population in the NCR which has risen from 24.12% in 1941 to 34.42% in 1961, whereas there has not been much of a rise in the All India figures with 13.86 and 17.97 respectively.

Table 4.0.3

Comparison of Urbanization - NCR and All India

	%age of Urban Population to Total		
	1941	1951	1961
NCR	24.12	28.94	34.42
All India	13.86	17.29	17.97

Source: Compiled by TCPO from Census of India.

The total working force in the NCR constituted 38.7% of the total population in 1951 and 35% in 1961 and the corresponding figures for All India are 37.1% and 33.5%. (Table 4.0.4).

Table 4.0.4

Percentage of Working Force to Population - NCR and All India.

	(Figures in Lakhs)			
	1951*		1961	
	Working Force	Population	Working Force	Population
		%		%
NCR	32.3	83.4	38.77	37.4
India	1395.2	3611.3	39.0	11884.1
% to All India	2.3	2.3	2.6	2.4

Source: Compiled by the TCPO from the Census of India.

* The 1951 figures of working force includes self-supporting and earning dependent members.

The NCR population which was 2.3% of All India in 1951 rose to 2.4% in 1961 whereas the working force came down from 2.3% to 2%. A comparison of the urban working force in the NCR and that of All India is given in Table 4.0.5 and shows a rise from 4.1% in 1951 to 4.3% in 1961 whereas the urban population rose from 4.1% to 4.6%. The percentage of

urban working force to urban population in the NCR which was 36.3% in 1951 has come down to 31.6% whereas the corresponding decrease in All India figure is from 37.1 to 33.5%.

Table 4.0.5

Percentage of Urban Working Force to Urban Population - NCR & All India.

	1951			1961		
	Working Force	Population	%	Working Force	Population	%
NCR	9.4	25.9	36.3	11.3	36.8	31.6
India	231.7	624.4	37.1	264.0	789.4	33.5
% to All India	4.1	4.1	-	4.3	4.6	-

Source: Compiled by TCPO from the Census of India. The 1951 figures of working force includes self-supporting and earning dependent members.

In 1961, the NCR had a working force of 37.4 lakhs with a participation ratio of 31%. This proportion was higher in the rural areas (42%) and lower in the urban areas (30%). Table 4.0.6 gives the occupation structure by nine categories. It shows that agriculture is the main occupation in this Region where cultivators and agricultural labour constitute

49.5% of the total working force. There is a large component of "service" workers who constitute 21.1% with a total strength of 7.9 lakhs. Next comes, the category of household

Table 4.0.6

Occupational Structure in the NCR by Nine Categories (1961).

Sl.No.	Categories	Number	%
1.	Cultivators	16,64,277	44.5
2.	Agricultural Labour	1,86,338	5.0
3.	Mining Etc.	25,488	0.5
4.	Household Industry	3,13,217	8.4
5.	Manufacturing Industry	2,98,450	8.1
6.	Construction	71,401	1.9
7.	Trade & Commerce	2,92,472	7.8
8.	Transport etc.	1,00,696	2.7
9.	Other Services	7,88,833	21.1
Total		37,41,172	100%

Source: Compiled by TCPO from the Census of India.

Industrial workers who form 8.4% (3.1 lakhs) of the total workers. Manufacturing industries give employment only to 8.1% of the workers (3 lakhs). Trade and Commerce was as important in

terms of employment opportunity with 7.8% or 2.9 lakh workers. Transport activities have not yet assumed a strong base, being 2.7% (1 lakh). Construction with 1.9% and mining 0.5% are the other sectors of the economy which are not of lesser significance.

Table 4.0.7 gives the inter-sectoral pattern of distribution of workers in the NCR which shows 50.0% in the primary, 18.4% in the secondary and 31.6% in the tertiary sectors. In areas with advanced economies the tertiary sector becomes predominant. In contrast the primary sector is still predominant in the NCR. In the tertiary sector the bulk of the employment is in other services constituting 70% of that sector. In 'other services' there are quite a few employed in petty jobs and in low paid activities requiring neither high skills nor much educational qualifications. There are also a large number of workers in government and semi-government offices mostly concentrated in Delhi and in professional jobs.

Table 4.0.7

Inter-Sectoral Pattern in the NCR (1961).

3 Major Sectors	Workers No.	%
Primary	18,76,103	50.0
Secondary	6,83,068	18.4
Tertiary	11,82,001	31.6
Total	37,41,172	100.00%

In 1961 there were 50 urban areas or towns in the NCR whose total population came to nearly 37 lakhs out of which 11.3 lakhs comprised the working force; this constituted 30% of the urban population. Table 4.0.8 gives the percentage distribution of urban workers in 9 major categories. The largest single category is that of "service" workers (4.61 lakhs) which includes

Table 4.0.8

Percentage Distribution of Urban Working Force in the NCR (1961).

	50 Towns	Working Force	%
1.	Cultivators	32,652	2.9
2.	Agricultural Labour	8,640	0.8
3.	Mining etc.	9,571	0.8
4.	Household Industries	49,611	4.1
5.	Manufacturing	2,24,276	19.8
6.	Construction	46,693	4.1
7.	Trade & Commerce	2,20,189	19.5
8.	Transport etc.	77,239	6.8
9.	Other Services	4,62,536	40.9
	Total (50 Towns)	11,31,407	100.0

workers in government offices, (in 1961 Delhi alone had about 2.32 lakhs workers in Govt. offices) scientific and technical personnel, doctors, engineers, lawyers, teachers, domestic servants etc. They accounted for about 41% of the total workers (11.3 lakhs). The second largest employment category was that of manufacturing industries (19.8% or 2.23 lakhs), and trade and commerce was equally important (19.5%, 2.20 lakhs). Transport comes next with 6.8% and 0.8 lakh workers. Household industries and construction activities both had 4.1% each with about 0.51 lakh workers. A comparison of Table 4.0.6 and 4.0.8 shows that out of 6.8 lakh workers in the secondary sector in the NCR, 2.7 lakhs or 45% were in the urban areas, but the urban areas account for only 35% of the total population of the Region. Also 2.24 lakh workers in the manufacturing industries were concentrated mainly in the urban areas out of a total of 2.94 lakh workers in the NCR. In contrast, of the 3.1 lakhs workers in household industry in the NCR only about 50,000 were in the urban areas in 1961. Map 4.0 shows, the working force characteristics in Delhi and 17 towns in the NCR in 1961.

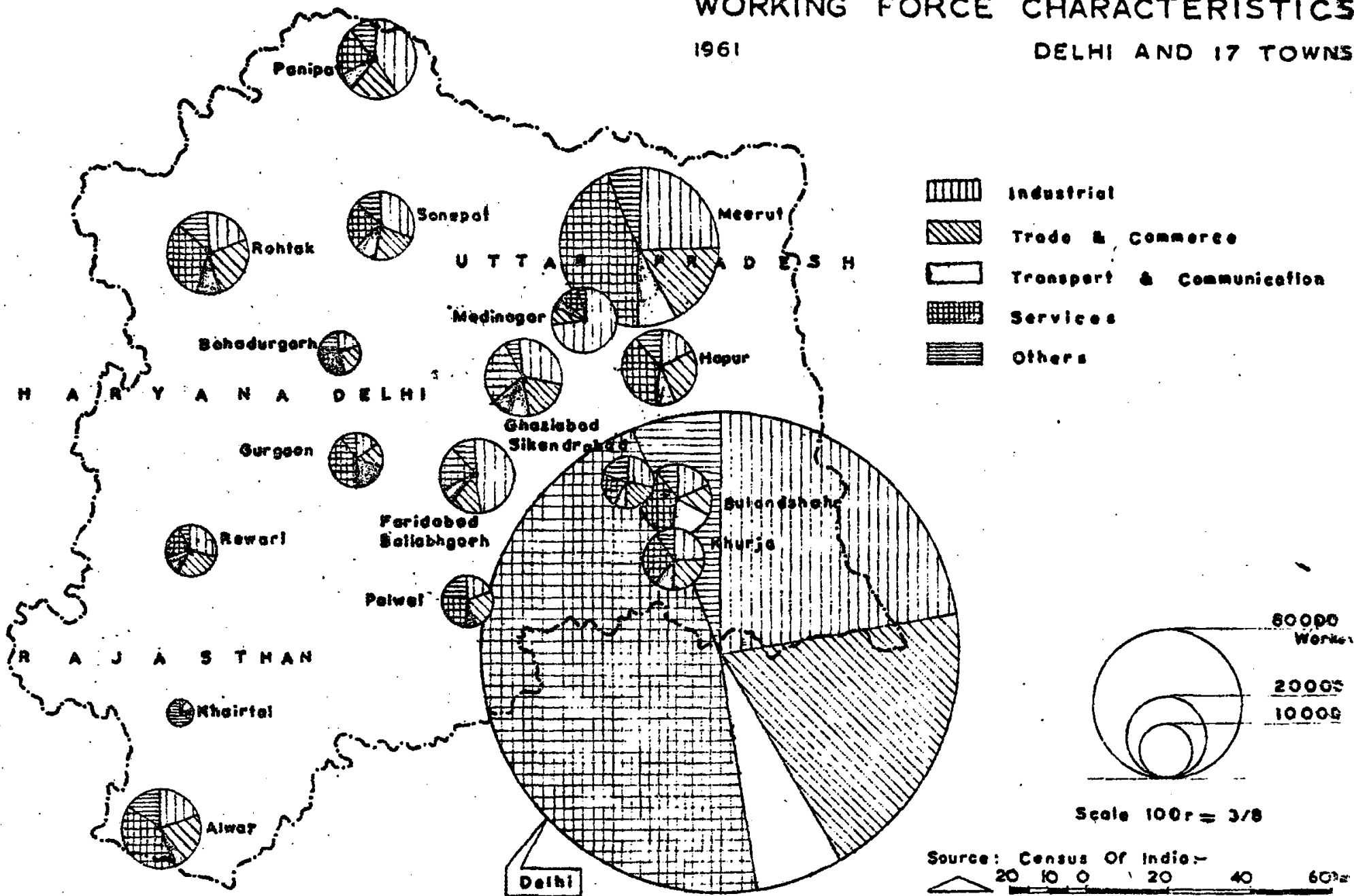
A determination of the economic structure of the Region can be made in terms of the total and per capita income of the Region compared to other States and to that of All India. Table 4.0.9 gives the total and per capita incomes in the States of Haryana, U.P., Rajasthan and the Union Territory of Delhi which are the constituent states of the NCR, and compares it with that of All India. In computing the income of Haryana has been applied to the Districts outside the Union Territory of Delhi while

retaining the income figures for Delhi. It is assumed that the income in the districts of U.P. and Rajasthan, which form part of the NCR, are similar to those of Haryana, although their respective state averages are somewhat different due to externalities governing the state average. This shows that per capita income in the NCR has risen from Rs.480 in 1960-61 to Rs.859 in 1967-68 at current prices. The per capita income in the Union Territory of Delhi increased from Rs.840 to Rs.1,398 and the All India figures from Rs.306 to Rs.542 during the same period. While the total income of Delhi was about 50% of the NCR as a whole in 1960-61, it has declined to about 40% in 1967-68 reflecting partly the sharper growth of the agricultural sector in the NCR in recent years as compared to the slower growth in urban incomes. The per capita income in the NCR is pretty high on the whole, combining the higher figure for the Union Territory of Delhi which is mostly urban and that of Haryana which is also one of the highest in the country.

Agricultural Sector:

In terms of agricultural production, the NCR is advantageously located. It constitutes one of the most fertile and productive areas of the country. Especially on the U.P. side, the National Capital Region contains some of the best agricultural lands of India. Their output of wheat and sugarcane products provides a portion of the most important food resources of India; much of the land in the districts of Bulandshahr and Meerut is irrigated and represents a higher capital investment in agriculture than in other parts of India. Similarly, the districts of Gurgaon

WORKING FORCE CHARACTERISTICS 1961 DELHI AND 17 TOWNS



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN
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Table 4.6.9

Comparison of Per Capita Income 1960-61 and 1967-68.

	Year 1960-61		Year 1967-68*			
	Then Current Prices		Current Prices		At Constant Prices of 1960-61	
	Total Income 'in Crores Rs.'	Per Capita 'in Rs.'	Total Income 'in Crores Rs.'	Per Capita 'in Rs.'	Total Income 'in crore Rs.'	Per Capita 'in Rs.'
1. Delhi	241.94 ^(a)	840.0	517.62	517398		
2. Haryana	253.43	337.0	629.50	678.0	357.85	386.0
3. U.P.	1,799.31	246.4	2,968.91 (b)	364.0	1,896.35 (c)	288.0
4. Rajasthan	626.47	318.0	1,155.70	499.0	614.26	265.0
5. All India	13,208.00	206.7	27,992.00	542.9	16,525.00	321.3
6. NCR	512.32	479.6	1,202.80	859.1		

* All figures for 1967-68 are provisional

Source: C.S.O., New Delhi for item 2 to 5
Bureau of Economics and Statistics,
Delhi for item 1.

(a) Figures refer to 1962-63

(b) " " 1965-66

(c) " " 1966-67

T.C.P.O. item 6.

and Rohtak and also Panipat tehsil of Karnal district in Haryana, though drier and less productive than the parts of Western U.P., are among the agriculturally advanced districts of the country. Although Haryana like Punjab is primarily known for food-crops, it has an additional importance as a producer of cattle and other animal products because of its drier climate and the prevalence of grazing ranges. Unlike many other large Indian cities, Delhi is surrounded by rela-

tively good agricultural land, and only in the south-west in the Rajasthan part the agricultural land is less productive, although in the State of Rajasthan as a whole, Alwar area is one of the most agriculturally rich with fertile land.

The transport network converging on Delhi has greatly contributed in developing it into an important grain mandi for north-

western India. However, with the creation of food zones, the Union Territory of Delhi has become a deficit area, the city of Delhi being the greatest consumer. However, the NCR as a whole is nearly self-sufficient in the matter of food-grains. The urban area of Delhi also gets most of its milk supply, fruits and vegetables and eggs from within the NCR. But with increasing urbanisation there will be greater demand for these food-stuffs.

Gradual Transformation of Economy:

With the 'green revolution', which has made a greater impact in NCR than in other areas except the Punjab, a gradual transformation of the economy of the Region has set in. Increase in agricultural production is being achieved by better technology in the form of irrigation facilities better seeds, use of fertilisers, better methods and mechanised farming wherever possible. However, agriculture production may not be getting labour intensive. This means that surplus labour has to find employment in non-agricultural activities mostly in the towns of the Region, specially in Delhi. A study on migration to Delhi has revealed that a significant proportion of the migrants (nearly 25%) come to the Capital from within the National Capital Region. Simultaneously there has been a moderate growth in employment opportunities in the towns of the Region, especially, in the 'ring towns' nearer Delhi. Thus these migrants are the cause of the change that is taking place in the occupational structure, in the level of income, and in the general run of the economy.

The Growth of Industries:

Gradually industries are being established in the National Capital Region both in Delhi and in the regional towns. Although a major share of new industrial establishments has gone to the central city of Delhi, towns such as Faridabad, Ghaziabad, Panipat and Modinagar are also receiving a considerable share of the new growth. They represent the most prominent industrial centres of the Region apart from Delhi. Industrial services for the rural hinterland are now becoming available in these towns. Khurja and Sonapat to a certain extent have also acquired a certain level of industrial development. A new industrial climate promoting industrial development is being fostered with Governmental intervention in places like Sonapat, Bahadurgarh and Gurgaon. The existing industries are mainly manufacturing industries of engineering goods; are market oriented rather than resource based. Industrial licenses and permits are being processed in Delhi, which together with the presence of a large number of banks, financiers and entrepreneurs has given Delhi and its environs a climate for development. Delhi provides a ready market for the purchase of raw materials, sale of the finished product and numerous other allied transactions.

Wholesale Trade Still Getting Stronger in Delhi

One of Delhi's most important functions is wholesale trade. After Independence a number of new trades have come to be centralised and today about two dozen wholesale trades are conducted from here. The wholesale trade activity located in other towns of the Region caters to the requirements of only district areas or even

smaller areas. But Delhi's trading activity covers a large hinterland. As the largest city in northern India, Delhi's market has assumed distributive functions for the entire north India. This is mainly because Delhi is advantageously situated at the hub of a transport network both in terms of rail and road and the availability of finance and godown facilities.

Public Sector Office Concentration in Delhi:

In spite of the efforts of the Government of India to shift some of its offices away from Delhi, the Central Government office employment is still concentrated very heavily in Delhi. The public sector office employment also covers the autonomous bodies, the Delhi Administration, and the Municipal Institutions. All these are located in Delhi and are extending their scope of activity and employment. In fact, some offices which were shifted to other towns have come back to Delhi. The land acquired at Ghaziabad for the construction of Government office space has not yet been developed. The whole programme of decentralization of public sector offices is in a state of flux. Every firm, every ministry, every institution tries to have its head office or at least a branch in Delhi. The level of services available in Delhi, although inadequate for its large and growing population, is still far superior to those available in the regional towns which makes the dispersal of offices a difficult proposition.

Transport Nodes:

Although there are a number of important

Meerut
railway junctions in the NCR such as Ghaziabad, Kurja/Hapur, Rewari etc., and big centres of road transport, such as, Ghaziabad, Meerut, Rewari, Gurgaon, Rohtak and Alwar, Delhi is still the biggest centre of all transport and traffic facilities. Since it forms the origin or destination of most of the routes, all the booking facilities for passengers and for goods are concentrated at Delhi. Innumerable truck transport companies have also sprung up in Delhi. Wagons for rail-shipment of goods are mainly available at Delhi and only to a limited extent elsewhere. Air transport is confined to Delhi, as there is no other airport in the National Capital Region.

Banking, Ware-housing, Raw-material Trade:

All the important Banks have their head-offices or at least regional offices located in Delhi. Ware-housing facilities of the modern type are also concentrated largely in Delhi; the other places which have some facilities available for ware-housing are Hapur and Faridabad. As all the existing wholesale trade is concentrated in Delhi, a large number of dealers have come up in Motia Khan, Sadar Bazar, Chandni Chowk and in Bhagirath Place; they supply raw-materials for industrial production and import goods from far off places which are not produced in the Region; Their margin of profit is also reasonably low, on account of the prevailing competition. In many cases an industrialist prefers to buy from the dealers in Delhi rather than have a direct contract for its supply from the original source. Financial institutions and service institutes are also located chiefly in Delhi.

Cultural Facilities:

Being the seat of the National Government and having a master plan which has decided against giving it an industrial character, Delhi is fast becoming a cultural centre of the highest order. A second university, - the Jawaharlal Nehru University - has been set up. Various cultural and social welfare associations, dramatic and art societies, community centres, journalists associations and youth forums are coming up in Delhi. The location of the head-quarters of the All India Radio in Delhi and the opening of the first T.V. Centre in Delhi, have given opportunities and facilities to singers, artists, and related professionals. A number of scientific laboratories are located in the National Capital.

Newspaper offices and a large number of printing and publishing concerns are in Delhi, as a result of which the printing and publishing industry is very well developed. A large number of magazines and journals apart from newspapers are published from Delhi. This sustains a large number of reporters, writers, editors, photographers and similar professionals. The seat of the Supreme Court of India, a separate High Court for Delhi and district courts create opportunities for constitutional judicial and legal activities, debates, and discussions. Political parties also function from Delhi as their headquarters. In any case, politics is the prime preoccupation of Delhi.

In a nutshell, such type of activities creates a social and cultural atmosphere of its own in Delhi. No other town in the National Capital Region or even in northern India has the

same level and so many types of professional, scientific, artistic, recreational, social and cultural facilities as Delhi. This makes Delhi the window of the Nation not only for the official foreign dignitaries but to foreign tourists and nationals who come for various purposes. The National Capital Region partakes some of the importance of the National Capital but this is not enough because to a large extent it puts the Region in its shadow and inhibits its growth to its fullest potential. In this situation the questions to be raised are what are the prospects of economic growth in the Region? What is the perspective of the Regional Plan? These matters are of prime importance in the future development of the NCR.

Future Prospects of Economic Growth in the Region:

There has been a steady growth of urban population in the Region in the past three decades between 1931 and 1961 ranging between 40 to 60% per decade. It is estimated that between 1961 and 1981 while there would be a growth of 98% in the total population, the corresponding growth in urban population would be of the order of 153%. The percentage of urban population to total population in the Region would be 44.0 (See Table 4.0.10).

But more than the growth in the urban population, there is a dynamic quality in the urban concentrations in Delhi. Primarily due to their proximity to Delhi, this dynamic quality is also reflected in some of the 'ring towns'. The total urban population of 93 lakhs in 1931 with an urban working

Table 4.0.10

Estimated Growth of Urban and Total Population - NCR & India 1981.

	Percentage 'Growth of 'Urban Po- 'pulation (1961-81	Percentage 'Growth of 'Total Po- 'pulation (1961-81	Percentage of 'Urban Popula- 'tion to Total 'Population (1981)
NCR	152.60	97.65	44.00
All India	91.40	58.20	21.87

Note: The total and urban population of NCR have been projected at 211 and 93 lakhs respectively by the TCPO. Please see Chapter-III. The All India 1981 figures projected by the Planning Commission are 6,949 and 1,520 lakhs respectively.

force ranging between 31 lakhs to 33 lakhs would be a tremendous asset if they are employed in productive jobs. (See Table 4.0.11). The success of the Regional Plan lies in providing jobs to this working force in various occupations in a balanced manner so as to lend stability to the economy. For this purpose the central theme should be the exploitation of the endowments of the Region - human, material and physical resources.

Table 4.0.11

Estimated Working Force in the NCR 1981.

(Figures in Lakhs)

	Urban Working Force 'Total 'Urban 'Popu- 'lating 'force 'range	Total Working Force 'Total 'Urban 'Work- 'ing 'force 'range	% range	Total 'Popu- 'lation	Total 'Work- 'ing 'force	% range
NCR	30.7	80.2	33	211	38	
All India	32.5	84.4	35		40	

Note: Estimated by TCPO.

It has been stated earlier that the agricultural area around Delhi has of late shown signs of great productivity. Thus the Region is on the threshold of rapid economic growth. It is the objective of the Regional Plan to promote growth, without in any way causing problems in the physical, social and economic fields. Earlier in Chapter III, the Regional Plan has proposed the most desirable physical pattern that will bring about economic growth, keeping in view the social desirability as well as the technological feasibility. Later in Chapter V proposals for restructuring the transport network, in order to open up the Region for development, has been made. But a new physical pattern and restructuring of the transport network will not by themselves bring about the desired results, unless synchronous action is taken to re-structure economic activity in the Region, so desired as to disperse

and decentralize it in suitable centres, to achieve a pattern of economic activity which would be in the overall interest of the Region.

The material resource in the Region is mostly agricultural which has shown a spectacular rise in recent years. This should be the beginning of activity related to agricultural production as well as marketing of the small towns. The "central place villages" and the market towns should be the new growth centres for economic activity. The surplus labour as a result of mechanisation of agriculture and the growth of population will have to be provided with jobs mostly in the Regional Towns, which should be developed to provide services of a higher level to the rural hinterland. They should be also centres of manufacturing activity not only for agricultural implements but also for the consumer-goods for both rural and urban areas. In performance of these various functions at different levels, the transport linkages are of great importance. The Region is already provided with a reasonably good transport network. However, steps to avoid the bottleneck at Delhi, with bypass routes and linkages between the eastern and western parts of the river Yamuna and the development of a system of major district roads and rural roads will provide the framework for a higher level of interaction and thereby economic activity in the future. Flood control measures, irrigation works, power supply and other physical resources will have to be augmented in a coordinated way for greater productivity in the Region.

/agricultural surpluses all over the rural areas and in the

If the present trends of increasing concentration of economic activity in Urban Delhi continues, there would be an accentuation of the imbalanced growth which will be detrimental to the very economic growth of the Region. The imperatives of the national policy* and the objectives of regional development require that deliberate actions be taken to put a halt to the concentration of jobs in Urban Delhi. Apart from the national capital functions, which Delhi should rightly perform, there are many areas in which decentralization would be beneficial both for Delhi and the towns around. But this policy can be successfully carried out only if infrastructure in selected urban centres are augmented enabling them to facilitate and sustain new growth. Earlier in Chapter III the potentialities of 17 towns have been analysed. In the succeeding paragraphs of this Chapter the growth in various sectors of the economy will be discussed with an accent on dispersal of economic activity away from the metropolis and on a balanced development of the Region.

* "In the case of other cities, future planning must be oriented towards stabilisation of population at a desirable optimum figure and towards planning suitable new centres in the Region for the likely spill-over" p.398 Fourth Five Year Plan 1969-74, Planning Commission, Government of India, New Delhi. The 'other cities' referred to are metropolitan cities other than Calcutta and Bombay.

1. Agriculture:

Introduction: The National Capital Region has a vast area of agricultural land. Out of its total area of 29,800 sq.kms., roughly 85% is being used for agriculture and its allied activities. The rural population in the Region, according to the Census of 1961, was 70.03 lakh persons, constituting 65.6% of the total population in the Region. The number of workers (cultivators) and agricultural labourers) engaged in agricultural and allied activities were 18.51 lakhs which constituted (a proportion of) 50% of the total workers in the Region. Although the latest estimates regarding district income are not available, but, the size of cultivated land in the Region and the yield of the three important crops, namely, wheat, sugarcane and oil-seeds do reflect that the contribution of agriculture (to the total income generated) in the Region would be sizeable. According to the estimates* for the year 1955-56, about 45% of the total income of the NCR (excluding Delhi) was from the agricultural sector alone. It would thus be noticed that from the point of view of employment as well as income, agriculture occupies an important place in the Region.

It has been observed that due to lack of suitable and remunerative employment opportunities in the rural tracts of the three States adjoining Delhi, namely, U.P. undivided Punjab and Rajasthan, there is heavy migration to Delhi. According to the Study on Migration to Delhi, 87% of the total migrants coming to

Delhi in 1961 were from these three States alone; migration from rural to urban tracts was as high as 59.6% while from urban to urban tracts was 40.4% of the total migration. Delhi thus, has been growing mostly at the expense of its rural hinterland. The unprecedented growth of Delhi during the last two decades, which is mainly due to the unabated flow of migrants, has caused an imbalance between rural and urban pockets of the National Capital Region. About 22.4% of the total migration from within India to Urban Delhi in 1961 was from six districts around Delhi. The rural as well as the male components were more predominant than the urban and female as may be seen from Table 4.11. This reflects the increasing inability of the villages in the NCR to sustain the growing population. It is, therefore, important to check the exodus of the people, especially those who are talented and have initiative and drive by giving a fillip to the rural economy. In fact, agriculture is the foundation to a stable industrial and commercial base. Industrialisation would lose much of its meaning in the absence of flourishing agriculture. It may not be possible to build up a lasting foundation for the industrial sector in the Region at the expense of agriculture. The development of rural economy in the correct perspective is, therefore, of vital importance in the planning of the National Capital Region so that there is rational and orderly development in the Region.

*According to the estimates made by the National Council of Applied Research for 1955-56, the contribution of agriculture sector in the district income of Meerut, Bulandshahr, Gurgaon,

Rohtak and Alwar comes to 28.07%, 41.07%, 51.0%, 48.75% and 46.49% respectively.
@ "A Diagnostic Study of Migration to Delhi", T.C.P.O. 1969.

Table 4.1.1.

Migrants to Urban from Urban/Rural Area of Districts
partly or fully included in the NCR - 1961.

Sl. No.	District	Rural Migrants to Urban Delhi			Total migrants to Urban Delhi	Percentage of rural migrants to total migrants in Urban Delhi.
		Male	Female	Total		
1.	Meerut	21,342	15,450	36,792	57,676	63.79
2.	Bulandshahr	20,668	12,680	33,348	42,653	78.18
3.	Rohtak	19,788	13,152	32,935	43,198	76.24
4.	Gurgaon	13,107	12,224	25,331	33,548	75.51
5.	Karnal	4,030	2,851	6,881	13,093	52.55
6.	Alwar	2,862	3,547	6,409	9,566	67.00
Total of six Districts		81,792	59,904	1,41,696	1,99,734	70.94
Percentage		(57.72)	(42.28)	(100.00)		

Source: Compiled from the records of Census of India.

Existing Position of Agriculture in the NCR:

With a view to suggesting the developmental framework and regional policy in regard to agriculture in the NCR, it is necessary to analyse the existing position in respect of land utilisation, irrigation, cropping pattern, food production and other allied aspects. These are discussed below:-

Land Utilisation:- Geological, pedological and climatic characteristics of land in the NCR are of similar in nature to those generally found in the Gangetic Basin. The whole of the Region except the Aravalli ridge in the south-west, is a flat plain. Large areas along the rivers and canals popularly known as 'khadar' get flooded with heavy rain because of the imperceptible slope and sand chokad beds. Some parts of the NCR, particularly in the district of Rohtak are saline. The quality of soil in the Region is not uniform. No systematic soil survey of the Region has been done so far. However, a rough idea of soil in the various districts of the NCR and their comparative quality can be had the work of Sarva Shri K.B. Shome and S.P. Chaudhary. They have worked out the soil-index rating for each district in India by multiplying three factors, namely, (i) character of the soil profile (ii) topography, texture and structure of the soil and (iii) degree of climatic suitability, salinity, stoniness and tendency to erode. The description of the soil, rainfall and soil index rating in respect of various districts of the NCR is given in Table 4.1.2 which shows that the soil

Table 4.1.2

Soil Index Rating in NCR

Name of the District	Description of the soil	Average annual rainfall (cms.)	Soil index rating (%)
Meerut	Soils may be classified as sandy loams and PH is around 7.0	81.1	64.6
Bulandshahr	Alluvial soil high in soluble salts.	65.4	56.5
Rohtak	Generally the surface soils are loamy, and the clay content increases with depth. The soils are neutral to slightly alkaline in reaction.	55.7	68.4
Gurgaon	Alluvial soils.	62.1	68.4
Karnal	The soils are sandy to sandy loam in texture. They are highly alkaline with a PH near about 10.0	58.7	57.6
Alwar	Grey brown alluvial soils together with undifferentiated alluvial soils. soils in general are sandy	69.6	64.8
Union Territory	Soils in general are sandy loams. They are poor in nitrogen and organic matters.	68.1	60.8

Note: In India there are regur or black cotton soil which have high clay content and high water holding capacity. These soils are given an Index rating of 70.00%.

Source: Ratings of Soil of India by Shome and Raychaudhuri.

rating in the NCR ranges from 57.6 to 68.4. This compares favourably with the highest All India index rating for South Kanara District in Mysore State, which is 81.2. The lowest index rating of 31.5 is for the district of Jhabua in Madhya Pradesh.

Land utilisation statistics have been collected from the tehsil records of the States. The total area of the NCR, according to these, works out at 29,95,200 hectares in 1961-62 and 29,88,900 hectares in the year 1968-69. The difference of 6,300 hectares may be due to an alteration in the Central forest area which is not accounted for in the District Revenue Records. Table 4.1.3 gives the broad classification of this area under different heads and is described below:-

Forest: Forests are of vital importance in preserving the freshness of the environment and have an indirect influence on climate by increasing humidity because of transpiration; their presence is also essential as a safeguard against floods, erosion and desiccation. It would be noted that the area covered by forests in the NCR is around 42,000 hectares; this forms a meagre proportion of 1.42 per cent of the total area of the Region.* A major portion of the forest area is concentrated in five tehsils, namely, Alwar, Anupshahr, Nuh, Tijara and Gurgaon. There is

* Indian forest Policy 1952, envisages forest area as $\frac{1}{3}$ of total land area. In the year 1966-67 forests formed 23.1 per cent of total land area in India. Similar figures for U.P., Rajasthan, Haryana are 13.5%, 11.0% and 3.1% respectively. Central Forestry Commission in India "India's Forests", 1969.

a shrinkage of about 3,000 hectares, in the area under forests in the Region from 1961-62 to 1968-69. While judging the position in the various district, it is noticed that the largest area under forests in the year 1968-69 is in Gurgaon District; it is 1,22,494 hectares forming 2.0% of the total area of the district. This is followed by Alwar Sub-district and Bulandshahr district which have 10,959 hectares and 8,969 hectares respectively under forest. Thus it is seen that the area under forests in the NCR is meagre and requires to be increased.

Land not available for Cultivation:- Under this category come both barren land and the land put to non-agricultural uses. In the NCR it totals 4,53,661 hectares constituting about 15 per cent of the total area of the Region. It is important to note that this type of land increased by around 18 thousand hectares in a seven year period from 1961-62 to 1968-69. This means that land not available for cultivation is increasing at the rate of about 2,500 hectares per year.

The largest area not available for cultivation is in Alwar Tehsil. It was 33,989 hectares constituting 23.33 per cent of the total area of the tehsil in 1968-69. There are three more tehsils which have more than 20,000 hectares of land not available for cultivation. These are: Panipat, (24,333 hectares), Ballabgarh (20,526 hectares) and Gurgaon (20,270 hectares). The size of land not available for cultivation in rest of the tehsils may be noticed from the following frequency groups.

Table 4.1.3
Land utilisation in the NCR (1961-62 and 1968-69)

Sl. No.	District	Year	(In Hectares)					Net area sown
			Total area	Forest	Not available for cultivation	Uncultivated land	Fallow land	
1.	Delhi	1961-62	148,230 (100.00)	1,620 (1.10)	34,856 (23.49)	17,820 (12.62)	6,480 (4.37)	87,480 (59.02)
		1968-69	148,059 (100.00)	3,106 (2.10)	42,050 (28.40)	4,461 (3.01)	21,146 (14.28)	77,296 (52.21)
2.	Meerut	1961-62	598,751 (100.00)	9,828 (1.66)	65,886 (11.00)	30,336 (5.06)	24,570 (4.10)	168,134 (78.18)
		1968-69	592,370 (100.00)	4,658 (0.79)	75,829 (12.80)	26,991 (4.56)	23,410 (3.95)	461,401 (77.90)
3.	Bulandshahr	1961-62	495,465 (100.00)	7,178 (1.47)	56,611 (11.40)	30,973 (8.07)	18,382 (3.71)	373,321 (75.35)
		1968-69	490,453 (100.00)	8,060 (1.83)	50,439 (12.12)	42,996 (8.77)	6,983 (1.42)	372,066 (75.86)
4.	Gurgaon	1961-62	608,488 (100.00)	12,250 (2.01)	94,667 (15.56)	11,504 (1.91)	10,621 (1.74)	479,356 (78.78)
		1968-69	611,576 (100.00)	12,249 (2.00)	99,876 (16.33)	10,272 (1.86)	29,228 (4.78)	45,995 (75.21)
5.	Rohtak	1961-62	604,300 (100.00)	2,500 (0.42)	56,600 (9.36)	46,000 (7.76)	33,300 (5.51)	465,000 (76.95)
		1968-69	604,029 (100.00)	2,443 (0.40)	55,595 (9.20)	37,500 (6.23)	23,424 (3.88)	484,968 (80.30)
6.	Panipat (Tehsil)	1961-62	122,302 (100.00)	2 (0.01)	23,934 (19.50)	18,198 (14.83)	1,216 (0.99)	79,342 (64.67)
		1968-69	123,213 (100.00)	2 (.00)	24,333 (19.75)	18,194 (14.77)	1,136 (0.92)	79,548 (64.56)
7.	Alwar (Sub- district)	1961-62	417,280 (100.00)	12,300 (2.97)	83,521 (20.02)	35,580 (8.53)	6,570 (1.57)	279,219 (66.91)
		1968-69	419,163 (100.00)	10,959 (2.61)	76,539 (18.27)	33,595 (8.01)	14,288 (3.41)	283,782 (67.70)
8.	N.C.R.	1961-62	2,995,209 (100.00)	45,768 (1.53)	416,049 (13.89)	200,401 (6.69)	101,139 (3.37)	2,231,852 (74.52)
		1968-69	2,988,872 (100.00)	42,386 (1.42)	443,661 (14.51)	174,108 (5.83)	119,615 (4.00)	2,219,102 (74.24)

Source: Compiled by TCPO from the District Revenue Records of the State Governments.

Tehsils having 15,000 to 20,000 hectares of land not available for cultivation.

Tehsils having 10,000 to 15,000 hectares of land not available for cultivation.

Tehsils having less than 10,000 hectares of land not available for cultivation.

Ghaziabad, Sikandrabad, Nuh, Rewari, Jhajjar and Sonapat.

Baghpat, Hapur, Mawana, Anupshahr, Bulandshahr, Kurja, F.Jhirka, Palwal, Rohtak, Gohana, Mandawar, Kishangarh and Tijara.

Meerut, Sardhana, Behror.

It is further observed that the increase of this type of land is not uniform in all the tehsils in the NCR. Tehsils which show comparatively larger increase in the land 'not available for cultivation' from 1961-62 to 1968-69 are: Nuh, Mawana, Ghaziabad, Baghpat and Palwal. An important cause for the increase in this type of land may be the extension of the urban boundary of the towns in the NCR and the laying down of new roads.

Area subject to floods:

Total land subject to floods in the NCR is 721,712 hectares. This forms 24.15 percent of the total land of the Region. Area subject to floods in various Sub-regions of the NCR is given in Table 4.1.4.

Table 4.1.4

Area subject to Floods in NCR (Hectares)				
Sub-Region/ Region	Total Area	Floodable (Area)	(%age to Total)	%to-area of sub- region
Delhi	148,059	52,896	7.33	35.73
Uttar Pradesh (sub-region)	1,082,832	221,168	30.65	20.43
Haryana (Sub-region)	1,338,818	447,552	62.01	33.43
Rajasthan (Sub-Region)	419,163	96	0.01	0.02
Total NCR	2,988,872	721,712	100.00	24.15

Source: Compiled by TCPO from data obtained from State Governments.

The largest area subject to floods is in the Haryana Sub-region. It is to the extent of 447,552 hectares constituting 33.43 percent of the total area of this Sub-region followed by Uttar Pradesh Sub-region where it is 2,21,168 hectares accounting for 30.65 percent of the total area; in Delhi and Rajasthan Sub-regions it is 52,896 hectares, (forming 35.73 percent of the total area) and 96 hectares (forming 0.02 percent of the total area) respectively. Thus, it is noticed that except for the Rajasthan Sub-region, area subject to floods forms

a substantial proportion of the total area in each of the Sub-regions.

Uncultivated land: This land refers to the area under permanent pastures and grazing land, land under miscellaneous trees, crops and groves, and the culturable waste like water logged areas and saline land. The size of this land in the Region is 1,74,100 hectares; it constitutes 5.83 percent of the total land in the Region. Judging the frequency distribution of tehsils included in the NCR according to the uncultivated land in 1968-69, it is noticed that there are only two tehsils which have more than 15,000 hectares of this type of land; these are: Jhajjar (18,881 hectares) and Panipat (18,194 hectares). Tehsils which have 10,000 hectares to 15,000 hectares of uncultivated land are: Bulandshahr, Khurja and Alwar. Rest of the tehsils have below 10,000 hectares of uncultivated land.

Net-sown Area: Net sown area in the NCR is 28,19,102 hectares, constituting 74.24 percent of the total land in the Region. Besides this, 1,9,615 hectares has been shown as fallow land in the year 1968-69. It is noticed that there is a slight increase in the net sown area (including fallow land) of 5,700 hectares from 1961-62 to 1968-69.

It is observed at tehsil level that the net sown area forms the bulk of the tehsil area. There is no tehsil in the NCR where the net sown area is less than 60 per cent of the total area of the tehsil. There are certain tehsils, which have as much as 80 percent or even more of its

area under net sown area. These are: Bagnapur, Hapur, Sarhana, Bulandshahr, Ferozepur, Jhirka, Palwal, Rohtak and Gohana.

The tehsils, which show an increase in net area sown plus fallow land of more than 3,000 hectares from 1961-62 to 1968-69 are: Sonapat and Alwar; in case of both these tehsils, there is a corresponding decrease in the uncultivated area, indicating that culturable waste has been brought under the plough. The tehsils which show a decrease in net area sown plus fallow land of more than 3,000 hectares from 1961-62 to 1968-69 are: Ghaziabad, Meerut, Bulandshahr, Anupshahr, and Nuh. In case of Ghaziabad and Nuh tehsils, there is a corresponding increase in the area 'not available for cultivation'. Most probably this area has been taken over for non-agricultural use. But in the case of Meerut tehsil, the total corresponding increase is noticed in uncultivated land, showing that the land might have become unfit for cultivation but it could be recovered for cultivation in future. However, in the case of both Anupshahr and Bulandshahr tehsils, an increase of around 1,000 hectares is noticed in the area 'not available for cultivation' and the remaining 2,000 hectares in the uncultivated area. This shows that in each of these tehsils, a portion of the land might have come under non-agricultural use and the remaining area has deteriorated to culturable waste.

Irrigation: Total area in the NCR, which has assured irrigation facilities is 11,02,664 hectares in 1968-69; it forms 49.69 percent of the net sown area in the Region. Around 3,09,950 hectares of land is irrigated more than once, and it constitutes 28.11 percent of the net irrigated area in the Region. The proportion of assured irrigation facilities in the Region is more than that of All India (20.08%), Haryana (37.77%), U.P. (36.12%), and Rajasthan (14.53%).

The distribution of net irrigated area in the NCR in 1968-69 according to the source of irrigation is presented in Table 4.1.5

Table 4.1.5:
Distribution of Net Irrigated area in the NCR by sources (1968-69).

Description	Figures in Hectares			
	Net Irrigated area.	Irrigated by canals.	Irrigated by wells & tube-wells.	Irrigated by tanks & other sources
1	2	3	4	5
Actual area	11,02,669	4,62,170	6,23,370	17,129
Percentage (%)	100.00	41.91	56.53	1.56

Source: Compiled by TCPO from the District Revenue Records.

It may be observed from the Table that the largest source of irrigation in the NCR is the underground water. The area irrigated by wells and tube-wells in 1968-69 is 6,23,370 hectares which constitutes 56.53 percent of the net irrigated area. Canals are the other important

source of irrigation in the Region. The area irrigated by canals is 4,62,170 hectares and forms 41.91 percent of the total net irrigated area. The remaining area of 17,129 hectares is irrigated by tanks and other sources forming a meagre percentage of 1.56.

There is a wide variation in the availability of assured irrigation facilities in different parts of the NCR. A frequency distribution of tehsils according to the percentage of net-irrigated area to net sown area in 1968-69 is given below:

Percentage of net irrigated area to net sown area:	Tehsils	
	1	2
Below 20 percent.	Tijara, Mandawar, Kishan- garh; Ferozepur-Jhirka, Thajjar, Behror and Ballabgarh.	
20 - 40 per cent	Nuh, Gurgaon, Rewari and Alwar.	
40 - 60 per cent.	Sonapat, Palwal, Gohana Rohtak and the Union Territory of Delhi.	
60 - 80 per cent.	Khurja, Mawana, Panipat, Sikandrabad, Ghaziabad and Anupshahr.	
80 - percent and above	Hapur, Meerut, Sardhana Baghat and Bulandshahr	

Source: Compiled by T.C.P.O. from the District Revenue Records.

It is important to note that all the tehsils except Panipat showing more than 60 percent irrigated area to the net sown area belong to the U.P. Sub-region of the FCR. This means that irrigation facilities are comparatively better in the U.P. Sub-region of the NCR; tehsils which show less than 40 percent irrigated area to the net sown area belong to the Rajasthan Sub-region, and the tehsils of Ferozepur Jhirka, Jhajjar, Ballabgarh, Gurgaon, Rewari and Nuh in Haryana Sub-region.

The analysis of the net-irrigated area according to various sources like canals, wells and tanks at Tehsil level brings out the following important points:-

Canals: The largest area irrigated by canals is noticed in the tehsil of Rohtak; it is 57,600 hectares. This is followed by Gohana (51,500 hectares), Baghpat (48,392 hectares) and Ghaziabad (36,564 hectares). There are five more tehsils which show more than 20,000 hectares irrigated by canals. These are: Anupshahr, Khurja, Sikandarabad, Palwal and Panipat. Five tehsils, namely, Behror, Mandawar, Kishangarh, Tijara and Alwar of the Rajasthan Sub-region and two tehsils of the Haryana Sub-region, Gurgaon and Rewari, do not have canal irrigation. Ballabgarh tehsil has a nominal area of 380 hectares under canal irrigation. Tehsils which have more than 60 percent of their net irrigated area by canals only are: Baghpat, Palwal, Rohtak and Gohana. These may be considered as predominantly canal irrigated tehsils of the NCR.

Wells and Tube Wells: The largest area irrigated by wells and Tube-wells is in Bulandshahr tehsil; it is 73,530 hectares. Other tehsils with exceptionally large areas irrigated by wells and tube wells are: Hapur, (53,849 hectares), Anupshahr (45,650 hectares), Sardhana (13,441 hectares) and Sikandarabad (43,015 hectares). The remaining tehsils which have more than 20,000 hectares of land irrigated by wells and tube wells are: Baghpat, Ghaziabad, Meerut, Mawana, Khurja, Gurgaon, Rewari, Rohtak and Sonapat.

Tehsils having more than 60 percent of their net irrigated area only through wells and tube-wells are: Hapur, Sardhana, Anupshahr, Bulandshahr, Sikandarabad, Gurgaon, Rewari, Ballabgarh, Jhajjar, Sonapat, Behror, Mandawar, Kishangarh, Tijara and Alwar. Out of these five tehsils of Alwar district, namely, Behror, Mandawar, Kishangarh, Tijara, Alwar and the neighbouring tehsil of Rewari in Gurgaon district show practically cent percent irrigation by wells and tube-wells.

Tanks: The area irrigated by tanks in most of the tehsils in NCR is insignificant. Largest area irrigated by tanks is noticed in the case of Nuh tehsil; it is 3,580 hectares constituting 16.42 percent of the total irrigated area in the tehsil. Other tehsils which have noticeable tank irrigation area: Alwar (2,183 hectares) and F. Jhirka (2,099 hectares).

Area Irrigated More than once: The largest area irrigated more than once is in Bulandshahr tehsil; it is 44,715 hectares, constituting 48.74 percent of the net irrigated area in the tehsil. Other

tehsils which show more than once are as under:

Table 4.1.6

Area Irrigated more than once in the NCR
Tehsils (1968-69)

Tehsil	Area irrigated more than once (hectares)	Percentage of area irrigated more than once to irrigated area.
1	2	3
Ghaziabad	33,932	51.64
Hapur	33,515	47.17
Baghpat	28,252	37.16
Sardhana	25,608	40.68
Sikandrabad	25,367	37.95
Gohana	24,000	44.94
Meerut	20,552	45.49

Source: Completed by T.C.P.O. from District Revenue Records.

All the above tehsils belong to the U.P. Sub-region of the NCR. It may, thus, be inferred that U.P. Sub-region has not only a larger sown area under irrigation, but the irrigation facilities are also better as compared to the other parts of the NCR.

Cropping Pattern:

The cropped area in the NCR in the year 1968-69 is 29,83,207 hectares. As pointed out earlier, the total net sown area in the NCR in

1968-69 is only 22,19,100 hectares. Thus area around 7,64,100 hectares is used for multiple cropping; this constitutes 34.4% of the net area sown in the NCR.

The area under different crops in the NCR in 1968-69 with its percentage share to total cropped area is presented in Table 4.1.7.

As would be noticed from this Table, 85.71 percent of the total cropped area in the NCR is under food crops. Important food crops grown in the Region are: cereals, pulses (including gram) and sugarcane. Wheat is the most important crop with 29.43 percent of the total cropped area under it. This is followed by bajra, with 13.15 percent of cropped area; pulses with 12.8 percent of total cropped area and sugarcane with 7.88 percent of the total cropped area. Barley, jowar and maize each has 4 to 5 percent of the total cropped area under it rice and oil seeds have 2.67 percent and 2.44 percent respectively.

The important non-food crop in the NCR is fodder; it has 10.42 percent of total cropped area under it. There is around 33 thousand hectares under cotton, constituting 1.11 percent of the total cropped area in the Region. Tobacco has a very little area of 500 hectares in the entire Region.

It is worth noting that around 60 percent of the total cropped area in the NCR is under cereals. Relative position of various cereals grown in the Region in 1968-69 may be seen from the data presented in Table 4.1.7(a).

Table: 4.1.7

Area under different crops in the
NCR - 1968-69

(Figures in Hectares)			
Sl. No.	Crop	Area	Percentage to Total
1	2	3	4
1.	Wheat	877,926	29.43
2.	Rice	79,799	2.67
3.	Jowar	132,638	4.45
4.	Bajra	392,351	13.15
5.	Maize	169,940	5.70
6.	Barley	143,216	4.80
7.	Millets	5,974	(0.20)
8.	Other Cereals	5,611	0.19
Sub-Total		1,807,455	60.59
Cereals:			
9.	Pulses	360,250	12.08
10.	Sugarcane	235,070	7.88
11.	Oil Seeds	72,993	2.44
12.	Other Food crops	81,264	2.72
Sub-Total Food crops.		2,557,032	85.71
13.	Tobacco	541	0.02
14.	Cotton	33,216	1.11
15.	Fodder	310,750	10.42
16.	Other Non-food crops.	81,668	2.74
Sub Total Non-food crops		426,175	14.29
17.	Total Food crops and Non-food crops.	2,983,207	100.00

Source: Compiled by T.C.P.O. from District Revenue Record.

Table 4.1.7 (a)

General Crops:	% distribution
Wheat	48.57
Bajra	21.71
Maize	9.40
Barley	7.93
Jowar	7.34
Rice	4.41
Millets	0.33
Other Cereals	0.31
Total Cereals:	100.00

Reviewing the position of land under various crops tehsil-wise, important variations are noticed. Data regarding land under various crops in each district for the year 1968-69 is presented in Table 4.1.8. As pointed out earlier, the important crops in the NCR are: wheat, Bajra, pulses, and sugarcane. Besides these, the fodder crop shows a fairly large proportion of cropped area. The area where these crops are concentrated are mentioned below.

Wheat: It is a well distributed crop throughout the NCR. Each tehsil in the Region has substantial area under it, ranging from 56,762 hectares in Sikandarabad to 20,365 hectares in Jhirka.

Bajra: The total area under Bajra in the NCR is around 392,000 hectares; out of this, around 211,000 hectares is sown in the five tehsils of Alwar district and its adjoining tehsils of Rewari and Jhajjar. These seven tehsils thus constitute around 54 percent of the total cropped area in the Region. Other

tehsils having sizeable area under this crop are: Gohana, Nuh, Gurgaon, Anupshahr, Sikandrabad, Khurja and the Union Territory of Delhi.

Pulses (including Gram)*: The largest area under pulses is in Gohana tehsil; it is 35296 hectares, constituting 20 percent of the cropped area in the tehsil. It is followed by Rohtak having 33,822 hectares under pulses with 24.08 percent of its cropped area. There are three more tehsils which have 20 to 30 thousand hectares under pulses; these are: Sonapat, Rewari and Alwar. Besides these, there are seven tehsils which have around 10,000 hectares of their cropped area under pulses; these are: Nuh, F.Jhirka, Kishangarh, Tijara, Palwal, Gurgaon, and Mawana.

Sugarcane: The largest area under sugarcane is noticed in Mawana tehsil; it is 27,701 hectares, constituting 26.55 percent of the total cropped area in the tehsil. Other tehsils which have more than 20,000 hectares of cropped area under sugarcane are: Baghpat (27,573 hectares), Sardhana (27,321 hectares) and Hapur (21,672 hectares). It is important to note that all these tehsils belong to the Meerut district. There are a few more tehsils in the Region which have 10 to 20 thousand hectares of cropped area under sugarcane; these are: Rohtak, Gohana, Panipat, Ghaziabad, Meerut, and Bulandshahr.

*Gram is grown extensively in many tehsils of the NCR. The major part of the area included under pulses consist of gram. Besides this, gram is also grown as a mixed crop with wheat and barley.

Fodder: The largest area under fodder is found in Baghpat tehsil; it is 22,399 hectares, constituting 18.45 percent of the total cropped area in the tehsil. Other tehsils which have comparatively large areas under fodder are: Ghaziabad (21,592 hectares), Sardhana (19,399 hectares), Hapur (19,375 hectares), Meerut (17,637 hectares). All these tehsils belong to Meerut district. Other tehsils which have more than 10,000 hectares of cropped area under fodder in the Region are: Rewari, Panipat, Bulandshahr, Sikandrabad, Alwar and Behror.

In addition to the above crops, there are a few localised cash crops like oilseed, tobacco and cotton in the Region. Although, the area under these crops is not much, but it is concentrated in a few pockets of the NCR; oilseeds cropping is mainly noticed in the five tehsils of Alwar district; the largest cropped area of 14,546 hectares being in Alwar tehsil. Besides these, Ferozepur-Jhirka and Rewari tehsils also have substantial area under oilseeds. Cotton, in a small quantity, is grown in many tehsils of the NCR, but the tehsils having comparatively a larger area under this crop are: Rohtak, Gohana, Ghaziabad, Baghpat, Bulandshahr, Anupshahr and Khurja, Tobacco is cropped in a small area in the tehsils of Bulandshahr and Alwar districts.

As brought forth earlier, around 60 percent of the total cropped area in the NCR is under cereals. Wheat is the main cereal crop in most of the tehsils. There are only seven tehsils in the NCR where wheat is grown in less than 40 percent of the total cropped area under cereals. The major cereal crops in these tehsils

are; maize in Khurja and bajra in Jhajjar, Rewari, Alwar, Mandawar, Kishangarh, Tijara and Behror.

Production of Principal Crops in the NCR.

A variety of crops are grown in the NCR. Amongst the cereals, wheat, rice, jowar, bajra, maize and barley are popular. The pulses grown in the Region include gram and dal of all types; amongst the cash crops sugarcane and oilseeds are mostly found. Although cotton, tobacco and potato are also grown, but their production is insignificant. Production of various crops in different parts of the NCR in 1968 is given in Table 4.1.8.

The total production of all the crops (cereals, cash crops and pulses) in the Region was 3,431.4 thousand metric tonnes in 1968. Of these, the production of cereals is significant; it accounts for 2,041.6 thousand metric tonnes, constituting 59.5% of the total production in the Region. The production of cash crops at 787.6 metric tonnes ranks next in order; its proportion is 22.8% of the total agricultural production. The pulses, however, have low production; these account for 602.1 thousand metric tonnes, constituting 17.7% of the total agricultural production in the Region. The detailed position of various crops in the Region is given below:

Cereals: Four districts, namely, Bulandshahr, Meerut, Rohtak and Gurgaon together account for more than 85% of the total production of cereals in the NCR. The maximum quantity of cereal is produced in Bulandshahr district; it is 488.6 thousand metric tonnes, accounting for about

one-fourth of the total cereals in the Region in 1968. Each of the three districts, Meerut, Rohtak and Gurgaon produce around 21% of the total cereal production. The remaining areas viz., Alwar (Sub-district) Delhi and Panipat tehsil together produce less than 15% of the total cereal production. This low production can be ascribed to various reasons, such as, higher rate of urbanization in Delhi, and poor irrigation facilities in Alwar (Sub-district). In case of Panipat the production of cereals is comparatively lower being a tehsil it is a small unit.

The important cereal crops in the Region are wheat, barley and bajra. Details of production of each of these crops in different parts of the Region are given in table 4.1.9.

Wheat: Among the various cereal crops in the Region, wheat is by far the most important; it accounts for 64.6% of the total cereal production in the Region. Except in Alwar (Sub-district), production of wheat in all parts of the Region is significant; it varies between 86% in Delhi to 52% in the Gurgaon district. In Delhi the proportion is high due to the introduction of H.Y.V. under the supervision of the I.A.R.I. In terms of production, Meerut, Bulandshahr, Rohtak and Gurgaon districts together contribute more than 87% of wheat production in the Region. This is mainly because of the larger area under wheat in these parts of the Region. In the U.P. Sub-region, assured irrigation facilities and good soil are mainly responsible for a higher production of wheat, than in the Haryana Sub-region.

Table 4.1.8

PERCENTAGE DISTRIBUTION OF PRODUCTION OF PRINCIPAL CROPS IN VARIOUS PARTS OF THE NCR-1968

(Production Figures in '000 metric tonnes)

Sl. No.	District/tehsil	Cereals		Pulses		Cash crops		Total	
		Production.	Percentage to total	Production	Percentage to total	Production	Percentage to total	Production	Percentage to total
1	2	3	4	5	6	7	8	9	10
1.	Delhi	85.2 (80.0)	4.17	20.3 (19.1)	3.37	1.0 (0.9)	0.12	106.5 (100.0)	3.10
2.	Meerut	424.5 (42.5)	20.79	89.3 (8.9)	14.84	486.9 (48.6)	61.81	1000.7 (100.0)	29.16
3.	Bulandshahr	488.8 (70.9)	23.95	84.7 (12.3)	14.06	117.1 (16.8)	14.87	690.4 (100.0)	20.12
4.	Rohtak	431.0 (57.7)	21.12	197.6 (26.4)	32.82	119.2 (15.9)	15.13	747.8 (100.0)	21.70
5.	Gurgaon	416.0 (68.0)	20.38	168.8 (27.6)	28.03	27.3 (4.4)	3.47	612.1 (100.0)	17.84
6.	Panipat(tehsil)	86.8 (63.0)	4.25	16.1 (11.6)	2.68	35.1 (25.4)	4.46	138.0 (100.0)	4.03
7.	Alwar(Sub-district.)	109.5 (80.9)	5.36	25.3 (18.4)	4.20	1.1 (0.7)	0.14	135.8 (100.0)	3.96
TOTAL (NCR)		2041.6 (59.5)	100.00	602.1 (17.7)	100.0	787.7 (22.8)	100.0	3431.4 (100.0)	100.0

Source: Compiled by T.C.P.O. from Revenue Records of U.P., Haryana, Rajasthan and Delhi.

Note: 1. The Production of sugarcane is in terms of Gur.
2. Percentage figures in brackets are in relation to total production of all crops.

Barley: Barley is the second important crop of the Region, contributing 11.8% to the total production of cereals. It is grown mainly in the districts of Gurgaon, Rohtak and Bulandshahr. Its production in Gurgaon is the highest; about 48% of the total production. In the Union Territory of Delhi and Panipat tehsil it accounts for the lowest proportion; it is below 1% in each of the two areas. Barley, being a coarse grain requires comparatively less water supply than wheat. Hence, it is grown in those areas where assured irrigation facilities from canals and tube wells are not available. The production of this crop has not yet been stepped up because the high yielding variety of seeds has not been released.

Bajra: Bajra assumes the third rank in order of importance among cereals in the Region. It accounts for 10.6% of the total production of cereals. More than 58% of the total production of Bajra is in the three districts of Gurgaon, Rohtak, and Alwar (Sub-district). It is, however, the principal crop of Alwar Sub-district. Moreover, it is a short duration crop of 60 days, requiring unassured water supply through rains. It is grown on barani fields, mainly dependable on rains.

The other cereal crops viz., maize, rice and jowar in the Region, however, assumed little importance. These together account for 13% of the total production of cereals in the Region. Maize is mainly noticed in the U.P. Sub-region, accounting for more than 90% of the total maize production in entire Region. Jowar is produced mainly in the Haryana Sub-region, accounting for

more than 77% of its total production in the Region. The production of rice in the NCR is insignificant (90.0 thousand metric tonnes). It is mostly grown in Meerut district, accounting for 46.57% of the total rice production in the Region. Maize is popularly grown in the U.P. Sub-region because it requires comparatively more water supply than jowar. Moreover, its rotation with potato and other vegetable crops, largely grown in Bulandshahr and Meerut districts, is ideal. Rice is mainly grown in low-lying areas in Meerut, Rohtak, and Bulandshahr districts and Panipat tehsil where water is stagnant. This crop requires a good water supply.

Pulses: Pulses which consist of gram and all types of dal account for only 17.7% of the total food production in the Region. The details of their production in different parts of the Region in 1968 are given in table 4.1.10.

As would be seen from the Table 4.1.10, the production of gram in the NCR is more than three times than that of dal; gram accounts for 76.4% while dal, 23.6% of the total production of pulses. While judging the position in different parts of the Region, it is noticed that gram is mostly grown in Haryana Sub-region. Nearly 75% of its total production is noticed in Rohtak and Gurgaon districts alone. This crop does not require assured water supply and can be grown in rainfed areas, which do not have assured water supply. It is mostly grown in the Haryana Sub-region, where it is mainly used as fodder for cattle.

Table 4.1.9

PERCENTAGE DISTRIBUTION OF IMPORTANT CEREAL CROPS IN VARIOUS PARTS OF THE NCR-1969.

District/ Tehsil	Wheat		Barley		Bajra		Maize		Rice		Jowar		Total Cereals	
	(Prod- ucti- on	(Perc- entage to total	(Prod- ucti- on	(Perc- entage to total	(Prod- ucti- on	(Perc- entage to total	(Prod- ucti- on	(Perc- entage to total	(Prod- ucti- on	(Perc- entage to total	(Pro- duct- ion	(Perc- entage to total	(Pro- duct- ion	(Perc- entage to total
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Delhi	74.0 (83.0)	5.59	1.0 (1.2)	0.46	6.0 (7.0)	2.67	1.0 (1.2)	0.47	3.0 (3.4)	3.10	1.0 (1.2)	2.99	85.0 (100.0)	4.17
Meerut	326.0 (76.8)	24.72	10.0 (2.4)	4.16	9.0 (2.0)	4.12	37.0 (8.9)	27.01	42.0 (9.9)	46.57	0.3 (0.1)	0.89	425.0 (100.0)	20.79
Bulanish- ahr	319.0 (65.2)	24.14	51.0 (10.4)	20.92	13.0 (2.7)	6.09	90.0 (18.4)	65.02	13.0 (2.7)	14.93	3.0 (0.6)	7.70	489.0 (100.0)	23.93
Rohtak	290.0 (67.3)	21.97	39.0 (9.0)	16.11	59.0 (13.7)	27.38	5.0 (1.2)	3.61	18.0 (4.2)	20.10	20.0 (4.6)	55.50	431.0 (100.0)	21.12
Gurgaon (tehsil)	215.0 (51.8)	16.29	116.0 (27.9)	47.91	74.0 (17.8)	34.34	2.0 (0.5)	1.44	1.0 (0.2)	1.12	8.0 (1.7)	22.20	416.0 (100.0)	20.38
Panipat (tehsil)	64.0 (74.2)	4.87	2.0 (2.5)	0.91	4.0 (4.3)	1.74	3.0 (3.1)	1.94	13.0 (14.7)	14.18	1.0 (1.2)	2.94	87.0 (100.0)	4.25
Alwar (sub- district)	32.0 (29.1)	2.42	23.0 (21.0)	0.53	51.0 (46.6)	23.66	1.0 (0.6)	0.51	Neg.	-	3.0 (2.7)	7.78	110.0 (100.0)	5.36
Total	1320.0	100.00	242.0	100.0	216.0	100.0	139.0	100.0	90.0	100.0	36.0	100.0	2042.0	100.0
NCR.	(64.6)		(11.8)		(10.6)		(6.8)		(4.4)		(1.8)		(100.0)	

Source: Compiled by T.C.P.O. from the District Revenue Record.

Table 4.1.10:

Production of Pulses in the NCR-1968 (000'm tonnes)

Sl. No.	District/tehsil	Gram Pulses	other than gram.	Total Pulses
1	2	3	4	5
1.	Delhi	19.1 (94.6)	1.1 (5.4)	20.2 (100.00)
2.	Meerut	34.1 (38.2)	55.3 (61.8)	89.4 (100.00)
3.	Bulandshahr	25.4 (30.0)	59.3 (70.0)	84.7 (100.00)
4.	Rohatak	197.0 (99.7)	0.6 (0.3)	197.6 (100.00)
5.	Gurgaon	167.0 (98.9)	1.8 (1.1)	168.8 (100.00)
6.	Panipat (tehsil)	12.4 (76.4)	3.8 (23.6)	16.2 (100.00)
7.	Alwar (Sub-district)	24.5 (97.2)	9.7 (2.8)	25.2 (100.00)
Total NCR:		479.5 (76.4)	122.6 (23.6)	602.1 (100.00)

Source: Compiled by T.C.P.O. from District Revenue Record.

Pulses other than gram are popularly grown in the U.P. Sub-region. Its production in Meerut and Bulandshahr is more than 90% of its total production in the Region. Among the

various pulses moong, moth and mash are kharif crops and are grown along with the jowar and bajra. Masur is the only rabi pulse.

Table 4.1.11:

Production of Important cash crops in the NCR - 1968.

Sl. No.	District/tehsil.	Sugar-cane	Oil-seeds	Total
1	2	3	4	5
1.	Delhi	0.9 (90.0)	0.1 (10.0)	1.0 (100.00)
2.	Meerut	486.4 (99.9)	0.4 (0.1)	486.8 (100.00)
3.	Bulandshahr	116.2 (99.2)	0.9 (0.8)	117.1 (100.00)
4.	Rohatak	118.0 (99.0)	1.2 (1.0)	119.2 (100.00)
5.	Panipat (tehsil)	35.1 (100.00)	-	35.1 (100.00)
6.	Gurgaon	24.0 (87.9)	3.3 (12.1)	27.3 (100.00)
7.	Alwar (Sub-district)	-	1.1 (100.00)	1.1 (100.00)
Total NCR:		780.6 (99.1)	7.0 (0.9)	787.6 (100.00)

Source: Compiled by T.C.P.O. from District Revenue Records.

Cash Crops: Among the cash crops in the Region, sugarcane and oilseeds are important. These together account for 22.8% (vide table 6.0) of the total food production in the Region. Table 4.1.11 gives the production of these two cash crops in different parts of the Region in 1968.

The production of sugar-cane (in terms of gur) accounts for 99.1% of the total production of cash crops in the entire Region. The bulk production of sugarcane is noticed in Meerut, Rohtak and Bulandshahr district; it is 720 thousand metric tonnes in 1968. More than 60% of the production of the ~~XXXX~~ ~~XXXXXXX~~ sugarcane is from Meerut district alone. In Rohtak and Bulandshahr district the production is almost the same 15% in each case. Sugarcane is mostly grown on fertile land; it needs heavy manuring and assured water supply from all sources. It stays in the fields for almost a year. Hence, those farmers who possess big farms and can invest more money, can afford to grow this crop. In the U.P. Sub-region which has alluvial soil, assured water supply from canals and tubewells and enterprising farmers having big chunks of land, sugarcane is mostly grown. The existence of sugar mills near the fields results in cheap and quick transportation of the produce; the sugar mill owners also provide good quality of seeds and fertiliser to the farmers which in turn augment its production.

The other important cash crop in the Region is oilseeds. Its production accounts for only 0.9% of the total production of cash crops in the Region. It is important to note that about

one-half of the total production of oilseeds in the Region is from Gurgaon district alone. Rohtak and Alwar (Sub-district) together produce about 33% of the total production in the entire Region. Oilseeds are mainly grown with gram in the Region. They are grown mostly in Barani fields of the Haryana and Rajasthan Sub-region.

Increase in Production of Cereals in the NCR from 1960-61 to 1967-68:

The increase in the cropped area and production of wheat and total cereals in the Region and its various districts from 1960-61 to 1967-68 is presented in Table 4.1.12. The index of increase in cropped area and production of total cereals in the Region with 100 as base for 1960-61, shows that it has increased to 124 for the total cropped area under cereals in the year 1967-68. The largest increase in cropped area under cereals is noticed in the case of Gurgaon district, where the index figure in 1967-68 is 145. The corresponding index figure for production in the district is 270. It is followed by Bulandshahr (cropped area 131, Production 183); Delhi (cropped area 129, Production 274); Meerut (cropped area 126, Production 149); Rohtak (cropped area 123, Production 185) and Alwar (cropped area 109, Production 157); In case of Panipat tehsil, although there is decrease in the cropped area under cereals, the index figure being 86, there is still an increase in production, (the index figure being 112).

Table 4.1.12

INCREASE IN AREA AND PRODUCTION FOR WHEAT AND TOTAL CEREALS IN NCR 1960-61 - 1967-68.

Sl. No.	District/ Tehsil	Year	Cropped Area (under wheat '000' hectares)	Index (wheat base 1960- 61 as 100)	Produ- ction of whe- at '000'm. tonnes	Index (wheat) (base 1960-61 as 100)	Cropped Area (under total cereals '000' hectares)	Index (base year 1960- 61 as 100)	Produ- ction of total '000'm. tonnes	Index (base year 1960-61 as 100)
1	2	3	4	5	6	7	8	9	10	11
1.	Meerut	1960-61	160	100	214	100	284	100	285	100
		1967-68	210	131	326	152	358	126	425	149
2.	Buland- shahr.	1960-61	104	100	149	100	300	100	267	100
		1967-68	174	167	319	214	393	131	439	183
3.	Rohtak	1960-61	132	100	175	100	349	100	233	100
		1967-68	170	129	290	166	429	123	431	185
4.	Gurgaon	1960-61	71	100	81	100	323	100	154	100
		1967-68	128	180	215	265	469	145	416	270
5.	Panipat (tehsil)	1960-61	50	100	65	100	74	100	78	100
		1967-68	40	80	64	98	64	86	87	112
6.	Alwar (Sub- district)	1960-61	26	100	24	100	166	100	70	100
		1967-68	34	131	32	133	131	109	110	157
7.	Delhi	1960-61	28	100	17	100	62	100	31	100
		1967-68	38	133	74	435	80	129	85	274
Total:		1960-61	571	100	725	100	1,588	100	1,118	100
NCR.		1967-68	794	139	1,320	182	1,974	124	2,043	183

Source: Compiled by T.C.P.O. from District Revenue Records.

Comparative Position of Important Crops: An attempt has been made to compare the yields of important crops in the Region with the adjoining states of Haryana, U.P., Rajasthan and All India. Table 4.1.13 gives this comparison as under:-

Table 4.1.13

Comparative Position of average Yield of Important Crops:

Sl. No.	Name of the principal crops	Average yield (Metric tonnes/hectares)				
		NCR	Haryana	U.P.	Rajasthan	All India
1	2	3	4	5	6	7
1.	Wheat	1.66	1.73	1.18	1.04	1.10
2.	Barley	1.05	0.95	1.10	1.18	1.04
3.	Jowar	0.17	0.20	0.50	0.37	0.55
4.	Bajra	0.45	0.52	0.46	0.29	0.41
5.	Maize	0.75	0.08	0.78	1.37	1.12
6.	Rice	1.10	1.32	0.72	1.00	1.03
7.	Sugarcane (Gur)	4.02	3.89	3.80	1.57	4.78
8.	Oilseeds	0.11	0.46	0.42	0.27	0.53
9.	Pulses	1.02	1.01	0.81	0.43	0.53

Source: Area, production and average yield of principal crops, in India-1968-69, Directorate of Economics & Statistics, Ministry of Food and Agriculture.

It is observed from the above data that the average yield of wheat, barley, bajra, rice, sugarcane and pulses in the Region, compares favourably with the yields of these crops in three adjoining States and the All India. However, in case of Jowar, Maize and oilseeds the average yield in the Region is very low as compared to the adjoining

States and All India. The increase in the yield of these crops can go a long way in enhancing the farm income of the Region. In case these crops are not found suitable for the soil of the Region, their replacement by other crops which may be more profitable, needs to be made. The above data shows that during the seven year period from 1960-61 to 1967-68, there has been a substantial increase in the cropped area under cereal and in the production of cereals in the Region. It is important to note that the size of increase in production of cereals is comparatively more than the size of increase in area under cereals. This may be ascribed to an increase in the yield of various cereals grown in the Region. The break through in agriculture due to the use of artificial fertilisers, high yielding varieties of seeds of wheat, bajra, jowar and maize, better irrigation facilities and the application of modern methods of farming is beginning to show its results in the NCR.

Wheat is the most important cereal grown in the Region. The index of production for wheat shows that for the Region as a whole it is 182 in 1967-68, as compared to 100 in 1960-61. Highest index figure is in Delhi; it is 435 for 1967-68. The corresponding figures for other areas in the Region are: Gurgaon, (265), Bulandshahr (214), Rohtak, (166), Meerut (152), Alwar Sub-districts (133), and Panipat tehsil (98). The decrease in production of wheat in 1967-68 in Panipat tehsil over 1961-62 is due to a considerable decrease in the cropped area under wheat during the same period. The index of area under wheat for 1967-68 as seen in the table is only 80.

Identification of Surplus/Deficit Areas in the NCR.

It is important to identify surplus/deficit areas in the Region as regards to food so that its production could be augmented in deficit areas to meet the requirement of the people as far as possible. Such identification would also help in evolving a suitable regional land use policy. In such rural areas which are agriculturally backward, measures will have to be taken to step up agricultural production by concentrating on irrigation and other inputs. In case of surplus areas, warehouses, mandis and a road network will have to be provided to bring about a proper marketing of cereals in the Region.

The term surplus/deficit used here means the balance of net* output of cereals after meeting the consumption requirement of the local population of each district/tehsil and also the Region as a whole. The term 'surplus' or 'deficit' in the study is in reference to production of cereals in 1968 and bears no relationship with fertility and soil, etc. A district may be very rich in agriculture in general, but still it may show deficit in respect of production of cereals.

Methodology followed in Computing Consumption: The identification of surplus and deficit areas has been estimated for all the cereals grouped together, as the actual consumption of each cereal crop

* The net output has been assumed at 87.5% of the gross production after making allowances for seeds, fodder for livestock, wastage and non-edible uses as based on the reports of the Marketing Surveys of the Ministry of Food & Agriculture.

is not known. Moreover, there is inter-substitutability of various cereals; wheat and rice are popularly consumed in urban areas, while the coarse grains being cheaper, are mostly consumed in rural areas. All cereals have more or less equal calorific value. However, gram which is not used widely in the Region has been excluded from cereals in the study.

Three different norms of per capita consumption have been applied to assess the total cereal requirement in each district, sub-district and the Region for the year 1968. Since the actual consumption data of cereals for each district is not available, the analysis of surplus and deficit areas is based on the results of these three norms of per capita consumption. These norms are explained below:

(a) Average intake of cereals at 400 gms. per capita per day (146 kg. per capita per year): This rate of cereal consumption is the minimum, necessary for adequate nourishment according to the Nutrition Experts of the Indian Council of Medical Research, Hyderabad. Total consumption requirement on the basis of this norm would give only the minimum demand for cereals in each district during the period under study.

(b) This is based on the results of a family survey conducted by the Nutrition Department of the Indian Council of Medical Research Hyderabad for the district of Bulandshahr*.

* Nutrition work done in States - 1965?
Nutrition Department, Indian Council of Medical Research, Hyderabad.

According to the results of this survey, the actual average intake of cereals is 477 gms. per capita per day (174 kg. per capita per year). The same rate of per capita consumption has, however, been adopted for the district of Meerut and the Union Territory of Delhi as the food habits are more or less similar in these parts of the Region. For the other parts of the Region viz., Alwar (Sub-district), Rohtak, Gurgaon districts and Panipat tehsil the intake of cereals has been considered slightly higher; it is 5 gms. more than that of Bulandshahr. This has been fixed after consulting the concerned District Authorities. Thus, the per capita consumption in these parts is placed at 482 gms. per consumption unit per day or (176 kg. per capita per year).

(c) Average intake of 165 kg. per capita per year for the rural areas and 133 kg. per capita per year for the urban areas: These are based on the standards suggested by the National Council of Applied Economic Research*. They have applied a different per capita consumption rate of cereals for rural and urban areas. In the rural areas, the per capita consumption requirement is higher (165 kg. per capita per year) than in the urban areas, where it is taken at 133 kg. per capita per annum; the consumption requirement for each district/tehsil in the present study has been worked out by applying these different norms of per capita cereal consumption in rural and urban areas.

* Occasional Paper No. 19, A Strategy for Agricultural Planning 1966: National Council of Applied Economic Research, New Delhi.

The final analysis of surplus/deficit areas in respect of cereals in the Region is made on the basis of the above three norms; the lowest and the highest ranges of total consumption requirement in different parts of the Region have been matched with their net production; thus surplus/deficit areas have been identified. This identification holds good under the conditions existing in 1968 regarding production of cereals, and consumption pattern in different parts of the Region.

Surplus/Deficit Areas in the NCR in 1968: The extent of surplus deficit in respect of cereals in different parts of the NCR in 1968 has been worked out, keeping in view the consumption requirement as against the net production. Table 4.1.14 shows that the consumption requirement of the Region is higher as compared to the net production of cereals in the Region in 1968. The deficit is between the range of 240 thousand metric tonnes to 638 thousand metric tonnes in the Region on the basis of the three norms of per capita consumption, mentioned above.

While judging the position in various parts of the Region, it is noticed that Delhi, Meerut and Alwar (Sub-district) are deficit areas. In case of Delhi, the magnitude of the deficit is conspicuous, ranging between 479 thousand metric tonnes to 535 thousand metric tonnes of cereals. This is, however, due to abnormal increase in urban population and a comparatively smaller area under agriculture.

In the district of Meerut, the deficit varies between 112 thousand metric tonnes to 205 thousand metric tonnes during 1968. This

Table 4.1.14

IDENTIFICATION OF SURPLUS/DEFICIT AREAS IN THE NCR - 1968.

Sl. No.	Area	Popula- tion 1968 (Lakhs)	Net* produ- ction	Consumption requirement per capita per year			(Production in '000 metric tonnes)		
				Surplus (+) Deficit (-)					
				Norm (a)	Norm (b)	Norm (c)	Norm (a)	Norm (b)	Norm (c)
1	2	3	4	5	6	7	8	9	10
1.	Delhi	37.95	75	554	660	518	(-) 479	(-) 585	(-) 443
2.	Meerut	33.08	371	483	576	524	(-) 112	(-) 205	(-) 153
3.	Bulandshahr	21.33	428	310	369	340	(+) 118	(+) 59	(+) 88
4.	Rohtak	18.84	377	275	332	303	(+) 102	(+) 45	(+) 74
5.	Gurgaon	16.31	364	238	287	260	(+) 126	(+) 77	(+) 104
6.	Panipat (Tehsil)	3.86	76	54	65	53	(+) 22	(+) 11	(+) 18
7.	Alwar (Sub- district)	7.73	96	113	136	125	(-) 17	(-) 40	(-) 29
Total NCR:		139.30	2027	2027	2425	2128	(-) 240	(-) 638	(-) 341

*Net production is arrived at after deducting 12% for cattle feed, seed, wastage etc. from the total production.

Norm (a) Average intake of cereals at 400 gms. per capita per day (146 kg. per capita per year).

Norm (b) Average intake of cereals at 477 gms. and 482 gms. per capita per day (174 kg. and 176 kg. per capita per year)

Norm (c) Average intake of cereals - 165 kg. per capita per year in rural areas, 133 kg. per capita per year in urban areas.

is due to the fact that Meerut is the second largest urban centre in the Region and the percentage of urbanization in that district, in 1961 was 20.63 and the density of population 451 persons per sq. km. Besides this, as stated earlier the district, grows more of cash crops (especially sugarcane) than cereals. Deficit in Alwar (Sub-district) is rather small; it varies between 17 thousand metric tonnes to 40 thousand metric tonnes of cereals in 1968. This is due to the fact that its area under agriculture is not productive due to poor irrigation facilities.

The remaining parts of the Region, i.e., Bulandshahr, Rohtak, Gurgaon districts and Panipat tehsil are surplus in respect of cereals. The production in all these parts is higher than the cereal requirement during 1968. The maximum amount of surplus is noticed in the district of Gurgaon, ranging between 77 thousand metric tonnes to 126 thousand metric tonnes of cereals in 1968; this is followed by the districts of Bulandshahr and Rohtak and Panipat tehsil. These areas are not densely populated. In case of Bulandshahr district and Panipat tehsil, the surplus can be ascribed to good irrigation facilities also.

Live Stock in the NCR:

According to the latest livestock census conducted in 1966, the total number of animals in the NCR is 45,72,187. Detailed classification of the livestock in the Region is presented in the Table 4.1.15.

There are approximately 1.83 million cattle in the Region, forming 40.1 percent of the total livestock; 1.82 million buffaloes (39.8 percent of the total); 0.46 million goats (10.1 percent of the total); 0.21 million sheep (4.4 percent of the total); and 0.10 million pigs (2.3 percent of the total). Other animals in the Region are donkeys, horses and ponies, mules and camels. As may be observed from the table, these do not form a significant portion of the total livestock in the Region. The main livestock of the Region thus are cattle and buffaloes which account for approximately 80 percent of the total livestock in the Region, and sheep and goats account for another 15 percent of the total livestock.

A major proportion of the cattle and buffaloes of the Region (approximately 89 percent) are accounted for by the four districts of Meerut, Bulandshahr, Gurgaon, and Rohtak.* The total number of cattle and buffaloes in these four districts and their position in relation to district population in the year 1961 and 1966 is presented in table 4.1.16.

It may be observed from the data that although there is a slight increase in the number of cattle and buffaloes in each of the four districts (except Meerut where the number is constant) from 1961 to 1966, the number of cattle and buffaloes per thousand population has reduced considerably during the same period. This means that the increase in the number of cattle and buffaloes is not keeping pace with the increasing trend of population of these districts.

* Due to non availability of tehsilwise data of cattle and buffaloes for 1961, the analysis of population growth and cattle growth from 1961 to 1966 has been restricted only to these four districts.

Table 4.1.15

Classification of live-stock in NCR - 1966

Sl. No.	District/ Tehsil	Cattle	Buffaloes	Donkies	Horses & ponies	Mules	Sheeps	Goats	Camels	Pigs	Total
1	2	3	4	5	6	7	8	9	10	11	12
1.	Delhi	75,515 (34.8)	1,80,481 (50.0)		5,165 (2.4)		5,006 (2.3)	14,345 (6.6)	2,212 (1.0)	6,053 (2.8)	2,16,777 (100.0)
2.	Meerut	4,47,263 (42.7)	4,93,786 (47.2)	13,938 (1.3)	9,221 (0.9)	2,082 (0.2)	18,068 (1.7)	31,231 (2.9)	4,996 (0.5)	26,871 (2.6)	10,47,456 (100.0)
3.	Bulandshahr	3,48,913 (40.9)	3,93,886 (45.6)	14,031 (1.7)	5,562 (0.7)	1,089 (0.1)	18,879 (2.2)	41,969 (4.9)	4,860 (0.6)	19,498 (2.3)	8,51,687 (100.0)
4.	Rohtak	3,23,600 (41.0)	3,28,800 (41.6)	14,700 (1.9)	5,000 (0.6)	1,700 (0.2)	45,900 (5.8)	34,000 (4.3)	12,200 (1.6)	23,800 (1.7)	7,89,700 (100.0)
5.	Gurgaon	3,36,200 (40.3)	2,75,600 (33.0)	14,200 (1.7)	3,300 (0.4)	700 (0.1)	54,600 (6.6)	1,21,900 (14.6)	13,500 (1.6)	13,900 (1.7)	8,33,900 (100.0)
6.	Karnal(Pani- pat tehsil)	75,500 (43.0)	70,500 (39.7)	3,100 (1.7)	1,900 (1.1)	300 (0.2)	12,100 (6.8)	5,800 (3.2)	1,700 (1.0)	5,900 (3.3)	1,77,800 (100.0)
7.	Alwar(NCR portion)	2,24,141 (34.2)	1,43,294 (21.9)	6,428 (1.0)	1,266 (0.2)	87 (0.01)	50,590 (7.7)	2,11,044 (32.2)	12,830 (2.0)	5,181 (0.8)	6,54,961 (100.0)
Total NCR		18,32,132 (40.1)	18,17,347 (39.8)	66,397 (1.5)	31,414 (0.6)	5,958 (0.1)	2,05,143 (4.4)	4,60,289 (10.1)	52,298 (1.1)	1,01,203 (2.3)	45,72,181 (100.0)

Source: Compiled by T.C.P.O. from Livestock Census-1966.

Table 4.1.16

Cattle and Buffaloes in Four Districts
of N.C.R.

District	Cattle & Buffaloes (figures in milli- on)		Cattle & Buffaloes (per 1,000 population)	
	1961	1966	1961	1966
Meerut	0.94	0.94	351	301
Bulandshahr	0.69	0.75	406	369
Rohtak	0.64	0.65	457	337
Gurgaon	0.30	0.61	500	405

Source: Compiled by T.C.P.O. from livestock census 1956.

This may not be undesirable if large dairies with high yielding milch cattle replace the present stock in the Region. But this is not so. Another important point which emerges from the above data is that Rohtak and Gurgaon districts have lesser number of cattle and buffaloes as compared to Meerut and Bulandshahr districts. In terms of cattle and buffaloes per thousand population, however, the position is different. In the year 1966, Rohtak and Gurgaon districts show 367 and 405 cattle and buffaloes per thousand population respectively as compared to 369 and 301 in the districts of Bulandshahr and Meerut.

Sheep and goats are other important livestock of the Region. Their number in the Region is 665,432. Of this, the largest number of 261,634 is in the five tehsils of Alwar district, forming 39.4 per cent of the total sheep and goats in the Region. Other districts where the number of sheep and goats is significant are: Gurgaon 176,500 (26.5 per cent of the total); Rohtak 79,900 (12.0 per cent of the total), Bulandshahr 60,848 (9.1 per cent of the total) and Meerut 49,299 (7.4 per cent of the total).

Milch Stock: Position of Milchstock in the NCR is presented in the table 4.1.17.

The total number of milch cattle and buffaloes in the Region in the year 1966 is 11,34,846. This forms approximately 30 per cent of the total cattle and buffaloes in the Region. Out of this, 3,04,073 are buffaloes in milk in the Region, which account for approximately 69 percent of the total milch stock in the Region, and 3,30,773 are milch cows constituting the remaining 31 percent of the total milch stock in the Region. It is observed from the table 4.1.17 that the percentage of milch cattle and milch buffaloes form larger proportion of the total number of cattle and buffaloes in the districts of Meerut, Bulandshahr and Alwar as compared to Rohtak and Gurgaon districts. Presumably it is so because the districts of Rohtak and Gurgaon which have good bread cattle export their milch stock to other parts of India.

Table 4.1.17.

Milch stock in the National Capital Region (1966)

Sl. No.	District/ Tehsil	Total Cattle	Total Buffaloes	Cattle over 3 yrs in Milk	Buffaloes over 3 yrs in Milk	% of cattle in milk	% of buffa- loes in milk.
1	2	3	4	5	6	7	8
1.	Delhi	75,515	1,08,481	7,908	13,405	10.47	12.36
2.	Meerut	4,47,263	4,98,786	83,977	2,57,546	18.78	54.20
3.	Bulandshahr	3,48,913	3,96,886	60,587	2,32,582	17.36	58.60
4.	Rohtak	3,23,600	3,28,800	45,600	1,06,400	14.09	32.36
5.	Gurgaon	3,36,200	2,75,600	47,600	94,600	14.16	34.33
6.	Karnal (Pani- pat)	76,500	70,500	9,000	20,100	11.63	28.51
7.	Alwar (NCR portion).	2,24,141	143,294	76,101	69,340	33.95	48.39
Total NCR:		18,32,132	18,17,347	3,30,773	3,04,073	18.05	44.24

Source: Livestock Census - 1966.

Veterinary Services:

Data regarding the position of veterinary facilities in various districts of the Region is not available for a common year. A broad picture of veterinary hospitals and artificial insemination centres in the Region is given in Table 4.1.18

Table 4.1.18

Veterinary position in the NCR (1966-70)

Sl. No.	Area	Veterinary Hospital	Artificial Insemination centres
1.	Delhi (1966)	34	5
2.	Meerut District (1968-69)	36	18
3.	Bulandshahr District (1969-70)	19	16
4.	Rohatak District (1966)	27	5
5.	Gurgaon District (1966)	24	2
6.	Alwar (NCR Part) (1966)	4	2
7.	Panipat Tehsil (1970)	4	1
Total NCR:		148	49

Source: Director Animal Husbandary for the concerned District.

The total number of veterinary centres in the NCR as seen from the table are 148. There are 49 artificial insemination centres in the Region. In addition to this, the Region has 7 sheep and wool extension centres, out of which 5 are located in Alwar district (NCR Part) and 1 each in Panipat tehsil and Gurgaon district. Region also has 4 poultry centres and 14 piggery centres. Most of the piggery centres are located in the districts of Meerut and Bulandshahr.

Poultry:

According to the livestock census (1966), the total number of poultry in the Region is 5,02,903. Out of this, the largest number is in the Union Territory of Delhi (1,37,398), followed by Gurgaon District (1,22,200), Meerut district (1,10,168) Bulandshahr district (64,700), Rohatak district (37,000) and Alwar Sub-district (31,237).

Dairy:

Delhi Milk Scheme is the only large organised dairy in the region. It is located in Delhi. The distribution capacity and procurement of milk by this dairy from 1960-61 to 1968-69 is given in Table 4.1.19.

Table 4.1.19

Procurement & Distribution of Milk by DMS (1960-61 to 1968-69)

Year	Procurement (Litres)	Index base year 61-62=100	Distribution (lit-res)	Index base year 61-62 = 100
	1	2	3	4
1960-61	236,07,420	-	232,84,953	-
1961-62	316,81,114	100	324,17,688	100
1962-63	448,90,369	142	427,82,000	133
1963-64	483,31,311	152	518,45,530	160
1964-65	390,12,149	123	499,22,791	154
1965-66	516,40,819	163	590,51,936	182
1966-67	628,32,714	198	726,76,263	224
1967-68	578,24,067	183	802,44,779	248
1968-69	610,06,839	193	830,87,184	256
1969-70	708,28,430	224	987,88,600	305

Source: Souvenir of Nov. '69 published by DMS. (estimated)

It may be noticed from table 4.1.19 that the annual procurement has increased by about two and a half times during the last nine years. It has increased from 23.6 million litres in 1960-61 to 61 million litres in 1968-69. The distribution has always been more than the procurement. This shortage is met by the recombined powdered milk. The index of progress as shown in the table clearly indicates that in case of procurement it has increased from 100 in 1960-61 to 193 in 1968-69, while in case of distribution it has gone up from 100 in 1961-62 to 256. Besides the distribution of milk, DMS is also manufacturing 3 tonnes of ghee and 2 tonnes of butter per day, for the local market, in the year 1968-69.

Delhi dairy has 16 chilling and collection centres and 5 collection centres without chilling facilities. Details about these centres is presented in Table 4.1.20

Table 4.1.20

Collection and chilling units of DMS for milk procurement-1970.

Sl. No.	Centres	Collection and chilling centres	Date of commencement	Distance from central dairy in miles	Amount of milk received in quintals per day
1	2	3	4	5	6
1.	Muradnagar	Collection & chilling	29.10.59	27	77.35
2.	Bhagpat	do	9.5.60	31	130.18
3.	Pil-khawa	do	11.2.61	37	53.23
4.	Dankaur	do	1.3.61	44	149.61

Contd..

Contd...

1	2	3	4	5	6
5.	Pilana	Collection & Chilling	9.8.61	41	132.22
6.	Gulaothi	do	29.9.61	54	63.81
7.	Masuri	do	17.3.62	30	35.76
8.	Dadri	do	25.7.62	31	90.77
9.	Kithore	do	4.9.64	63	22.28
10.	Ballabgarh	do	6.8.60	24	46.08
11.	Palwal	do	2.11.60	37	190.74
12.	Sahna	do	11.1.62	37	158.96
13.	Bahadurgarh	do	1.10.62	12	N.A.
14.	Kharkoda	do	22.2.64	35	N.A.
15.	Jalma Area	do	1.1.65	100	N.A.
16.	Bikaner	do	Feb.62	300	N.A.
17.	Sardhana	do	-	38	46.79
18.	Rewari	do	-	52	30.23
19.	Kama	do	-	-	26.20
20.	Sonepat	do	-	28	9.15
21.	Aligarh	do	-	81	77.15
Total(1,30,094.46 litres)					1,41.18

Source: Delhi Milk Scheme, Administration Report 1964-65 and 1965-66.

It may be observed from the table 4.1.20 that most of the milk collection and chilling centres are located within a radius of 50 miles from Delhi, and fall in the NCR. However, the Region is not in a position to supply the total requirements of milk of the DMS and milk has to be processed from far off places. The ready market for milk in the Region may serve as an important incentive for the growth of milch stock in the Region.

II. Agro-Based Industries:

Information about agro-based industries in the NCR is available, only for those units which are registered with Chief Inspector of Registered Factories, U.P., Haryana and Rajasthan. A study of these units for the year 1966 reveals that there are 126 such units in the Region (excluding Delhi) employing 15,733 persons. Details of these units regarding type of agro-based industry, number of units, employment, and their location in various towns, districts and Sub-regions for 1966 is presented in table 4.1.21 and 4.1.22. Agro-based industries located in Delhi have been discussed separately.

It is observed from tables 4.1.21 and 4.1.22 that a large number of agro-based industries are located in the U.P. Sub-region; their number is 85 (67.5 per cent of the total units) employing 13,173 persons (83.7 per cent of the total employment); this is followed by Haryana Sub-region with 38 units, employing 2,405 persons and Rajasthan sub-region with 3 units, employing 155 persons.

While judging the townwise position it is observed that as high as 105 agro-based units out of a total of 126 units are located in the 17 important towns of the Region. The largest number of units are in Ghaziabad (26), followed by Meerut (19), Rohtak (9), Faridabad-Ballabhgarh, Hapur and Khurja (8 each), Sonapat and Panipat (5 each), Bulandshahr and Bahadurgarh (4 each) Modinagar and Alwar (3 each) Gurgaon (2) and Rewari (1).

The Largest number of units in agro-based industries in the Region are these manufacturing implements; these are 46 in number and

employ 1,443 persons. Out of these, 32 are located in the U.P. sub-region and 14 in the Haryana Sub-region. Majority of these are concentrated in the towns of Ghaziabad (18), Meerut (19) and Faridabad (4). This is followed by sugar mills, which are 26 in number but employ as many as 10,679 persons. It is important to note that sugar mills employ as high as 68 per cent of the total workers in the agro-based industries of the Region. Except for four sugar mills in the Haryana Sub-region, the remaining 22 are located in the U.P. Sub-region. These are distributed in various centres of the Region; only ten are located in the important towns of the Region and the remaining 16 units are located in other areas.

There are 17 edible oil units in the Region, employing 788 persons; out of these 9 are located in the Haryana Sub-region, 5 in the U.P. Sub-region and 3 in the Rajasthan Sub-region. All these units are located in important towns of the Region viz., Rohtak (3 units), Sonapat (2 units), Ballabhgarh (3 units), Rewari (1 unit), Hapur (1 unit), Modinagar (1 unit), Ghaziabad (1 unit), Meerut (1 unit), Khurja (1 unit) and Alwar (3 units).

Other agro-based industries in the Region are: cold storages (8 units), cotton ginning (7 units), hydrogenerated oil (4 units), canning and preservation of fruits and vegetables (3 units), Distilling and rectifying spirit (2 units), Rice mills and Dairy products (one unit each).

Table 4.1.21

Number of the Agro-based Industrial Units and Employment in the
various Sub-regions of NCR 1966 (excluding Delhi)

Sl. No.	Type of Industry.	'Haryana Sub-region'		'U.P. Sub-region'		'Rajasthan Sub-region'		Total N.C.R.	
		Units	Employment	Units	Employment	Units	Employment	Units	Employment
1	2	3	4	5	6	7	8	9	10
1.	Flour mills	3	71	3	58	-	-	6	129
2.	Dal mills	2	20	3	25	-	-	5	45
3.	Sugar mills	4	1,385	22	9,294	-	-	26	10,679
4.	Edible oil	9	185	5	448	3	155	17	788
5.	Agricultural implements.	14	454	32	989	-	-	46	1,443
6.	Cotton ginning	5	278	2	50	-	-	7	328
7.	Rice mill	1	12	-	-	-	-	1	12
8.	Cold storage	-	-	8	174	-	-	8	174
9.	Canning, preserving of fruits and vegetables	-	-	3	328	-	-	3	328
10.	Dairy products	-	-	1	35	-	-	1	35
11.	Distilling and rectifying spirit.	-	-	2	118	-	-	2	118
12.	Hydrogen-ated oil	-	-	4	1,654	-	-	4	1,654
Total		38 (30.16)	2,405 (15.4)	85 (67.46)	13,173 (83.7)	3 (2.38)	155 (0.9)	126 (100.0)	15,733 (100.0)

Source: Compiled by T.C.P.O., from the Office record of Chief Inspector of Registered Factories U.P., Haryana and Rajasthan.

Table 4.1.22

Agro-based Industries in Seventeen important Towns of the NCR
(excluding Delhi).

Sl. No.	Type of Industry	Located in important towns		Located in other places		Total	
		Units	Employment	Units	Employment	Units	Employment
1	2	3	4	5	6	7	8
1.	Flour mills	6	129	-	-	6	129
2.	Dal mills	5	45	-	-	5	45
3.	Sugar mills	10	3,495	16	7,184	26	10,679
4.	Edible oils	17	788	-	-	17	788
5.	Agricultural implements.	44	1,370	2	73	46	1,443
6.	Cotton ginning	6	255	1	73	7	328
7.	Rice mills	1	12	-	-	1	12
8.	Cold storage	8	174	-	-	8	174
9.	Canning, preserving of fruits and vegetables	2	303	1	25	3	328
10.	Dairy products	1	35	-	-	1	35
11.	Distilling and Rectifying spirit	2	118	-	-	2	118
12.	Hydrogenated oils	3	1,213	1	441	4	1,654
NCR (Excluding Delhi)		105	7,937	21	7,795	126	15,733

Source: Compiled by T.C.P.O., from the office records of Chief Inspector of Registered Factories U.P., Haryana and Rajasthan.

The present picture of agro-based industries in the NCR (Except Delhi), shows the pre-dominance of units engaged in (i) the manufacture of agricultural implements (ii) sugar mills and (iii) edible oil units. This is in consonance with the general agricultural situation of the Region described earlier, the Region has a large agricultural area which is being cultivated intensively. The presence of a large number of units manufacturing agricultural implements, reflect the steady demand for agricultural implements in this Region. The presence of a large number of sugar mills and edible oil units are inter-related with the two important cash crops of the Region, i.e., sugarcane and oil seeds. Physical location of the units manufacturing sugar and edible oils in the Region also appears to be mainly dictated by the availability of raw materials. Most of the sugar mills in the Region are located in the U.P., Sub-region which grows sugarcane extensively, and edible oil units in Haryana and Rajasthan Sub-regions, which grow a major part of the oil seeds in the Region. Besides the availability of raw material, another important factor which appears to have influenced the location of agro-based industries in the Region is the availability of economic and social infrastructure. Except for certain sugar mills, practically all the agro-based industries of the Region are located in important towns of the Region. The desirability of other growth centres with the requisite infrastructure have to be explored.

Delhi located in the centre of the Region, with all the advantages of a metropolitan economy, also has a large number of registered agro-based industries. The total number of agro-based industries in Delhi in the year 1966 is 103 employing 4,977 persons. Out of these, 29 units are engaged in the manufacture of agricultural implements, 23 cold storages, 17 flour mills, 16 cotton ginning mills, 10 bakeries, 3 units are making milk products, and the remaining units are engaged in processing of fruits and vegetables and the distillation of rectified spirit. A large number of units in Delhi are manufacturing agricultural implements. These coupled with other units in the adjoining towns of Ghaziabad and Faridabad may not be catering to the needs of the agricultural area of the NCR, but also to the other parts of India, to which Delhi is linked advantageously in regard to rail and road transport network. The remaining agro-based industries like cold storage, flour mills, cotton ginning mills, bakeries, milk products, mainly relate to the preservation and distribution of perishable agricultural produce for the large population of the metropolis, and also the other parts of the country, and simple conversion of agricultural produce for local consumption and for consumption in the hinterland.

IX. Banking Facilities in Rural NCR:

Data regarding availability of banking facilities in the various districts of the NCR viz., Meerut, Bulandshahr, Rohtak Gurgaon, and Alwar for the year 1966 is presented in Table 4.1.23.

Table 4.1.23

Spread of Banking facilities serving Rural areas in NCR districts -1966

Sl. No.	District	No. of centres with banking facility	Per bank centre No. of Villages	Pop. (000)	Gross cultivated area (000 hectares)	No. of Banking Offices	Bank Deposits Per village (Rs. in '000)	Per person	Per hectare of gross cultivated area.
1	2	3	4	5	6	7	8	9	10
1.	Meerut	16	103	170	41	52	1,321	0.80	3,295
2.	Bulandshahr	10	164	174	53	16	277	0.26	860
3.	Rohtak	8	101	178	80	21	860	0.49	1,070
4.	Gurgaon	11	144	113	50	28	410	0.52	1,180
5.	Alwar	5	388	218	111	12	110	0.20	400

Source: Reserve Bank of India Bulletin-October, 1969.

N.B.: Actual location of the most of the Banking Office is in the towns of NCR.

The highest number of banking centres are in Meerut district. These are 16. Total number of banking offices (both commercial and co-operative) in these centres

is 52. Similar figures for other districts, as shown in the table No.4.1.23 reveals that Gurgaon district ranks next having 11 centres and 28 banking offices. This is followed by Bulandshahr with 10 centres and 16 banking offices; Rohtak with 8 centres and 21 banking offices and Alwar with 5 banking centres and 12 banking offices. On an average each of the banking centre serves between 101 to 388 vi

villages and 113 thousand to 218 thousand persons in various districts of the NCR. In terms of gross cultivated area, each banking centre serves on an average from 41 thousand hectares to 111 thousand hectares. Comparing these figures for the various districts, it is noticed that in the districts

of Meerut and Gurgaon, the spread of banking facilities in rural areas is comparatively better than other districts of the Region. The bank deposits per village, and per person in

Various districts varies from Rs.110 thousand to Rs.1,321 thousand and Rs.200/- to Rs.800/- respectively. In respect of bank deposits the position of the Meerut district is the highest. It is followed by Gurgaon, Rohtak, Bulandshahr and Alwar.

Number of co-operative banks in the districts of Meerut, Bulandshahr, Rohtak, Gurgaon and Alwar for the year 1961-62 and 1967-68 is given in Table 4.1.24.

Table 4.1.24

Co-operative Banks in the NCR.

Sl. No.	District	No. of Banking Offices		Increase in the no. of banking offices from 1961-62 to 1967-68
		1961-62	1967-68	
1	2	3	4	5
1.	Meerut	2	7	5
2.	Bulandshahr	1	2	1
3.	Rohtak	4	5	1
4.	Gurgaon	4	5	1
5.	Alwar	2	4	2

Source: Statistical statement relating to the Co-operative movement in India Reserve Bank of India.

Note:1: The highest bank deposit per village in India is in the district of Ernakulam in Kerala it is Rs.30,060 thousand.

Note:2: According to a study conducted by the Reserve Bank of India, 300 districts have been ranked in relation to (i) the spread of Banking facilities in Rural areas (ii) and the level of Deposit Mobilisation by the end of 1966. The position of districts included in NCR is as follow:

Meerut 32nd, Karnal 81st, Bulandshahr 102nd
Rohtak 74th, Gurgaon 84th, Alwar 145th

The largest number of Co-operative Banks are located in the district of Meerut, their number in the year 1967-68 is 7. This is followed by Rohtak and Gurgaon (5 banks in each); Alwar (4 banks) and Bulandshahr (2 banks). A major increase in the Co-operative Banks from the year 1961-62 to 1967-68 is also noticed in the district of Meerut. There were only two Co-operative Banks in Meerut district in the year 1961-62; their number in 1967-68 has gone upto 7, showing an increase of 5 banks during the six year period. Corresponding increase in the number of Co-operative Banks in Alwar district is only 2 and in the districts of Bulandshahr, Gurgaon and Rohtak it is one each.

With a view to getting an idea of the working of Co-operative Banks in the various districts of the NCR, data relating to the liabilities and assets of these banks have been compiled and presented in table 4.1.25 (see next page).

The working capital of the Central Co-operative Banks in the various districts of the NCR in the year 1968 varies from Rs.4,714 thousand to Rs.47,017 thousand. The total outstanding loans advanced by these banks are in the range of Rs.5,638 thousand to 31,427 thousand. Largest working capital and loans advanced by these banks, are noticed in the case of Meerut district. The relative position of Central Co-operative Banking in regard to working capital and loans advanced to the rest of the districts in NCR in the descending order is: Bulandshahr, Rohtak,

Table 4.1.25

Central Co-operative Banks-Liabilities and Assets in various districts of NCR.

(Figures in thousand rupees)

Sl. No.	District	Bank Offices	Total Assets	Total liabilities	Working Capital	Total deposits	Total outstanding loans.
1	2	3	4	5	6	7	8
1.	Meerut	7	49,663	48,158	47,017	17,380	31,427
2.	Bulanishahr	2	39,741	37,858	37,689	5,057	29,180
3.	Rohtak	5	25,608	24,890	23,756	10,316	15,482
4.	Gurgaon	5	21,325	21,186	19,522	10,396	23,969
5.	Alwar	4	8,898	8,520	4,714	1,206	5,638

Source: Reserve Bank of India Bulletin September 1969:-

Gurgaon and Alwar with the exception of Gurgaon district showing a greater amount in outstanding loans than Rohtak district.

As pointed out earlier, general banking facilities (commercial and Co-operative Banks) are comparatively better in the districts of Meerut and Gurgaon, as compared to the other districts of the NCR. Both these districts have a higher proportion of urban population to total population than the rest of districts in the Region. It appears that the banking facilities at present in the Region are mostly in the urban areas and are related to urbanisation (which indirectly reflect the presence of commercial and industrial activities) and not to agriculture. But undoubtedly the prosperity in agriculture has triggered secondary

and tertiary activities. Banking facilities if extended extensively to the other districts and also to smaller towns and villages, will result in more intensive agricultural production, which in turn will act as a catalyst to non-agricultural activities, if helped by banks.

Main Finding and Recommendations:

Agriculture forms the most important part of the economy of the National Capital Region. The present picture of agriculture and its allied activities like livestock, and agro-based industries, described earlier, suggests a certain course of action which should form an integral part of the comprehensive regional plan. These are explained below:

Land Utilisation:

Land is a fixed resource. Its optimum utilisation has to be viewed from the point of view of broad objectives set forth for the planning of the National Capital Region. It is in this context only that the demand for land for various uses can be rationalised. The important uses under which the land in the Region has been classified are: (i) Forests, (ii) Land not available for cultivation, (iii) uncultivated land and (iv) net sown area including fallow land; suggestions pertaining to these are as under:

Development of forest-resources is an integral part of the programme of optimum land utilisation. Forests are of vital importance in preserving the freshness of the environments and cast indirect influence on climate by increasing humidity through transpiration; their presence is also essential as a safeguard against floods, erosion and desiccation. The area covered by forests in the NCR is around 42,386 hectares; this forms a meagre proportion of 1.42 per cent of the total area of the Region. A major portion of the forest area is concentrated in the tehsil of Alwar (Sub-district). It is noticed that there is a small decrease in the area under forests in the Region from 1961-62 to 1968-69. The area under forest in the Region should not only be protected jealously, but efforts should be made to increase this area as far as possible, especially in the south west of the Region which is under the influence of the Rajasthan desert winds. The

overall land utilisation position in the Region shows that the scope of bringing additional area under forest is limited. In these circumstances what is possible is to lay emphasis on dispersal forests wherever feasible. Systematic attempt should be made for the growth of a larger number of trees on community lands in each village owned by village panchayats. There is a wide network of roads in the Region which is expected to expand considerably in future. Plantation of trees along the roads is an accepted idea by the public authorities. Tree plantation in multiple rows of two or three on most of the road-network will make up for the deficiency of forest area in the region. These thick walls of trees may be extremely useful in cutting the wind velocity which is responsible for soil erosion in parts of Rohtak District. In this connection, the recent experiment of growing eucalyptus trees in Haryana and Punjab on G.T. Road is worth taking note of. This may be done in the U.P. and Rajasthan sub-regions also. Trees may also be planted along irrigation canals. Forests in a metropolitan Region can be used as large recreational parks; these are considered in a separate Chapter wherein the afforestation of the 'ridge' has also been recommended.

Land not available for Cultivation: This land consists of barren land and the land put to non-agricultural uses. The size of this land in the NCR is 433,651 hectares and it constitutes around 15 per cent of the total area of the Region. It is important to note that this type of land increased by around 18

thousand hectares in seven years period from 1961-62 to 1968-69. This means that land not available for cultivation is increasing at the rate of around 2,500 hectares per year. Due to the expected rise in the tempo of non-agricultural economic activity in the future, the demand for land for non-agricultural use is going to increase considerably. The rational and planned use of land for non-agricultural use thus becomes a matter of primary importance. It is further observed that the increase of this type of land is not even, throughout the Region. Tehsils, which showed comparatively large increase in the land not available for cultivation from 1961-62 to 1968-69 are: Nuh, Mawana, Ghaziabad, Bhagpat and Palwal; in most of these tehsils urbanisation is low except in Ghaziabad and the reason for the increase is perhaps due to the increase in barren land. Hence these tehsils need special attention in agricultural planning.

Uncultivated Land: Uncultivated land refers to the area under permanent pastures and grazing land, land under miscellaneous tree crops and groves, and the culturable waste like water logged areas and saline land. The size of this land in the Region is 1,74,108 hectares and it constitutes 5.85 per cent of the total land in the Region. Tehsils which have more than 10,000 hectares of this type of land in the Region are: Jhajjar, Panipat, Bulandshahr, Khurja and Alwar.

There is a large cattle wealth in the Region. Bullocks are still used extensively

for cultivation and large number of cows and buffaloes are kept for milk supply. The demand for milk in the Region is expected to increase considerably with the increase in population, particularly so in the urban centres. Part of the Haryana Sub-region specialised in breeding buffaloes for the markets in other parts of India. In these circumstances the area under grazing land may have to be protected and wherever possible, it has to be increased. However, there are certain water-logged and saline areas under cultivated land particularly so in Jhajjar and Panipat tehsils which may be reclaimed and used for cultivation. Besides this, there seems little scope of bringing additional land under cultivation.

Net Sown Area: Net sown area in the NCR is 2,219,102 hectares; it constitutes 74.24 percent of the total land in the Region. Besides this, 119,615 hectares of land has been shown as fallow in the year 1968-69. It is noticed that there is a slight increase in the net sown area (including fallow land) to the extent of 5,700 hectares from 1961-62 to 1968-69. There seems little scope for expansion of this area in the Region beyond putting the fallow land under the plough. It is, therefore, necessary to protect it by a suitable land use policy and to make efforts for intensification of cultivation by augmenting irrigation facilities. Land subject to floods which is 7,21,721 hectares, constituting 24.15% of the total area in the Region may be fully utilised after adopting flood control measures.

Irrigation:

As the scope of increasing the land under cultivation is limited and in the years to come some of it may have to be put to non-agricultural uses, it is imperative that optimum utilisation of this land is made for productive purposes. An important factor which helps in this connection is the availability of assured irrigation.

The total area in the NCR, which has assured irrigation facilities, is 1,102,664 hectares, constituting 49.69 per cent of the net sown area of the Region. Around 309,950 hectares have irrigation facilities more than one crop a year and it forms 28.4 per cent of the net irrigated area in the Region. The proportion of 49.69% having irrigation facilities in the Region is favourable as compared to that of All India (20.08%), Haryana (37.77%), U.P. (36.12%), and Rajasthan (14.53%). Two important sources of irrigation in the Region are: (i) underground water which irrigates 56.53 per cent of the total irrigated area in the Region and (ii) canals, which irrigate 41.91 per cent of the total irrigated area in the Region.

There is a wide variation in the availability of assured irrigation facilities in the Region. The U.P. Sub-region has comparatively better irrigation facilities. Some of the tehsils in the U.P. Sub-region have as high as 90% of their sown area irrigated. Practically all the tehsils in this Sub-Region have more than 60 per cent of their

net sown area irrigated. On the other hand tehsils of the Rajasthan Sub-region and adjoining tehsils of Alwar district in the Haryana Sub-region have as low as 20 per cent of their net sown area irrigated. Rest of the tehsils in the Haryana Sub-region have average facilities of irrigation.

According to the Fourth Five Year Plan Schemes, around 24,000 hectares of additional land would be brought under assured irrigation in the U.P. Sub-region. A major part of it will be from tube-wells. In the Haryana Sub-region greater emphasis has been put on the increase of irrigation facilities. An important scheme in this connection is the Rewari Lift Scheme which will bring 55,000 hectares of additional sown area under irrigation. Other projects are the Gurgaon Canal Project, Beas I and II Projects and Remodelling of the Western Yamuna Canal. Besides these, ambitious schemes of tube-well installation and many more minor irrigation schemes are proposed in the Fourth Plan. The data regarding additional land to be brought under cultivation is not available for these schemes, but these are expected to benefit a sizeable net-sown area in the Haryana Sub-region. In the Rajasthan Sub-Region the Sahibi Irrigation Cum Flood Control Scheme will improve irrigation.

Apart from the utilisation of water from the rivers Yamuna and Ganga through major irrigation schemes, important sources of future irrigation are the collection of rain water and the exploitation of underground

water in the Region. A systematic underground water survey and water testing should be undertaken for the whole Region. The results of this survey would help in suggesting better utilisation of the waters of the Ganga and the Yamuna for irrigation in the NCR, and for those places where underground water is not available either in sufficient quantity or is not suitable for irrigation. The underground survey should be done on a priority basis for the Haryana and the Rajasthan Sub-regions, where a large proportion of sown area has no irrigation facilities. In this connection rural electrification and spread of banking facilities are vitally important. Unless electricity and rural credit are available, the installation of tube-wells for irrigation cannot be a success. Co-operative Land Mortgage Banks should play a major role in advancing money to the farmers for sinking more tube-wells. A crop loan system should be introduced under which a farmer can be given credit not in relation to ownership of land but in proportion to the acreage of the particular crop which he is going to sow.

The work of storage of rain-water for irrigation and flood control in the Region should be undertaken simultaneously. On the basis of the findings of a detailed contour survey for floodable areas in the Region, it may be possible to suggest the creation of deep tanks, from which water could be lifted throughout the year for irrigation of the adjoining areas. The creation of deep tanks at suitable places may also solve the problem of water-logged areas. The irainage of

water from these areas to rivers or canals is a costly proposition. It may be cheaper to drain this water to a well located tank, according to the contours and slopes of the water-logged areas.

Livestock:

The main livestock of the Region are cattle and buffaloes. According to a 1966 livestock census the Region had 1.83 million cattle and 1.32 million buffaloes. Both these put together account for around 80 percent of the total livestock in the Region. Sheep and goats account for another 10.4 per cent of the total livestock in the Region. There is also a sizeable number of milch stock in the Region. The total number of milch cattle and buffaloes in the Region is 1.13 million; this forms approximately 30 per cent of the total cattle and buffaloes in the Region.

Bullocks are extensively employed for cultivation in the Region and cows and buffaloes are an important source of milk supply which augments farm income by the sale of milk or milk products. Marketing of milk in the Region is getting systematised by the opening of milk collection centres by the Delhi Milk Scheme. As pointed out earlier, the Region is not in a position to supply all the milk required by the D.M.S. for the urban population of Delhi. With the rapid growth of population in the Region, the demand of milk is expected to increase considerably. It is suggested that the Region should be able to meet its own

requirements of milk in future. This can be possible only if a systematic dairy development and cattle development plan is formulated. In this connection, 'The National Dairy Development Board' has prepared a comprehensive proposal popularly known as "Operation Flood" for the expansion of metropolitan dairy plants by the use of funds from the sale of skimmed milk powder and butter oil to be received as aid from the World Food Programme of the F.A.O. Besides expansion of the plan capacity, the project also provides for cattle development on an extensive basis in the "milk shed" of Delhi city, so that the scheme will be able to find full requirements of milk for the city from local sources in due course of time.

Cattle development on scientific lines is being attempted by the State Governments as well. Intensive cattle development blocks have been formed for improving cattle breed, better provision of veterinary services, and 'Gaushala' development work. Besides improving the breed of cattle major emphasis in the Region should be on the availability of cheap and better quality fodder. New varieties of high yielding grass of better nutritional contents should be introduced in the Region and all farmers who have relatively larger farm lands should be encouraged to set aside part of their land for growing fodder crops and grass. The Community grazing lands in the Region should

be preserved and not allowed to be converted to other uses.

Sheep and goats is another important part of livestock of the Region. Gurgaon, Rohtak and Alwar districts may be suitable for sheep development. There is already a nucleus of the wool industry at Panipat, which can provide a ready market for sheep farms. Development of piggery and poultry also has much scope in the Union Territory of Delhi and the Haryana Sub-region. The urban population of Delhi and in future other urban centres ^{/would} need huge quantities of meat, chicken and eggs. The Region should be able to supply all these internally if suitable measures are taken. The growth of cattle, sheep and goats, piggery and poultry, taken seriously, can go a long way in supplementing the farm income in rural parts of the NCR. Also organised dairies and poultry farms should be started in the private and public sectors.

Crop Planning:

Crop planning for the NCR should be such that it augments the food supply to fulfil the needs of its future population, and at the same time is remunerative. While attempting any such scheme, it is, therefore, necessary to examine the food requirement of the NCR in 1981.

Food Requirement of the NCR in 1981: Table 4.1.26 elicits the requirement of food in the National Capital Region in 1981. This has been worked out on the basis of production

*Delhi Milk Scheme 'Sournier' - Nov. 1, 1969.

estimates of cereals in the Region and high and low consumption norms, discussed earlier. The estimates of production of cereal crops have been made on the basis of the targets given in the respective District Fourth Five Year Plans and the anticipated increase in the Fifth Five Year Plan period*.

The net production of cereals in 1981 is estimated at 3,017 thousand metric tonnes while the requirement of cereals in the NCR in 1981 is estimated between 3,082 to 3,688 thousand metric tonnes for the projected population of 211.12 lakhs** by 1981. Thus, there would be a short-fall of cereals between 65 to 671 thousand metric tonnes in the Region by 1981. Although the production of cereals in 1981 would register an increase of about 59% over the production in 1968 due to the introduction of H.Y.V. seeds, chemical fertilisers, modern techniques of agriculture, better irrigation facilities, and mechanised farming etc., but inspite of this there would be a food deficit in the Region which may be ascribed to a progressive and rapid increase in its population and the inability of food supply to keep pace with it. Hence, there may be a food deficit

*This is worked out in consultation with the concerned District Authorities and the experts of the I.A.R.I., Pusa Institute, New Delhi.

** Population estimates for 1981 as worked out in the TCPJ.

in the Region in 1981 on the basis of the above estimates for food production and consumption requirement.

The districtwise analysis of production and the requirement of cereals in the Region points out that Bulandshahr, Rohtak, Gurgaon districts and Panipat tehsil may be surplus areas in 1981. The maximum surplus may be in case of Bulandshahr district; it would be between 328 to 408 thousand metric tonnes. As compared to 1968, the position in all the above three surplus areas may be much more comfortable in 1981 excepting Gurgaon district. In case of Meerut district, the position may be satisfactory. Although the production of cereals in this district would almost be doubled from 371 thousand metric tonnes in 1968 to 736 thousand metric tonnes in 1981, the district may not be considered as a surplus area in food due to a high increase in population. The other parts in the Region viz., Union Territory of Delhi and Alwar (Sub-district) may be deficit in food by 1981. In case of Delhi, the deficit is worked out between 845 to 1,033 thousand metric tonnes; if the past trends of abnormal growth of population and high rate of urbanisation are allowed to continue. In Alwar (sub-district), the deficit seems largely due to low production of cereal crops in the absence of adequate irrigation facilities.

Table 4.1.26

Food Requirements in the NCR - 1981.

(Figures in '000 Metric tonnes)

Sl. No.	District/Tehsil	Popula- tion in 1981 (lakhs)	Net Pro- duction	Consumption requi- rement per capita per year		Surplus/Deficit In 1981		Surplus/deficit In 1981	
				Norm A	Norm B	Norm A	Norm B	Norm A	Norm B
1	2	3	4	5	6	7	8	9	10
1.	Delhi	67.24	137	982	1,170	(-)845	(-)1,033	(-)479	(-)585
2.	Meerut	45.45	736	664	791	72	(-) 55	(-)112	(-)205
3.	Bulandshahr	28.50	824	416	496	408	328	118	59
4.	Rohtak	28.86	593	421	508	172	85	102	45
5.	Gurgaon	24.81	452	362	437	90	15	126	77
6.	Panipat(Tehsil)	5.46	125	80	96	45	29	22	11
7.	Alwar(Sub-distt.)	10.79	150	157	190	(-) 7	(-) 40	(-) 17	(-) 40
Total N.C.R.		211.12	3,017	3,082	3,688	(-) 65	(-) 671	(-)240	(-)638

N.B. 1) Norm A relates to consumption @ 146 k.g. per capita per year.

2) Norm B relates to consumption @ between 174 and 176 k.g. per capita per year.

The distribution of total population of the region for 1981 in different areas given above is based on the past trends. The desirable distribution of population is given in chapter III for which districtwise figures have not been worked out.

Agricultural Productivity: It is important to increase food supply in the Region by stepping up the agricultural productivity so as to meet the food shortage. This may, however, be done through proper planning of crops and enriching the soil in various ways, especially in those areas where agricultural productivity is comparatively low. Hence, it is necessary to measure agricultural productivity in different districts in the NCR through a suitable index.

Agricultural productivity has two important factors viz., (a) yield per acre of different crops and (b) area under these crops. A composite index, using both these factors with appropriate weights would denote agricultural productivity. With the help of this index it would be possible to determine areas with high and low agricultural productivity for planning purpose in the NCR.

The crop yield indices for all the districts in the NCR, the Union Territory of Delhi and Panipat Tehsil have been framed for 1967-68. For working out these indices, the crop yield in the districts as a percentage to crop yield in the NCR is multiplied by the crop area in the district as a percentage of the crop area in the Region. The sum of the products for all the 13 principal crops is divided by the sum of the area under these crops in the district as a percentage to the area under the respective crops in the Region.

The results of the crop yield indices of different parts of the NCR are presented in Table 4.127. Table 4.1.27: Crop Yield Index in NCR-1967-68.

Sl.No.	District/Tehsil	Crop yield index of all principal crops	Ranking
1.	Panipat (Tehsil)	138.15	I
2.	Bulandshahr	103.66	II
3.	Rohtak	98.19	III
4.	Gurgaon	87.93	IV
5.	Meerut	95.45	V
6.	Delhi	77.58	VI
7.	Alwar (Sub-district)	49.17	VII

Note:1

Mathematically the Index can be expressed as follows:

- A_i = Area under the i the crop in the district.
- B_i = Area under the i the crop in the Region.
- C_i = Yield per acre for the i the crop in the district.
- D_i = Yield per acre for the i the crop in the Region.

$$\text{Crop yield Index} = \frac{\sum_{i=1}^n \left[\frac{A_i}{B_i} \times 100 \right] \left[\frac{C_i}{D_i} \times 100 \right]}{\sum_{i=1}^n \left[\frac{A_i}{B_i} \times 100 \right]}$$

Note:2 The results of the above table indicate that Panipat tehsil has the highest agricultural productivity in the Region, as reflected by the higher crop yield indices; Bulandshahr ranks next in order and is followed by Rohtak and Gurgaon, where the level of agricultural productivity is more or less the same. Meerut attains the fifth rank in the Region in terms of agricultural productivity. It is important to investigate the causes of low yield in this area, as compared to Bulandshahr. The Union Territory of Delhi and Alwar (Sub-district) have very low agricultural productivity respectively.

For augmenting agricultural productivity in the Region, soil has to be enriched and a suitable cropping pattern be evolved.

Retaining Soil Fertility: Very meagre data about soil in the NCR is available. Whatever scanty data is there, it simply helps us to recognise a number of broad soil-groups. Far less do we know about the varieties within each of them. The alluvial soils, mostly found in the U.P. and Haryana, are still an ill-defined group. However, some suggestions to maintain and step up the productivity of the soil may be made. In this connection proper rotation of crops, mixed cropping and catch cropping* deserve attention. A proper rotation can maintain the fertility to a great extent and also check the damage done by insects and pests. The prevalent rotations may be improved upon. For instance in the U.P. Sub-region rice, which does not allow cultivation of millets, can be combined with berseem cultivation. Sugarcane crop both in the U.P., and the Haryana Sub-regions may be followed by paddy, legumes and next, green manure. The practice of keeping land fallow has an important place in many crop rotation

*Both mixed and catch cropping mean growing more than one crop. In the former, the crops are mixed together and then drilled; in the latter, other crops are produced while the main crop continues to mature.

schemes. Land is left unused for a period before sowing the next crop and the area which is weed infested is allowed to go out of cultivation. In the short period, cultivation of fallow land may be undertaken for growing foiler of a new variety, as has been practised lately in Gujarat; it should be possible to return to the soil what is extracted from it by a previous crop and yet grow a crop all the time on it. From a long term range point of view, the system of mixed farming should be introduced. This would result in increasing food production in the Region. Mixed cropping is specially suited for dry farming areas like Alwar and parts of Haryana Sub-region where the main problem is to collect, preserve and use all the moisture available. Some of the crops that may be recommended for dry farming areas in the NCR are: millets, pulses, oil seeds, fibres and tobacco. The following combinations may suit the 'ek-fasli' areas; cotton and methi; groundnut and cereals; maize and black gram; jowar and arhar; wheat and gram legumes.

For enriching the soil, cheap artificial fertilisers need to be supplied to the farmers in proper time; side by side organic manures may also be used. Conservation and application of dung, production and use of compost and adoption of the system of green manuring deserve special mention on the grounds of convenience and cost. The soil scientists have

established that humus, i.e. (decayed vegetable and animal matter) is essential for the soil. The humus makes for better tillage. It increases the internal area of the soil which is available for holding water and for presenting the nutrient salts to the roots. It affords a home and food for the soil bacteria and imparts disease resistance to the crops and the animals that feed on them. The scorching heat burns out the humus from the soil and hence a regular supply of organic matter is essential.

Cropping Pattern: With a view to attaining maximum agricultural production in general and cereal production in particular the existing cropping pattern in the NCR needs to be changed for making the Region self-sufficient in food as far as possible and boosting its economy. A suitable cropping pattern has to be evolved which will not only augment the agricultural production but will also check the current wasteful expenditure on unremunerative crops. Various factors need to be examined while suggesting such a cropping pattern for the NCR, e.g., physical conditions, irrigation facility, fertilizers, availability of H.V. of seeds etc.*

The National Council of Applied Economic Research have made a detailed study of cropping pattern in the Punjab (undivided) keeping

*A detailed study on cropping pattern in the NCR keeping in view of the above factors is being made by the T&CPO on the basis of linear regression equations; this study would suggest a suitable and most paying cropping pattern for the NCR.

@Cropping Pattern in Punjab, N.C.A.E.R.-1966.

in view various important factors. In the course of this study, they have suggested a suitable cropping pattern which would give rewarding returns to the farmer. Table 4.1.28 gives the details for the districts of Gurgaon and Rohtak and Panipat tehsil in regard to the possible changes in area and crops. The additional net returns (in terms of money) under existing conditions and under the conditions when additional irrigation facilities will be provided are also depicted in this table. Under the existing conditions, there seems no possibility of a major change in Gurgaon district groundnut is suggested in place of bajra while in Panipat tehsil Hybrid bajra is suggested in place of bajra. But under the conditions of additional irrigation facilities, major changes could be possible, as may be seen from the table. A shift from coarse grains to wheat, sugarcane, cotton and groundnut have been suggested. This has, however, to be examined in the light of the District Fourth Five Year Plan proposals which contemplate a green revolution. The possibility of a multiplex cropping pattern with suitable rotation of crops, whose experiments* have yielded fruitful results, may also have to be seen.

As regards U.P. and Rajasthan Sub-regions and the Union Territory of Delhi, it may, however, be pointed out that in the absence of detailed information regarding soil conditions, use of fertiliser, irrigation facilities being provided for different crops,

*Experiments being made by the Agriculture Extension Division of the I.A.R.I. Pusa Institute, New Delhi.

Table 4.1.28 +

Area on which Rewarding Crop could be Substituted in the Haryana Sub-Region of the NCR.

Sl. No.	District	Area that could be substituted and substituted crops												
		Area Under Existing Conditions if additional irrigation is provided'									Total			
		Area '000 Acres	Crop that could be substituted.	Substituted crop	Adl. return per acre	Adl. return per acre	Area '000 Acres.	Crop that could be substituted.	Substituted Crop.	Adl. return per acre	Adl. return per acre	Area '000 Acres	Adl. return in Gross Net	Adl. return in Gross Net
					Gross Rs.	Net Rs.				Gross Rs.	Net Rs.		Gross	Net
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Rohtak	-	-	-	-	-	257.6 (15.94)	Maize 8.8. Barley 21.7 Gram 100.0 Bajra 63.0 (Fodder) Bajra 64.1 (Grain)	Sugarcane 8.8 Wheat 21.7 Wheat 50.0 Mustard 50.0 Cotton 45.0 Groundnut 18.0 Desi Cotton 45.8 Groundnut 18.8	10.99 7.59	7.59	257.6 (15.94)	10.99 7.59	7.59
2.	Gurgaon	15.0	Bajra 15.0	Groundnut 15.0	1.95	0.88	486.0 (33.54)	Gram 175.0 Jawar 131.0 Bajra 180.0 (grain)	Wheat 175.0 Maize 131.0 Cotton (Desi) 180.0	37.53 19.25	19.25	501.0 (34.61)	30.34 20.13	20.13
3.	Panipat	-	Bajra (Hybrid)	Bajra	3.95	1.67		Maize Gram Bajra (gram)	Sugarcane Wheat, Potatoe Maize, sugar-cane.	45.85 19.98	19.98	49.81 (12.06)	49.81 21.65	21.65

Note: Figures in brackets express the area as percentage of gross cropped area.

Source: Adapted from 'Cropping Pattern in Punjab' by N.C.A.E.R. - 1966

and the cost of various inputs and farm income, it may not be possible to make concrete suggestions on the cropping-pattern. However, keeping in view of the available information some broad suggestions are given below for different Sub-regions which may increase the production of cereals as well as the income of the farmers.

In the U.P. Sub-region, millets may be replaced by wheat, oilseeds and tobacco in irrigated areas. It is observed from the crop yield index (table 4.1.27) that the yield of sugarcane in Bulandshahr is very low and the quality is also not good. Hence, it is suggested that sugarcane beats may also be grown especially in Bulandshahr District. Sugar made from sugar beat is decidedly better than from sugarcane. The yield of the cotton crop is found to be very low both in Meerut and Bulandshahr districts. Due to its poor quality, it does not fetch a good price to the farmers. Hence, it is not remunerative to grow cotton in this Sub-region. It should be replaced by a suitable crop. Barley may be replaced by rape and mustard as far as possible. Under conditions of additional irrigation facilities, a part of the area under gram may be shifted to wheat. A high yielding variety of wheat may be used so that wheat production in the Region is increased considerably to wipe off the future deficit.

In case of the Union Territory of Delhi, the yield of the wheat crop is the highest in the Region, while that of cash crops, namely, sugarcane and oilseeds is comparatively very low. In view of this, it is suggested that

these two crops may be substituted by wheat (Kalyan) and rice (paddy N.P. 130 & Podma). In rotation with wheat hybrid bajra and hybrid and composite maize which have shown very good results in Delhi, may be grown. As part of the Kharif programme, vegetable cultivation may be encouraged. The latest varieties, of cow peas, soya-beans, ladies finger and turnips may be used.

As regards the Rajasthan Sub-region, it is suggested that bajra, jowar and pulses may be replaced by wheat under conditions of additional irrigation facilities. The special variety of wheat seeds lately released for dry areas, may be used. Area under gram which is non-irrigated may be further increased.

The cropping pattern, suggested above, would go a long way in wiping out the food deficit ranging between 65 to 671 thousand metric tonnes in the Region in 1981. A considerable area has been suggested under high yielding varieties, especially in the wheat growing areas. With a more intensive application of fertilisers and a wider distribution of agricultural inputs among farmers, along with shifts in the crops with proper rotation and an effective operational plan, it should be possible to bring about a significant increase in productivity, and farm income. This increase in farm income will have an impact on the economy of the Region by accelerating savings which in its turn would be helpful in realising the growth rates envisaged in the National perspective plans.

Rural Electrification and Banking Facilities:

Rural electrification is of vital importance both for agricultural purposes and agro-based industries. Unless electricity is provided tubewells for irrigation cannot be a success. Any 'Central Place' Villages can become centres for agro-based industries and for processing agricultural products. The social impact of electricity in providing lights to streets and homes is also now rated high.

Another factor in stimulating greater agricultural production is the spread of banking facilities in the rural areas. Co-operative and Mortgage Banks should play a major role in advancing loans to the farmers for sinking more tubewells. A crop loan system should be introduced in which a farmer can be given credit not in relation to ownership of land but in proportion to the acreage of the particular crop which he is going to sow. Commercial banks will also act as catalyst for non-agricultural activities in the rural areas such as commerce and agro-industries. Banks will also help to stimulate savings among the more prosperous farmers.

Agricultural Marketing: The most crucial role which the agricultural sector has to fulfil in the development of urban areas in the Region's economy is related to the supply of agricultural products, especially perishable goods, such as, milk, eggs, fruits and vegetables, cotton, oilseeds etc. This is also an important aspect of the rural-urban relationship. It has been stated before that the Region is well endowed to provide the increasing demands

for agricultural products emanating from the urban areas. To actually meet this demand certain organisational measures will require to be adopted. Here the main suggestion would be that the State Governments should step up the programmes for the establishment and development of co-operative activity in these lines of production. The assistance from the Agricultural Refinance Corporation set up by the Reserve Bank of India should be sought for this purpose. This Corporation advances substantial loans to large co-operative societies, through State Co-operative Banks under certain conditions. Only large co-operative Societies requiring assistance. Probably, it would be advisable to worm Producer Societies and their Federations. These Federations can be Registered under the Central Co-operative Act and the federating societies under the respective State Co-operative Acts. The three federations can undertake the functions relating to the supply of producer's goods such as fertilisers, high yielding seeds, chicken feed etc. as well as the marketing of the produce in the urban areas. All these activities can be organised with the help of assistance from the Agricultural Refinance Corporation. In view of the growing demand for these products in this Region, such a course would help to raise the incomes of many rural areas without imposing any initial or recurring financial burden on the State Governments and also meet one of the pressing needs of the growing urban areas*.

Interim Report on the Planning of the NCR" T.C.P.O., 1967.

substantial amounts are considered for such

Strategy for Rural Development:

The rural part of the NCR is unable to provide gainful employment to its fast growing population. According to the 1961 Census, the total number of migrants from Bulandshahr, Rohtak, Gurgaon, Karnal and Alwar was 199,734 persons. Out of these, 141,696 persons were from the rural areas of these districts and constituted about 71 percent of the total migrants from these districts to Urban Delhi. As brought forth earlier, there is little scope of bringing additional area under cultivation in the NCR. The pressure on the existing cultivated land in 1961, measured in terms of number of cultivators per 100 hectares of net sown area in various tehsils of the Region varies from 55 to 131. A detailed position of land pressure, in various tehsils of the Region may be observed from the frequency distribution of tehsils given below:

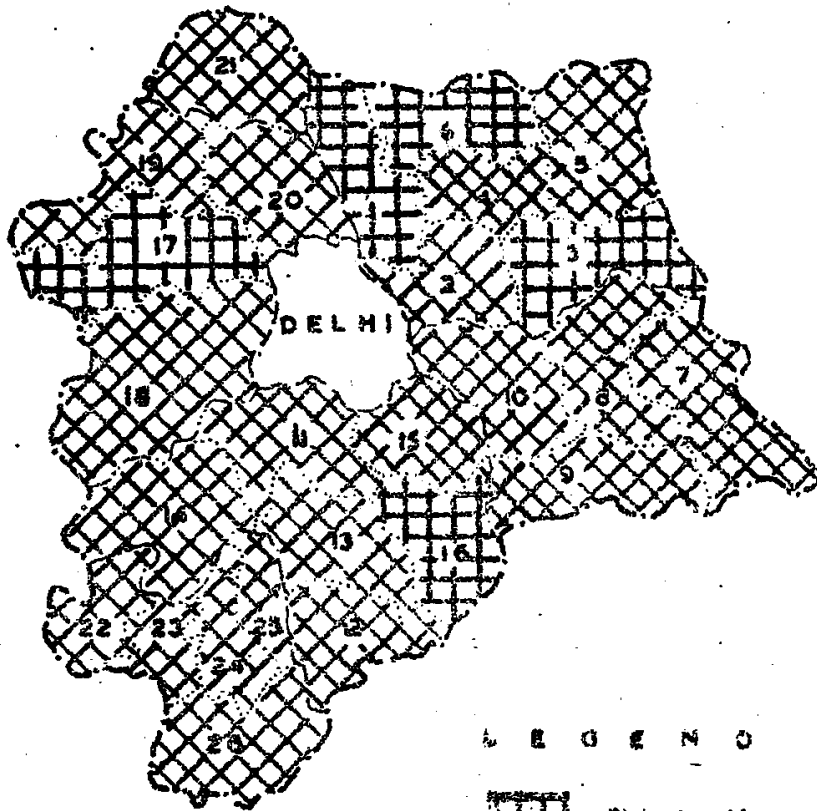
Land pressure in terms of cultivators per 100 hectares of sown area -1961	Names of tehsils/ area in the Region.
Below 60	Delhi, Gurgaon, Rewari, Kishangarh, Gohana.
60 - 80	Ghaziabad, Hapur, Meerut, Mawana, Khurja, Nuh, Palwal, Ballabgarh, Rohtak, Jhajjar, Behror, Mandawar, Tijara.
80 -100	Bhagpat, Anupshahr, Bultani-shahr, Sikandrabad, F. Thirka, Sonapat, Alwar.
Above 100	Sardhana and Panipat.

Whether the land available for cultivation in the Region can support any further working force in agriculture is a complex question, as it is related to the intensity of cultivation, modernisation and mechanisation of agriculture and the aspiration of the rural population for a better standard of living. Due to the non-availability of relevant data on all these aspects it is not possible to assess the exact surplus rural population of the Region in future who will seek means of livelihood other than cultivation either in the rural or in the urban areas of the Region. The trend of migration and the low standard of living in rural areas, however, indicates that by 1981 a large population will seek refuge in the urban areas. "At this point it is interesting to note that, there is much interdependence between city and farm for provision of jobs. Farms provide jobs for many people not only in the task of food or raw material production but also in processing and providing and maintaining services and transport to and between the farm and the city. In the highly mechanised arable farming areas each person working directly in agriculture is serviced by two people who may live closeby or some distance away in a market town or industrial city".* Such a situation may not exist in Rural NCR today but with the mechanisation of agriculture, larger creation of jobs in small mandi towns of the Region could be possible in future.

*Agriculture and Urban Growth by G.P. Wibberley.

NET SOWN AREA TO TOTAL
AREA OF TEHSIL ①

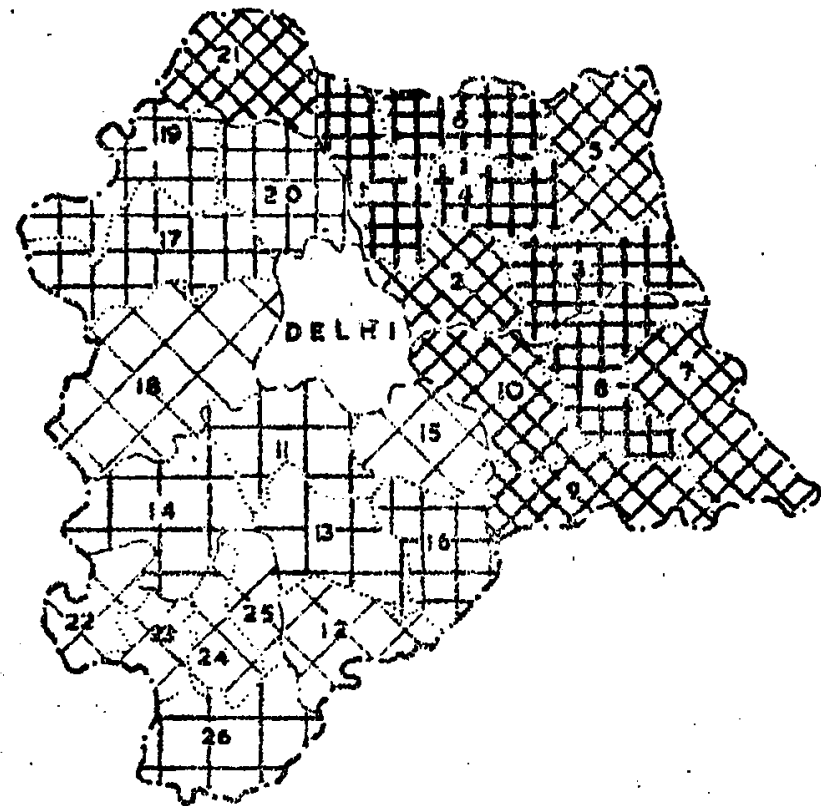
AGRICULTURAL DEVELOPMENT
IN N.C.R. 1968-69 FOUR INDICES



LEGEND

	81% & Above
	61% To 80%
	41% To 60%
	21% To 40%
	20% & Less

NET IRRIGATED AREA TO NET
SOWN AREA IN TEHSIL ②



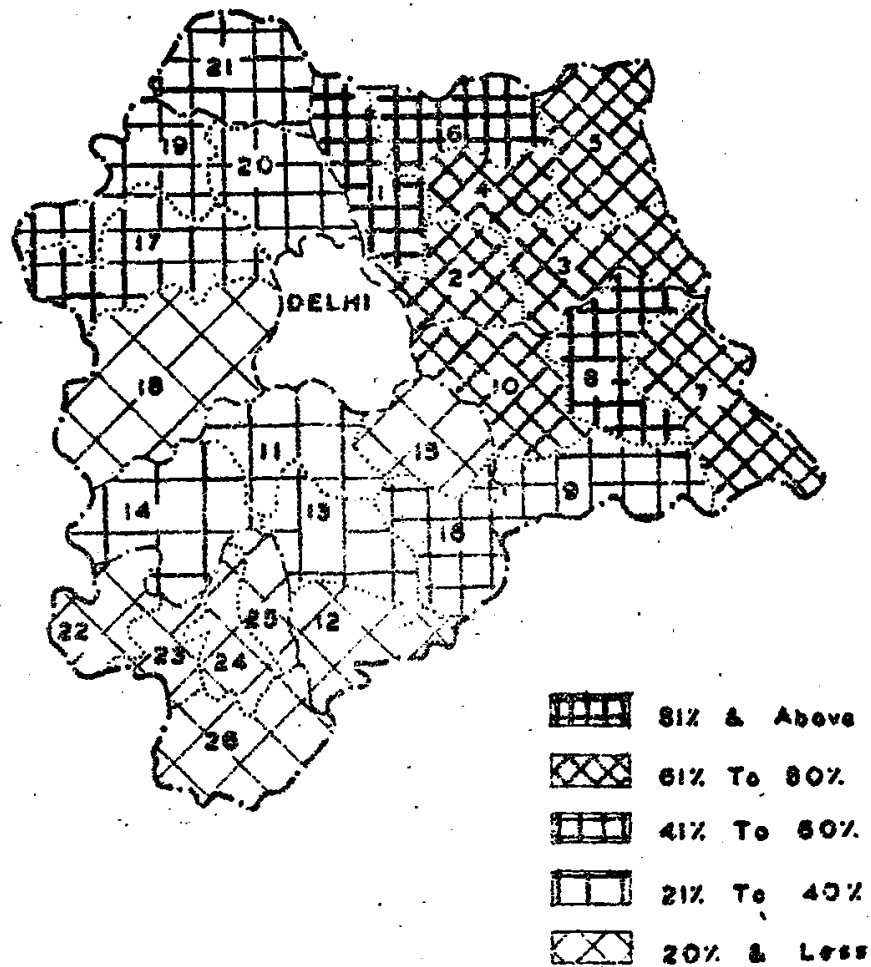
Source : Revenue Records Of State Govts.



NATIONAL CAPITAL REGION

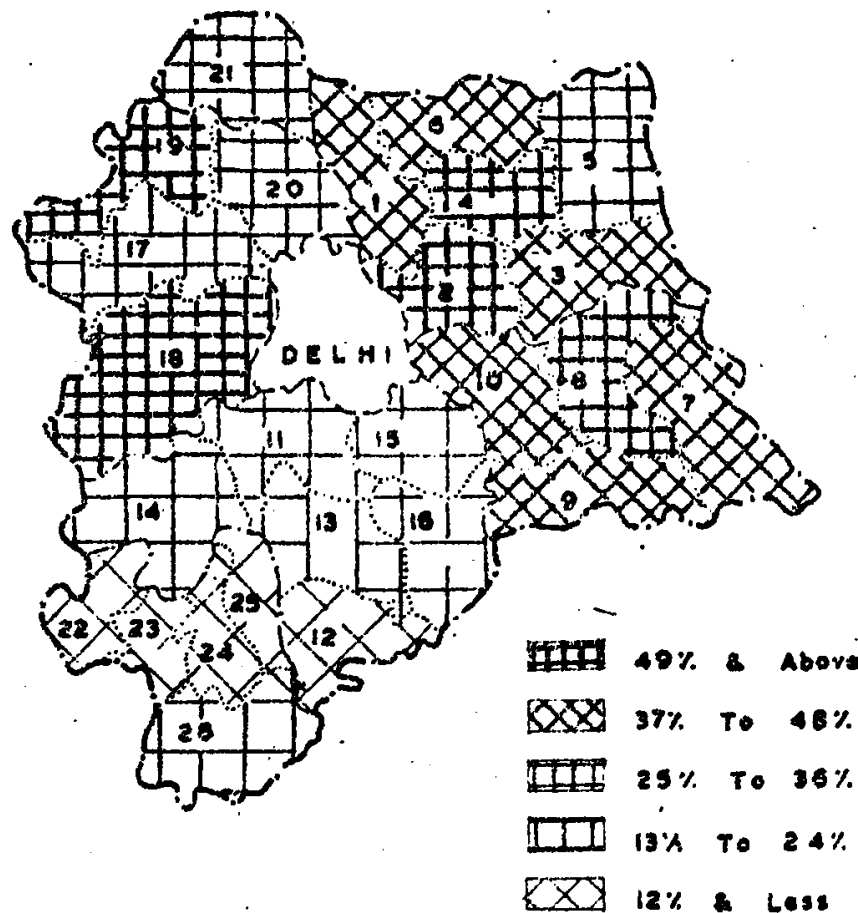
TOWN & COUNTRY PLANNING ORGN
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**GROSS IRRIGATED AREA TO TOTAL
CROPPED AREA IN TEHSIL** ③



**AGRICULTURAL DEVELOPMENT
IN N.C.R. 1968-69** FOUR INDICES

**AREA SOWN MORE THAN ONCE TO
NET SOWN AREA IN TEHSIL** ④



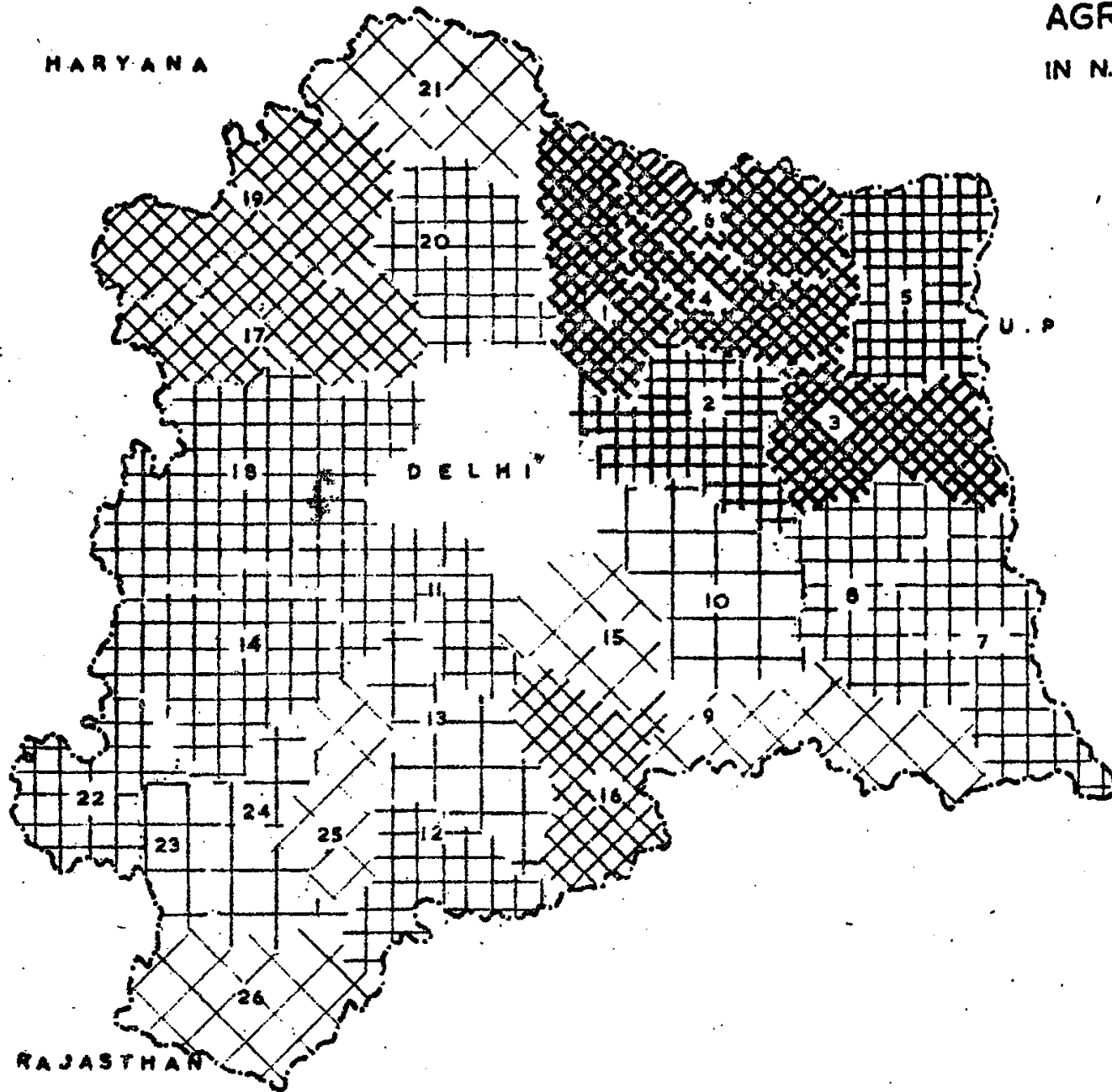
Source : Revenue Records Of State Govts.



REGION

TOWN & COUNTRY PLANNING ORGN.
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AGRICULTURAL DEVELOPMENT IN N.C.R. 1968-69 COMPOSITE INDEX



NET SOWN AREA TO TOTAL AREA
GROSS IRRIGATED AREA TO GROSS
CROPPED AREA
INTENSITY OF RAINFALL
SOIL FERTILITY

LEVELS

	One	}	Average
	Two		
	Three		
	Four	}	
	Five		
	Six		
	Seven		



NATIONAL CAPITAL REGION

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The search for alternative economic activity for a majority of the surplus rural population; and its location in the Region, becomes an important factor which affects regional urban pattern. The clues for it can best be sought from the present position of those economic activities which link the rural and urban sectors of the Region. The important activities of this type discussed below are: transfer of surplus food-grains from rural sector for urban needs and consumer goods from urban areas to rural areas; provision of milk and vegetables to urban population; agro-based industries.

Food Surplus/Deficit and Comparative Better Agricultural Area:

The NCR as a whole is deficit in foodgrains in 1968. A major portion of this deficit is caused by the large urban population of Delhi. Other parts of the Region which are deficit in food grains are Meerut and Alwar (Sub-district). The deficit in Meerut district may be due to a comparatively higher density of population, and larger area under sugarcane. The deficit in Alwar (Sub-district) is rather nominal. Other parts of the Region are surplus in foodgrains. Storage and market facilities for foodgrains are required both in surplus areas as well as those which are deficit in foodgrains. This function is being performed presently by the Mandi towns and other urban areas of the Region. The size and growth of these towns is expected to be related to the level of agricultural development in different parts of the Region. With this in view, the 26 tehsils of the NCR and the Union Territory of Delhi

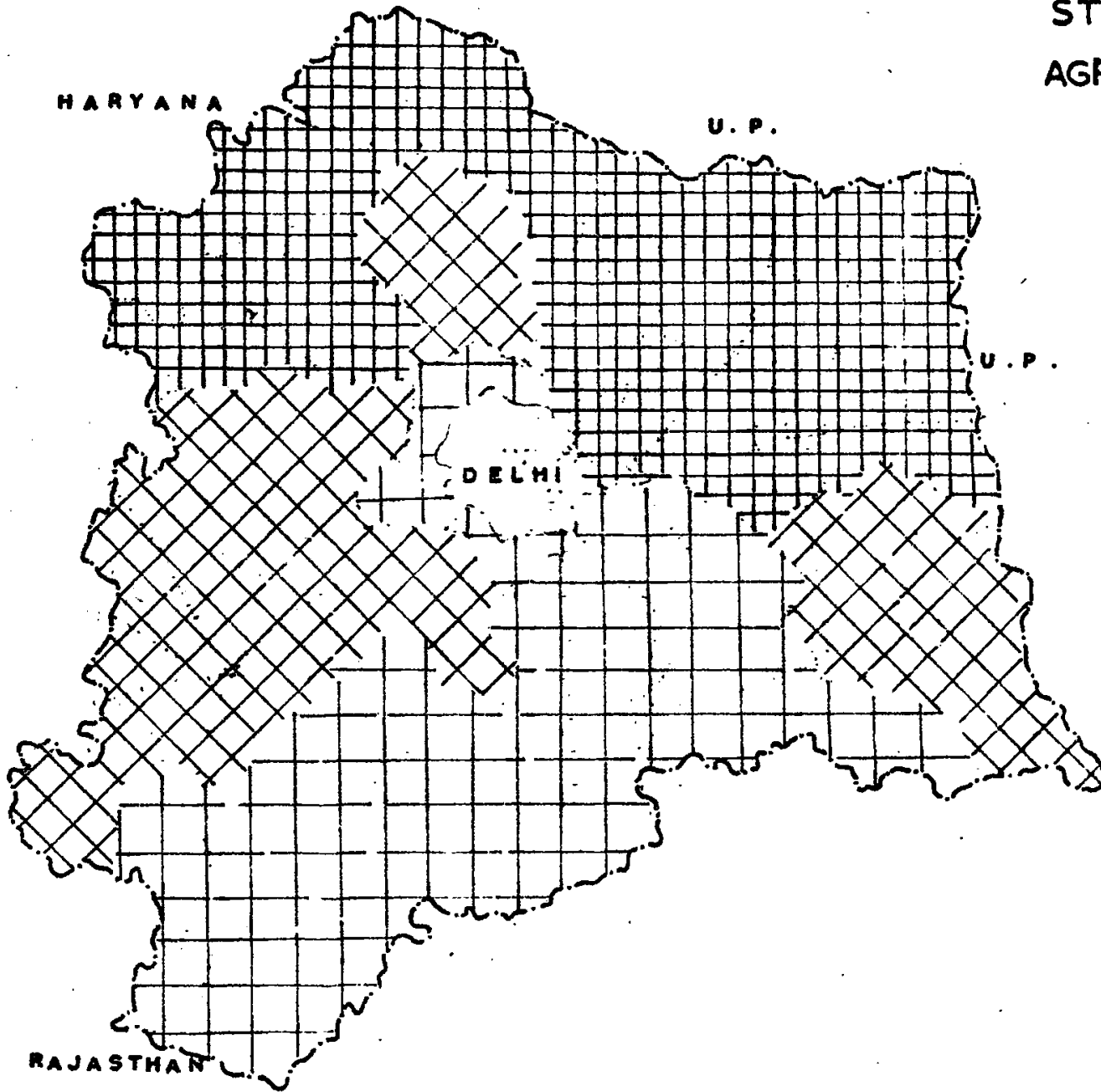
have been ranked according to the level of agricultural land in 1968-69. The ranking has been done on the basis of a composite index of four factors: (i) Percentage of net sown area to total area (ii) percentage of gross irrigated area to gross cropped area (iii) Rainfall (iv) soil fertility. Maps 4.1.1 & 4.1.2. The results of composite values are presented in table 4.1.29. These tehsils have been further grouped according to the standard deviation of the composite values. These have also been compared with the proportion of urban population to total population of the tehsils of each group (map 4.1.3).




It is observed from the next table that the groups of tehsils showing a comparatively higher level of agricultural development have in general higher urbanisation. This trend is expected to continue in future and should be kept in mind while deciding an urban regional pattern and in assigning priorities for the provision of social and economic infrastructure. Tehsils of Sarhana, Baghat, Hapur, Mednuf, Bazia- bad, Mawana, Palwal, Rohtak and Gohana are included in Group I, II and III which show a comparatively high level of agricultural development. These groups also show a comparatively higher proportion of urban population to total population. Tehsils of Anupshahr, Rewari, Sonapat, Bulandshahr, Farazpur, Jhirka, Gurgaon, Behror, and Thajjan included in group IV show an average level of agricultural development and average urbanisation. Tehsils of Mandawar,

Table 4.1.29
Level of Agriculture in NCR - 1968

Rank	Tehsil	Composite Values	Group Range	Proportion of urban to total population	Remarks
1.	Sardhana	+1.03)	<u>Group I</u> +0.75 and above	21.82	Standard deviation of the composite values is 0.29 to 0.30 (round figure) has been taken for group formation.
2.	Bhagpat	+1.01)			
3.	Hapur	+0.96)			
4.	Meerut)			
5.	Ghaziabad	+0.59)	<u>Group II</u> +0.45 to +0.75	17.92	
6.	Mawana	+0.57)			
7.	Palwal	+0.41)	<u>Group III</u> +0.15 to +0.45	16.31	
8.	Rohtak	+0.21)			
9.	Gohana	+0.18)			
10.	Anupshahr	+0.09)	<u>Group IV</u> Average group -0.15 to +0.15 (slight)	9.12	
11.	Rewari	+0.07)			
12.	Sonepat	+0.06)			
13.	Bukandshahr	+0.06)			
14.	Jhirka	-0.04)			
15.	Gurgaon	-0.06)			
16.	Behror	-0.29)			
17.	Jhajjar	-0.30)			
18.	Manjwar	-0.35)	<u>Group V</u> -0.15 to -0.45	6.31	
19.	Nuh	-0.36)			
20.	Kishangarh	-0.40)			
21.	Sikandarabad	-0.40)	<u>Group VI</u> -0.45 to -0.75	21.28	
22.	Ballabgarh	-0.43)			
23.	Panigat	-0.47)			
24.	Khurja	-0.56)			
25.	Alwar	-0.56)			
26.	Tijara	-0.68)			
27.	Delhi	-1.01)	<u>Group VII</u> -0.75 and below	88.74	

STRATEGY FOR AGRICULTURAL DEVELOPMENT



-  Area Recommended For Urbanisation
-  Area Recommended Both For Urbanisation And Agricultural Development
-  Area Recommended For Agricultural Development



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Nuh, Kishangarh, Sikanjarabal, Ballabgarh, Panipat, Khurja, Alwar Tijana and Union Territory of Delhi are included in group V, VI, and VII show comparatively low level of agricultural development. However, tehsils of group VI and VII, show comparatively high urbanisation. This is due to the presence of Urban Delhi, and the towns of Panipat, Ballabgarh and Alwar. Broadly, the NCR can be divided into three areas from the point of view of agricultural development. The strategy for development in each of these parts may be as follows (please see map 4.1.4).

(i) Area recommended for higher urbanisation: This area includes tehsils showing a comparatively higher level of agricultural development. The main emphasis in this area may be on the provision of social and economic infrastructure, which may help in scientific crop planning and modernisation of agriculture. The allied economic activities like agro-based industries may be encouraged. The development of growth centres in the form of small towns may be emphasised which will give rise to non-agricultural activities. The physical planning of the growth centres and their road links with villages and other towns of the Region may be taken up on a priority basis.

(ii) Area recommended for agricultural development and urbanisation: This area includes most of the tehsils showing an average level of agricultural development. There is scope for increase in irrigation and the possibility of major shifts in cropping from coarse cereal to fine cereals and cash crops.

Side by side there may be emphasis on the provision of economic and social infrastructure, for the development of growth centres and central place villages.

(iii) Area recommended for agricultural development: This area includes most of the tehsils with a comparatively low level of agricultural development. Major emphasis in this area may be on the extension of irrigation facilities. An underground water survey may be undertaken on a priority basis. A careful selection of the central place villages may be made and the socio-economic infrastructure including road network may be provided in these villages which is needed for speedy growth of agriculture. Livestock development may be undertaken on a priority basis for supplementing the income of the rural population.

Supply of Milk and Vegetables:

Supply centres of milk and vegetables to urban areas in the Region provide another important economic link of agriculture with urbanisation. These centres also have a good potential for growth into future towns of the NCR. If these centres are related to some towns of the Region, these will provide impetus for faster growth of these towns in future. The important vegetable growing centres in the Region are: Kharkhoda, Sonapat and Bahadurgarh in Rohtak district; Panipat in Karnal District; Palwal, Sona, Gurgaon, Faridabad and Ballabgarh in Gurgaon district and the surrounding areas of the

Towns in Meerut and Bulandshahr districts. NCR has also a large cattle population. With the growing demand of milk in the urban areas certain milk collection centres are bound to develop. Delhi Milk Scheme collection centres have come out at Muradnagar, Bhagpat, Pilibkhat, Dankaur, Pilsana, Masuri, Dadri, Ballabgarh, Palwal, Siana, Bahadurgarh, Kharkhoda, Sardhana, Rewari, Kama & Sonapat.

Agro-Based Industries:

Data on agro-based industries is available only for those units which are registered with the Chief Inspector of Factories of U.P., Haryana and Rajasthan for the year 1965-66. There are in all 229 units in the NCR employing 20,710 workers. The largest number of units are engaged in the manufacture of agricultural implements; these are 75 in number. There are 26 sugar mills and 4 units processing edible oil. Other agro-based industries in the Region are: flour mills, dal mills, bakery products, dairy product, canning and preservation of fruits and vegetables, cold storage and distilleries.

Besides the manufacture of agricultural implements, most of the agro-based industries are engaged in the processing and the preservation of regional agricultural produce. Important raw materials for agro-based industries grown in the Region are sugarcane and oil seeds. Cotton is also grown in small quantity in the districts of Meerut and Rohtak. So the basic emphasis in future has to be on the growth of sugar, gur and other sugar based

industries, edible oils cotton ginning, and the handloom industries, other agro-based industries which involve processing, conversion and storage of the agricultural produce, and those manufacturing agricultural implements may be expanded. The following groups of industries are, therefore, suggested for the NCR:

1. Traditional industries: processing of agricultural produce; industries which can be based on animal husbandry and forest produce; industries related to building and construction material.

The present location of the agro-based industries is indicative of those towns, which are providing the major link between the urban and the rural sector in the Region. The growth of the agriculture sector will have an important bearing on the growth of these towns and hence the urban Regional pattern: Towns or village according to the type of industry are:

Agricultural Implements:

Gurgaon, Faridabad, Rohtak,

Sonapat, Bahadurgarh, Panipat, Sampla, Meerut, Ghaziabad, Modinagar, Hapur and Baraut.

- * Relating to maintenance and repairs, namely, establishment of workshop and such industries as agricultural implements, chaff-cutters, buckets etc.

Sugar Mills: Rohtak, Panipat, Hapur, Meerut, Molinagar, Bhagpat, Madina Dangi, Kharkhola, Sakhoti, Tanda, Sanpholi, Mohindpur, Dambala, Begamabad, Mawana, Inokoli, Baraut, Samesahpur, Rahmanpur.

Edible Oils: Rohtak, Sonapat, Balabgarh, Rewari, Hapur, Molinagar, Ghaziabad, Meerut, Delhi, Begamabad.

Flour Mills: Rohtak, Hapur, Bahadurgarh, Meerut and Delhi.

Dal Mills: Rohtak, Hapur.

Cotton Ginning: Rohtak, Panipat, Hapur.

Rice Mills: Panipat.

Cold Storage: Meerut, Hapur, Ghaziabad, and Delhi.

Canning and Preservation of Fruits: Ghaziabad, Delhi.

Distillery and Refinery: Meerut, Ghaziabad.

Dairy Products: Delhi.

These places are the focal points of agro-based industries in the Region. Many of these are important towns of the Region and will get the benefit of planned growth and will become centres of considerable industrial growth.

There are also a few smaller towns and villages having a sugar mill. These can be considered for development in terms of the growth of agro-based industries, particularly sugar-based. It will be important in future to take care of the necessary social and economic infrastructure in a number of 'central place villages' and towns which is the pre-requisite for the promotion of agro-based industries in order to stabilize the economy of the rural areas.

The study reveals that important economic linkages between rural and urban areas are found in mandi-towns, milk and vegetable collection centres and the towns and villages in which agro-based industries are located. The physical location of these centres and their planned growth is very important for the Region.

Growth Centres for Rural Uplift:

Rural planning in the NCR in an orderly fashion requires an integrated approach. This implies planning of rural areas in relation to urban towns in the Region in respect of all aspects of development, such as, transportation, communications, education, agriculture, banking, industries, health, recreation and other services required for the betterment of rural living. Essential to this kind of rural planning is the idea of a 'growth centre' which implies the development of a town with a cluster of villages around it. These growth centres may be small towns or large villages which have potential for becoming nuclei - for the future development of the surrounding areas. Drawn to these centres with effective

road links will be clusters of villages which will depend on these growth centres for necessary services demanded by rural modernisation. The links of these centres with the villages they serve by trade, industry, finance, education etc., will create the foundations of viable rural-urban communities. In these communities, there would be new job opportunities and new avenues for those who want to migrate. This would help to mitigate the problem of growing migration of the rural unemployed from the backward rural pockets to the metropolis. These centres would also generate a development process by moving larger agricultural inputs into the farm, facilitating the movement of larger marketing surpluses in agriculture through mandies and providing a larger flow of goods and services. In short, such centres would set off catalytic developmental process resulting in higher income, better services, housing and larger employment. These growth centres will be served by higher tier of larger towns and cities in the Region, as well as lower tier of centrally located villages.

The main growth centres in the NCR could be small towns or large villages which have the potential for becoming nuclei for the future social and economic development of the Region. According to the 1961 Census, besides the Delhi Metropolis, there are 49 towns in the NCR; these towns are of varying population sizes and many of them already perform certain important economic functions. They have agricultural mandies, agro-based industries, milk and vegetable collection

centres etc. Map 3.1 in Chapter III shows the physical location of these towns. It is observed from the map that these towns are so well-dispersed in the Region (except the south-west) that practically all villages in the Region have one such town within a radius of 12 to 14 kms. With the average density of the Region, (excluding Delhi and Meerut) at 251 persons per sq. kms., many of these towns act as growth centres and serve an area of 400 to 600 sq. kms. and a population varying from one to one and a half lakhs. In addition to these, a few more large villages particularly in the south-west may be selected to serve as growth centres on the basis of detailed surveys.

Factors for Selection of Growth Centres:

1. Population size and non-agricultural working force.
2. Central location in relation to cluster of villages not being served by any other growth centre.
3. Availability of certain physical and social infrastructure, and growth potential.

III

Infrastructure in the Growth Centres:

Growth centres in the Region may provide:

1. Adequate water supply.
2. Power.
3. College.
4. Dispensary.
5. Post & telegraph.

6. Telephone.
7. Cinema.
8. Bank.
9. Planned market.
10. Adequate facilities for storage of seeds, fertilizer and pesticides.
11. Warehousing.
12. Industrial sheds/estate.
13. Small scale industrial training centre with facilities of repairing farm machinery.
14. Agricultural service centre with attached laboratory for soil testing.
15. Planned bus stop.

Centrally located villages in the lower tier may provide the following facilities and services:

1. High/higher Secondary School.
2. Primary Health Centre.
3. Veterinary centre.
4. Small market.
5. Co-operative societies.
6. Reading room.
7. Post office.
8. Play ground.
9. Service shops (smithy, pottery etc.)
10. Electricity.
11. Filter water supply.

Certain large towns in the higher tier, which are 17 in number may also specialise in certain economic activities to cater to the larger hinterland. These services would vary from town to town keeping in view the function of the town and the needs of the Region.

THE INDUSTRIAL SECTOR:

Industries in the Region:

Delhi has been well known for its traditional crafts and industries, and yet it had never been recognised as an industrial centre. After independence and in the wake of the Partition there was a great influx of refugees from Pakistan among whom there were a large number of artisans and entrepreneurs. This gave a considerable fillip to the process of industrialisation in Delhi. A large number of small-scale and cottage industries have been set up to meet the requirements of the growing urban population of Delhi and the demand for exportable goods. Apart from Delhi, the Punjab entrepreneurs have established industries in a number of nearby towns, such as, Modinagar, Faridabad, and Panipat. Ghaziabad and to a lesser extent Gurgaon have many industrial units established in recent years.

The textile products of Modinagar and Panipat, the fruit juices, beverages, breweries and oil engines of Ghaziabad, the electronic equipment, tractors, tyres and motor cycles of Faridabad and the textiles, electrical and general machinery produced in Delhi are used extensively in the country. Cycles of Sonapat, sugar from a number of mills from all over the Region, utensils from Rewari, cotton waste yarn products from Rohtak, hand pumps from Bulandshahr, pottery from Khurja and agricultural machinery, such

as cane crushers, disc harrows, etc. from Meerut are the other important industrial products of the NCR.

Industries in Delhi: No matter how the concentration is measured, whether in terms of total employment or in terms of raw-material utilisation, value added by manufacture, value of out-put, capital investment, etc., by far the largest concentration of the industries of the Region both registered and unregistered is in Delhi.

Progress in Delhi achieved in the Three Five Year Plans and After: The programmes implemented under the three Five Year Plans and the following three Annual Plans, and in the first year of the Fourth Plan have contributed to industrial growth in Delhi. The number of industrial units has gone up from 8,107 in 1951 to 19,038 in 1965 and to 25,221 in 1969. There has been a corresponding increase in the workers from 69,256 in 1951 to 1,58,731 in 1965 and to 1,84,000 in 1968*. The present employment strength in the entire industrial sector in the Union Territory of Delhi is in the region of 2.7 lakhs, out of which 2.5 lakhs is concentrated in Urban Delhi alone. The total capital investment has increased considerably from Rs. 81 crores in 1965 and was about Rs. 112 crores in 1969. The position as in 1968, is given in Table 4.2.1. (18 crores in 1950 to

*These figures are based on the Industrial Survey 1968 conducted by the Director of Industries, Delhi, which covered nearly 80% of the units.

Table 4.2.1.

Industries in Delhi-1968

Items	All Indus-tries	In small scale and cottage in-dustries.	Percentage of Col.No. 3 to 2.
1	2	3	4
Investment	Rs.112 crores	Rs. 66 crores	58.9%
Production	Rs.271 crores	Rs.156 crores	57.5%
Employment (No.)	1,84,180	1,45,519	79.0%

Source: Survey by the Directorate of Industries, Delhi.

From the Table the following observations clearly emerge:

- (i) The Small Scale and Cottage Industries are employment -intensive having 58.9% of the total investment accounting for 79% of the total employment.
- (ii) The productivity of the Small Scale sector is comparable with the investment. With 58.9% of total investment, they are contributing 57.5% of the total production.
- (iii) The output per rupee invested in the Small Scale and Cottage Industries is Rs.2.36.

Some important indicators of the growth of registered factories in Delhi are given in Table 4.2.2.

Delhi has been exporting both the traditional commodities and the exports have now reached a level of about Rs. 9 crores. (and non-traditional)

Large and medium industries in the Region:
As per the 1965 Industrial Census of Delhi, out of a total of 1,400 registered factories only 250 were large scale industries with a capital investment of more than Rs.7.5 lakhs per unit. This shows that there is a preponderance of small scale industries in Delhi. (Capital investment is the criterion of defining a factory as large or small). However, taking employment as a determinant of the size of an industry, Delhi has 12 factories employing more than 500 workers as against 28 such large industries in the 17 towns in 1968. Medium industries, those employing 100 to 500 persons numbered 97 in Delhi and 107 in the 17 towns (in 1968). The number of factories employing below a 100 workers in 1968 was 1,322 in Delhi and 814 in the 17 towns. (See Map 4.2.1). Thus, a majority of medium and small scale industries are located in Delhi and large scale ones in the 17 towns. The small scale industries are getting modernised, better organised and more skilfully managed.

Village and house-hold industries in the Region:
Among the industries flourishing either as cottage industries in the villages or as house-hold industries in urban areas, the handloom industry is one of the most important. It has

*The discussion on industries in the Region outside Delhi is confined to the registered units, because no survey of the unregistered sector has been conducted.

Table 4.2.2.
Some Indicators of Industrial Growth in Delhi:

Item	1960	1961	1962	1963	1964	1965
Productive Capital (Rs. in crores)	29.68	41.27	44.76	78.49	83.93	92.83
Employment (Number)	62.88	64.211	66.833	80.890	88,104	87.649
Ex-factory Output (Rs. in crores)	80.08	89.87	93.70	118.70	134.07	145.70
Value added by Manufacture (Rs. in crores)	20.15	22.77	21.86	28.10	32.17	34.43

Source: Survey by the Director of Industries, Delhi.

made a rapid progress during the past 19 years. Many of the production organisations and enterprises belong to the co-operative fold. Handloom cloth manufacture is concentrated mainly in rural Delhi, Meerut, Panipat, and Pilibhara run.

Other industries which are/as village industries are mini-scale industries, ~~xxx~~ manufacturing sports goods, electronic equipment, leather works, production of domestic appliances etc.

Among the handicrafts of Delhi may be mentioned: ivory carving, zari zardosi, jewellery, metal-ware, blue pottery and making of other similar articles.

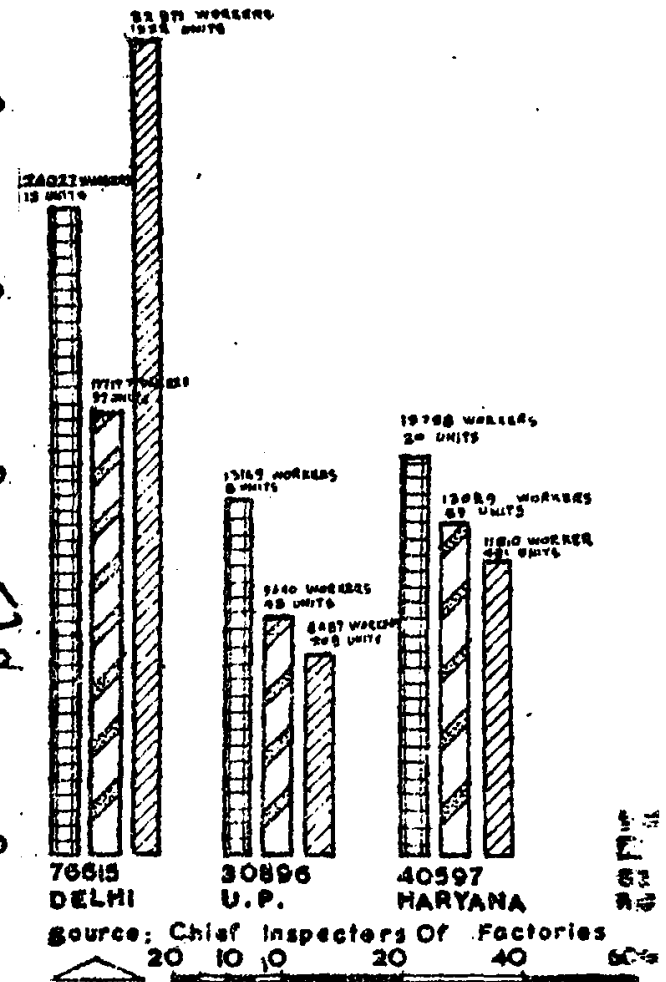
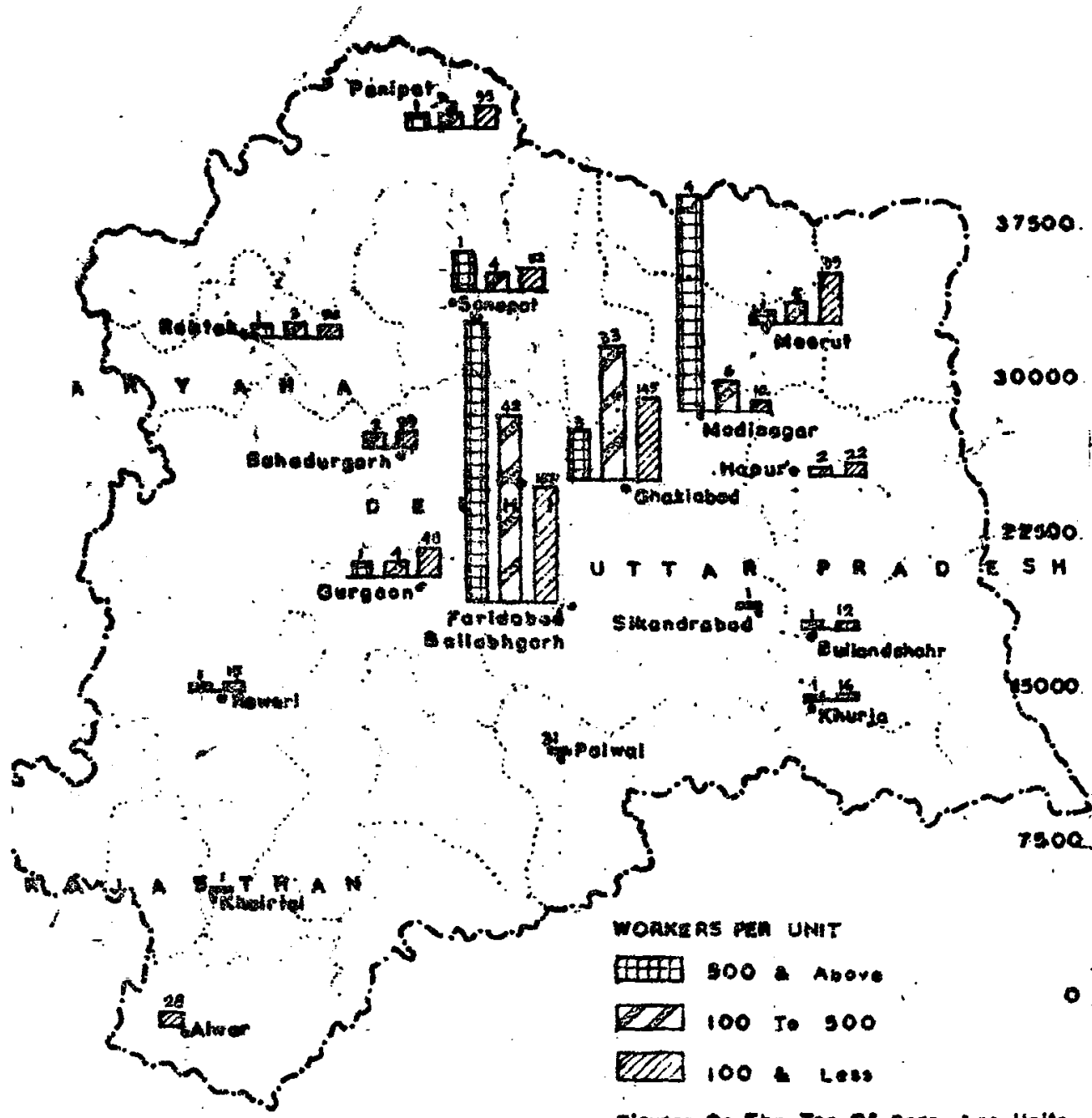
Handicrafts that have come up in the other towns of the NCR are making of scissors at Meerut, cloth printing at Sikandrabad, utensil making at Rewari, lense grinding at Gurgaon, tile making

at Bahadurgarh, and processing of henna at Faridabad.

Industrial Employment Pattern in the Region:

Employment in the industrial sector should be studied in terms (a) household industries and (b) manufacturing industries. Household industries are generally in operation in the rural areas of the 3.1 lakh household industrial workers in 1961, only 0.5 lakhs, or less than one-sixth belonged to the urban areas. On the other hand, the factory industries of the Region are located mostly in the urban areas. Out of nearly 3.0 lakh workers in the registered sector, 2.2 lakhs or approximately 75% of the employment is located in the cities and towns. A study of the industrial activity of the urban areas almost completes the study of such activities in the entire Region. Out of the 50 towns of the NCR, Delhi and the

INDUSTRIAL EMPLOYMENT IN REGISTERED SECTOR EMPLOYMENT RANGE 1953



NATIONAL CAPITAL REGION

17 towns have practically the entire industrial employment. They account for over 2.5 lakh workers out of the 2.7 lakh workers in the industrial sector in the 50 towns.

Industrial employment in Delhi and the 17 towns: Delhi and the 17 towns of the NCR (out of which Khairtal was not yet an urban area in the Census of 1961) represent the most important urban places, having both industrial as well as total growth potential. Their population was 33.6 lakhs out of a total of 36.8 lakhs and comprised over 91% of the urban component of the NCR. In terms of the total working force, Delhi and 17 towns accounted for 10.4 lakhs or about 92% of 11.3 lakhs in the Urban NCR. And, as mentioned above, their industrial work-force also constituted about 92% of that in the Urban NCR (2.5 lakhs out of 2.7 lakhs).

Among these 18 Urban Centres an overwhelming share goes to Urban Delhi alone, whether in terms of population, total working force, or in terms of industrial workforce. In 1961, Delhi (Urban) included 1,67,183 industrial workers of all sorts. They formed roughly 70% of all the industrial workers in the 18 centres (including Delhi). The main concentration of industrial activity of the NCR, or of the Urban NCR was in Delhi. The other towns did not come anywhere close to Delhi in industrial employment. None of the other towns had even 25,000 industrial workers; Meerut town group had only 23,000 industrial workers. Each of the other towns had less than 10,000 industrial workers. (See Table 4.2.3).

However, when viewed in terms of the proportion which the industrial working force had in relation to the total working force, quite a few towns showed an industrial bias in comparison to Urban Delhi which had only 22.4% of its working force in industries. In the first group may be placed three towns, namely, Modinagar, Faridabad-Ballabgarh, and Panipat which had 72.5%, 49.0%, and 41.6% of their workers respectively in the industrial sector. In the next group another three towns with industrial work-force between 30-32% of the total work-force were Sonapat, Ghaziabad, and Rewari.

Thirdly, another group of three, where the proportion ranged from 25% to 28% were Sikandrabad, Khurja, and Meerut. The fourth group consisted of the two towns of Bahadurgarh and Palwal which had 20-22% industrial workers. This covers 11 towns of the NCR. The remaining six towns were not important from the point of view of industrial development, as they had less than 20% of their workers engaged in industries in 1961. Among them though Rohtak and Hapur had an industrial work-force of a little less than 20% each whereas, Gurgaon with 15.3% of its workers in industry was found to be the least industrialised among the towns under study.

Towns such as Alwar, Palwal, Rohtak, Hapur, Bahadurgarh and Bulandshahr are of importance now as they are considered to be desirable focal points of industrialisation for future planning of the Region. Khairtal is a special

Table 4.2.3.

Major Towns and their Industrial Work-Force 1961.

Name of the Town	Population 1961. (in thousand)	Total working (in thousands)	Mfg. Industries (in thousands)	Household industries (in thousands)	Industrial working force. (Cols.4-5)	Industrial workers as % of total workers
1	2	3	4	5	6	7
Urban Delhi	23,59.4	7,46.8	1,55,099	12,684	1,67,783	22.4%
1. Meerut	2,34.0	86.4	17,608	5,489	23,097	25.5%
2. Rohtak	38.2	22.3	3,255	1,174	4,429	19.9%
3. Alwar	72.7	20.4	2,250	1,913	4,163	16.4%
4. Ghaziabad	70.4	19.8	5,376	248	6,124	31.0%
5. Panipat	67.0	20.4	3,838	4,590	8,428	41.6%
6. Faridabad-Ballabgarh	59.0	18.0	7,924	939	8,863	49.0%
7. Hapur	55.2	15.3	1,399	1,152	3,051	19.9%
8. Sonapat	45.9	12.7	3,096	940	4,036	31.8%
9. Bulandshahr	44.2	13.3	1,824	653	2,477	18.6%
10. Khurja	41.5	11.7	1,875	1,119	2,994	25.5%
11. Gurgaon	37.9	9.9	1,130	356	1,516	15.3%
12. Rewari	37.0	9.4	1,273	1,573	2,851	30.2%
13. Palwal	27.9	7.6	707	856	1,563	20.7%
14. Sikandrabad	26.3	8.2	857	1,452	2,309	28.1%
15. Modinagar	24.3	9.3	6,665	65	6,730	72.5%
16. Bahadurgarh	15.0	4.4	625	322	947	21.7%
17. Khairtal	5.9	2.0	47	58	105	5.4%
Sub-total of 17 towns	10,02.3	2,91.0	60,829	22,904	83,733	29.4%
Grand total of Major towns:	33,61.7	10,37.8	2,15,923	35,588	2,51,516	24.2%

Source: Compiled by T.C.P.O. from the Census of India.

case, holding possibilities of agro-industrial development; and it may be noted that during the past one year it has been declared as an urban area. Besides Alwar, Khairtal is the only town in the Rajasthan Sub-region where industrial growth of a substantial order can take place.

In Table 4.2.3, the total population, the total working force, the working force of household industries and manufacturing industries separately, and the proportion of industrial workers have been shown. The names of the towns are presented in order of their population size in 1961. It would be clear that Panipat, Rewari, Sikandrabad, Palwal, Alwar, and even Khurja had a significant household industrial sector and relatively weak factory sector. However, the picture has been changing except at Panipat and Rewari where household industries are still reported to be in a dominating position.

Growth of Employment in Industries (Registered Sector): Factories registered under the Factory Act 1948 constitute the organized sector of industrial activity. These are important not only in terms of space requirement, safety standards and employment strength, but also because information about them is available on a uniform basis all over the country. In the different Sub-regions of the NCR, town-wise data on the number of units and employment is available from the office of the Chief Inspector of Factories of each State

Government. In Table 4.2.4 employment in the registered sector in Delhi and the 17 towns is given along with total industrial employment as reported in the Census of 1961. It is not possible to check therefrom the proportion of total industrial employment in the registered sector factories at that time.

Delhi had over 60,000 employment in its registered factories in 1961, which formed about 36% of the total industrial employment. In the 17 towns, the largest number of industrial workers in the registered factories was found at Faridabad-Ballabgarh (8,600), Modinagar (5,900), and Ghaziabad (5,500). These, therefore, were important centres of industry in the NCR even in 1961. In the second tier may be considered those towns which had an employment in the registered factories of more than 2,000. These were Sonapat, Bulandshahr, and Panipat.

It may also be noted that in places like Faridabad-Ballabgarh, Modinagar, and Ghaziabad, 87 to 97% of the factory employment was in the registered sector. Delhi as mentioned above had only 36% employment in its registered sector factories. Towns with a better share of registered sector employment than Delhi were, (in addition to the three named above), Sonapat (62%), Bulandshahr (51%), and Bahadurgarh (36%). Especially Alwar with 10.3%, Khurja with 9.4%, Rewari with 11.6%, and Palwal with 2.0% of total industrial employment accounted for by the registered sector were towns with mostly un-organized, tiny-scale, and household industrial units.

Table 4.2.4

Registered and Unregistered Sector-Delhi and 17 Towns in 1931.

Towns:	Employment in Registered Sector	Employment in Unregistered Sector	Total Industrial workers.	Registered Sector as % to Industrial employment.
1	2	3	4	5
Delhi	60,317	1,07,466	1,67,783	35.9%
1. Meerut	6,648	16,449	23,097	28.8%
2. Rohtak	1,032	3,397	4,429	23.2%
3. Alwar	427	3,736	4,163	10.3%
4. Ghaziabad	5,495	629	6,124	89.7%
5. Panipat	2,042	6,438	8,478	23.3%
6. Faridabad				
7. Ballabgarh	8,585	273	8,863	96.9%
8. Hapur	783	2,268	3,051	25.7%
9. Sonapat	2,507	1,529	4,036	62.1%
10. Bulandshahr	2,477	1,259	1,218	50.8%
11. Khurja	282	2,712	2,994	9.4%
12. Gurgaon	561	955	1,516	37.0%
13. Rewari	331	2,520	2,851	11.6%
14. Palwal	32	1,531	1,563	2.0%
15. Sikandrabad	360	1,849	2,309	15.6%
16. Modinagar	5,852	878	6,730	87.0%
17. Bahadurgarh	367	530	947	38.8%
18. Khairtal	37	68	105	35.2%
Total:	96,015	1,54,601	2,51,516	38.5%

Source: Census of India and the Chief Inspectors of Factories of the concerned State Governments, Compiled by T.C.P.O.

Table 4.2.5

Employment growth in Registered Sector-Delhi and 17 Towns 1961-68

Towns:	1961	1962	1966	1968	Growth 1961-68	
					Employees	%
1	2	3	4	5	6	7
Delhi	60,317	62,992	76,132	76,615	16,298	26.9
1. Meerut	6,648	4,508	5,833	3,833	2,913	42.31
2. Rohtak	1,032	1,037	2,015	1,933	901	87.3
3. Alwar	427	499	648	647	220	51.5
4. Ghaziabad	5,495	5,872	11,430	12,770	7,275	132.3
5. Panipat	2,040	2,572	3,329	2,959	919	45.0
6. Hapur	783	959	836	731	2	0.3
7. Faridabad						
Ballabgarh	8,585	11,102	23,368	26,965	18,380	227.9
8. Sonapat	2,507	2,670	3,855	3,833	1,381	15.5
9. Bulandshahr	1,259	976	917	756	503	40.0
10. Khurja	282	372	463	580	298	103.5
11. Gurgaon	561	1,232	1,708	2,653	2,092	372.9
12. Rewari	331	477	603	504	173	52.3
13. Palwal	32	9	40	31	1	0.3
14. Sikandrabad	360	266	362	13	347	96.4
15. Modinagar	5,852	7,797	10,575	12,161	6,309	107.8
16. Bahadurgarh	367	636	1,812	1,664	1,297	353.4
17. Khairtal	37	26	24	25	12	32.4
Total:	96,915	1,04,096	1,44,541	1,48,780	51,765	52.7

Source: Chief Inspectors of Factories of State Governments,
Compiled by T.C.P.O.

Industrial Growth during 1961-68 in the Registered Sector:

Figures on industrial employment as a whole are not available since the Census of 1961. In all probability it has increased in all the towns. Table 4.2.5 gives the employment in Delhi and the 17 towns in 1961, 1962, 1966 and 1968 for factories in the registered sector only.

In percentage terms, the highest growth has been registered in Bahadurgarh (353%), Gurgaon (373%), and Faridabad-Ballabgarh (228%). Other towns where more than 100% growth in employment has taken place are Ghaziabad (132%), Modinagar (108), and Khurja (104%). These are the fast-growing industrial centres of the NCR.

In the seven years from 1961-68 about 51,000 new industrial jobs came into being in Delhi and the 17 towns, of which nearly one third came to Delhi, more than one third went to Faridabad-Ballabgarh and the remaining new jobs were distributed in the other towns. A significant increase in the number of jobs took place in the following towns also:

Ghaziabad-7,300; Modinagar -6,300;
Gurgaon-2,100; Sonapat- 1,400; Bahadurgarh-
1,300; Panipat and Rohtak-900 each.

However, in early 1969, in spite of a slower increase in the number of jobs, Delhi was still much ahead of any other town in the NCR. Even though Faridabad-Ballabgarh, is growing very fast in terms of new

industries and industrial jobs, its total employment in the registered sector industries at the end of 1968 was still about one third of that in Delhi. Faridabad-Ballabgarh with about 27,000 jobs in 1968 was, however, much ahead of the other important industrial centres, e.g., Ghaziabad had around 13,000 jobs and Modinagar followed with 12,000 jobs. At that time Sonapat and Meerut were the only two towns with a substantial number of industrial jobs in the registered sector.

In fact, certain towns like Hapur, Bulandshahr, Sikandrabad, and Khairtal have seen a decline in the share of employment in the registered factories.

Establishment of New Units: On a comparative basis, information about the establishment of new units is available only in respect of those registered under the Factories Act. In the seven years, after 1961, 963 factories were established in Delhi and the 17 towns. (Table 4.2.6). But the largest share of newly registered units went to Delhi, which received 387 or 40% of all the units. Ghaziabad (162 or 17%) and Faridabad-Ballabgarh (with 14% or 121 units) were the other towns where a larger number of new units were established. Delhi, Ghaziabad and Faridabad accounted for more than 70% of all the new units that were established during the seven years after 1961. The yearly average came to 55 in the case of Delhi, 24 in the case of Ghaziabad, and 17 in the case of Faridabad-Ballabgarh. The only other towns where a considerable number of new units in the registered sector came-up were Meerut with 74, Panipat with 42, Rohtak 38, Sonapat and Gurgaon with 23 each.

Table 4.2.6

Growth in the Number of Units-Delhi and 17 Towns 1961-68

Towns:	Total No. of Registered Units				New Units establi- shed during 1961-68	
	1961	1962	1966	1968		
	1	2	3	4	5	6
Delhi	1,044	1,096	1,356	1,431	387	(40%)
1. Meerut	31	101	114	105	74	
2. Rohtak	21	45	49	59	38	
3. Alwar	22	24	23	27	5	
4. Ghaziabad	81	99	160	131	163	(17%)
5. Panipat	57	81	91	99	42	
6. Faridabad						
Ballabgarh	104	136	214	225	121	
7. Hapur	11	26	29	24	13	
8. Sonapat	34	42	57	57	23	
9. Bulandshahr	4	11	14	13	9	
10. Khurja	8	14	14	17	9	
11. Gurgaon	20	26	43	53	23	
12. Rewari	7	14	18	16	9	
13. Palwal	2	1	10	10	8	
14. Sikandrabad	-	6	5	1	-	
15. Modinagar	5	25	26	20	15	
16. Bahadurgarh	20	27	38	41	21	
17. Khairtal	1	1	1	1	nil	
Total:	1,404	1,775	2,262	2,380	963	(100%)

Source: Same as in /previous Table.

At the end of 1968, Delhi was having more than 1,400 units out of a total of about 2,400 in the NCR. The second largest number (225) was at Faridabad-Ballabgarh, and the third largest (181) at Ghaziabad. The only other town with more than 100 registered units was Meerut (105). Panipat with 99, Rohtak with 59, Sonapat with 57, and Gurgaon with 53 units are the towns in the Region having more than 50 registered factories. Sikandrabad and Khairtal had only one each and were therefore the least industrialised.

Sub-Regional Picture: When it comes to a comparison of the different Sub-regions, Haryana comes next to the Union Territory of Delhi. Out of a total employment of nearly 1.5 lakh in the registered factories, more than half, above 76,000 was concentrated in Delhi, Haryana Sub-region in its 8 towns had more than 40,000 employment as against U.P. Sub-region having about 31,000 employment in the registered units. Rajasthan Sub-region had less than 1,000 employees in the factories registered under the Factories Act. (Table 4.2.7), (See for a town wise picture see Maps 4.22. and 4.2.3).

The first five industries are more or less the same in the different Sub-regions, although with a change in their order of ranking. Textile is the most important industry from the view-point of employment not only in Delhi but also in the U.P. part of the NCR. General machinery is the second most important industry of Delhi and also occupies the second rank in Haryana but is

third in rank in U.P. The printing and publishing industry is important only in Delhi where it becomes the third biggest employer and in Rajasthan where it ranks second. The metal products industry ranks fourth in Delhi but does not figure among the prominent industries of Haryana or Rajasthan or even in Uttar Pradesh. Electrical machinery is number five in Delhi but is the most important industry in Haryana; in U.P. again it occupies the fifth rank.

Transport equipment has a special importance in Haryana because of the Atlas Cycles Works at Sonapat. It does not figure among the prominent industries of other Sub-regions.

The non-metallic mineral products constitutes the most important industry in Rajasthan, in Haryana its position is fifth and in U.P. it is not important. The Chemicals and chemical products industry figures among the first five industries in the Rajasthan Sub-region. Similarly, the food products (except beverages) constitute an important industry in U.P. and the Rajasthan Sub-regions. In the U.P. Sub-region which is agriculturally prosperous and a noted producer of foodstuffs, the food product industry is second only to the textiles in terms of employment, whereas in Rajasthan it is the last among the first five.

In the Region as a whole the first five industries employmentwise in the registered factories are the following:-

Table 4.2.7

Sub-Regional Employment and Specialization in the NCR, Dec. 1953.

Sub-Region	Employment in First Five Industries (with Regd. Factories (with employment))				
	1	2	3	4	5
Delhi	7,561	21,270	9,143	6,241	4,682
					4,655
					<u>46,016</u>
Haryana	40,596	7,559	6,184	5,862	4,250
					3,916
					<u>27,771</u>

Source: Same as in the previous Table.

1	3
Rajasthan	672
	1. Non-metallic Mineral Products 216
	2. Prt. Publishing & Allied Industry 132
	3. Electricity, Gas & Steam 116
	4. Chemicals and Chemicals Products 88
	5. Food except Beverages 25
	<u>Total 577</u>
U.P.	30,890
	1. Textiles 9,634
	2. Food except Beverages 5,031
	3. General Machinery 4,074
	4. Basic Metal Industry 2,303
	5. Electrical Machinery 1,964
	<u>Total 23,056</u>
Total of N.C.R.	72,165
	1. Textiles 15,516
	2. General Machinery 10,258
	3. Electrical Machinery 1,934
	4. Food except Beverage 5,056
	5. Transport Equipment 4,250
	<u>Total 44,633</u>

<u>Names</u>	<u>Employment in Regd. factories (1968)</u>
1. Textiles	36,836
2. General Machinery	19,406
3. Electrical Machinery	14,198
4. Transport Equipmant	11,402
5. Food except Beverages	9,528
Total of five industries:	<u>91,370</u>
Total of all industries: 1,48,780	

These industries employ 1,48,780 workers and cover more than 60% of the employment in the industrial concerns of the entire Region. Of these, the first and the last are based on the agricultural raw materials, traditional labour, and transport facilities. The other three constitute engineering goods industries and depend mainly on urban consumption markets.

Functional Relationships of Industries:

The Region appears to have emerged as one single area unit for industrial production and may be considered as a complex on a regional scale. The ranking of industries in different sub-regions is also not different from each other except for the fact that one or the other industry is more prominent. This also shows the inter-dependence of various industries that have come up in the NCR and among the different towns either for purposes of marketing of raw material or supply or transport facilities or banking services or similar facilities. Practically

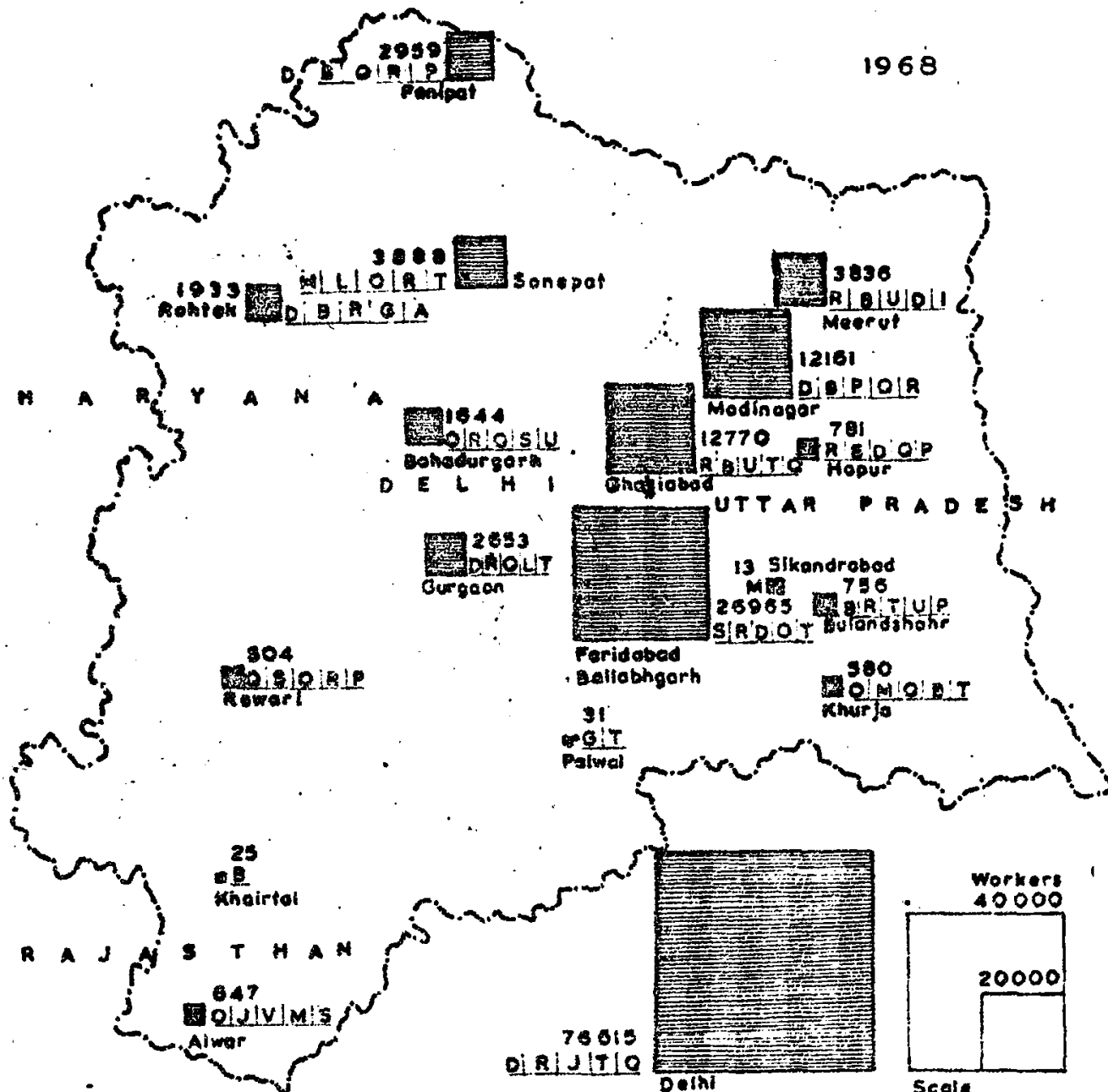
all the industries and practically all the ~~xx-xxxxxxx~~ towns in the NCR depend to some extent on Delhi and on one another.

Industry-wise analysis: The most important location for most of the industries of the Region is Urban Delhi. But there are exceptions too. Electrical machinery is more prominent at Faridabad. Similarly, rubber goods industry, foot-wear and paper-product industry are more prominent at Faridabad. Tobacco manufacturing is more prominent at Ghaziabad. (Table 4.2.8 and Map 4.2.4.)

The Table shows the extent of concentration of each industrial category in two or three main towns apart from Delhi. In most cases the other towns are Modinagar, Faridabad, Ghaziabad and Sonapat. Only in some cases Gurgaon, Meerut, Rohtak and Panipat are important as a second or third most important centre of location of an industry. This also indicates that however, well distributed and well dispersed an industry might be in the Region, it tends to get concentrated in two or three places. The first ten industries have given rise to an employment of more than 5,000 each. The textile industry is the single largest creator of employment. General machinery and electrical machinery considered together do not create as many job opportunities as in textiles in which there are fewer units but of a larger size.

Inter-Industry Linkages: In the NCR, inter-industry linkages exist both townwise and industry-wise. Many industries in different towns depend on one another by using the products and component parts manufactured by

INDUSTRIAL EMPLOYMENT IN REGISTERED SECTOR TYPES OF INDUSTRIES RANKING



LEGEND

- A Process Allied To Agriculture
- B Food Except Beverage
- C Tobacco Manufacturing
- D Textiles
- E Beverages
- F Footwear Other Wearing App. & Made Up Textiles Goods
- G Wood & Cork Except Furniture
- H Furniture & Fixture
- I Paper & Paper Products
- J Printing Publishing Allied Industries
- K Leather & Leather Products
- L Rubber & Rubber Products
- M Chemical & Chemical Products
- N Products Of Petroleum & Coal
- O Non-Metallic Mineral Products
- P Basic Metal Industries
- Q Metal Products
- R Machinery
- S Electrical Machinery
- T Transport Equipment
- U Misc. Industries
- V Electricity Gas Steam
- W Water & Sanitary Services
- X Personal Services
- Total Employment

D J R T P Five Top Ranking Industries

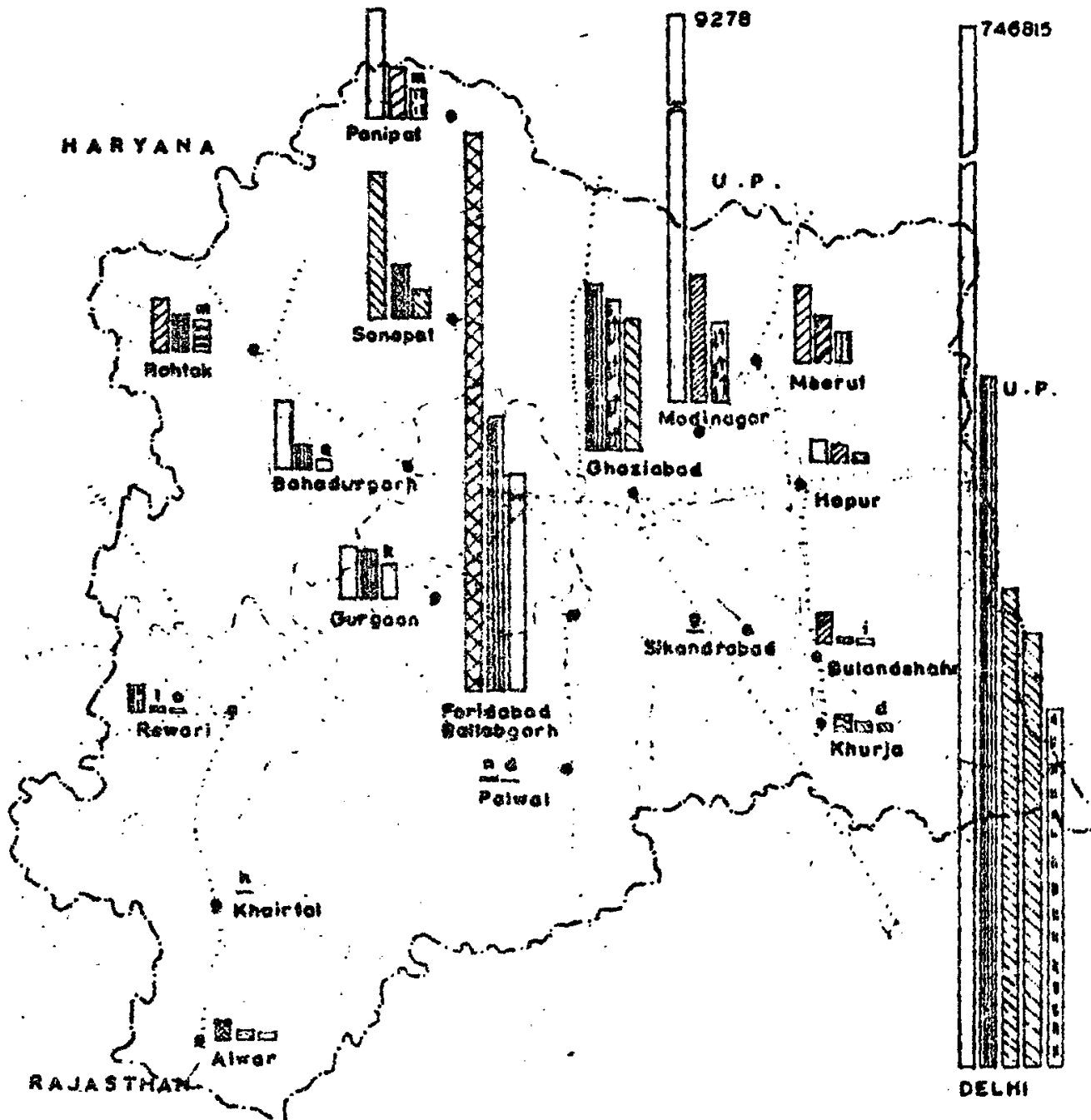
Source: Chief Inspectors Of Factories.



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RANKING OF INDUSTRIES IN DELHI AND 17 TOWNS 1968 REGD SECTOR EMPLOYMENT



- a [] Textiles
- b [] General Machinery
- c [] Printing & Publishing
- d [] Transport Equipment
- e [] Metal Products
- f [] Electrical Machinery
- g [] Basic Metal
- h [] Food (Except Beverages)
- i [] Miscellaneous Industries
- j [] Chemicals
- k [] Rubber Products
- l [] Mineral Products
- m [] Agricultural Processes
- n [] Wood & Cork
- o [] Foot-Wear etc.
- p [] Petroleum & Coal Products
- q [] Paper & Paper Products

2000 Workers

0 Scale

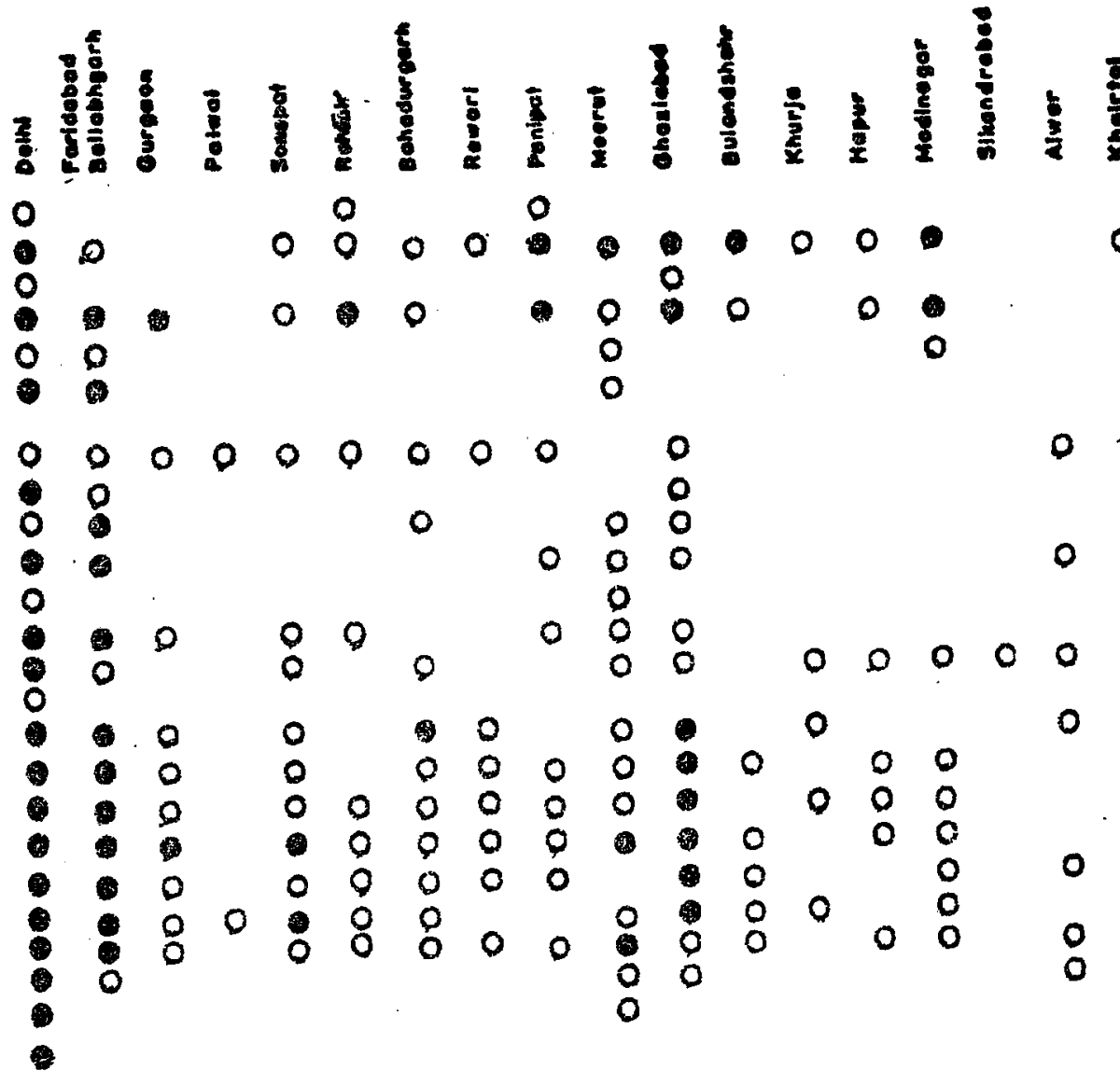


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MINISTRY OF H.F.P. W.H. & U.D.

INDUSTRIAL EMPLOYMENT IN REGISTERED SECTOR

TYPES OF INDUSTRIES SIZE



LEGEND

- A Process Allied To Agriculture
- B Food Except Beverage
- C Tobacco Manufacturing
- D Textiles
- E Beverages
- F Footwear Other Wearing App. & Made Up Textiles Goods
- G Wood & Cork Except Furniture
- H Furniture & Fixture
- I Paper & Paper Products
- J Printing Publishing Allied Industries
- K Leather & Leather Products
- L Rubber & Rubber Products
- M Chemical & Chemical Products
- N Products Of Petroleum & Coal
- O Non-Metallic Mineral Products
- P Basic Metal Industries
- Q Metal Products
- R Machinery
- S Electrical Machinery
- T Transport Equipment
- U Misc. Industries
- V Electricity Gas Steam
- W Water & Sanitary Services
- X Personal Services

LEGEND

- Employment More Than 500 Persons
- Employment Less Than 500 Persons

NATIONAL

CAPITAL

REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H. F. P. W. H. & U. D.

4

Source: Chief Inspectors Of Factories.

other industries in the same town or in another town. Each of the 17 towns of the Region is coming up also as a market for certain specialised industrial goods. Dealers, industrialists and customers come from nearby, as well as far-off places to make their purchases of the specialised items for which a town is famous. As for marketing of products, it may be pointed out that although a good deal of the production is marketed within the Region, much of it now goes to distant parts of the country. Originally the consumer market and the marketing facilities of Delhi may have provided the necessary stimulus for starting an industry somewhere in the Region, but now its products are marketed throughout the country and also exported.

Moreover, industries of the Region are inter-dependent on one another for the supply of trained labour. The unskilled and semi-skilled labour is generally drawn from the local areas and adjoining villages but the well-paid engineers and technicians and supervisors and managerial personnel might be drawn either from Delhi or from other big towns of the Region. Quite frequently specialised labour is brought from Calcutta or even from Bombay. This indicates that everything by way of industrial production or industrial marketing is not hundred per cent dependent on Delhi, although some facilities of Delhi might have been originally the determining factor in the establishment and initial success of industrial enterprise.

It may also be mentioned that Delhi has been supplying quite a sizeable number of entrepreneurs to the other industrial centres of the NCR. In many cases they continue to reside in Delhi because of the amenities available in the city. But in towns like Meerut, Panipat and Alwar where some facilities are available, the entrepreneurs may like to shift to these towns. The State Governments are taking some initiative in trying to attract entrepreneurs to their towns in order to build up a nucleus of industrial activity.

Inter-Towns Linkages : The industries of the towns in Haryana have a closer link with Delhi than those of the other towns in the NCR. The U.P. and Rajasthan towns hardly utilise the facilities of the Capital city, such as banking, warehousing, transport, book-ing etc., whereas this is not true of the industries in the Haryana part. Quite a substantial amount of manufactured goods in the Haryana towns are marketed to or through Delhi. Comparatively a large number of firms carry on their banking transactions from Delhi and a very large number have their sales office or head offices in Delhi.

As regards inter-dependence for raw-materials, the Haryana towns do not benefit from the other towns of the NCR, outside Delhi. Instances of drawing raw-materials from other towns are very few. For example, Faridabad potteries get some raw materials from Alwar.

There is yet another aspects of inter-town linkage - the links between the towns

Table 4.2.8

Employment Distribution in Different Industries in the NCR 1968.

Industries	Total Employment in Delhi & 17 towns.	Towns with high employment
Textiles	36,836	Delhi (21,290), Modinagar (8,221), Faridabad (3,020)
General Machinery	19,406	Delhi (9,148), Faridabad (3,775), Ghaziabad (2,343)
Electrical Machinery	14,198	Faridabad (7,243), Delhi (4,655), Ghaziabad (1,759)
Transport Equipment	11,402	Delhi (5,621), Faridabad (2,081), Sonapat (1,916)
Food except beverages	9,528	Delhi (3,113), Ghaziabad (2,023), Modinagar (1,616)
Metal Products	9,164	Delhi (4,882), Faridabad (1,515), Ghaziabad (1,186)
Products of Petroleum & Coal	8,126	Delhi (6,241), Faridabad (968), Meerut (189)
Printing, Publishing & Allied Industries.	7,558	Delhi (2,568), Faridabad (2,146), Ghaziabad (1,148)
Basic Metal Industry	6,950	Delhi (3,490), Modinagar (1,126), Ghaziabad (932)
Miscellaneous	5,589	Delhi (3,304), Faridabad (1,129), Meerut (405)
Chemicals & Chemical Products	4,084	Delhi (2,790), Ghaziabad (328), Faridabad (293)
Rubber & Rubber Products	3,108	Faridabad (1,470), Delhi (925), Gurgaon (283)
Footwear	2,616	Faridabad (1,140), Delhi (1,463)
Furniture & Fixtures	2,557	Delhi (2,457), Faridabad (59), Ghaziabad (41)
Electricity, Gas & Steam	1,683	Delhi (252), Faridabad (233), Alwar (116)
Paper and Pater Products	1,442	Faridabad (711), Meerut (279), Ghaziabad (277)
Water & Sanitary Services	1,325	Delhi (1,325)
Wood & Cork except Furniture	770	Delhi (309), Rohtak (115), Faridabad (107)
Beverages	720	Delhi (442), Meerut (146), Modinagar (96)
Personal Services	591	Delhi (591)
Non-Metallic Mineral Products	438	Delhi (438)
Processes Allied to Agriculture	376	Delhi (255), Rohtak (81), Panipat (32)
Tobacco Mfg.	178	Ghaziabad (141), Delhi (37)
Leather & Leather Products	137	Delhi (76), Meerut (46)
Total	1,48,780	Delhi, Faridabad, Ghaziabad, Modinagar

Source: Same as in previous Table.

of the same sub-region. For instance, Panipat is the largest supplier of cotton waste machinery to Rohtak town. About 90% of the machinery used is supplied from Panipat and the other 10% is brought from Delhi. Besides this, Panipat supplies its own textile machinery with iron castings.

/manufacturers

Delhi remains the sole supplier of raw materials like M.S. rounds, ball bearings etc. to various towns in the NCR and especially to the towns in the Haryana Sub-region. Alloy steel is supplied by Delhi to Gurgaon. Another raw material which is mainly supplied by Delhi is chemicals. Delhi has got a large number of wholesale traders and dealers in chemicals who purchase it from different parts of the country and make them available to the industrialists of the NCR. Sonapat buys 50% of the organic chemicals for its industries from Delhi. Gurgaon also purchases 50% of its chemicals for its rubber industry from Delhi and porcelain and also raw materials for its porcelain industry. Similarly the Samalkha rubber industry is also dependent on the chemicals supplied from Delhi.

As in the case of raw materials, so also in the case of markets the Haryana towns are very much dependent on Delhi. The Haryana industries hardly cater to their own local markets or to the other towns in the Sub-region. Rohtak is the only town that manufactures some of the products for the Sub-region. For instance it provides all the manufactured cotton waste yarn to the mills at Panipat and to its own mills.

Examples of a great deal of dependence of Haryana towns for the sale of manufactured goods in Delhi can be multiplied very easily. Rewari supplies 50% of its manufactured utensils to the Delhi Market. Most of the rubber products of the Sonapat industries go to Delhi. The surgical instruments, cutlery, hospital ware produced at Gurgaon are marketed through Delhi to other parts. Delhi retains 50% of these goods for its own consumption.

This is not to say that Delhi alone absorbs the entire production of the Haryana industries. From the Haryana Sub-region quite a number of industrial products are exported to other parts of the country. Household utensils find their way to Maharashtra, Gujarat, U.P. and other parts of Haryana. In the case of industrial goods produced at Rewari, although 50% of the production might be going to Delhi but the remaining part is being sold in U.P. and all over the country.

Export Relationships: This brings us to the export-orientation of a substantial part of industrial production carried on in the NCR. In some cases the industries have passed the stage when they were largely dependent of Delhi's market and have now started exporting their products. In other cases they have come up as export industries from the very beginning, and have not had to rely on Delhi's market or marketing facilities. In this connection it may be mentioned that for export purposes, even the transport facilities of Delhi are not availed of to any great extent because the sale being in small lots is shipped by trucks.

/Gurgaon rubber industry also sells 40% its product at Delhi.

External Relationships for Raw Material and Labour Supply:

Raw materials are procured from Delhi's wholesale market as mentioned above but as the industry grows larger, it builds up its own relationship with the suppliers in event distant parts of the country. Raw rubber may be obtained directly from Kerala and chemicals may be obtained directly from abroad. This is to mention that not all industries which are coming up in the NCR are dependant on the facilities which Delhi can provide in the setting up of a factory.

Another important factor is the existence of local entrepreneurs in towns like Panipat, Meerut, and Khurja who are independently able to establish industrial enterprises as and when favourable conditions are available. Similarly labour supply is not being drawn from Delhi so far as semi-skilled or unskilled labour is concerned. It is only highly trained engineers and well-paid technicians who may be brought from Delhi or from any where else for that matter. To this extent these towns are no longer dependent on Delhi and may not have been so from the very beginning.

Alwar's Relationship with Delhi: Among the towns of the NCR, Alwar is the farthest from Delhi being 160 kms. (100 miles). It is very interesting to study what kinds of industries are being established in Alwar. From where do they draw their raw material supplies and to what extent do they depend /Bombay or Calcutta and machinery may be purchased direct from

on Delhi for marketing or for any other facilities? Alwar's case may show that it does not send much of its goods nor draws much of its raw materials from Delhi, and yet it has very significant functional relationships with the other parts of the NCR, especially with places like Faridabad, Modinagar or Khurja.

It has been observed that most of the industries were established in Alwar because of the availability of raw material in the district as such. Alwar district is an area which provides raw materials like quartz, dolomite barytes, felspar, and soapstone. In terms of raw materials Delhi has very little to offer to Alwar's industries. But Alwar has connections with other towns in the NCR. Faridabad supplies plastic tubes but this does not satisfy the total demand and plastic tubes have also to be brought from Hyderabad and Maharashtra, Modinagar supplies galvanised wire to the metal goods industry at Alwar. Raw materials such as soda ash, chemicals, nitric acid, and tin plates are not supplied by firms within the NCR but are purchased from other parts of the country such as Gujarat (soda ash), Calcutta (chemicals), and Bombay (nitric acid). Tin plates are brought directly from Rourkela or are imported.

There is a greater link between Delhi and Alwar in terms of produce. Some of the concerns have their sales office in Delhi, as bulk of their supply is for the industries in Delhi. They supply ground barytes, for the glass and tiles industry of Delhi, and 100% of the felspar and quartz powder manufactured at

Alwar is provided to the potteries at Delhi.

In the case of other products, Delhi's share is considerably less and bulk of it is exported to other States. Only 25% of the manufactured sodium sulphide and 5% of the barium is supplied to Delhi; the rest of it goes to Punjab and other parts of Haryana. Barium is supplied mainly to U.P. and distributed to other parts of India. About 10% of the tin containers produced at Alwar are sent to Delhi; this is one of the products which is locally sold. The others are being sent out. About 70% of the cistern fittings are sold at Calcutta and remaining 30% are shared between U.P., Bihar and Punjab. Pesticides are exported from Alwar to Bihar, U.P., Rajasthan, and parts of Haryana and the Punjab. Ground barytes are sent to Gujrat, Dolomite is also used by the glass industry of U.P. and the paint industry of Bihar. Thus Alwar's market for its manufactured products is spread all over north India.

Alwar does not face much competition with concerns in the NCR. In the case of cistern fittings there is some competition from the Delhi firms. Tin containers are supplied by Delhi to Rajasthan. In the case of pesticides it has to compete with Faridabad. Generally these concerns have ~~concerns have~~ to face competition in their own State from the firms at Kotah and Udai-pur manufacturing tin containers. In the case of chemicals its competition is with concerns in south India. Alwar does not have to depend on Delhi for its banking,

booking, or warehousing facilities. A negligible percentage of banking transactions take place from Delhi (i.e., 3% to 5%). One concern having a sales office in Delhi uses some warehousing facilities; about 1% of its products are stored at Delhi.

Industries in other towns of the NCR dependent on Alwar for raw material or manufactured goods are potteries, glass industry, paints, pesticides, etc. The Non-metallic mineral industry of Alwar is also linked with the cold storage industry of Delhi.

The tin containers are needed by the oil mills, the vegetable mills etc.

Correlation between Distance from Delhi and Nature of Industry:

It is interesting to study the effect of distance from Delhi on the nature of major industries in the 17 towns. Distance may mean degree of dependence on the commercial services and transport services of Delhi. A longer distance accounts for a greater degree of independence from Delhi; therefore a certain amount of difference in the scale and type of industrial development creeps in. In Table 4.2.9 all the 17 towns are arranged in terms of their distance from Delhi in kms. and the first two major industries in each town as in 1968 have also been indicated.

The towns have been divided into three groups:

- I. Those upto a distance of 45 kms.;
- II. Those between 45 and 80 kms. from Delhi and
- III. Those beyond 80 kms.

It will be noticed that in the first group* where the distance from Delhi is short and therefore dependence on Delhi's services heavy, it is mainly the machinery industry which shows prominence. Machinery making is truly a market-oriented industry; its market is mainly in or through Delhi. Other industries such as mineral products, though important in individual towns, do not have much to do with the distance from Delhi as their presence or existence or prominence depends primarily on the availability of the raw materials. The manufacture of transport equipment is allied in nature to the general machinery and the electrical machinery industry. For technical skills also many of these towns depend on Delhi as is evident from the fact that electricians, technicians, engineers, business executives, and

* In this group textile is a special industry at Modinagar and in fact, although it supplies its products to Delhi, its market comprises Western U.P. and Haryana and to some extent the other parts of Northern India, as it produces mainly coarse and inferior variety of cloth for consumption by rural folk. Of course, products of Modipur and rayon find a market in urban areas throughout the country. Located at the periphery of the close distance range, Modinagar begins to show a certain degree of independence from the market or marketing services of Delhi.

Other skilled workers residing in Delhi commute daily to Faridabad, Ghaziabad, Bahadurgarh etc. Financing of a large number of industrial enterprises located in these centres is also done by the institutions of Delhi.

In the second group, a curious mixture of different industries predominate. The major industries are general machinery, transport equipment, basic metal, wood and cork, or food. Depending on the pulls of Delhi and of the nearby market in the surrounding areas, these towns exhibit different characteristics of industrial development in the sense that their prominent industries are not market-oriented towards Delhi but towards markets in the neighbouring parts. As in the case of Hapur food industry begins to show its prominence. Although the food industry is more or less ubiquitous, its importance is witnessed at a greater distance from Delhi because in these towns there is lack of diversification. Industrial units in food, like flour mills, dal mills, cold storages, etc. thrive on the availability of agricultural raw materials. To this extent they represent a resource-oriented industry.

The third group shows the importance of mineral products, textiles, and food; and these are mostly based on local raw materials and local skills. For instance, Panipat's textile industry is heavily dependent on local skills and is mainly organised in terms of co-operative factories. This indicates the presence of factors other than the influence and needs of Delhi.

Table 4.2.9

Correlation between Distance from Delhi and Nature of Industry in Towns

Group	Sl. No.	Towns	Distance in kms.	Important Industrial Groups in the town in 1963.
1	2	3	4	5
I	1.	Ghaziabad	16	1. General machinery 2. Food.
	2.	Gurgaon	32	1. Textiles 2. General machinery
	3.	Bahadurgarh	36	1. Mineral products 2. General machinery
	4.	Fariidabad-Ballabgarh	38	1. Electrical machinery 2. General machinery
	5.	Sonepat	44	1. Transport equipment 2. General machinery
	6.	Modinagar	44	1. Textile 2. Food
II	7.	Hapur	57	1. General machinery 2. Food
	8.	Sikandrabad	60	1. Chemical and Chemical products.
	9.	Palwal	65	1. Wood and Cork 2. Transport equipment.
	10.	Meerut	66	1. General machinery 2. Food
	11.	Rohtak	71	1. Food 2. Textiles.
	12.	Bulandshahr	78	1. Food 2. General machinery.
III	13.	Panipat	85	1. Textile 2. Food.
	14.	Khurja	97	1. Mineral products 2. Chemical products.
	15.	Rewari	97	1. Metal products 2. Electrical machinery.
	16.	Khairtal	136	1. Food 2. Nil.
	17.	Alwar	136	1. Mineral products. 2. Printing & publishing.

It is noted, that the total industrial employment in the registered sector decreases as we move away from Delhi along the same corridor. Thus, in corridor I, Ghaziabad, Modinagar and Meerut show a descending order of registered sector industrial employment. Similarly along corridor II, Faridabad-Ballabgarh is much bigger than Palwal; in corridor III, Gurgaon leads over Rewari; in corridor IV, Bahadurgarh scores over Panipat. This is not true of the total industrial employment, including the unregistered sector and household industries, which is dependent on the size of population to a large extent. Thus, Meerut has a larger total industrial working force than either Ghaziabad or Modinagar, Rohtak has more than Bahadurgarh, and Panipat has more than Sonapat.

Influence of Population size and distance from Delhi on Industrial Activity:

Apart from the distance from the Mother City, the other factor which comes into play is that of population size. As the distance of a place is closer to Delhi and the population size is substantial, it will give rise to a higher level of industrial development and a faster industrial growth, specially because of the linkage with Delhi and because of the influence of Delhi playing a major role in boosting its industrial activity. One such index calculated on the basis of the formula p/d^2 , in which p stands for population size of the individual town and d for distance from Delhi, has been calculated and is presented in Table 4.2.10.

Table 4.2.10.

Correlation between Population of Towns and Distance from Delhi:

Sl. No.	Name of Town	Population in 1961 (P)	Distance from Delhi (d) in Kms.	p/d^2 (in descending order)
1.	Ghaziabad	70,438	16	275.15
2.	Meerut	2,83,997	66	65.20
3.	Faridabad-Ballabgarh	59,039	38	40.88
4.	Gurgaon	37,868	32	36.98
5.	Sonapat	45,882	44	23.70
6.	Rohtak	88,193	71	17.49
7.	Hapur	55,248	57	17.00
8.	Modinagar	24,266	44	12.53
9.	Bahadurgarh	14,982	36	11.56
10.	Panipat	67,026	85	9.26
11.	Sikandrabad	26,290	60	7.30
12.	Bulanishahr	44,163	78	7.26
13.	Palwal	27,363	65	6.59
14.	Khurja	41,491	97	4.41
15.	Rewari	36,994	97	3.97
16.	Alwar	72,707	166	2.97
17.	Khairtal	5,879	136	0.33

The 17 towns have been arranged in the above Table with regard to their index determined in terms of p/d^2 . The value is the highest for Ghaziabad. Its level of industrial activity is most likely to be influenced by what happens in Delhi (by way of policies and programmes) due to its

closeness. In fact, an area of future study could be on the nature of industrial relationship between industries of these towns and those of Delhi.

Higher values of the index, as shown in Table 4.2.10, are more likely to show a closer linkage with the activities of the services available in Delhi. Lower the value, the less will be the impact of Delhi on the trend of industrial development. Ghaziabad, Faridabad-Ballabgarh, Gurgaon, Sonapat, and Meerut show a higher value and it is in these towns where industrial development seems to be closely related to the requirements of Delhi as a market and as a transportation centre. The precise nature of dependence and linkage will be the subject-matter of another study.

Of course there are other factors which also have a bearing on the level and growth of industrialisation in the towns. Constraining factors are lack of water supply, power, communications, etc. and favourable factors are administrative encouragement, transport facilities, local skills etc.

Industrial Finances:

The availability of finance for starting or running a factory is in a much better position in the Union Territory of Delhi than in the surrounding districts. Delhi is a centre of financial institutions and under various schemes or Acts finances are made available to the industries for various purposes, such

as purchase of machinery, plant, and appliances; construction of factory godowns, warehouses; purchases of raw material; for industrial research; for shifting from non-conforming areas of Delhi; for purchases of land and construction of factory building; for expansion and/or modernisation of industrial plants and so on.

Delhi Administration itself grants loans to small-scale and cottage industries through the Directorate of Industries. Ordinarily loans are granted upto Rs.25,000, but in special cases (for instance to a small-scale unit of national importance) a loan upto Rs.50,000 may be advanced. However, in no case the applicant gets more than 75% of his own investment. The rate of interest chargeable from an industry taking a loan of less than Rs.25,000 is 3%, but from those whose loans exceed Rs.25,000, it is 5%.

The Directorate of Industries also grants loans to help the small-scale industrial units now functioning in the areas declared non-conforming under the Master Plan, in the acquisition of an industrial plot in the new industrial areas and in constructing buildings therein, with the ultimate object of shifting their industries to the new site. An amount upto Rs.50,000 or 80% of the estimated cost of industrial building or the industrial plot purchased can be granted. For the purchase of a plot the entire amount is loaned; but the amount in the case of construction is disbursed in three instalments. The interest on loans for shifting is chargeable at the rate of 8 $\frac{1}{2}$ % per annum. In the case of

regular payment the rate is reduced to 5 $\frac{1}{4}$ % per annum.

Medium scale units and small scale units requiring substantial loan can go to the Delhi Financial Corporation, which grants loans upto a maximum of Rs.20 lakhs. The rate of interest chargeable from a small scale unit is 8% if the repayment is prompt. The loans are repayable within a period of 10 to 11 years.

In addition to the financial help available from Delhi Administration and from Delhi Financial Corporation, small scale industries can also go to the State Bank of India and other banks. The main bank helping the growth of small scale industries is the State Bank of India. The Delhi Head Office of the State Bank makes loans available to the industries of the towns in the National Capital Region automatically.

The Role of State Bank in Financing Small Scale Industries:

The State Bank of India has played a positive role in financing small scale industries in the country as a whole also in the NCR. The S.B.I. (State Bank of India) and its subsidiaries have given assistance to the tune of Rs.260 crores to about 32,000 units in the country. There are 53 branches of the S.B.I. in the 18 towns of NCR., Delhi alone accounting for 35 of them. There are two branches in Meerut and one industrial units located in the entire northern India, benefitting the

branch in each of the ~~XXXX~~ towns except Khairtal. About Rs.17.49 crores of advances have been sanctioned in these towns for small scale industries. The Regional headquarters of the Bank at Delhi can sanction Rs.2 lakhs and above; the banks in the other towns can sanction amounts ranging from Rs.60,000 to 5 lakhs. The general tendency in the Region is for smaller advances upto Rs.50,000, which covers about 65% of the units requiring loans.

Table 4.2.11 gives the number of parties getting the advance and the total amount disbursed to the 18 towns of the NCR. Khairtal does not have a branch and Faridabad-Ballabhgarh Complex has two separate branches. The loan requirement of industries in Delhi is notably large; they take about half the amount sanctioned for the entire Region. The average amount loaned per party (1.19 lakhs) in Delhi is more; and the number of parties is also the largest (almost 700 during 1969-70). Meerut stands second regarding the number of parties (about 230); but it can be grouped with Ghaziabad, Faridabad, and Sonapat in terms of the total amount of loans advanced. These five towns form a group, each availing more than a crore of rupees as assistance as shown in the Table 4.2.12. Four towns have been sanctioned from 50 lakhs to one crore of rupees, one gets 25 to 50 lakhs, three in the range of 10 to 25 lakhs, and there are five other towns getting less than 10 lakh rupees assistance during 1969-70.

The number of parties getting loans sanctioned seem to be rising every year, as also

Table 4.2.11

Number of parties getting Advance from S.B.I. and the Amounts sanctioned
In the NCR (1968-70)

Towns	No of branches of the S.B.I.	Number of Parties getting the advance during				Percentage increase from 1968-70	Amount of advance sanctioned in cro- res.			Percentage increase from 1968-70	Average amount per party (lakhs)
		67-68	68-69	69-70	1968-70		67-68	68-69	69-70		
1	2	3	4	5	6	7	8	9	10	11	
Delhi	35	470	554	696	47.0	4.59	6.40	8.23	80.4	1.19	
Meerut	2	210	250	279	32.9	0.84	1.06	1.34	59.5	0.48	
Ghaziabad	1	61	87	125	104.9	0.50	1.16	1.35	125.0	1.03	
Hapur	1	21	46	72	242.9	0.18	0.45	0.70	233.0	0.97	
Modinagar	1	8	12	21	61.9	0.14	0.16	0.22	57.1	1.05	
Bulanishahr	1	3	4	20	533.7	0.02	0.03	0.14	700.0	0.70	
Khurja	1	13	23	27	107.7	0.05	0.19	0.15	300.0	0.55	
Sikandrabad	1	-	-	9	900.0	-	-	0.07	700.0	0.77	
Faridabad	1	89	110	139	56.2	0.96	1.29	1.46	52.0	1.05	
Ballabgarh	1	-	5	10	1000.0	-	0.02	0.03	300.0	0.33	
Palwal	1	-	2	20	2000.0	-	0.01	0.06	600.0	0.30	
Gurgaon	1	33	51	57	72.7	0.20	0.36	0.51	155.0	0.89	
Rewari	1	11	10	45	39.0	0.05	0.03	0.09	80.0	0.20	
Rohtak	1	10	11	52	420.0	0.15	0.22	0.34	123.6	0.65	
Bahadurgarh	1	48	56	142	195.3	0.39	0.61	0.87	123.0	0.61	
Sonepat	1	70	89	159	127.0	0.69	1.05	1.20	73.9	0.75	
Alwar	1	5	5	8	60.0	0.02	0.02	0.05	250.0	0.62	
Panipat	1	27	42	90	233.3	0.35	0.55	0.63	80.0	0.70	
Total:	53	1,079	1,360	1,971	82.7	9.23	13.31	17.49	89.5	0.89	

Source: (Unpublished). Compiled by State Bank of India, 1970. New Delhi.

the amount. The number of parties rose from 1079 in 1967-68 to 1360 in 1968-69, a rise of 26%, and to 1971 in 1969-70, representing a percentage increase of 45. The amount of sanction registered a uniform rise; it rose by 4 crores of rupees each year. But the number of parties seeking the sanction in itself does not signify much, unless the total number of industrial units existing, their nature and type, the stage of development, and the growth potential for new industries are considered.

The average amount of advance each party gets presents an interesting analysis; for all the 18 towns, it works out to about Rs. 29,000 during 1969-70. But during 1968-69, it was nearly one lakh rupees. Considering the average amount per party in each of the towns, a large gap is found between Rs. 1.19 lakhs sanctioned for Delhi for instance and Rs. 20,000 going to a town like Rewari.

Other Financial Assistance:

In addition to direct loans as described above, financial assistance is available in the form of supply of machinery on hire-purchase basis; this is done by the National Small Industries Corporation on the recommendation of the Industries Department. Only 20% of the value of machinery has to be deposited in advance and the balance, cost of machinery plus interest are to be repaid in seven annual instalments. The rate of interest on the outstanding amount is 7%, an additional 6% administrative charge is also payable on each instalment.

Table 4.2.12
Distribution of the 18 NCR Towns according to the Amount of advance sanctioned by S.B.I.

Amount Sanctioned	No. of Towns	Names of Towns
1. Less than 10 lakh rupees.	5	Sikandrabad, Ballabgarh, Palwal, Rewari Alwar.
2. Rs. 10 lakhs to 25 lakhs	3	Modinagar, Bulandshahr Khurja.
3. Rs. 25 lakhs to 50 lakhs	1	Rohtak
4. Rs. 50 lakhs to 1 crore	4	Hapur, Gurgaon Bahadurgarh Panipat.
5. Rs. one crore or more.	5	Delhi, Faridabad Ghaziabad, Meerut, Sonapat.

Source: (Unpublished) Compiled by the State Bank of India, 1970, New Delhi.

Additional financial incentives include 5% rebate on handloom cloth sold through the recognised Emporia throughout the year with an additional 5% rebate during the handloom week. Co-operative Societies for handloom

can get working capital loans at the rate of Rs. 50/- per handloom installed. On other handicrafts also usually 10% rebate on sale is available. Delhi Administration gives loans to artisans.

Assistance is also being given to technically qualified persons in setting up their own small scale industrial units. Some plots have been allotted to Engineers in Badli Industrial Estate.

Industrial Housing:

Industrial housing in the Region is minimal nor are there any organised labour colonies. While the Delhi Administration has been executing some housing projects in industrial areas, there is an utter lack of effort on the part of private industrialists to provide houses to their workers. Except for two textile mills, no industrial unit has availed of the industrial housing subsidy introduced by the Government.

The number of industrial units in the Union Territory of Delhi has gone up from 19,000 in 1965 to about 25,000 in 1969. The number of workers has also gone up from 1.60 lakhs to 1.85 lakhs during this period but there has not been any significant increase in the number of houses for them. About 2,800 housing units were built in 1956 in Karampura by the Administration and allotted to workers at cheap rents - only at Rs. 13/- for a two-room tenement. Karampura has the largest concentration of industrial units

and the labour force in the neighbouring industrial area is estimated at about 50,000. But none of the industrialists have built dwelling units for the workers. The Administration has now launched two labour housing projects. One at Shahdara and the other at Okhla. At Shahdara 852 tenements are almost ready and awaiting electricity and water connections. These are expected to be allotted shortly. The project at Okhla has yet to be started. Only a plot of land has been acquired and construction will begin soon. The Administration proposes to build 1,184 dwelling units there. 694 more housing units are proposed to be built during the remaining years of the Fourth Plan in the Najafgarh Road area. About 40 acres of land would also be purchased during the period for industrial housing purposes.

Policies and Programmes of State Governments:

It is important to consider the extent to which the industrial development policies of the respective State Governments have taken into cognizance the benefits that can be derived from an active pursuit of programmes to receive such industries which would otherwise go to Delhi. ~~It is the policy of the States that will bring about adequate and/or desirable and diversified industrial development.~~ It is the programmes and development activities of the States that will bring about adequate and/or desirable and diversified industrial development. However, in the industrial growth of the National Capital Region as a whole, the industrial policy of Delhi would remain central. The Master Plan for Delhi has prohibited certain types of industries (mainly

large-scale and obnoxious industries) from being set up in Delhi and this has been mainly responsible for the growth of only small-scale industries in Delhi, generally manufacturing consumer goods of different kinds. Those consumer industries which cater mainly to the needs of this large urban market would naturally have to be located in the Capital. Other industries which are dependent on the transport facilities available in the city and also on its banks and financial institutions have had to be located here.

The impact of Delhi's policy of discouraging some industries and dis-allowing others has been the chief factor behind the growth of industrial centres like Faridabad, Ghaziabad, Bahadurgarh, Gurgaon, and Sonapat. If all types of industries were allowed in Delhi, Ghaziabad or Faridabad would not have witnessed a rapid industrial growth. This is to say that the negative aspects of the policy proposals enunciated in the Delhi Master Plan have ~~negatively~~ ~~aspects of~~ ~~the~~ ~~policy~~ ~~proposals~~ ~~enunciated~~ ~~in~~ ~~the~~ ~~Delhi~~ ~~Master~~ ~~Plan~~ ~~have~~ ~~contributed~~ in a positive and constructive manner to the establishment, development and growth of industries in the regional towns and especially so in the ring towns. Besides this, the cost of land in Delhi is very much higher. The commercial rate is Rs.60/- per sq. yd. (charged by the Delhi Development Authority) and in the case of auctioned plots the price has been as high as Rs.150/- per sq. yd., whereas the price of industrial land ranges between Rs.6/- to Rs.14 in the other towns. Even in respect of industrial power rates Delhi rates are higher i.e.,

16 paise per unit as compared to Rajasthan which is the cheapest 11 paise followed by Haryana 14 paise. Only in Uttar Pradesh is it higher being 17 paise per unit.

This being so, the question arises as to whether the State Governments have been fully alive to this situation regarding the possibility of rapid industrial growth and whether they have adopted suitable policy measures to foster this growth. In the following paragraphs, a review of State Government policies in this regard is presented.

Industrial Policy in Delhi:

The policy regarding the future industrial growth in the Union Territory of Delhi is based on the policy note on industrialisation given in the Master Plan for Delhi. The main tenets of this policy are:

- (i) Delhi is not a suitable place for heavy industries and for self-contained industries. Such industries should be located in the 'ring towns' and other towns of the National Capital Region.
- (ii) The location of industries creating problems of waste disposal, smoke, fumes, water pollution etc. should be discouraged in Delhi. They are practically to be prohibited.

iii) Within the city, preference has to be given to industries which are essential for either feeding, servicing or maintaining Delhi's population.

iv) Existing obnoxious and nuisance industries or those located in the residential areas/congested areas should be shifted to specified areas (conforming areas).

v) There is a well-defined industrial classification system in vogue in Delhi and zones for industries (light or extensive or service etc.) are set up accordingly. This would ensure planned location, balanced growth and environmental control of different types and various sizes of industries in Delhi, specially in Urban Delhi.

Implementation of the Industrial Policy of Delhi.

For purposes of allotment of land in the planned industrial areas developed by the Delhi Development Authority, the industrial units of Delhi are grouped into five major types:-

1) One group comprises the new industries. Out of the total industrial land being developed by the DDA only 25% are being made available to this group, the other 75% is meant for expansion of existing industries and for shifting non-conforming industries. Before 1966 those new

industries which had an import licence were being given land by means of allotment but now they have to bid in auction. The method of auctioning of industrial land has been practised only during the past four years.

ii) Existing conforming units in the city, specially those in rented premises were allotted land by the D.D.A. on a commercial price upto May, 1968, if they were willing to shift. No allotment of land has taken place, after this date. All land for industries has been auctioned.

iii) Non-conforming industries set up prior to September, 1962, are allotted land by DDA at reserved rates.

iv) Unauthorised units which were set up after September, 1962, but before December, 1966, are allotted land at a commercial price.

v) The fifth or the last group is of those unauthorised units which were set up after December, 1966. These are considered as wholly unauthorised and are not allowed to apply for allotment of land, nor can they bid for land in an auction. These can simply be removed or demolished and have no claim to an alternative plot of land.

As regards the pricing of industrial land in Delhi, the reserved rate per sq. yard of developed plot for allotment used to vary bet-

between Rs.22 to Rs.25 upto July, 1969. The commercial rate was roughly 50% more than this. The price in those days, however, varied on the basis ~~of xxxxxxxx~~ of the cost of development of different areas, which meant the provision of roads, water supply sewerage, storm water drainage etc.

In July, 1969, after a survey, the pricing formula was revised because the cost of development had shot up tremendously. As an illustration it may be pointed out that the Delhi Electric Supply Undertaking which used to charge 50 paise per square yard for installation of electric lines and equipment started charging Rs.5/- per square yard after July, 1969. The Commercial price of industrial plots given by allotment was fixed at Rs.60/- per square yard at one and a half times that of the reserved price which was fixed at Rs.40/-.

Experience in Delhi shows that the price of an industrial plot when auctioned is above Rs.100/- per square yard. For instance, in the Naraina Industrial Area for a 400 sq. yds. plot the price in the auction has ranged from a minimum of Rs.100/- per sq. yd. to a maximum of Rs.124/- per sq. yd. the minimum auction price is not less than Rs.70/- in any industrial area. There is a 25% cash down payment and 75% has to be paid within two months if the area is fully developed (e.g., the Lawrence Road Industrial Area).

Table - 4.2.13.

Industrial areas of the D.D.A.		
Name of the Industrial Area/ Scheme.	Area (acres)	No. of Plots
1. Okhla Ph.I (Extensive)	650.00	1,051
2. Okhla Ph.II (Extensive)	336.00	629
3. Okhla Ph.III (Light)	67.00	67
4. Rewari Line Ph.I (extensive)	147.66	256
5. Rewari Line Ph.II (extensive)	166.41	1,322
6. Naraina Ph. I (Service)	129.00	392
7. Naraina Ph.II (Service)	34.88	114
8. Naraina Warehousing.	35.40	358
9. Lawrence Road (Light)	196.20	319
10. Jhilmila Tahirpur (Light)	108.95	166
11. Wazirpur (Service)	210.00	757
12. G.T. Karnal Road (Light)	125.04	291
13. Kirti Nagar Warehousing	156.13	439
14. *Rohtak Road Ph.I	345.00	594
15. *Rohtak Road Ph.II.	69.70	16
16. *Patparganj.	997.60	1,386
17. *North of Railway Line to Rohtak.	160.00	195
Total:	3,933.97	8,352

*Note Areas to be developed.

Source: Delhi Development Authority.

The plot sizes in these areas range from a minimum of 400 sq. yds. to 3 acres. Industrial allotment is on a functional basis as far as possible in addition to scale of operation and the level of industrial requirement. For instance, in the Lawrence Road Industrial Area, generally small-scale industries are allotted land. Also clean and related industries

(like cold storage) are very much encouraged. On the other hand in the Naraina Industrial Area, bigger industries are allotted land. Industries such as food canning and processing have not been allowed. However, it may be mentioned that this policy has not been uniformly pursued and in the case of small sized plots (400 sq. yds.) there have been no restrictions placed on the type of industries to be set up.

Another problem relates to the construction of flatted factory buildings in built up areas recommended by the Master Plan. So far no such factory has been constructed in Delhi. Perhaps, the first one would be at Motia Khan. The authorities have not been able to sort out the various problems involved such as the agency to construct the flatted factories, land ownerships, the rent to be charged etc.

So far as the procedure/allotment of land for industries is concerned, initially there was a tendency to allot larger plots than was actually required. Due to shortage of land and also due to the cost of land having increased, industrial land is being rationed. Existing units with four or less than four workers are allowed to continue in commercial areas. In the new district centres and community centres, small plots for service industries are being allotted but very few have actually started working. This has been one of the major drawbacks of the programme of implementation.

One of the major tasks of the D.D.A. is to shift non-conforming industries. It takes 30 months to shift factory operations from their original site in the city to a planned site in the industrial area. Many non-conforming units have already shifted. About 50 to 60 units have gone to Revari Industrial Area, 20 to 30 have gone to Jhilmilla near Shahdara, 15 to 20 have gone to Naraina Industrial Area and about 20 to Lawrence Road Industrial Area.

The main problems experienced by the DDA in implementation are as follows: This will have to be looked into at the time of the evaluation of the Master Plan.

- (i) At present there is no punitive tax on those industries which though non-conforming have not shifted even after the moratorium period is over.
- (ii) There are greater restrictions in the establishment of new industries in the allotment of land whereas existing industries change to a new line of manufacture without permission on the allotted site.
- (iii) Sub-letting is not permitted according to the lease conditions but this is not being enforced at present. Many of the bigger plots (1200 sq-yds.) have been sub-divided and sublet.
- (iv) The consequences of giving more land than is absolutely necessary have to be considered. At present in many cases some provision of land is made for future expansion and this has led to corrupt practices.

- (v) The industrial policy of Delhi will have to be clear about the types of industries to be encouraged and those to be discouraged. For instance, no new textiles units should be encouraged. Printing and publishing industrial concerns are mushrooming in Delhi. These have to be properly accommodated. Similarly other types will have to be properly accommodated. ~~Similarly other types will have to be~~ categorised as desirable or undesirable for Urban Delhi.
- (vi) The land requirements of industries for a larger population in Delhi than envisaged in the Master Plan, the F.A.R. permissible in industrial plots, the Zonal regulations for industries etc. require to be comprehensively reviewed in a general evaluation of the Master Plan for Delhi.

Haryana Sub-region:

A large part of Haryana falls within the National Capital Region. Though the Fourth Plan has taken cognizance of this fact and wants to cash on the proximity to the Capital, it does not seem to have devised a suitable policy for industrial development of the Sub-region in the NCR. No special incentives are available for the area which forms a part of the National Capital Region and whatever incentives are announced from time to time are on a State-wise basis.

Only two or three focal points have been proposed for future industrial development in the area falling in the NCR but even those envisaged in the official or non-official schemes have not really been taken up. A major focal point is being established along G.T. Road in the triangle formed by the Murthal Road and Bahalgarh Road going to Sonapat. The other focal point like Palwal or the area between Bahadurgarh and Rohtak or between Faridabad and Gurgaon have merely been suggested and there has been no concrete move in this direction. In fact, the State Government is paying attention to creating nuclei of industrial growth near Chandigarh and at Hissar.

In the budget for 1970-71 there is a provision of certain concessions to new industries in the initial stages of their establishment. These concessions are given in terms of three different groups of areas. Faridabad-Pallabgarh industrial belt is considered as an already developed area and therefore only very small industries qualify for receiving concessions and that too for a short period only. In the backward pockets of Haryana form the second group where small and medium industries would receive concessions for a longer period. Only Rewari Tehsil in the NCR has been considered a backward area for this purpose. In the third group, come the other areas where an inter-mediate level of concessions would be given.

Besides, considering these three groups of areas for availing of concessions relating to electricity duty, sales-tax, octroi etc.,

and besides expressing the view that Faridabad-Ballabgarh industrial belt would receive the minimum of concessions for a minimum period of time, Haryana has not yet formulated a policy of special benefits for industrialisation for the areas which fall in the National Capital Region. Faridabad has become the most attractive place for factory location even though concessions may not be available, as a certain type of industrial environment has set in here. About 1,200 hectares of industrial land have been earmarked in the development plan.

But the other towns in the sub-region are not able to attract enough industry. Bahadurgarh, Gurgaon, Rohtak and Palwal can develop industrially and contribute significantly to the overall economic development of the State, provided the problems of each of these centres are properly studied and tackled.

Haryana is expecting large-scale foreign investment within a few years. The State has recommended 180 proposals for large and medium industries and most of them involve foreign collaboration or substantial import of machinery and materials. Several foreign investors have shown keen interest in Haryana.

The list of new proposals approved by the State Government keeps growing every week. It includes plants for a variety of sophisticated items which could within a few years transform Haryana to one of the most industrialised States in the country. Television sets, refrigerators, tape-recorders alloy and special steel, automobile parts, tractors X-ray plants, roller flour

mills, a variety of electronic equipment, diesel engines, scooters, motor tyres and tubes and fertilizers are the items to be manufactured in the State. This has put Haryana as a sellers' market.

This is evident from the State Government's resolve to discourage more investments in Faridabad. So far most industrialists seeking to invest in Haryana have tended to converge on Faridabad.

The State Government, it is reported, has now taken two decisions to divert industry to other places; it has decided to give up the policy of giving a large number of incentives at a few focal points, such as Faridabad. New places are to be developed near Delhi, especially around Bahadurgarh and Sonapat to harness the investors' confidence in Haryana. The State's effort now is to promote the growth of similar large industrial-cum-urban metropolitan complexes at Bahadurgarh and Sonapat.

Uttar Pradesh Sub-Region:

The Fourth Five Year Plan of U.P. is silent about its role in the National Capital Region. Though there was a clear mention in the Third Plan of the 'spill-over' industrial growth from Delhi would be to absorbed at Ghaziabad. Apart from developing Ghaziabad as a planned industrial centre, U.P. has done precious little in other towns. The Fourth Plan has no industrial policy for the integrated development of the U.P. Sub-region although adequate

Facilities of financial assistance, technical knowhow, industrial space, power, and industrial raw material are to be provided to selected growth points on a state level. The Government of U.P. has also decided to allow a 15% rebate on power consumption by new units, exemption from payment of sales tax on finished goods for a period of three years and exemption of octroi duty on building material and machinery required by the new units.

The Fourth Five Year Plan Schemes of the Directorate of Industries reveal the following:

In the U.P. Sub-region, Ghaziabad has a predominant place in the Fourth Five Year Plan Schemes in respect of the development of industrial infra-structure. A quality marking scheme, a trade-centre, a sampling display centre, and a technical information service centre has been recommended for Ghaziabad. The tool room cum-testing laboratory at Ghaziabad is also to be completed during this period.

At Khurja the Fourth Plan has proposed the expansion of the Government Pottery Development Centre.

A quality marking scheme, a forge and a heat treatment plant is to be set up at Meerut. There is also provision for higher investment to complete the spill-over work on the industrial estate at Shyam Mandi (Bulandshahr District).

"Among the newly licensed industries (licences) issued upto 23rd February, 1970) that are likely to be established in the near future, almost 50% are to be set up at Ghaziabad. The remaining are to be located at Meerut, Morinagar Shahibabad, Muradnagar, Bulandshahr, and Hastinapur. The types of industries that will be established would manufacture engineering goods, cotton, textiles, metal products, and food-stuffs. Most of the licences have been granted to the local entrepreneurs, but a few Delhi firms have also been granted licences at Shahibabad, Muradnagar, and Ghaziabad to set up their factories"

There are 45 new industries for which letters of intent for grant of licences have been issued. Here too, Ghaziabad will get a major share of the industries in the course. Ghaziabad has attracted industrialists from Calcutta, Bombay and Gwalior. The programme of industrial development at Ghaziabad is being pushed through by the State Government. About 940 plots out of the 1,100 developed plots have already been sold.

But obviously the Government of U.P. has not thought of creating new focal-points, nor has it announced any special incentives or concessions for rapid industrial development in its Sub-region. It seems to be of the view that Meerut and Bulandshahr Districts are already areas with relative higher income per capita than other parts of the State. This is because of the agricultural prosperity and the success of the 'green revolution'.

Its attention is directed towards the backward pockets of the eastern districts.

However, it is learnt that an industrial potentiality survey of Meerut and Bulandshahr district will be undertaken by the small Industries Institute at Kanpur. Also Meerut, Ghaziabad, Haridwar and Khurja have now been singled out as major growth centres in the Sub-region for future development of industries. The minor growth centres which have been selected for industrial development are: Molinagar, Baraut, Mawana, Pilkhawa, Sarhana, Kankar-Khera, Sikanirabad, Jahangirabad, Debal, Shikarpur, Sirsa, and Anupshahr.

Rajasthan Sub-Region:

In this Sub-region, there are only two towns, namely, Alwar and Khairtal. The Rajasthan Government has focussed its main attention on the industrial development of Kota, Jaipur, and Udaipur. Located in one corner of the State, Alwar has not been able to capture the due attention of the State Government for purposes of developmental activities. Its main asset is its closeness to Delhi and its locational advantages. This town would have attracted more industries, had it been located on the broadgauge railway line. However, it had direct connections via the meter-gauge with all parts of Rajasthan, Gujarat and Delhi.

Moreover, Alwar area is also rich in minerals and the chemical industries are important in the town and will continue to remain so. The food product industry and manufacture of port products is coming up on a large scale and the pharmaceutical industries can also thrive well in this area.

Problems and Prospects of Industrial Growth Magnitude of the Problem:

The most important change likely to take place in the economy of the NCR will be a shift from the agricultural to the non-agricultural occupations. The rural-urban ratio is likely to change from 34% in 1961 to 44% by 1981. Not only will there be a higher proportion of non-agricultural working force but the internal composition will also change in terms of employment. The picture in 1961 of the urban working force and the urban industrial working force in the Sub-regions of the NCR is given in Table 4.2.14. In the urban areas 31% of the population forms the working force. About 24% of the total workers are engaged in industry. Comparatively Haryana has a larger number of urban workers engaged in manufacturing (about 29%) followed by U.P. (28%), Delhi (22.5%) and Rajasthan with only 20%.

Within the urban sector the proportion of manufacturing industries including household industries is likely to go up and in fact it should be so planned. Trade and commerce is bound to go up especially with the establishment of the 'dry-port' at or near Delhi. If industrial activity has to grow, transport

Table 4.2.14

Urban Working Force in the Constituents of the NCR (1961)

Constituents of NCR	Total Population	Urban Population	Urban Population as % of Total Pop.	Urban Working Force No.	% of Urban Pop.	Urban Industrial Force No.	% of total workers.
	1	2	3	4	5	6	7
Haryana	29,13,040	4,67,134	15.8	1,29,639	27.3	37,259	23.7
Rajasthan	6,29,326	72,707	11.5	20,437	23.1	4,163	20.3
U.P.	44,50,357	7,73,673	17.5	2,34,516	30.1	61,632	27.6
Delhi	26,53,612	23,59,408	38.7	7,46,815	31.7	1,61,733	22.5
TOTAL	1,06,31,835	36,77,925	34.5	11,31,407	30.8	2,73,387	24.2

Source: Compiled by T.C.P.O. from the Census of India.

and communications must expand as well, absorbing a larger proportion of workers. In estimating the future urban working force, the estimated urban population of 93 lakhs has been accepted for 1981. The estimate of prospective working force of the NCR as a whole is based on the assumption that the share of the total population in the working force ~~1981~~ by 1981 would be approximately 38%. This is a very conservative estimate of the participation ratio; it could even be higher, i.e., 40%.

In the urban areas as a whole the participation ratio may vary between 33% (in rural areas it would be higher and vary between 38% to 40%). This would give rise to an urban working force of 30.7 to 32.5 lakhs. (See Table 4.2.15). By 1981, the proportion of industrial workers must go upto 28% to 30% in order to provide a stable economy. As a result, industrial work force would have to be somewhere between 8.6 and 9.8 lakh workers. From 2.8 lakh workers in 1961, a net addition of six to seven lakh workers is thus envisaged in the industrial sector.

The specific steps required for initiating an industrial development programme will vary from town to town. It may be helpful to suggest a possible pattern, which can be altered if necessary. A preliminary study of the situation in a particular town can point to the most important limiting factors, and the action programme can then be constructed with special emphasis on these factors. Usually the limiting factors so revealed will be multiple, and the action programme will

need to be broad based and an integrated one, so that each programme reinforces the others. That is to say that the action programme, to be effective, must simultaneously push outwards quite a number of limiting factors.

As it is, Delhi and the 17 towns are the main centres whose problems should be studied and prospects analysed. All of them are by now associated with one or more industrial speciality for which they have acquired the status of a market, to which customers and dealers come from within and outside the National Capital Region. In the Table 4.2.16 such specialised industrial items are indicated to point out that each one of them (17 towns) has already a certain level of industrial production.

The problems and prospects of industrial growth in the towns are discussed in the following paragraphs.

Table 4.2.15 Projected Industrial working Force in the NCR 1981

Urban Popu- lation	Assumed par- ticipation ratio	Total work force	Recommended % of industrial work force	Total In- dustrial workers
93 Lakhs	33%	30.7 Lakhs	28%	8.6 lakhs
	35%	32.5 lakhs	30%	9.8 lakhs

Note: In 1961, NCR had about 2.75 lakhs of urban industrial workers who constituted 23.9% of the total urban working force.

Table 4.2.16

Special Industries of Delhi and 17 Towns of the NCR.

<u>Name of the Town</u>	<u>Special Industries</u>
Delhi	Printing Press, Electronic Industries, Domestic appliances.
Meerut	Agricultural Machinery and Parts (Discs, harrows, cultivators crushers).
Ghaziabad	Oil Engines.
Modinagar	Textiles
Hapur	Sewing Machines
Bulanishahr	Hand Pumps
Khurja	Pottery
Sikandrabad	Textile Printing
Faridabad	Machinery and Electronic Equipment
Ballabgarh	
Panipat	Handloom and Products
Sonepat	Bicycles
Palwal	Saw-mills
Rewari	Utensils
Rohtak	Waste Yarn and Products
Gurgaon	Optical goods
Bahadurgarh	Sanitary goods.
Alwar	Chemicals and Products
Khairtal	Oil Mills

1. Delhi:

One of the problems of Delhi is to find alternative space for those large factories which are at present located in the congested parts of the city. As far as possible the new sites should be within the Union Territory of

Delhi. The best location for them would perhaps be at Narela (ring town) but land is yet to be acquired there. About 400 acres were notified for acquisition, but afterwards the land was denotified. Hence one of the major problems which remains to be tackled is the development of land at Narela and all the activities for industrial growth at that place.

In such cases where Delhi is not able to meet the demand for industrial land especially for those factories which would like to relocate from places like Bombay and Calcutta or where the site demand is for a very large size of plot for a new industrial unit, the DDA must clearly and specifically mention the towns in the NCR where such large pieces of land are available and where such industrial unit could be set up. In other words the DDA might have to take up the function of a "clearing house" of information regarding the availability of industrial land in the regional towns.

The schemes for building industrial tenements are progressively slow. These need to be strengthened and speeded up.

Delhi today is becoming a city of mini-scale factories. A large number of factories with a capital investment of Rs. 20,000 to 50,000 and employing less than ten workers are functioning now and new ones are being established almost everyday. Unfortunately these are not quality-oriented. Many of them are without a licence and a great many are avoiding sales tax and other taxes. Perhaps, Delhi offers good scope for such mini-scale

establishments; but then in order to place them in a proper working environment and in order to avoid the losses of revenues to the Government, 'flatted factories' must be constructed immediately.

The non-conforming industries which do not shift after the moratorium period and the unauthorised factories which are illegal in every sense must be penalised. Other methods such as disconnection of power and water connections and also the positive methods of persuasion must be resorted to in clearing away the unauthorised and non-conforming industries. When most of the non-conforming industries are shifted to conforming areas, the policy for the establishment of new industries may be liberalised to the extent necessary for a healthy economic base for the city.

2. Meerut:

Meerut is another town where there is at least an Interim General Plan. Unfortunately the Comprehensive Plan has not yet been prepared; but the areas which would be earmarked for industrial land-use are more or less known. What is needed is that an agency should be appointed or designated for acquiring, developing, and for disposing-off industrial land. Meerut by itself has an adequate number of entrepreneurs. Their initiative and investment capability have not yet been tapped or encouraged by the Government. Apart from this, other actions required both at the Industrial Estate of Partapur and other parts of the urban area are the following:-

- 1) Partapur Estate needs post and telegraph services, booking facilities, labour colonies, an administrative block, banking facilities etc.
- 2) Clearance should be given by the U.P. Government to the proposal of the Meerut Central Industrial Co-operative Society Ltd. for the acquisition of a 100 acres near Partapur Estate.
- 3) Building plans for industry should be sanctioned expeditiously.
- 4) Above all, Meerut needs publicity regarding its locational advantages in order to attract entrepreneurs from Delhi and those who would like to avoid the disadvantages of locating in Delhi (high price of land, water shortage, etc.). Although Meerut is not an industrial city of U.P., there are hardly three or four urban areas of U.P. which have a larger industrial working force than Meerut. It has a great potentiality for future industrial development because of its being a regional headquarters and the biggest city in North-West U.P. and also because the surrounding region is undergoing a phase of urbanisation emanating from Delhi which creates demand for goods and services. Textiles, general engineering, vanaspathi oil, caustic soda, alloy steel works are footloose types of industries which are not tied to local raw material and therefore can be set up here conveniently.

3. Ghaziabad:

It is the best example of a self-contained 'ring town' of Delhi. For procurement of raw materials and for marketing its products Ghaziabad is ideally located. Not only does it have excellent road and rail connections with Delhi (and these will improve with the construction of the National By-pass) it has direct road-cum-rail connection with Kanpur-Calcutta in one direction; with Hapur-Lucknow in another direction; and with Meerut, Saharanpur and Amritsar. The U.P. Government is fully alive to the importance of Ghaziabad in absorbing the spill-over of industrial growth from Delhi. Planned industrial areas are being developed to provide land for industries. However, in certain ways there is sub-standard development of facilities in the industrial/plots, the power lines have also not reached the inner roads, and there is no provision of underground sewerage so far. Although the rate, i.e., Rs.6-7 per sq. yd. for an industrial plot is very attractive, the environmental standards are below that at Faridabad. This has to be corrected even though it means raising the rates of industrial land in Ghaziabad. There is a shortage of industrial raw material and their cost has gone up due to the levy of sales tax. The power rates are high. There is also a shortage of labour housing. If these problems are set right the decade between 1971 to 1981 is most likely to witness a very fast tempo of development, because the foundations for such a tempo are being laid at present. Already the U.P. Government areas of Ghaziabad. The water lines have not yet been extended to the industrial

has spent about Rs.7 crores on the new development. Another Rs.4 crores are expected to be spent during the Fourth Plan period. But these need to be stepped up.

4. Modinagar:

In Modinagar Industrial growth may be faster, if co-operatives could be allowed to have industrial plots and if the Government also helped in the establishment of an industrial estate or an industrial area. Diversification of industrial production is very much possible at Modinagar, provided entrepreneurship is not limited as at present. Industrial housing will have to be provided as well as other amenities to attract labour.

5. Hapur:

Here, industrial development can take place provided serious efforts are made. The experiment of a co-operative industrial estate has failed here. A public sector industrial estate should be established to relocate some of the existing industries which are operating in unhealthy surroundings. Manufacture of parts and accessories of sewing machines can very well be taken up by small scale units which may be housed in the industrial estate. Thus, at Hapur there is a case for a functional estate.

6. Bulandshahr:

The manufacturers of Bulandshahr have to face some difficulties, and if these were removed conditions for industrial development

would be greatly improved. First, the price of land for industrial use is very high in the absence of any organised industrial area in the town where land could be purchased at a reasonable price. The rate of electricity is also considered high and because of an inefficient system there are frequent break downs and there are fluctuations in voltage which prove a great hindrance. Non-availability of raw materials is another problem which the industries of Bulandshahr have to face. Bulandshahr's important industry is that of hand pumps, which has a wide scope as this town is situated in an agricultural belt. An organised industrial area in the town would greatly help to remove some of the problems of the industries. The powers of the District Industries Officers should be increased so that he can actually assist in the industrial programmes of his area.

7. Khurja:

Khurja is known for its pottery works and the U.P. Government have all plans to help in the improvement and expansion of this industry. It is going to be developed as an important growth point for industrial development. Electrical goods such as insulators can also be manufactured there.

8. Sikandrabad:

Sikandrabad at present manufactures small agricultural implements to feed the local demand; this industry could be promoted if land is made available. Being closer to Ghaziabad it has some locational advantages as compared to Bulandshahr.

Sikandrabad has also been selected as a minor-growth centre for industrial development.

9. Fariyabad:

Fariyabad-Ballabgarh Complex, which is one of the important industrial centres of the NCR, does not face the usual problems of other smaller towns such as shortage of power, water, lack of basic facilities, as it has been planned as an industrial township. If the industrial development programme is pushed through it is going to be the biggest industrial centre of Haryana State and can attain a nation-wide importance. But its infrastructure needs to be further strengthened since many of the industries are catering to the requirement of the country, better railway facilities must be provided. The railway siding is comparatively small to handle even the present goods traffic. There are no facilities for private sidings at present. Though this is a modern township, there are no subsidised housing or labour colonies provided. The telephone facilities need to be increased to facilitate better functioning.

10. Panipat:

Panipat is the home of the handloom industry in the NCR. But this town suffers from lack of basic facilities such as drainage, sewerage, and frequent power break-downs. Panipat also does not have provision for godowns and storage and has to depend on Delhi which proves rather inconvenient. About 100 acres have been earmarked for an industrial area, but at present

a large part of this land is still under the possession of the farmers. If this area is released, the entire industrial area can be developed and industrial growth of the town speeded up.

11. Rohtak:

Rohtak being a commercial town and an administrative centre of the district cannot attain the scale of industrial activity at Faridabad, Bahadurgarh or Sonapat. But there are still some industries of importance such as cotton waste yarn, sugar and flour mills.

The main problem is the acute shortage of water which is proving a great hindrance to industrial development. This problem should be tackled immediately. Proper booking facilities are not available at Rohtak. Nor are raw materials easily available. These problems should be solved first so as to attract industrialists in this area.

12. Palwal:

This place specialises in saw mills; here too the basic facilities, drainage, sewerage etc., are lacking. Palwal can develop as a centre for agro-industries if proper attention is paid towards the improvement of the facilities. Small agro-based industries can very well be developed based on raw materials produced in the surrounding areas.

13. Rewari:

Though Rewari is in an industrially backward area, it has always been famous for its brass utensils, due to the non-availability of raw materials, viz., copper and zinc, the industry has had to face great difficulties, and hence a good number of units had to change their type of manufacture from brassware to aluminium goods. Rewari is also manufacturing machine tools: generally the machines for sheet metal work such as double action power presses, circle cutting machines, spinning lathes, rolling machines etc. There are three such units. Previously all these units were getting their castings from Delhi. One unit has installed a foundry under the guidance of the Small Industries Service Institute Extension Centre and another one has started a workshop for casting of small parts.

About 300 families are dependent on the leather industry. The industry comprises mostly of one-man units making desi jutees; about 12 units manufacture shoes, and there are a number of leather tanning units as well. Besides these industries, Rewari has some chemical industries.

The main problem faced is the non-availability of proper water supply and also the quality of water is hard. Besides, water is available at a depth below 100 feet, which makes it an expensive and difficult operation. There is shortage of electric power and the drainage system is deplorable. At present there is no planned industrial area, but an industrial estate has been planned on the Delhi-Rewari Road.

Rewari has been a business centre since a long time. Its main advantage is the fact that it is connected both by road and rail. It is the biggest meter-gauge railway junction in India. It has the necessary skilled labour for its traditional industries of utensil and shoe making for which there is a good local market. These industries have scope for modernisation and for capturing markets outside the State. It is the only town in the NCR which has a S.I.S.I. Extension Centre which can provide valuable guidance to the industries in and around the town.

14. Sonapat:

It has a concentration mainly of small and medium scale industries. Sonapat has all India fame for its bicycles. The town suffers from shortage of water, sewerage and drainage and lack of proper booking facilities. There is also a need for institutions for training skilled labour. Small scale industries which do not depend on railway siding can come up on the G.T. Road. Sonapat should be given the necessary facilities as other focal points.

It has a substantial industrial working force (39.8%) but there is no provision for housing for its workers, nor any organised labour colony. Industrial development has taken place due to factors such as availability of cheap land, availability of electric power in abundance, nearness to Delhi and its favourable location on the G.T. Road as also on the main broadgauge railway line. The State Government is also encouraging industrial growth by

providing raw material, finances by way of liberal loans, and developed industrial plots.

The industries which have scope in this town are chemicals, namely, paints and varnishes, as also machinery (mainly machine tools) which have come up over a period of time. The number of units and their employment have steadily increased. An organised industrial area is also being developed along the G.T. Road which will augment the industrial growth of the town. By 1981 it has been estimated that 28,000 persons will be engaged in manufacturing alone.

15. Gurgaon is not suitable for large scale industrial development and whatever small scale industries have been established are primarily due to its nearness to Delhi. But at present only 33% of the total installed capacity is being utilised. The main factors which affect production capacity are shortage of raw materials and lack of markets (other than Delhi) lack of demand, finances, trained labour and competition from bigger markets. It is, therefore, essential that concerted efforts should be made by the State Government to revitalise industry by arranging for regulated supply of raw materials and finances. Long term loans on easy terms and condition can be given to entrepreneurs for this purpose.

Gurgaon will always be at a disadvantage in attracting industries, as it has to compete with Faridabad which has a more

favourable industrial environment. Moreover, Gurgaon is served by a meter-gauge line; this results in unnecessary delays in the trans-shipment of goods and raw materials besides transportation by truck proves very expensive. It costs Rs.100 by a truck to send goods to Delhi and as much as Rs.33 for one truck-load as far as the Gurgaon Station within the town. There should be some government control on these routes to provide better and cheaper transport, so that the difficulties of the rail system can be overcome. The price of land for industries in Gurgaon is higher and compares unfavourably with the price prevailing at Faridabad. It is felt that there should be special octroi rate for the Gurgaon industries, otherwise they cannot compete with those in Faridabad. A master plan has been prepared but it has not yet been approved. If this were done, areas earmarked for industrial use would be known and land could be acquired and released for industries at a proper rate. This would greatly help industrialisation in the town. Lack of sufficient water supply is also a deterring factor. However, those small scale industries which are not dependent on water have a good scope in the town such as optical goods, food preservation, potteries, refractories, and metal goods etc. This town can also provide for service industry as is indicated by existing employment pattern. These industries can cater for the surrounding rural areas. Some industry is coming up along the Railway road.

16. Bahadurgarh:

In Bahadurgarh, industrialisation gained momentum only after the restrictions of the

Delhi Master Plan. It specialises in the manufacture of sanitary ware; but like other towns in the Sub-region the standard of basic amenities is poor. ~~These need to be greatly improved to encourage further industrialisation and attract industrialists from Delhi.~~ These need to be greatly improved to encourage further industrialisation and attract industrialists from Delhi. About 14 small units such as thread making, rolling mills, automobile parts, etc. are proposed to be set up. A larger unit for the manufacture of tiles has also been proposed.

17. Alwar:

The Rajasthan Government has focussed its attention mainly on towns like Kotah and Jaipur for industrial development. Alwar has been comparatively in the background. A lot of effort is required at the Governmental level to give a boost to industries here, so that favourable conditions are created and eventually Alwar can compete with the other towns. The industries that have developed are those based on local raw materials. Recently the chemical industry has come up here.

At present a large chunk of industrial land has been diverted to agriculture under the "Grow More Food Campaign". The Government should provide alternate land for industrial development on a low lease payment as is the case in towns like Kotah or Jaipur. This concession would be a great inducement. Being on the meter gauge line Alwar's industries face unusual delay in obtaining raw materials which come from places like Calcutta. Also, raw materials coming to this town are subject

to a higher Octroi duty as goods generally have to pass through both the Delhi and Haryana borders before entering the State. On the Delhi Road a small nucleus of industries has come up and this can grow if other incentives and concessions are provided.

18. Khairtal:

Khairtal is a town in the NCR which had only 5% of its working force engaged in industry in 1961; at present the only industry worth mentioning is oil making. But it can be developed as a focal point in the Rajasthan Sub-region. The oil industry has further scope for expansion in this area. Other suitable agro-industries can also be set up.

Agro-Based Industries:

Agriculture plays a vital role in the overall economy of the NCR. The occupational distribution is highly biased in favour of agriculture. In 1961 about 50% of the total working force of the Region was absorbed in this sector. This is in itself indicative of a lesser degree of industrialisation in the NCR, therefore, in order to bring about a satisfactory growth both in income and in employment and also to diversify the economic structure certain new avenues must be found and existing ones augmented.

The eastern portion of the Region has some of the most fertile land and is agriculturally one of the most important areas in the country. The output of wheat and sugarcane and oil-seeds in the U.P. Sub-region

provides one of the most important food resources in the country. Similarly the Haryana Sub-region though less productive is a producer of cotton, wheat coarse grains such as bajra and millet, etc. Because of its drier climate there is a prevalence of grazing grounds and as a result of this, this Sub-region has become a producer of cattle and animal products.

Though the State of Rajasthan is not as fertile as the States of U.P. and Haryana, Alwar district is one of Rajasthan's agriculturally richer areas. Oil-seeds, especially mustard and rape seeds, are grown here. Other important crops of this area are millets, tobacco, sugarcane, gram and wheat. It is also known for its livestock, especially pigs. Recently a Pork manufacturing unit has been established here. Other industries based on these products (both crops and livestock) could be set up here. Dairy farming and poultry farming can also have good scope in the areas close to the urban centres of Alwar and Khairtal.

The NCR having such an abundance of agricultural raw material should make the best use of it. The development of agro-based industries could greatly help in this direction.

In the registered sector (under the Factories Act 1948) there were 184 agro-based industrial units in the Region, mainly located in the larger urban areas namely, Meerut, Hapur, Modinagar, Bahadurgarh in Haryana; and Alwar in the Rajasthan Sub-region. These industries employed about 19,000 workers. The maximum number of units were to be found in the U.P. Sub-Region (85 units), followed by Delhi (38 units),

Haryana (38 units), and only 3 units in the Rajasthan part, employing 13,000, 3,100, and 155 workers respectively.

The predominant agro-based industries of the U.P. Sub-region are sugar, agricultural implement, cold storages and hydro-generated oil industry. Meerut district has the largest number of sugar factories and a concentration of oil mills is also found there.

Delhi's agro-based industries are mainly flour mills, bakery products, dairy products, and cold storages. In the Haryana Sub-region Rohtak district has a larger number of agro-based industries. Edible oil, agricultural implements, cotton ginning and sugar mills are among the more important ones in the registered sector in this Sub-region. The Rajasthan Sub-region has hardly three units employing less than 200 persons. They manufacture edible oils. In the unregistered sector in the U.P. Sub-region industries such as sugar-cane crushers (at Hapur), handpumps (at Bulandshahr), handloom products (at Meerut), flour mills (at Modinagar), cloth printing (at Sikandrabad) have been set up.

In Haryana saw mills (at Palwal & Rohtak) and flour mills (at Rohtak, Bahadurgarh) have been set up. In the Rajasthan part dal and flour mills at Alwar and oil mills at Khairtal have been established in the unregistered sector. It has been found that the bulk of the agro-based industries have come up in the bigger towns of the NCR. Comparatively speaking, the rural areas have a smaller share.

With the growth of agro-based industries in the rural areas of the Region, better distribution of economic activity will take place between the urban and the rural areas, and also the migration to the towns will be reduced to a great extent and the local population will be able to get additional employment. As is already known, the farm sector alone cannot provide full employment. But to encourage agro-based industry in the rural areas, infra-structure facilities such as electricity, water, transport, proper roads etc., will have to be provided in the important rural centres. The sugar industry of this Sub-region ranks first but it suffers from a number of drawbacks and needs to be improved greatly.

Meerut District is the home of the sugar and edible oil industry in the U.P. State. There is at present a high maintenance cost and the equipment used is old and obsolete. Being uneconomic they cannot compete with other industries. The quality of cane also needs to be improved. This is one agro-based industry which needs to be boosted up in the NCR, and can be done if modernisation is introduced both in plant and equipment and raw material. It can become a profitable industry in the long run. This industry when properly developed will give filip to industries like cane crushers, agricultural implements, repairing shops, cold storages etc.

Agro-based industries which can have scope for further development in the Union Territory are the Khandhari industry for which there is a great demand and can be developed in places

like Alipur and Khanjawala (Villages) where sugarcane is available.

Other industries based on livestock can also be developed. There are about 2 lakhs of livestock in the rural areas; the hides and skins of the dead animals can be gainfully used.

Poultry can also come up along with agriculture in the rural areas as there is a great demand from the surrounding urban areas; but efficient marketing facilities need first to be provided before this industry can grow. Milk collecting and chilling centres can be set up provided there is marketable surplus.

The Rajasthan Sub-region has an insignificant number of agro-based units in the registered sector; the reason is obvious; this area is not properly industrialised. In fact, in Rajasthan, the Alwar area is next only to Ganganagar in fertility, agricultural output, and yield per acre. But adequate attention has not been paid for tapping these resources for rural industrialisation.

Haryana has industries based on agricultural raw material such as cotton as also industries based on livestock. A wider range of industries can be developed in this Sub-region for the available resources are more varied. There is ample scope for the handloom industry and allied manufacture such as cloth printing, dyeing etc., flour mills saw mills etc. At present the manufacture of leather foot-wear and tanning is being done at Rewari and in the surrounding villages. This industry could be better organised and the villages

easily accessible by the provision of proper roads, so that goods are easily marketed. The embroidered jutti has a great export potential.

Proposals and Recommendations:

Regional Industrial Policy: The Industrial Policy for the Region should take into account the impact of the various proposals made in the Regional Plan regarding settlement pattern, transport structure, and agricultural development. Moreover, it should be an integrated policy for the NCR as a whole and should be pursued at the sub-regional level so as to effectuate the broader objectives of the Regional Plan. It should have the twin objectives of fostering rapid industrial growth and achieving balanced development of the Region. It may be spelled out as follows:

(i) A policy aimed at dispersal of industries from Urban Delhi to a wider areas in the medium sized regional towns and "central place" villages and small towns, where suitable infrastructure has to be provided has to be vigorously pursued. There should be consolidation of growth in the existing industrial towns by improving the other sectors of the town economy before further industrial development is attempted. New growth points should be created farther away from Urban Delhi so that a proper balance between the developed and undeveloped areas of the Region is achieved.

(ii) There should be a definite attempt to change the basic character of the regional economy of the NCR from agricultural and pre-industrial to

a more diversified one in order to raise the earning capacity of the people. By 1981 nearly 44% of the population would be living in the urban areas. This would entail the creation of more and more jobs in non-agricultural occupation than at present. For this purpose, there should be not only an injection of additional industrial activities in existing and new centres outside Urban Delhi but also the development of agro-based industries in the rural areas in order to support urbanisation on the one hand and to stabilise the rural areas on the other.

(iii) In the Region, land is generally good for agriculture and hence selection of sites for industries should be done judiciously. There is a general shortage of potable water in the Region except perhaps in the area east of the Yamuna, and paucity of power is also a factor to be reckoned with. These factors may be considered in the location of heavy industries in the Region since these are the pre-requisites for such industries. Also, since the Region is getting to be highly urbanized, the location of noxious industries in the Region will have to be under controlled conditions. On the other hand consumer and service industries are suitable for location in the Region because of the availability of transport network, large markets and skilled labour.

(iv) With due regard to the present policy of not permitting large scale and heavy industries in Urban Delhi and limiting the expansion of existing large and medium industries,

the industrial policy in the Region should promote growth, as well as coordinate the dispersal of industries in suitable centres in the Region, on the following basis.

In Urban Delhi, selected small scale industries have to be encouraged. In Narela, Faridabad-Ballabgarh, Sonapat, Panipat, Meerut, Ghaziabad, Modinagar, Khurja and Alwar medium and large scale industries may be encouraged with the provision that in some of them ~~the~~ further growth should be attempted only after consolidation of the present growth. In Hapur, Bulandshahr, Sikandrabad, Rohtak, Gurgaon, Bahadurgarh, Rewari, Palwal and Khairtal, some small scale industries are already thriving. These may be encouraged and new ones started. However, these are not mutually exclusive fields or areas but there will be a fair mixture of both small scale and medium scale industries in each town. In order to diversify the economy of the rural areas development of agro-based industries in an organised manner has to be encouraged in rural areas especially in 'central place villages' and small towns thereby reducing the disparities in the level of economic development between the rural and urban areas.

(v) The regional transport programme envisages not only better road and rail connections between Delhi and the regional towns but also inter-linking of the towns themselves. A phased programme of converting the meter-gauge railway line to broad-gauge had also been proposed, first upto Rewari from Delhi and then further upto Ahmedabad. All these would help in industrial development. At present most of the

railway bookings are done at Delhi. In the first instance such centres like Ghaziabad, Faridabad, Sonapat and Partapur near Meerut should be provided with these facilities as also railway sidings for bigger industries and industrial areas.

(vi) There is a need for streamlining not only the fiscal and other incentives given by the various State Governments but also the tax structure for industries and industrial products in the NCR. It should also be possible to rationalise the octroi and other taxes in Delhi and in the various towns for the mutual benefit and in the overall interest of the Region. This will enable a free flow of goods and encourage industrial development. There are other aspects to this matter, such as, the liability of industrial firms to pay taxes depending on the location of their registered head offices. These and other related matters of mutual interests should be sorted out by a Co-ordinating Industrial Committee of the States concerned. This Committee could also undertake feasibility studies for the location of different types of industries at suitable industrial centres, in order to assist private industries in their locational decisions which at present are based on insufficient data. It could also lay down minimum standards of development for providing basic amenities in industrial areas, such as, godowns, transport banking office, telephone, post and telegraph facilities etc.

Sub-Regional Industrial Policies

The recommendations of the Delhi Master Plan for the exclusion of large scale and heavy industries from developing within Delhi, and the shifting of non-conforming industries either to new industrial areas in Delhi or to the 'ring towns' of their own choice and a further proviso for limited expansion of existing large industries and medium industries in Delhi have had a significant influence on the pattern of development in the National Capital Region as a whole. Besides these, the Master Plan envisaged in Delhi an industrial working force not exceeding 25% of the total working force in 1981. Thus, the Master Plan proposals ordinate a definite pattern of industries and industrial growth not only in the Union Territory of Delhi but also in some of the 'ring towns'. In future, industrial policy will have to be pursued at two levels; in Delhi and in the rest of the Region.

In Delhi the Master Plan Industrial policy should be central to all industrial development programmes subject to the following qualifications:

(1) The present policy of shifting non-conforming industries should be more vigorously pursued. The present administrative set-up for the allotment of plots as well as the development of land should be streamlined in order to effectuate a phased programme of industrial development. In this connection the present policy of allotment of only 25% of the land in planned

Industrial areas for new industries as against 75% for the shifting or expansion of existing industries may be reviewed. Taking into consideration the fact that the expansion of existing industries alone will not be able to meet the requirements of jobs for a population of 52 lakhs, nor diversified enough to meet the vast range of requirements of a metropolitan society whose per capita income is one of the highest in India. Hence there may have to be a more liberal policy regarding new industries, specifically for small scale industries. On the other hand it seems to be that the demands of existing industries for very big plots for shifting or expansion have been on the higher side. In fact there has already been a reconsideration on this aspect and smaller sized plots are being allotted.

(ii) In the development of industries in Delhi, it is essential to encourage those which are required for feeding and servicing the population envisaged, as well as to provide adequate employment without changing the basic character of the National Capital. Hence clean industries without smoke, affluent and other nuisances based on skilled labour and transport oriented should be encouraged.

(iii) In recent years there has been a lack of planned "inlying locations" in the core of the city for small and service industries which rely on nearness of market but are labour intensive and require very little space. These have sprung up in undesirable locations in the lanes and by-lanes of residential areas and in the service lanes of commercial areas. Hence, there is an

urgent necessity to develop the areas shown in the Master Plan in 'inlying locations' for industries in "service industrial areas", "district centres", "community centres and "local shopping centres" as well as in multi-storied "flatted factories".

(iv) In a general evaluation of the Delhi Master Plan, the total industrial area requirements for a population of 52 lakhs in 1981 should be properly assessed and provided for. The evaluation should also take into account any existing deficiencies and difficulties experienced in the working of the industrial zoning regulations.

In the Region outside Delhi, the following policy may be pursued:

(i) Some of the 'ring towns' have shown a great spurt in industrial activity. In order that industrialisation may benefit the economy of the NCR as a whole, it is important that the disparity in the levels of development between different areas of the Region should be progressively reduced.

(ii) As part of this policy, industrial development in Ferozabad-Ballabgarh, Ghaziabad, Modinagar, Sonapat, and Bahadurgarh should be consolidated by providing housing and other community facilities, as well as developing other sectors of the urban economy. This would be necessary for a further growth of the industrial sector, because the present imbalanced growth if allowed to accentuate, will retard further industrial growth in these towns.

(iii) Taking the above into consideration, the State Governments within their own State industrial policies should draw an industrial programme for development of the Sub-regions which is in keeping with the optimum industrial development of the Region as a whole.

(iv) This will entail the provision of infrastructure in suitable locations. Regional studies have identified 17 towns in the Sub-regions as having a good potential for growth, many of which are also suitable for intensive industrial development.

(v) The State Government should review their programme of development of industrial growth points in view of the recommendations of the Regional Plan. In Haryana there may be scope for further boosting up of industrial development in Faridabad, Gurgaon, Bahadurgarh, Sonapat and Panipat. New growth points will also have to be developed. In U.P. substantial efforts will be required to raise the tempo of industrial development. In Meerut city, which already has a certain amount of infrastructure conducive to industrial development, development may be stepped up. Khurja, Hapur and Modinagar are some of the towns requiring an industrial development programme, while continuing the programme at Ghaziabad. In Rajasthan a programme may be drawn up for increased industrial activity in Alwar and Khairtal towns.

(vi) New focal points may also have to be developed keeping in view the following general criteria in their selections:

(a) Industrial growth points in the National Capital Region will have to be located on the transport network envisaged in the Regional Plan. These should not be mere ribbon development of industries but should be compact urban settlements with industry as an important sector.

(b) The size of the industrial estates in these growth points may be based on the growth potential of the centre. Tendency to overzone for industry should be avoided.

(c) The present endowments of infrastructure facilities, if any, may be taken into account and the future requirements for growth of industries at such centres have to be provided in a phased manner.

(d) Based on the State Governments overall policy in the matter, incentives may be given for the development of comparatively backward areas in the Sub-region for the location of industries such as, the tahsils of Rewari, Palwal, Sikandrabad, Anupshahr etc.

(vii) Taking advantage of the Government of India's subsidized Industrial Housing Schemes, a vigorous industrial housing policy should be pursued by the State Governments. Private industrialists may also be given facilities to build industrial housing. Provision of water, electricity, shopping, educational and medical facilities should be part of the housing development programme, which while giving a balanced growth to these towns will also attract the managerial personnel and highly paid technical personnel to reside in these colonies instead of commuting from Delhi. Such housing schemes are required on a priority basis in Ghaziabad, Faridabad, Gurgaon, Sonapat, and Bahadurgarh.

3. TRADE AND COMMERCE IN THE REGION:

Trade and commerce is an important area of tertiary activity. In the NCR the development of trade and commerce is of a higher order as compared to All-India*. In terms of employment, trade and commerce accounted for 7.8% of the total working force in the NCR in 1961. However, in the major urban centres of this Region, trade and commerce provided employment to about 19.4% of the working force. This shows a greater development of trade and commercial activity in the towns as compared to the rural areas. In Delhi and the 17 towns the working force in trade and commerce ranged from 8.61% to 27.23%. Fourteen of these had registered a higher percentage than the national average of 16.3% showing a high degree of trade and commerce. (See Table 4.3.1).

Among the towns under consideration, the highest percentage of commercial workers to total workers can be observed in Rewari, where it was more than 27% in 1961. Other towns where commercial activity is of considerable importance (around 25%) are - Rohtak, Khurja, Bulandshahr, Hapur and Palwal. These are the

*For All-India the proportion of Trade and Commerce workers to total workers in 1961 according to the Census of India was as follows:-

Total	-	4.05%
Urban	-	16.30%
Rural	-	2.06%

main commercial towns of the Region. Modinagar is the least developed in this sphere because it is overwhelmingly industrial and has only 9% commercial workers.

Though Delhi does not show a very high figure percentage-wise of workers engaged in trade and commerce in 1961, yet its importance as a commercial centre in the NCR as well as at the All-India level is of a very high order. Apart from conducting a voluminous retail trade, its commercial dominance is primarily due to a large number of wholesale trades. The details of wholesale trading activities will be discussed separately at some length. Suffice it to say that out of 2 lakh commercial workers in the 18 major towns of the NCR in 1961, 1.44 lakhs or 70% were concentrated in Delhi alone.

Trade and Commerce in Delhi:

In 1951, Delhi had 22.8% of its working force in trade and commerce which was second only to the services sector. In 1961, however, trade and commerce ranked third in order, next to services and industries as the percentage of workers in this sector came down to 19.3%. However, the total number of workers increased from 1,17,338 to 1,43,809, during this period. It is estimated that in 1969, the number of workers depending on trade and commerce was approximately 2.5 lakhs in a total working force of about 12.5 lakhs and a population of over 38 lakhs. This shows the continuing importance of trade and commerce as an employment creator.

Table 4.3.1

Employment in the Trade and Commerce Sector in Delhi and 17 Towns (1961)
(figures in thousands)

Towns	Total Population	Total working force	Working force in Trade & Commerce	% of total Working force
1	2	3	4	5
Delhi	23,59.4	7,46.8	1,43.8	19.25
1. Ghaziabad	70.4	19.8	3.6	18.11
2. Meerut	2,31.0	86.4	15.4	17.83
3. Modinagar	24.3	9.3	0.3	3.61
4. Hapur	55.2	15.3	3.7	24.47
5. Bulandshahr	44.2	13.3	3.3	24.53
6. Khurja	41.5	11.7	3.0	25.24
7. Sikandrabad	23.3	8.2	1.3	21.94
8. Faridabad-Ballabgarh	59.0	13.0	2.3	12.20
9. Panipat	67.0	20.4	4.0	19.73
10. Sonapat	45.9	12.7	2.7	21.09
11. Palwal	27.9	7.6	1.3	23.44
12. Rewari	37.0	9.4	2.6	27.23
13. Rohtak	33.2	23.3	5.7	25.65
14. Bahadurgarh	15.0	4.4	1.0	22.70
15. Gurgaon	37.9	10.0	1.5	14.37
16. Alwar	72.7	20.4	3.7	13.12
17. Khairtal	5.9	2.0	0.3	15.01
Sub-total of 17 towns	110,023.3	2291.0	67.1	19.63%
Grand Total:	33,61.7	110,37.8	2,01.0	19.36%

Source: Compiled by the T.C.P.O. from the Census of India.

Employment Prospects in Delhi and 17 Towns:

The Delhi Master Plan recognised the importance of this sector in the economy of Delhi and estimated that in 1981 about 20% of the working force would continue to be engaged in this sector. It envisaged an approximate employment of 4.2 lakh workers in a population of about 50 lakhs projected for the Delhi Metropolitan Area. With the increased population of 52 lakhs now anticipated for Urban Delhi by 1981, the 4.2 lakh jobs in the commercial sector will have to be found in Urban Delhi itself.

In the next census to be conducted in 1971, Urban Delhi is most likely to have a population count of 40 lakhs and a total working force between 14 to 15 lakhs. It is likely that the trade and commerce sector of the economy may show roughly 3 lakh workers. If the present trends are allowed to perpetuate Delhi is going to have a population of 64 lakhs whereas the 17 major towns would have only 18 lakhs by 1981. The working force* will rise to 24.6 lakhs in Urban Delhi and 5.8 lakhs in the 17 towns.

Table 4.3.2:

Alternative Position of Trade and Commerce in the NCR - 1981

1	Population		Working force		Trade and Commerce	
	Urban	17 towns	Urban	17 towns	Urban	17 towns
	Delhi		Delhi		Delhi	
	2	3	4	5	6	7
Present trends	64.0	18.0	24.6	5.8	4.9	1.2
Regional Plan proposals.	53.0	31.5	20.4	10.1	4.2	2.0

*Note: The ratio of working force and percentage in trade and commerce assumed are the 1961 rates.

If the present trend of concentration in trade and commerce continues, Delhi will have a lion's share of trade and commerce activity in the Region. As the Table indicates Delhi may have about 5 lakhs commercial workers whereas the 17 towns might have a total of only a little over one lakh of such workers. This is one of the imbalances which the Regional Plan seeks to correct. Accordingly, it has proposed that the population of Urban Delhi including Narela and Najafgarh should be contained within 53 lakhs in 1981. The share of the 17 towns should go up to 31.5 lakhs. The working force instead of being distributed between Urban Delhi and the 17 towns in the ratio of 4:1, would be 2:1, and approximately 20 lakh and 10 lakh workers should be absorbed in Delhi and the 17 towns respectively. Trade and commerce workers should be distributed in a similar ratio. Urban Delhi's share of jobs would be 4.2 lakhs and that of the 17 towns 2.0 lakhs.

The prospects of the commercial sector in the economy of Delhi are guided mainly by the following factors:-

(a) Delhi is a large consumer market. The

urban population creates a demand for goods with urban tastes and preferences. The general level of consumption of the urban population is always higher than that of the rural population. And because the metropolis of Delhi shows a higher per capita income than the rest of the country, the demand of a higher order for certain goods and services will continue to be exerted by the population of Delhi. Retail shopping would, therefore, continue to expand.

b) Delhi is already a well-known wholesale trading centre; from here, about two dozen types of commodities are brought and sold. The wholesale trade also gives rise to a good volume of retail trade.

c) Inter-related commercial activities such as banks, commercial firms, financial institutions, business houses, stock markets etc., are heavily concentrated in Delhi and are bound to expand their activity and continue to strengthen the commercial section of the economy.

The existing pattern of wholesale trades and their distribution in the NCR and its concentration in Delhi will now be discussed, with the object of decentralisation of this activity to other towns in the NCR.

Wholesale Trades in the Region:

Existing Wholesale Trades in the U.P. Sub-Region* Meerut is the most important town

*Survey by the Town & Country Planning Department, Govt. of Uttar Pradesh, 1970, Table 4.3.3.

of this Sub-region and has a prominent place in the wholesale trade in several items like foodgrains and pulses, vegetables and fruits, cloth and timber. There are 14 wholesale mandies. Food-grains have 4 such mandies with a business of Rs. 30 crores annually, employing about 700 persons. The cloth trade conducts about Rs. 35 crores worth of business employing about 1,100 persons. The other prominent trades are: timber Rs. 5.6 crores, firewoods Rs. 4.1 crores, and vegetables and fruits about Rs. 1 crore; employing nearly 600 persons.

Hapur has a foodgrains trade of Rs. 20.35 crores annually with an employment potential of 700 persons. Its vegetable market (Rs. 2 crores), timber market (Rs. 2 crores) and utensils trade (Rs. 1.25 crores) are also notable, employing about 1,250 persons. Most of the commodities transacted here are sent to places outside Hapur.

Baraut has made a name in the foodgrains market, conducting business worth Rs. 20.5 crores annually. As many as 2,500 persons are engaged in this activity. The other prominent trades are iron and steel products (Rs. 28 lakhs), dairy products (Rs. 22 lakhs), and kerosene, cement and fertilizers, having an annual business of Rs. 15 lakhs.

Ghaziabad has a business of Rs. 2.5 crores annually in machinery items and provides livelihood for 1,250 workers. There are other trades like foodgrains worth Rs. 85 lakhs, vegetables worth Rs. 35 lakhs, and other iron and steel products worth Rs. 30 lakhs. It has a

prominent distributive mandi for bicycles, with a sale of Rs.14 lakhs.

Khurja is famous for its pottery and stone-ware which bring a business of Rs.2 crores annually and employs 500 persons. But in terms of financial transaction, the gain mandi is bigger as it does a business of Rs.6 crores. The town also has a cloth business of Rs.80 lakhs, catering mainly to the local needs.

Bulandshahr's market is mainly in grain which turns out an annual business of Rs.1.75 crores. The cloth business contributes Rs.1.10 crores and is more or less a market for local needs. Pikhawa is noted for the handloom cloth trade which employs 700 persons and yields Rs.8 crores annually. The only other trade is the local grain market. In Dankaur and Modinagar the turn over from it is comparatively less (Rs.75 lakhs and Rs.15 lakhs respectively). Similarly Anupshahr has only a grains market transacting business worth Rs.1.9 crores, which is a little more than at Dankaur and Modinagar.

Existing Wholesale Trades in the Rajasthan Sub-Region:

Alwar:

According to a shopping survey conducted by the Town Planning Department, Rajasthan in 1966, wholesale trade contributed a major share to the total commercial activity.

The town is a flourishing distribution centre for the products, which are locally

manufactured. These include food and allied products, chemicals, agricultural implements, etc.

Khairtal:

The existing Mandi at Khairtal has 110 wholesale shops dealing in wheat, barley, gram and mustard seed. Besides, there are 190 retail shops dealing mostly in pulses and millets. The largest quantity handled is that of mustard seeds (10,000 quintals annually). Another commodity handled is that of gur which comes from U.P. Mustard seeds are grown mostly in the surrounding tehsils.

Apart from the commodities handled in the Mandi, other exports from Khairtal include onions, carrots, mustard oil, raw mustard and milk.

As the population of this urban area has been increasing by leaps and bounds, commercial activity should also grow. But the present facilities are inadequate in physical terms to cope with the potential growth. A further increase in the population will call for additional working opportunities in this urban area. There is need for an improvement in the conditions and expansion of the existing Mandi.

Although the mandi at Khairtal is smaller than at Alwar, being nearer to Delhi it has a good scope for further expansion and will become an important mandi in course of time.

Table 4.3.3

Distributive Trades in the U.P. Sub-region

1970

Commodities	BARAUT			HAPUR			GHAZIABAD		
	Amount of Business in lakh Rs.	Percentage of Business outside state	No. Employed	Amount of Business in lakh Rs.	Percentage of business outside state	No. Employed	Amount of Business in lakh Rs.	Percentage of Business outside state	No. Employed
1	2	3	4	5	6	7	8	9	10
Foodgrains & Pulses	20,50.0	85%	2,500	20,35.0	80%	700	85.0	40%	150
Dairy products	22.0	Nil	20	-	-	-	-	-	-
Vegetables Fruits	-	-	-	2,00.0	88	500	35.0	30	70
Oil & Oil products	5.0	Nil	630	22.0	25	60	-	-	-
Cloth	2.5	Nil	13	70.0	40	400	-	Nil	3
Tobacco	7.0	Nil	30	-	-	-	-	-	-
Kerosene, Diesel etc.	16.0	Nil	10	-	-	-	-	-	-
Stoneware, Pottery	-	-	-	-	-	-	-	-	-
Metal vessels etc.	-	-	-	1,25.0	40	250	-	-	-
Iron & Steel Products	-	-	-	-	-	-	-	-	-
Agri. Implements	27.8	60	166	-	-	-	30.0	15	30
Bicycles	-	-	-	-	-	-	14.0	-	40
Timber	-	-	-	2,00.0	85	500	-	-	-
Machinery	-	-	-	-	-	-	2,50.0	50	1,250
Cement, Fertilizers etc.	15.0	Nil	100	-	-	-	-	-	-
Woods	-	-	-	-	-	-	-	-	-
Total:	21,45.3	-	3,469	26,52.0	-	2,410	4,14.0	-	1,543

Table 4.3.3. (Contd)

Commodities	KHURJA			BULAN DSH AHR			PILKHAWA		
	Amount of Business in lakh Rs.	Percentage of Business outside state.	No. of Employees	Amount of Business in lakh Rs.	Percentage of Business outside State.	No. of Employees	Amount of Business in lakh Rs.	Percentage of Business outside state.	No. of Employees
	1	2	3	4	5	6	7	8	9
Foodgrains & Pulses	6,00.0	50%	70	1,75.0	30%	70	40.0	Nil	80
Dairy Products	14.0	70	20	-	-	-	-	-	-
Vegetables Fruits	25.0	25	64	35.0	20	40	-	-	-
Oil & Oil products	-	-	-	-	-	-	-	-	-
Cloth	80.0	Nil	36	1,10.0	Nil	20	8,00.0	75	700
Tobacco	-	-	-	-	-	-	-	-	-
Kerosene, Diesel etc.	-	-	-	-	-	-	-	-	-
Stoneware, Pottery	2,00.0	48	500	-	-	-	-	-	-
Metal Vessel etc.	-	-	-	-	-	-	-	-	-
Iron & Steel Products,	-	-	-	-	-	-	-	-	-
Agricultural Implemen-	-	-	-	-	-	-	-	-	-
ts	-	-	-	14.0	15	9	-	-	-
Bicycles	-	-	-	-	-	-	-	-	-
Timber	0.2	Nil	20	7.5	17	36	-	-	-
Machinery	-	-	-	-	-	-	-	-	-
Cement, Fertilizers	-	-	-	-	-	-	-	-	-
Woods	-	-	-	-	-	-	-	-	-
Total:	9,19.2	-	710	3,41.5	-	175	8,40.0	-	780

Table 4.3.3. (Contd)

Commodities:	DANKAUR			MODINAGAR			ANUPSHAHAR			MEERUT		
	Amount of Business in lakh Rs.	Percentage of Business outside state	No. of Employees	Amount of Business in lakh Rs.	Percentage of Business outside state	No. of Employees	Amount of Business in lakh Rs.	Percentage of Business outside state	No. of Employees	Amount of Business in lakh Rs.	Percentage of Business outside state	No. of Employees
	1	2	3	4	5	6	7	8	9	10	11	12
Food Grains & Pulses	75.0	43%	300	15.0	Nil	80	1,00.0	15%	15	30,20.0	10%	675
Dairy Products	-	-	-	2.0	20	12	-	-	-	-	-	-
Vegetables, fruits	0.2	10	50	-	-	-	0.3	10	17	94.0	4	265
Cloth & Textiles	20.0	Nil	550	6.0	Nil	6	-	-	-	35,00.0	33	1,100
Oil & Oil Products	-	-	-	-	-	-	-	-	-	-	-	-
Tobacco	-	-	-	-	-	-	-	-	-	-	-	-
Kerosine, Diesel etc.	-	-	-	-	-	-	-	-	-	-	-	-
Stoneware, Pottery	-	-	-	-	-	-	-	-	-	-	-	-
Metal Vessels etc.	-	-	-	-	-	-	-	-	-	-	-	-
Iron & Steel Products	-	-	-	-	-	-	-	-	-	-	-	-
Agricultural Implements	-	-	-	-	-	-	-	-	-	12,00.0	Nil	60
Bicycles	-	-	-	-	-	-	-	-	-	-	-	-
Timber	0.1	Nil	20	-	-	-	-	-	-	5,06.0	Nil	125
Machinery	-	-	-	-	-	-	-	-	-	-	-	-
Cement Fertilizers	-	-	-	-	-	-	-	-	-	-	-	-
Woods	-	-	-	-	-	-	-	-	-	4,10.0	Nil	200
Total:	95.3	-	420	23.0	-	98	190.3	-	32	87,30.0	-	2,425

Source: Survey by Town & Country Planning Department, Government of U.P., 1970.

Existing Distributive Trade in the Haryana Sub-Region:

The towns in the Haryana Sub-region of the NCR have comparatively smaller distributive functions, though many of the mandies in these towns were established even before 1920. Rewari has five distributive trades, Rohtak has four, and the others have less. In comparison to the U.P. Sub-region, these have a smaller wholesale trade. The main commodities handled are fruits and vegetables, grains, timber products, cloth, and utensils. The distribution of these commodities is restricted mainly to nearby towns and in some cases to Rajasthan. The only exception is in the case of grains which are exported outside the State in considerable quantities. Table shows the position of the wholesale trade in six towns,

Rohtak is an important centre for wholesale trade in grains, and has an annual turnover of Rs.4 crores and employs 450 persons; one-third of the grains are exported outside the State, of which fifty percent comes to Delhi. The next important trade is that of cloth, worth Rs.3 crores, providing employment to 250 persons. Timber trade comes to over Rs.1 crore. Rohtak conducts a wholesale trade in vegetables as well.

Sonepat is another important town for wholesale trading, though it has only three trades: fruits and vegetables, grains, and cloth. The wholesale trade in grains is the most important, having a business of Rs.10 crores per annum and employing 1000 persons.

About 55% of the marketed grains go outside the State. The cloth trade is worth only about Rs.1.5 crores. Its vegetable market handles little business.

From the point of view of trade, Rewari is the most important town of the Sub-region. It has five trades, the most important of which is the cloth trade. This trade turns out an annual business of Rs.4 crores and provides employment for 350 persons. From the point of view of turnover the utensil trade stands second; however, employmentwise it is much more important as it provides employment for 825 persons. The trade in grains is no less important; 75% of the goods are exported outside the State and 465 persons are dependent on it. Trade in timber, vegetables and fruit is also carried on. Thus, Rewari offers the largest employment and also the largest amount of business.

Next in importance is Panipat; its important trade is in grains. The annual turnover is nearly Rs.3 crores and it employs 380 persons. The trades in cloth and fruits and vegetables are worth about Rs.10 lakhs each and employing about 50 persons each.

The other towns in this Sub-region are Bahadurgarh and Gurgaon. Both these deal in grains and conduct business amounting to a few lakhs of rupees only.

Wholesale Trades in Delhi:

In the Region, Delhi's role as a distributive centre is distinctive; it is the largest distributor of goods on wholesale. In fact, in

Table 4.3.4

Distributive Trades in the Haryana Sub-Region 1970.

Whole sale trades	Rohtak			Sonapat			Bahadurgarh			Gurgaon			Newari			Panipat		
	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)	Amt. of Business, side (Lakhs, Rs.)	Busi, out, ness, side (Lakhs, Rs.)	Emp, loy, ment, No. (%)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Fruits & Vegetables	50	Nil	200	10	5	100	-	-	-	-	-	-	60	20	225	10	55	40
Grains	395	33	450	1000	55	1000	N.A	N.A	150	N.A	20	65	N.A	75	465	280	2	380
Timber and Stone	110	20	N.A	-	-	-	-	-	-	-	-	-	35	15	31	-	-	-
Utensils	-	-	-	-	-	-	-	-	-	-	-	-	250	55	825	-	-	-
Cloth	300	20	250	150	40	150	-	-	-	-	-	-	400	45	350	10	Nil	50
Total	855	-	900	1160	-	1250	N.A	N.A	150	-	-	65	745	-	1896	300	-	470

Source: Town Planning Department, Government of Haryana.

the country as a whole it is one of the three principal centres for wholesaling. It is the leading trade centre for electrical consumer goods and appliances, crockery, ceramics, hosiery and toys. Moreover, for a host of other commodities such as bicycles, cloth, fruits and vegetables, dry fruits and spices, motor parts and machinery etc., it is one of the top-most market centres. To give an illustration, the toy industry of India is mainly dependent on Delhi's marketing and distribution services. About 90% of the toys are manufactured in Delhi and distributed all over the country.

Distributive trade in Delhi is one of the basic activities of the city. Its growth has been facilitated by three determining factors: (1) The spatial location of Delhi in relation to the transport and communication network in the Region. (2) The resources available in Delhi and its environs. (3) The functional specialisation of Delhi.

A recent study conducted by the Town and Country Planning Organisation covered 21 major wholesale trades in the Capital. With a few exceptions each major trade has at least 300 establishments and the ~~XXXX~~ cloth trade has as many as 2,000 establishments. The trades

1 Master Plan Work Studies for Delhi, Delhi Development Authority, 1962.

2. The dominant Role of Delhi as a Distributive Centre: A case for Decentralisation in the NCR TCPD, 1960.

in fodder, glass sheets, cotton, furs, skin & wool have each about 100 establishments. Dry fruits, spices and herbs, iron and steel food-grains, timber, hosiery, hardware, bicycles, tyres and tubes have each between 100 and 300 establishments. Motor parts and machinery, iron scrap and junk, fruits and vegetables have upto 900 establishments as seen in Table 4.3.5. The number of dealers in the trades established at Bhagirath Palace varies from 250 to 400.

The Table also gives an estimate of the number of people employed, directly or indirectly in each trade, either as owners, office assistants, partners in shops, or as transport workers or jhalliwallas or brokers. The total employment* in all the trades may be around a lakh of which about 22,000 are engaged in the cloth trade alone. Other major trades employing a large number of workers are dry fruits and spices, motor parts and machinery and iron and steel each of which employs nearly 8,000 workers ~~xxxxxxx~~ except the fodder trade which engages only 950 persons and the radio dealers who employ about 600 workers.

Delhi is not only a wholesale trading centre for local goods but for goods which come from different parts of the country as it has direct access to all parts. Some of the commodities, one may notice from Table 4.3.6. come from the adjoining States, for example, food-grains, fodder, skin and wool. The area of

*In the Table the employment in some of the trades have not been included.

Table 4.3.5.

Distributive Trades in Delhi (1969/70)

Sl. No.	Distributive Trades	Year of Establishment.	No. of firms.	Employment	Location in Delhi.
0	1	2	3	4	5
1.	Cloth	1893	2,000	21,500	Chandni Chowk, Nai Sarak
2.	Dry Fruits, Spices, Herbs etc.	1850	300	8,200	Khari Baoli.
3.	Old Motor Parts and Machinery	1933	770	8,000	Mundhewalan Road (Motia Khan)
4.	Iron and Steel	1948	200	8,000	Loha Mandi (Motia Khan)
5.	Food Grains	1905	150	4,000	Naya Bazar, Med Ganj Rui ki Mandi.
6.	Iron Scrap & Junk (Kabar)	1933	920	4,000	Mundhewalan Road
7.	Fruits & Vegetable	1942-1869	511	3,870	Subzi Mandi, Phool Mandi
8.	Timber	1945	157	3,100	D.B.Gupta Road Lakar Mandi, Motia Khan
9.	Hosiery	1930	300	2,515	Sadar Bazar
10.	Film Distributors	1942	250	2,500	Bhagirath Palace
11.	Furs, Skin & Wool	1890	56	2,400	Motia Khan, Bahadurgarh Rd.
12.	Hardware	1840	300	2,000	Chawri Bazar
13.	Bicycles, Tyres and Tubes	1918	300	1,650	Esplanade Road, Lajpat Rai Market, Chandni Chowk.
14.	Glass Sheets	1924	12	1,500	Fatehpuri & D.B.Gupta Road.
15.*	Medicines	1947	90	1,500	Bhagirath Palace
16.*	Electrical Goods	1950	400	1,000	Bhagirath Palace, Pan Dariba, Chandni Chowk, Sadar Bazar.
17.*	Surgical Instruments	1949	100	1,000	Bhagirath Palace.
18.	Fodder	1954	104	950	Zakhira, Near Dayabasti Railway Station.
19.*	Radio Parts & Accessories	1954	300	600	Bhagirath Palace,
20.	Total	1831	8	84	Lajpat Rai Market.

Table 4.3.5(Contd..)

0	1	2	3	4	5
20. Cotton		1913	9	N.A. Med Ganj (Rai Ke Mandi)	
21. Oil		-	-	-	-
Total:		-	7,229	78,385	-

Source: Survey conducted by the T & C.P.O., 1969-70.

* figures for 1970.

Distribution shows that the wholesale trade of Delhi covers a wide field and is not confined to the National Capital Region but extends over the whole of northern India in such commodities as coarse foodgrains; bicycles, tyres and tubes; dry fruits, spices and herbs; hosiery; motor parts and machinery; furs, skin and wool; radio parts and accessories; medicines and surgical instruments. (See Maps 4.4.1 and 4.4.2).

Historical Growth of Wholesale Trade in Delhi:

Not all the Mandies or distributive trades of Delhi have been there for very long. Timber trade was established after the Second World War. Iron and Steel trade at Loha Mandi was expanded only after Independence. Fodder trade came to exist in Delhi as late as in 1954 and fruits and vegetables only in 1942. A perusal of various trades in Table 4.3.5 will indicate that these trades have been established one after another during the last 100 years and most of these have been building themselves up for more than 40 years. The trades at Bhagirath Palace and Lajpat Rai

Market (namely radio parts and accessories, electric appliances, medicines, and surgicals) are only 20 years old.

Growth in the past Decade: A survey of business and commerce conducted by the Town Planning Organisation in 1959, as part of the Master Plan studies, revealed that Delhi was performing a distributive function not only for Urban Delhi but also for the Metropolitan area, the National Capital Region, and other States in northern India. Table 4.3.7 indicates the break-up of the distributive trades over different areas in 1959. It revealed that in all commodities the share of sales in Urban Delhi was only from 20 to 40% except in spices and provision where it was 66%. It also revealed that of all the trade and commerce establishments surveyed in Urban Delhi, 21.3% were dealing with wholesale business and the share of Old Delhi in this business was as high as 92%.

Table 4.3.8 gives the total sales in the various distributive trades concentrated in the

WHOLESALE TRADES OF DELHI 1969

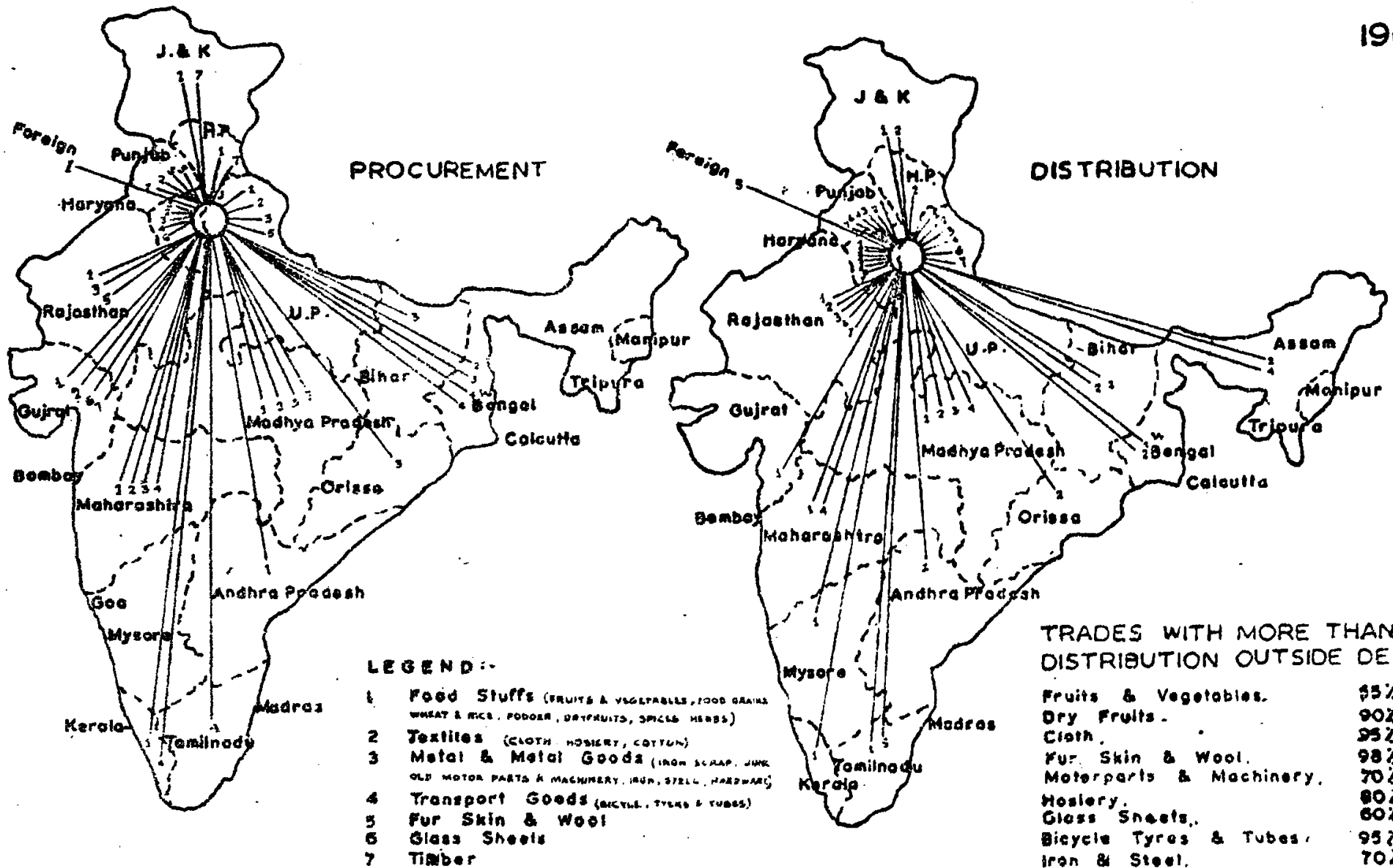


Table 4.3.a.

Distributive Trades in Delhi-Origin & Destination of Commodities: (1969)

Sl. No.	Distributive Trades	Procurement Area	Distributive Area
1	2	3	4
1.	Fruits & Vegetables	Afghanistan, J & K, Haryana, Punjab, U.P., Bombay, Rural Delhi, Jaipur, H.P., Andhra.	Delhi Metropolitan Area, Kanpur, Lucknow, Bareilly, Northern & Southern India.
2.	Foodgrains (Coarse)	Haryana, U.P., M.P., Rajasthan, Punjab.	Delhi, U.P., M.P., Bihar, Maharashtra, Gujarat, W.Bengal, A.P., Kerala, Madras, Mysore.
2a.	Wheat & Rice	-do-	Delhi
3.	Fodder	Haryana, Punjab, M.P., Rajasthan.	Delhi, U.P., Rajasthan, Bihar.
4.	Cloth	Bombay, Ahmedabad, Indore, Kanpur, Modinagar, Punjab, Delhi.	Punjab, Haryana, Rajasthan, H.P., U.P., M.P., Bihar, Orissa, Assam, W.Bengal, Delhi.
5.	Bicycles, Tyres & Tubes.	Bombay, Calcutta, Kerala, Madras, Bengal, Sonepat.	U.P., Assam, M.P., Haryana, Punjab, Bombay, Delhi.
6.	Dry Fruits, Spices, Herbs etc.	Iran, Afghanistan, J & K, South India, Maharashtra, U.P., M.P., Gujarat.	Delhi and area of 200 miles radius, J & K, Haryana, Rajasthan, Western U.P.
7.	Hosiery	Delhi, Calcutta, Kanpur, Ludhiana, Bombay.	Delhi, Punjab, H.P., Rajasthan, U.P., M.P., Kashmir, Bihar.
8.	Timber	M.P., Maharashtra, J & K, H.P., M.P.	Delhi, Punjab, U.P., Haryana, Rajasthan.
9.	Cotton	Hissar and other districts of Haryana	Delhi, U.P.

contd....

Table 4.3.6(contd..)

1	2	3	4
10. Iron Scrap & Junk		C.O.D. Cantt. Delhi, Rly. Depot Shakur Basti, and such other depots throughout India.	Delhi, Punjab, Haryana, U.P., Rajasthan, M.P.
11. Old Motor Parts & Machinery		Delhi, Bombay, Allahabad, Kanpur.	Delhi, Punjab, Haryana, U.P., Rajasthan.
12. Iron & Steel		Hindustan Steel TISCO, TISCO, Calcutta, Govindgarh, Faridabad.	Delhi U.P., Rajasthan, Punjab, Haryana.
13. Hardware		Delhi, Calcutta, Bombay	Delhi, U.P., Punjab, Haryana.
14. Furs, Skin & Wool		Delhi, Rajasthan, U.P., Punjab, Jaipur.	Europe, America, Russia, Madras, Panipat, Delhi.
15. Glass Sheets		Faridabad, Calcutta, Ahmedabad.	Delhi, Punjab, Haryana, U.P., Rajasthan.
16. Oil			
17. Electrical Goods		Delhi, Bombay, Calcutta, Patna, Kanpur.	U.P., Haryana, H.P., Punjab, and neighbouring areas.
18. Radio Parts		Delhi, Faridabad, Hyderabad.	Delhi, Western U.P., Haryana Punjab, H.P., J & K., M.P., Rajasthan.
19. Films		Bombay, Madras	Delhi, U.P.
20. Medicines		Bombay, Calcutta, Madras, Delhi	Delhi, Rajasthan, U.P., H.P., Punjab, J & K.
21. Surgical Instruments		Jullunder, Delhi, Meerut, Ambala.	All-India.

Source: Survey by T.C.P.O., 1969-70.

Table 4.3.3

Wholesale Trade in Delhi 1959: Area of Distribution.

Name of commodity*	Urban Delhi (less than 5 miles radius)	Delhi Metro- politan area(s to 25 miles radius)	Region (25 to 100 miles radius)	Northern India (100 to 500 mls. radius)	Rest of India.	Total
1	2	3	4	5	6	7
Foodgrains	40.0	-	5.0	5.0	50.0	100.0
Spices, provision/etc.	66.0	33.3	-	-	-	100.0
Hosiery toilets etc.	25.7	17.2	14.3	22.8	20.0	100.0
Cloth	38.6	26.3	10.5	15.8	8.8	100.0
Paper & Stationery	24.4	22.2	20.0	17.8	15.6	100.0
Watches, radios etc.	22.2	22.2	11.1	22.2	22.3	100.0
Electrical goods	24.2	21.3	18.2	24.2	12.1	100.0
Iron & steel	25.0	16.7	16.7	25.0	16.6	100.0
Chemicals & drugs	30.8	15.4	7.7	19.2	26.9	100.0
Sanitary goods	20.0	20.0	20.0	20.0	20.0	100.0
Automobiles & spare parts	26.9	19.3	11.5	23.1	19.2	100.0
Industrial Machinery	20.0	20.0	20.0	20.0	20.0	100.0
Leather & footwear	20.0	20.0	20.0	20.0	10.0	100.0

Source: Business and Commerce Survey for the Master Plan for Delhi: Town Planning Organisation, 1959.

* Other major commodities not shown here are films, toys, ready-made garments, plywood and timber, glass sheets, crockery, etc.

Table 4.38

Distributive Trades in Delhi - Percentage share of Delhi-1969-70.

Sl. No.	Name of Wholesale	Total sales yearly (in Rs. crores)	Sales in Delhi (%)	Sales outside Delhi (%)
1	2	3	4	5
1.	(a) Fruits & Vegetables (Subzi Mandi)	144.	45%	55%
	(b) Fruits & Vegetables (Phool Mandi)	4	100	-
2.	Dry Fruits, Spices, Herbs etc.	125	10	90
3.	Cloth	100	5	95
4.	Furs, Skin and Wool	15	2	98
5.	Motor Parts & Machinery	10	10-30	70-90
6.	Timber (a) D.B. Gupta Road, (b) Lakar Mandi, Motia Khan.	7 N.A.	56 90-95	44 5-10
7.	Hosiery	5	20	80
8.	Glass Sheets	5	40	60
9.	Fodder	.4	70-75	25-30
10.	Iron Scrap & Junk (Kabar)	2	75	25
11.	Bicycles, Tyres & tubes	1	5	95
12.	Iron & Steel (a) Chawri Bazar (b) Loha Mandi, Motia Khan.	1 N.A.	30 N.A.	70 N.A.
13.	Foodgrains	N.A.	100	-
14.	Cotton	N.A.	85-90	10-15
15.	Hardware	N.A.	85-90	10-15
16.	Electricals	40	25	75
17.	Radio-components	30	55	45
18.	Films	7	25	75
19.	Drugs + Pharmaceuticals	40	50	50
20.	Surgicals	2	10	90
Total:		542	-	-

Source: Survey conducted by the T.C.P.O., 1969-70.

Delhi Urban area as revealed in a quick reconnaissance survey conducted in 1969-70. Delhi now performs a stronger function for the Region than in 1959 in cloth, dry fruits, spices and herbs, hosiery, and general merchandise. In most of the other commodities like bicycles, fresh fruits and vegetables, furs, skins and wool, motor parts and machinery, and iron and steel, Delhi has now a larger share in the regional market. Since the creation of food-zones, the wholesale trade in foodgrains is very limited.

But with the increased production in the agricultural sector, foodzones in the country may undergo a change and Delhi may again take up some of the distribution functions in these commodities. In the case of timber, glass sheets, fodder, iron scrap and junk and cotton, Delhi has a small share in the distributive trade of the Region.

Trades in Chandni Chowk: Chandni Chowk, or the silver street to the foreigners, is the biggest wholesale market in northern India. In its narrow and winding kuchas and katras goods worth crores and crores of rupees are sold daily. It is the wholesale market for cycles, medicines and surgical goods, radio and electronic parts, ready-made garments, silver and gold, jewellery, textiles, 'gota', 'binari', 'nageena', 'Banarasi' and 'Bangalori sarees', 'Kashmiri' shawls, books, leather work, laminated goods etc.

In Chandni Chowk, the following markets sell different goods;-

- Lajpat Rai Market: General consumer goods and radio parts.
- Esplanade Road: Cycle goods.
- Dariba: Wholesale jewellers market.

- Dariba to Fountain: Radio and Electronic goods market.
- Bhagirath Palace: Wholesale market for electrical, surgical and medical goods and film distributors' market.
- Fountain to Parauthawali Gali: General merchants.
- Gali Parauthawali: Wholesale Banarasi sarees.
- Katra Shahanshahi: Wholesale market for cut-piece goods.
- Moti Bazar: Wholesale market for Kashmiri shawls.
- Moti Bazar to Katra Nawab Jahib: Ready-made goods markets.
- Around Clock Tower: Clothiers.
- Nai Sarak: Wholesale as well as retail markets for books and sewing machines.
- Kucha Rehman: Handicrafts goods.
- Billimaran: Wholesale market for leather work, carpets, laminated goods, rexine.
- Katra Dhulia: Wholesale market for cut-piece goods.
- Katra Sat Narain: Cut-pieces.
- Kucha Mahajini: Eatables and cloth garments.
- Kucha Natwa: After 1947 refugees started wholesale cloth business here.
- Near Fatehpuri Masjid: Wholesale and retail crockery goods.

*Evening News, New Delhi, August 31, 1970.

The main problem, in Chandni Chowk is that of overcrowding and congestion and inadequate godown facilities. There is heavy traffic because of the DTU buses and auto rickshaws which ply in a chaotic manner hampering trading activities. During the peak hours, it is impossible for the people to cross over from one side of the road to the other. Electric and telephone poles also obstruct smooth flow of traffic.

Trades in Bhagirath Palace: Bhagirath Palace is an important area of Chandni Chowk where a number of wholesale trades have become concentrated. Among them the notable ones are electrical goods and appliances, radios and their parts and accessories, film distribution, medicines and surgical instruments.

Most of these trades have come up only during the last 20 years or so. One of the main reasons for the growth of business in this location is the enterprising nature and business acumen of the refugee traders from West Pakistan. Previously this area was a residential area as its name indicates. However, commercial use has gradually been replacing the residential use from practically all the buildings and by now the ground and first floor of the building are almost commercial in character. The residential use is now confined to the second and the top floors. This process is going on and may continue for another 10 to 20 years. Any growth of the business activity results in

*T.C.P.O. Survey, 1970.

an encroachment of residential floor-space or the construction of another storey. The location is most central and convenient, as it is a part of Chandni Chowk and is very close to the Delhi Main Railway Station as well as to the Fountain which is the starting point of a very large number of bus routes. From this area both wholesale and retail sales are conducted; but 90% of these are wholesale transactions. The Bhagirath Palace now distributes its commodities all over India except in the case of films where its sale or distribution is confined to northern India.

Marketing facilities in Bhagirath Palace are well developed and organised and bulk of the products of a number of factories in the Delhi Metropolitan Area is handled here. However, this area has to face the difficulties of inadequate space, lack of parking in its immediate vicinity, traffic problems, etc. Redevelopment has become necessary here.

Trades in Khari Baoli: It is the biggest distributing centre for spices in Northern India and goods imported here are again exported to all parts of India and abroad. Khari Baoli, is the biggest wholesale market, for kirana goods, spices, dry-fruits, herbs, achar-murabba, ghee and vegetables, khoya, paints and chemicals.

The turnover in kirana, spices and dry-fruits alone comes to about Rs.125 crores. There are single parties in the kirana trade whose annual turnover exceeds Rs.1 crore. Being an Indian Express Supplement dated Monday, 28th September, 1970.

extension of Chandni Chowk, this area suffers from similar problems.

Trades in Sadar Bazar? Today Sadar Bazar is the biggest trading centre for pressure cookers, electrical appliances, crockery, ceramics, steel furniture, cutlery, metals, general merchandise, woollens, cotton-hosiery, leather goods, plastic goods and toys, to mention only a few items.

At present, Sadar Bazar caters for virtually the whole country. Besides meeting the local demand, goods from this market reach as far as Kashmir in the north and Kanya Kumari in the south. The entire industry in the north whether it is large, medium or small, not only finds it more convenient for the sale of their finished products but also obtain their requirements of raw materials and components from here.

Now Sadar Bazar is the leading market for all kinds of stationery articles including educational, drawing and art materials and office equipment, and caters to markets throughout the country. Quite a large number of items are even exported to Afghanistan and other countries.

Sadar Bazar has also played an important role in giving a big boost to the export of quality goods, most of which have their distribution channels, located in this market. Not only such products find their way in export markets all over the world, but these are well received also, because of their unique style, high standards of quality and viable costs.

²Based on Indian Express Supplement dated August 8, 1970.

There is heavy but avoidable congestion by pavement sellers on the main street of Sadar Bazar itself. Obviously there is a lot of room for improvement here even if the widening of the market ~~of the market~~ ruled out altogether on account of the various difficulties and hurdles. There is a lot of obstruction on the road and the "patris" which could at least be cleared from occupation by the squatters in the interest of free flow of traffic and smooth movement of buyers and sellers*

This area is subject to fires due to various causes such as, storage of inflammable materials, wooden structures, electrical short-circuiting etc. During the Diwali season, due to the sale of fire-works and crackers by road-squatters fires are frequent. Though authorities have tightened up the measures to ward off these, fire out-break is a perpetual hazard inherent in the situation. The sanitary conditions in the Bazar are also very poor. Even with a light shower the roads and by-lanes, with thousands of small and large shops, get miserably blocked up, obstructing the movement of people as well as traffic. This directly hits the traders in as much as their business activities are hampered. But indirectly this also results in loss of revenue to the government by way of taxes. Despite all these, business keeps spurting up all the time in this oldest market of India.

Problems of Future Growth of Trade and Commerce in Delhi: The position of wholesale trade in terms of creation of employment and growth of

*Sadar Bazar - Delhi's Wholesale Market, an Indian Express Feature, dated August 8, 1970.

Population in Delhi is important and its effects on the overall economy of the Region cannot be minimised. As stated previously, facilitated by the transport network, large scale godown facilities, availability of large investments and a ready consumer market, Delhi's wholesale trade has grown, with more than one lakh persons now working in them which in turn has contributed to the strengthening of the economy of Delhi. Its continued growth may bring in more revenues and also diversify the economy of the city and at the same time accelerate the growth of population. However, the economy of scale of operation in the wholesale trades has reached a point of diminishing returns. Every single market location has become a place of overcrowding, with traffic congestion, unhealthy environment, and devoid of proper approaches. It is now becoming clear that diseconomies have already set in, due to the over-loading of the transport network, parking problems and large-scale obsolescence of the residential areas of the city where these are located. Moreover, the situation has to be viewed from an overall regional perspective.

There are several factors inhibiting further expansion of these trades in Delhi. One of the important drawbacks to all the distributive trades in Delhi is the acute shortage of space. This leads to inadequacy of godown facilities, parking places, congestion, and susceptibility to fire hazards. Other common hurdles are the incidence of octroi and other taxation, lack of railway siding facilities, and lack of goods transportation within the city. Some trades like the iron and steel

bicycles, tyres and tubes have to operate under Governmental control only. Insanitary conditions and absence of urban renewal plague some trades. The scattering of markets may prove disadvantageous/

However, trade and commerce plays an important role in the economy of Delhi. With the planned growth of Delhi, its volume and range will have to increase. Certain wholesale trades which are essential for the urban population have to grow if the trade is to function effectively without raising the overhead costs of commodities. For this purpose, it is necessary to identify those wholesale trades which require space for expansion either in their existing satellite or in new sites. A beginning has already been made with the fruit and vegetable trade of Subziwadi which is being relocated at a site near Azadpur, on the G.T. Karnal Road.

In this connection the proposal to locate a "dry port" in Delhi requires careful study. Its location in Delhi will further concentrate trade activity in Delhi with wide ranging repercussions. The proposed 'dry port', in addition to creating sizeable employment, will also have an impact on the other sectors of the urban economy, such as transport, services etc. The marshalling yard near Tughlakabad is already reaching its maximum capacity with very little scope for expansion. This marshalling yard has yet to fulfil its major function of handling goods for Delhi's future population. It may not be able to take the heavy load due to the creation of a "dry port" in Delhi to serve the northern region. The transport proposals in the Regional Plan indicate a bypass road and rail route taking off from the /in some cases.

Agra-Delhi road and rail route, somewhere near Palwal, to avoid transport bottlenecks in Urban Delhi. A 'Dry port' located south of this bypass would be able to function more effectively. For this purpose any of the existing marshalling yards to the south of the Union Territory of Delhi may be selected and expanded accordingly or an entirely new marshalling yard could be established.

Prospects of Decentralisation of Wholesale Trade in the NCR:

The prospects of decentralising economic activity, especially the wholesale trade would depend to some extent on the measures suggested in the Regional Plan to restructure the transport network. It has also been stated that the towns of the Region are lacking in economic activities, except for some industries in Faridabad and Ghaziabad. Due to want of a sound economic base, their growth has not been upto the mark that would divert the growth ~~xxxxxx~~ ~~xxxxxx~~ of population from Delhi. To strengthen the economy of these towns, injection of some commercial activity (especially wholesale trade) would give the necessary fillip to their growth. This may in turn create the need for transportation, godowns, provision of eating houses and residential units, which in turn would create employment. The growth of physical facilities would give momentum to the overall growth of these towns. But this can only take place by positive measures such as the planned creation of big mandies and the necessary incidental infrastructure in the selected towns of the NCR.

All the towns in the Sub-regions face problems of warehousing, but its inadequacy is actually felt mainly in Sonapat, Rohtak, Meerut, Baraut, Ghaziabad, Hapur, Anupshahr and Alwar. The lack of planning in the initial stages has led now to a lack of space for proper movement. This, in turn, has resulted in the problems of loading and unloading, absence of parking facilities, and restrictions of truck movement, ~~This xxxxxxxx resulted in the xxx problems xxx~~ ~~of loading and unloading, xxxxxxxxxx of xxxxxx~~ ~~facilities and xxx restrictions~~ to night time only. A few markets have railway-sidings, telephone and telegraph facilities, and other civic amenities. In some of the towns, the trades are located in such congested places that the provision of the essential services becomes very difficult. Because of this and other problems expansion of trade at the existing sites is difficult. The problem could be solved effectively if the trade can move out of its present location to new sites where all these facilities could be provided and also meet the needs of further expansion. This should be done in the case of Meerut, Baraut, Ghaziabad, Hapur, Alwar, Sonapat, Rohtak, Rewari etc. But in the case of the towns, where the trades are unwilling to move out, the regulation on traffic will have to be so devised that the trades do not suffer.

Thus, it is seen that on the one hand the concentration of the wholesale trades in Delhi is having a centrifugal action in boosting up economic activity and consequent population concentration. On the other hand, the regional

towns have been deprived of gainful economic activity and employment thus depressing their economy. In Urban Delhi expansion of further wholesale trade is beset with the problems of redevelopment of the built-up area of the Old City and in the regional towns a lack of infrastructure necessary for the effective functioning of the wholesale trade. Under such a situation, it would be necessary to make a judicious selection of trades to be decentralised.

Recommendation:

Regional Policy requires that there should be a decentralisation of wholesale trades from Delhi. A study of the trade has revealed that this has to be selective. There are many factors which exert strong pulls on the market mechanism. The Regional Plan has made proposals on transport which would facilitate decentralisation. Another factor is the tax structure in the Union Territory of Delhi and the adjoining States. If the objective of decentralisation is accepted, then Delhi and the adjoining States in the Region should adopt suitable fiscal measures to make it possible. To spell this out in precise terms and other allied measures such as re-routing of commodities to the new wholesale markets and the pattern of distribution would have to be studied in depth for each individual trade. Market research would be necessary for assessing the success of the decentralisation measures. This is a sphere of planning in which the Delhi Administration and the concerned State Governments should co-operate and co-ordinate their activities. Only then can one expect any appreciable measure of success.

In the decentralisation process action has to be taken under four heads:

- (i) In certain trades, the 'trade transaction function' should continue to be located within Delhi. But the 'material handling function' such as warehousing etc. should be located in the regional towns, especially in cases where the commodity is being produced in the regional town itself (like cycles at Sonapat, grain godowns in the various towns etc.) or where the goods have to pass through such regional towns.

This avoids additional movement to Delhi on the urban transport network, simultaneously reducing the demand for space within Delhi. For the success of this arrangement, the active participation and co-operation of the traders would be necessary. This would be possible, if the trader finds that it is economical and advantageous to do so. Apart from the new transport structure and proposed improvements in the communication system between Delhi and the regional towns and amongst the towns themselves other facilities that would be required are better telephone connections, adequate facilities for movement of goods, receipts and despatches from the regional towns.

- (ii) Selected trades may be decentralised from Delhi on the following considerations:
 - a) Selection of trades to be confined to those for which Delhi performs, at present, the functions of a Regional Centre, as against those serving only its Urban population.

- b) Dis-economies to a particular trade if it continues to concentrate in Delhi.
- c) Disadvantages to the overall growth of Delhi by the continuation and concentration of the trade.
- d) Advantages to the trade if located at any other place outside Delhi.
- e) The advantages and the boosting up of the economy of the town and its hinterland in which the trade is to be relocated.
- f) The fiscal measures to be adopted on the part of the State Governments and the Delhi Administration to make decentralisation possible.

An illustration of the type of decentralisation that has taken place is the wholesale market for drugs and pharmaceuticals that has come up in Ghaziabad in the U.P. Sub-region. This was made possible by the development of a market and the fiscal policy measures adopted by the U.P. Government. The State sales tax on drugs and pharmaceuticals was reduced to 2% (which is the lowest for any State in northern India). This taxation policy led to decentralisation. At Ghaziabad there are about a 100 units, many of which are branches of firms in Delhi. The market now functions as a distributive centre for a large area in U.P.

(iii) In Delhi there is a case for urban renewal. It is desirable that certain

trades which are performing urban functions should be allowed to expand by improving their working conditions in the city on the existing sites or in decentralised sites within the Urban Area. Sadar Bazar, Bhagirath Palace, Chandni Chowk and Khari Baoli are some of the areas which have to be redeveloped.

- (iv) In the regional towns the infrastructure should be improved or created under the following heads to improve existing trade and commerce and/or relocated wholesale trades.
 - a) accessibility by rail and road.
 - b) railway siding and goods shed facilities.
 - c) truck terminal facilities.
 - d) telephone facilities and easy contact with-in the Region.
 - e) commercial warehousing facilities.
 - f) space for wholesale market, with adequate parking area etc.
 - g) residential accommodation and social infrastructure in the town.
 - h) the administrative agencies of these towns should take an interest in developing wholesale activities. Financial institutions and banking facilities must be improved in these towns with the provision of loan facilities both long and short term. While these measures would help the business already established, fiscal incentives of the State

Governments can attract new trades as well. Lowering of sales tax vis-a-vis Delhi and assistance in procuring commodities for wholesale trade would go a long way in attracting new ventures.

As a matter of policy, it is suggested that incentives, concessions, and infrastructure should be made available in the Regional towns to encourage and accelerate the growth of trade. While, at the same time a policy of discouragement and dis-incentives for further growth within Delhi, especially those for which Delhi performs a regional function, should be implemented. New trade functions (or related functions) with high growth potential should necessarily be located outside Delhi to create new growth-nuclei. Keeping these in view the following town locations are recommended as regional sub-centres for some of the trades.

Cloth Trade: Modinagar, Meerut, Rohtak, Alwar.

Bicycle Trade: Ghaziabad, Sonapat, Alwar.

Fruits and Vegetables: Faridabad, Meerut, Alwar, Sonapat.

Motor parts and Machinery (old and new): Meerut, Faridabad.

Dry Fruits; Spices and Herbs: Khurja, Rewari.

Hosiery: Panipat, Meerut

Iron and Steel: Faridabad, Ghaziabad, Alwar.

Fuel Oil: Hissar, Meerut, Alwar.

It is also necessary that the existing markets in the Region and outside are strengthened and new ones set up for the following trades:

Foodgrains: Hapur, Meerut, Rewari, Khairtal.

Timber: Alwar, Hardwar, Jagadhri, Baraut.

Furs, Skin and Wool: Alwar, Panipat Saharanpur.

Fodder: Rohtak, Rewari, Khurja.

Pulses: Khurja, Rewari, Hapur.

Drugs and Pharmaceuticals: Ghaziabad, Alwar.

Surgical Instruments: Meerut, Aabala.

Agricultural Implements: Bulandshahr.

4. Employment in Government and Quasi-Government Offices in NCR:

Growth of 'Other Services in Delhi: As stated earlier, the proportion of urban population to total population in the NCR has risen from 24.12% in 1951 to 34.42% in 1961. This increase may be ascribed primarily to migration to urban areas of the Region. Due to the lack of job opportunities in the rural areas, people have drifted to important cities in the Region, especially Delhi, Meerut, Ghaziabad, Faridabad and Rohtak in search of employment. These urban centres have expanded largely due to expansion in Government offices as well as industrial development. Among all these centres, Delhi has shown a spectacular growth; the major attraction here, of course, has been the employment in Government offices and public undertakings which have been expanding fast due to a change in the status of the metropolis from an almost dormant colonial law and order city to the Capital of a Welfare State. Government functions and personnel have expanded rapidly to cope up with added essential ~~xxxxxxxxxxxxxx~~ functions; foreign embassies, research and cultural organisations and foreign missions have had their distinct impact on the growth of the city. As a result of these activities, the proportion of working force in 'Other Services' to total working force in Delhi as well as in the NCR (urban) has

*In Census 1961 'Other Services' includes employment in professions, liberal arts, public sector, utilities and other services.

increased considerably, it was as high as 42.4% in the case of Delhi and 40.9% in the NCR (urban) in 1961. The decadal increase in 'Other Services' in 1961 over 1951 in Delhi alone was 6%.

It would thus be noticed that 'Other Services' accounts for about two-fifth of the total working force both in Delhi and the NCR. While studying the various sub-sectors of 'Other Services', it is observed that employment in Government and Quasi-government Offices is significant. The position regarding Delhi is shown in Table No.4.4.1.

Table 4.4.1.
Working force in 'Other Services' in Delhi (1961-67)

Sub-section of 'Other Services'	(in 000's)			
	1961		1967 (estimated)	
	Employment	%	Employment	%
1. Professions & liberal arts.	50	13.77	75	13.89
2. Public Sector	160	44.08	276	51.11
3. Utilities	9	2.48	14	2.59
4. Other Services	144	39.67	175	32.41
Total other services	363	100.00	540	100.00

Source: Census of India, 1961; TCPO estimate for 1967.

As would be noticed from the the public sector, which includes all Government and Quasi-government Offices, accounts for 1,60,000 workers which was 44.08% of the working force

Table 4.4.2

Details of Employment in Government and Quasi-government Offices
in Delhi State (1921-67)

Sl. No.	SECTOR	Employment						Percentage increase over				
		1921	1931	1941	1951	1961	1967	1921	1931	1941	1951	1961
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Central Govt.	7,895	11,172	25,649	87,559	94,440	124,182	41.5	129.6	241.4	7.9	31.5
2.	State Govt.	1,244	2,572	3,158	7,189	26,666	41,870	106.7	22.9	127.6	270.9	57.2
3.	Local Bodies.	1,774	1,278	11,492	10,639	32,367	73,974	(-)38.8	16.8	613.1	207.0	126.4
4.	Quasi-Govt.	N.A.	N.A.	N.A.	N.A.	6,397	36,106	-	-	-	-	464.4
5.	Total:	10,913	15,022	30,299	1,05,387	1,60,170	276,132	37.7	101.7	217.8	52.0	72.4

Source: 1. Master Plan for Delhi for figures from 1921 - 51.

2. Computed by the T.C.P.O. from the records of E.M.I. Unit, Employment Exchange, Delhi Administration for 1961 - 1967.

in 'other services' in 1961. During the six year period (1961-67) this number has increased to 2,76,000 and the proportion has risen upto 51.11%; in absolute terms, the increase has been of the order of 1.16 lakhs which is quite sizeable.

Growth of Employment in Government and Quasi-Government Offices in Delhi:

The employment in the various types of Government and Quasi-government Offices* has been constantly increasing ever since 1921. Tables 4.4.2 and 4.4.3 show the employment and the percentage increase from 1921 to 1967 in Delhi. It is evident from the Table that during the decade (1941-51), there was an overall increase of 217.8% in Government and Quasi-government Office employment. Amongst the various offices, the offices of the Local Bodies recorded the highest percentage increase of 613%. This may be ascribed to the larger responsibilities of the Local Bodies and the increasing overheads of servicing a metropolitan city (Table 4.4.4). Second in order is the increase of 241% in employment in In the decade (1951-61), there was a sharp fall in the percentage increase in employment in the Government and Quasi-government Offices to 52%, because the offices of the Central Government recorded comparatively a slow growth at the rate of 7.9%. But during that period the State Government Offices expanded rapidly because of the launching of the State Five Year Plans; these offices registered a maximum increase of 271%, followed by an increase of 207% by the Local Bodies.

The last six year period (1961-67) again registered a phenomenal increase in the Government and Quasi-government employment. The overall employment increased by 1,15,962 employees which exceeds the total employment of 1,05,337 in 1951. The Quasi-government employment, which was insignificant in the previous decade, showed the highest increase of 464.4% during the last six years, registering an additional employment of about 30,000 persons. The number of establishments has also increased from 42 in 1961 to 77 in 1967. (Table 4.4.5). This increase can be ascribed to the Government's Industrial

*The definition of Government and Quasi-government offices as given in the Census of 1951 differs with that of 1961. In this section Government and Quasi-government Offices refers to employment in the offices of Central Government, Quasi-government, State Government and Local Bodies, excluding employees in Transport, Post and Telegraph, Commerce and Education. The figures supplied by the Employment Marketing Information Unit of the Employment Exchange includes all employment in Government and Quasi-government Offices which have been suitably computed for comparison purposes with the Census figures.

Central Government Offices which is due to the increasing role and functions of the National Government.

Table 4.4.3

Percentage Distribution of Employment in the Government and Quasi-government Offices in Delhi State (1921-67)

(Percentage)

Sl. No.	SECTOR	1921	1931	1941	1951	1961	1967
1.	Central Govt.	72.3	74.4	84.7	83.1	59.0	45.0
2.	State Govt.	11.4	17.1	10.4	5.8	16.7	15.2
3.	Local Bodies	16.3	8.5	4.9	10.1	20.4	26.8
4.	Quasi-Govt.	-	-	-	-	3.9	13.0
5.	Total:	100.0	100.0	100.0	100.0	100.0	100.0

Source: Computed from the records of E.M.I. Unit, Employment Exchange, Delhi Administration for 1961 and 1967. For 1921 to 51 Master Plan for Delhi.

Table 4.4.4

Increase in Employment in Offices of Local Bodies in Delhi in relation to Population. (1961 and 1967)

Sl. No.	Population	No. of Employees in Local Bodies	Employees per lakh of population.	Population.	No. of Employees in Local Bodies.	Employees per lakh of population.
1	2	3	4	5	6	7
1.	26,58,612	32,667	1,225	* 36,40,000	73,974	2,032

Source: 1. Census of India 1961.
 2. E.M.I. Unit, Employment Exchange Delhi State, Delhi.
 * Estimated.

Resolution of 1957, which directed the Government to take more responsibilities in industrial and commercial activities; it is also due to the preference on the part of the Public Undertakings to locate their administrative and commercial establishments in the Capital due to certain advantages.

The Local Bodies also expanded rapidly during the last six years (1961-67). Employment in their offices increased by 126.4%, adding 41,307 employees. Thus, the total employment went upto 73,974 in 1967 which was more than one-fourth of the total employment in the Government and Quasi-government Offices, as against one-fifth in 1961 and only one-twentieth in 1941, as can be seen from Table 4.4.3. This is due to three factors; the expansion in the operational area of the Local Bodies consequent to population increase; improvement in the civic services rendered by the Local Bodies, and the increasing cost of servicing an expanding city. Thus, the proportion of employees per lakh of population in the local bodies has also increased from 1,225 in 1961 to 2,032 in 1967 as shown in Table 4.4.4.

The employment in State Government Offices also increased by 57.2% in the six year period (1961-67). Their total number of establishments increased from 47 to 79 in this period, adding about 15,000 employees.

The percentage increase in Central Government Offices during 1961-67, accounted for 31.5%, raising the total strength of employees,

to 1,24,184 in 1967. The dominant position of employment in the Central and Quasi-government Offices continued in 1967, though its percentage to total employment came down from 84.7% in 1941 to 45% in 1967 (Table 4.4.5).

Table 4.4.5)

Number of Establishments in Government and Quasi-Government Offices in Delhi State (1961-67)

Sector	No. of Establishments		Addl. Increase over 1961	
	1961	1967	No.	%
1. Central Government	268	349	81	52.3
2. Delhi Administration	47	79	32	20.6
3. Local Bodies	20	27	7	4.5
4. Quasi-Government	42	77	35	22.6
Total:	377	532	155	100.00

Source: Records of E.M.I. Unit, Employment Exchange, Delhi Administration.

The additional employment in the Central Government Offices during the last six years (1961-67) was of the order of 29,742; this was, however, less than the 40,000 employees added to the Local Bodies in the corresponding years. Of the total number of 155 new Government and Quasi-government Offices which came up during 1961-67, as many as 81 new offices were added in the Central Government sector and constituted more than 50% of the new Offices (Table 4.4.5). The total number of offices in the Capital in 1967 were 532, of which 349 were under the Central Government,

Table 4.4:6

Percentage of Employment in Government and Quasi-government Offices to total working force in Delhi State (1921-67)

Sl. No.	Public Sector	Percentage to total working force					
		1921	1931	1941	1951	1961	1967*
1	2	3	4	5	6	7	8
1.	Central Government	3.9	4.2	7.2	13.7	11.0	9.7
2.	State Government	0.6	1.0	0.9	1.1	3.1	3.3
3.	Local Bodies	0.9	0.4	0.4	1.7	3.8	5.8
4.	Quasi Government	-	-	-	-	0.8	2.9
Total:		5.4	5.6	8.5	16.7	18.7	21.7

Source: Census of India and E.M.I. Unit, Employment Exchange, Delhi.

* Estimated by T.C.P.O.

79 under the State Government, 77 were Quasi-government offices, and 27 were under Local Bodies.

Increase in Government and Quasi-government Employment in relation to total working force in Delhi State:

Table 4.4.6 shows that the percentage of employment in Government and Quasi-government Offices to total working force in Delhi has registered an upward trend; it has gone up from 5.4% in 1921 to 21.7% in 1967. During the decade (1941-51), the proportion has almost doubled from 8.5% to 16.5%. But in the subsequent decade (1951-61), it has increased only by 2.2% and in the six year period between 1961-67 by 3%. The sudden spurt in the proportion during the decade (1941-51) was primarily due to increase in the employment in the offices of the Central Government and Local Bodies. In the subsequent decade (1951-61) the increase was primarily due to the expansion in the offices of the Local Bodies because of the formation of a Corporation and also in State Government Offices. During the period 1961-67 the increase was mostly due to the expansion in the offices of the Local Bodies, Quasi-government and Central Government.

Migrant Workers in Government and Quasi-Government Offices:

Table 4.4.7 gives the details of migrant workers in Urban Delhi coming from the different parts of India as well as from foreign countries, including Pakistan, in 1961. As would be noticed from the Table the migrant

workers play a dominant role in the Government and Quasi-government employment in Urban Delhi. The percentage of migrant workers in Government and Quasi-government Offices to total workers in these offices is as high as 88.2%, whereas the percentage of migrant workers to total urban working force is 84.1% only. Further, the percentage of migrant workers in Government and Quasi-government Offices to total migrant workers is 22.6% as against 21.6% for workers in Urban Delhi. It may, however, be pointed out that the participation ratio of migrants which is worked out at 44.4% is much higher than the participation ratio of total workers in Urban Delhi which is 31.7%.

Table 4.4.7.
Migrant Workers in Government and Quasi-Government Offices in Urban Delhi-1961:

1. Population of Urban Delhi:	23.59 lakhs
2. Total Migrants in Urban Delhi:	14.14 "
3. Total workers in Urban Delhi:	7.47 "
4. Total migrant workers in Urban Delhi:	6.28 "
5. Migrant workers in Government and Quasi-government Offices:	1.43 "
6. Total workers in Government and Quasi-government Offices:	1.61 "
7. Participation ratio of total workers in Urban Delhi:	31.7%
8. Participation ratio of working migrants to total migrants in Urban Delhi:	44.4%
9. Percentage of migrant workers to total urban working force:	84.1%
10. Percentage of migrant workers in Government and Quasi-government Offices to total workers in Government & Quasi-Government Offices:	88.2%

11. Percentage of workers in Government and Quasi-government offices to total workers in Urban Delhi.	21.6%
12. Percentage of migrant workers in Government and Quasi-government Offices to total migrant workers.	22.6

Source: Census of India - 1961, compiled by T.C.P.O.

The employment in Government and Quasi-government Offices in the four districts around Delhi (Gurgaon, Rohtak, Meerut and Bulandshahr which fall in the National Capital Region) is given in Table 4.4.8. As would be noticed from this Table, the total employment in 1967 in these districts accounted for 1,08,206 employees, as against 78,271 employees in 1961, indicating an increase of 38.2%.

More than one-half of the employees (56,197) were employed in the State Government Offices in 1967, and the remaining half were distributed between the offices of the Central Government (24,159) Local Bodies (22,454) and Quasi-government (5,396). Considering the proportional increase in 1967 over 1961, it is noticed that the offices of the Local Bodies have recorded the highest percentage increase at 47.3%, followed by Quasi-government and State Government Offices at 45.8% and 40.5% respectively.

The increase in Central Government Offices was, however, only 25%.

Considering the distribution of employees in each of the four districts, it is evident from Table 4.4.8 that Meerut district alone accounts for more than one-half of the total employees in the four districts in 1967 (54,712) chiefly due to employment in ordnance factories and the location of Defence Services in the Cantonment. The next in order are Gurgaon (19,978) and Rohtak (19,283). In case of Bulandshahr district, the number of employees is comparatively lower (14,233). Among these four districts, the proportionate increase in 1967 over 1961 was highest in Gurgaon 45.2%, followed by Rohtak 41.5%. Proportions in the other two districts, namely, Meerut and Bulandshahr rank further down in order; these are 38.7% and 24.3% respectively. It is, thus, observed that the number of employees in the different offices is the highest in Meerut district, but the rate of growth during the last six year (1961-67) has been of a higher order in the districts of Gurgaon and Rohtak, as compared to Meerut and Bulandshahr districts.

Employment in Government and Quasi-government Offices in Faridabad and Ballabgarh Town Group:

Of the various 'ring towns' around Delhi, Faridabad and Ghaziabad which are developing fast, are the most important. Employment in different types of offices in these two important towns is given in Tables 4.4.9 and 4.4.10.

Table 4.4.8

GROWTH OF EMPLOYMENT IN GOVERNMENT AND QUASI-GOVERNMENT OFFICES IN THE FOUR DISTRICTS OF THE NCR (1961 & 1967)

PUBLIC SECTOR	GURGAON			ROHTAK			MEERUT			*BULANDSHHR			Total for 4 Districts		
	1961	1967	%over 1961	1961	1967	%over 1961	1961	1967	%over 1961	1962	1967	%over 1961	1961*	1967	%over 1961
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Central Govt.	2,882	3,110	7.9	686	838	22.2	15,745	19,958	26.8	8	253	3,062.5	19321	24,159	25.0
2. State Govt.	7,889	13,115	66.2	10,987	15,526	53.3	15,024	19,512	29.9	7002	8044	14.9	40,002	56,197	40.5
3. Quasi-Govt.	1,569	1,824	16.2	1,335	1,367	2.4	665	2,053	208.7	132	152	15.2	3,701	5,396	45.8
4. Local Bodies	1,411	1,929	36.7	1,522	1,552	1.9	8,099	13,189	64.7	4305	5784	34.4	15,247	22,454	47.3
5. Total	13,751	19,978	45.2	13,630	19,283	41.5	39,443	54,712	38.7	11,447	14,233	24.3	78,271	1,03,206	38.2

Source: District Sub-Regional, Employment Exchange of Gurgaon, Rohtak, Meerut & Bulandshahr.

Note: *Data for Bulandshahr district is available only for 1962. In the total for 4 Districts for 1961, this figure has, therefore, been taken into account.

The number of employees in Faridabad Town Group, as would be seen from the Table 4.4.9 has increased from 2,600 in 1961 to 4,491 in 1967 registering an average annual increase of 12.1% in the last six years. While comparing the different types of offices in Faridabad Town Group, it is noticed that the Central Government Offices have registered as annual growth rate of 40% and account for roughly one half of the total employment in the entire sector in 1967. Employment in Quasi-government and Local Bodies rank next in order; the average annual growth rate in these Offices are 10.4% and 4.9% respectively. The State Government Offices have, however, shown a negative average annual growth rate of 0.6%. The marked increase in employment in the Central Government Offices is mainly due to the policy decision of the Government of India based on the recommendations of the Master Plan for Delhi to shift some of the offices* from the metropolis. In pursuance of this, four offices have already shifted to Faridabad Town Group. The negative growth rate in the offices of the State Government may be ascribed to the bifurcation of the State.

- *These are:
1. Directorate of National Sample Survey (Bulk portion)
 2. Exploratory Tube wells Orgn. M/O Food & Agriculture (Part)
 3. Public Division, M/O Information & Broadcasting.
 4. Distribution Section of the Deptt. of Tourism.

Table 4.4.9.
Employment in Government and Quasi-Government Offices in Faridabad and Ballabgarh Town Group 1961 and 1967.

Sl. No.	Sector	1961	1967	Average annual % increase
1	2	3	4	5
1.	Central Government.	610	2,076	40.0
2.	State Government.	1,013	979 (-)	0.6
3.	Quasi Government.	528	856	10.4
4.	Local Bodies	449	580	4.9
Total:		2,600	4,491	12.1

Source: Sub-regional Employment Office, Gurgaon District (Haryana).

Employment in Government Quasi-government Offices in Ghaziabad 1963-67:

The number of office employees in Ghaziabad town has increased from 2,481 in 1963 to 7,944 employees in 1967 resulting in an average annual increase of 55% in the entire Government and Quasi-government Offices. Of all the branches of Government and Quasi-government Offices, Central Government Offices have registered a marked average annual increase of 479.4%, the number of employees increased from 68 in 1963 to 1,372 employees in 1967. The employment in the State Government Offices has also increased considerably from 263 employees in 1963 to 1,303 employees in 1967, registering an average annual increase of 98.9%. The rate of growth in case of local bodies and Quasi-government offices

account for an average annual increase of 39.3% and 19.8% respectively. The increase in employment in the Central Government Offices is due to the expansion of existing offices and setting up of two new offices in the last four years, i.e., 1963-1967.

Table 4.4.10

Employment in Government and Quasi-government Offices in Ghaziabad Town 1963 & 1967.

Sl. No.	Sector	1963	1967	Average annual percent increase.
1	2	3	4	5
1.	Central Government.	68	1,372	479.4
2.	State Government	263	1,303	98.9
3.	Quasi Government	334	599	19.8
4.	Local Bodies	1,816	4,670	39.3
	Total:	2,481	7,944	55.0

Source: Sub-Regional Employment Exchange, U.P.

Employment in Government and Quasi-Government Offices in the Union Territory of Delhi in Relation to All India and the Districts Around Delhi:

The proportion of employment in Government and Quasi-government Offices in the Union Territory of Delhi to All India has increased from 3.3% in 1960-61 to 3.8% in 1966-67 (Table 4.4.11). In case of Central

Government sector, Delhi's share in the total Government and Quasi-government employment increased from 6.9% in 1961 to 7.4% in 1967. The corresponding increase in State Government employment went up from 0.0% to 1.1%; in Local Bodies, from 3.4% to 4.7%; but in Quasi-government Offices it decreased from 2.8% to 2.7%. It is observed from the Table that Delhi has a lion's share in the total Central Government employment in the country. In fact, the proportion of 6.9% in 1961 quoted above does not, however, reveal the correct picture. The total employment in Central Government Offices in All India in 1961 was of the order of 20.90 lakhs. Of this 15.30 lakhs were in the Railways and Posts & Telegraphs, leaving 5.60 lakhs employees in the rest of the offices. The corresponding figures for the Union Territory of Delhi for 1961 were 1.44 lakhs, 0.19 lakhs and 1.25 lakhs. According to these figures, the proportion shoots up from 6.9% to 22.3% for Delhi in relation to All India (vide Table 4.4.12.) It is thus noticed that Delhi alone employs more than one-fifth of the total employment in the Central Government Offices in the whole of India, if employees in Railways and Posts and Telegraphs are excluded. This raises the question as to whether such a heavy concentration of Central Government activity in Delhi is desirable? Whether the capital functions cannot be performed satisfactorily by diffusing these activities to other cities in view of the rapid growth of population in Delhi?

Table 4.4.11.

COMPARISON OF EMPLOYMENT IN GOVERNMENT AND QUASI-GOVERNMENT OFFICES IN DELHI STATE AND ALL INDIA (1960 - 67)

Sl. No.	Year	Central Govt.			State Govt.			Quasi-Govt.			Local Bodies			Total		
		India	Delhi	% in Delhi to All India	India	Delhi	% in Delhi to All India	India	Delhi	% in Delhi to All India	India	Delhi	% in Delhi to All India	India	Delhi	% in Delhi to All India
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1.	1960-61	20.90	1.44	6.9	30.14	0.26	0.9	7.73	0.22	2.8	11.73	0.40	3.4	70.50	2.32	3.3
2.	1961-62	21.86	1.49	6.8	30.87	0.28	0.9	8.79	0.25	2.8	12.65	0.45	3.6	74.17	2.47	3.3
3.	1962-63	23.29	1.55	6.7	31.98	0.29	0.9	9.95	0.30	3.0	14.31	0.50	3.5	79.53	2.64	3.3
4.	1963-64	24.35	1.61	6.6	34.33	0.32	0.9	10.97	0.31	2.9	14.89	0.67	4.5	84.54	2.91	3.4
5.	1964-65	25.68	1.89	7.4	35.24	0.35	1.0	12.07	0.33	2.7	15.98	0.75	4.7	89.57	3.32	3.7
6.	1965-66	26.36	1.98	7.5	37.23	0.38	1.0	13.18	0.35	2.7	17.01	0.79	4.6	93.78	3.50	3.7
7.	1966-67	26.88	2.00	7.4	37.67	0.41	1.1	14.02	0.38	2.7	17.88	0.83	4.7	96.35	3.62	3.8

Source: i) Statistical Abstract of India C.S.O.; Cabinet Secretariat.

ii) E.M.I. Unit, Employment Exchange, Delhi.

Table 4.4.12.

Employment in Central Government Offices in Delhi as compared to All India.

Sl. No.	Employment in India (Lakhs)	Delhi (Lakhs)	Delhi to All India (%)
1	2	3	4
1. Total employment in Central Government Offices.	20.90	1.44	6.9
2. Employment in Railways.	11.57	0.14	1.2
3. Employment in Posts & Telegraphs.	3.73	0.05	1.3
4. Employment in Central Government Offices excluding Posts & Telegraphs.	5.60	1.25	22.3

Source: Records of the C.S.O. and E.M.I. Unit.

The growth of employment in Government and Quasi-government Offices in Delhi State has been much more rapid than in All India. Table 4.4.13. reveals that during the six year period (1961-67), there was an increase of 56% in the Government and Quasi-government employment in Delhi State

as against 36.7% in All India. The position in regard to individual sectors during the six year period is as follows:-

In the Central Government sector the increase in the Union Territory of Delhi is 38.9% as against 28.5% in All India; in State Government, the increase in Delhi is 58.7% as against 24.9% in All India and in Quasi-government, the increase in Delhi is 72.7% as against 81.4% in All India. These figures clearly point out that in all sectors except in the Quasi-government, the increase in public sector employment has been much more rapid in Delhi than in All India.

Government and Quasi-government Employment in State Government and Local Bodies in Delhi compared to the adjoining Districts:

Employment in State Government and the offices of Local Bodies in the Union Territory of Delhi increased at a much faster rate from 1961-66 than in the four adjoining districts. Table 4.4.14 shows that it increased from 66,000 to 1,17,000 in case of the Union Territory of Delhi as against from 55,239 to 76,647 in the four adjoining districts during the five year period (1961-66). The proportion of employees per lakh of population during the same period has increased from 2,482 to 3,433 in case of the former and from 777 to 912 in case of the latter. This points out the increasing overheads of a metropolitan city with its ever increasing demand for civic amenities and services. The accelerated growth in Delhi at the expense of its adjoining

Table 4.4.13

Growth of Employment in Government and Quasi-government Offices in the Union Territory of Delhi Public Sector and in All India (1961-67)

(Figures in lakhs)

Sl. No.	Year	Central Govt.		State Govt.		Quasi Govt.		Local Bodies		Total	
		India	Delhi	India	Delhi	India	Delhi	India	Delhi	India	Delhi
1	2	3	4	5	6	7	8	9	10	11	12
1.	1960-61	20.90	1.44	30.14	0.26	7.73	0.22	11.73	0.40	70.50	2.32
2.	1961-62	21.86 (4.1)	1.49 (3.4)	30.87 (2.4)	0.28 (7.7)	8.79 (13.9)	0.25 (13.6)	12.65 (7.8)	0.45 (12.5)	74.17 (5.2)	2.47 (6.5)
3.	1962-63	23.29 (6.5)	1.55 (7.1)	31.98 (7.3)	0.29 (3.6)	9.95 (13.2)	0.30 (20.0)	14.31 (13.1)	0.50 (11.1)	79.53 (7.2)	2.64 (6.9)
4.	1963-64	24.35 (4.6)	1.61 (3.9)	34.33 (7.3)	0.32 (10.3)	10.97 (10.3)	0.31 (3.3)	14.89 (4.1)	0.67 (34.0)	84.54 (6.3)	2.91 (10.2)
5.	1964-65	25.68 (5.5)	1.89 (17.4)	35.24 (2.6)	0.35 (9.4)	12.07 (10.0)	0.33 (6.5)	15.98 (7.3)	0.75 (12.0)	89.57 (5.9)	3.32 (14.1)
6.	1965-66	26.36 (2.7)	1.98 (4.8)	37.23 (5.6)	0.38 (8.3)	13.18 (9.2)	0.35 (6.1)	17.01 (6.4)	0.79 (5.3)	93.78 (4.7)	3.50 (5.4)
7.	1966-67	26.88 (2.0)	2.00 (1.0)	37.67 (1.2)	0.41 (7.9)	14.02 (6.4)	0.38 (8.6)	17.78 (4.5)	0.83 (5.1)	96.35 (2.7)	3.62 (3.4)
<p>% Growth in 1967 over 1961.</p>											
		(28.6)	(38.9)	(24.9)	(57.7)	(81.4)	(72.7)	(51.6)	(107.6)	(36.7)	(56.0)

Source: E.M.I. Unit, Employment Exchange, Delhi.

Note: Figures within brackets indicate percentage increase to the previous year.

Table 4.4.14

Employees per lakh of population in the Local Bodies and State Govt. Offices in the Districts of NCR and Delhi State (1961 & 66)

Sl. No.	Districts	Population (lacs)	Employment in State Govt. Offices	Employment in Local Bodies	Total (Col. 4+5)	Population (lakhs)	Employment in State Govt. Offices	Employment in Local Bodies	Total (Col. 8+9)	No. of employees per lakh of population in 1961	No. of employees per lakh of population in 1966
1	2	3	4	5	6	7	8	9	10	11	12
1.	Gurgaon	12.41	7,879	1,411	9,290	15.11	12,876	1,879	14,755	748	976
2.	Rohtak	14.20	10,087	1,522	11,609	17.43	15,205	1,521	16,726	817	959
3.	Meerut	27.13	15,024	8,009	23,033	31.30	18,416	12,942	31,358	849	1,001
4.	Bulandshahr	17.37	7,002	4,305	11,307	20.17	8,369	5,439	13,808	659	687
Districts of NCR.		71.11	39,992	15,247	55,239	84.01	54,866	21,781	76,647	777	912
Union Territory of Delhi		26.59	26,000	40,000	66,000	31.08	38,000	79,000	1,17,000	2,482	3,433

Source: 1. Population data from Census of India.
 2. Employment data from district Employment Exchanges and E.M.I. Unit, Employment Exchange Delhi.

areas has jeopardised the proposals of the Delhi Master Plan. The Plan has envisaged synchronous development in the region around Delhi, particularly in the selected 'ring towns'. An important proposal embodied in the Plan was the decentralisation of Central Government Offices away from Delhi. It also proposes to locate offices having a total employment of 50,000 workers in the 'ring towns' by 1981. As against this the actual employment in the Central Government in the four adjoining districts viz., Meerut, Bulandshahr, Rohtak and Gurgaon was roughly 24,000 in 1967 out of which about 2,000 were in Faridabad, Ballabgarh and about 1,400 in Ghaziabad. It would thus be noticed that the 'ring towns' have not yet been provided with sufficient employment opportunities.

Steps Taken in the Past to Decentralise Central Government Offices:

The employment position in the Government Offices, reveals that the trend of employment in the Central Government Offices in Delhi is significantly high due to a heavy concentration of their offices in the city. This has caused shortage of office and residential accommodation in Delhi. Table 4.4.15 reveals the backlog in residential and housing units in 1966.

Table 4.4.15..

Availability of Office Accommodation and Residential units in the General Pool of the Central Government in Delhi State in 1966.

Sl. No.	Type of accommodation	Demand	Availability	Shortage
1	2	3	4	5
1.	Office space (Lakh sq. meters)	5.98	4.98	1.00
2.	Residential units (numbers).	96,224	39,745	56,479

Source: Published Report of the Ministry of Works, Housing and Supply 1966-67.

As would be noticed from the Table, there was a shortage of one lakh sq. meters (10.70 lakh sq. ft.) of office accommodation and 56,479 residential units in 1966. The Master Plan for Delhi had recommended that the employment in government offices should not exceed 2.60 lakhs by 1981. One of the major policy decisions envisaged in the Plan in this connection was that there should be decentralization of Government Offices from Delhi and that some of the offices that have to be close to Delhi could function from the 'ring towns' so that the growth of Delhi could be rationalised. In order to implement this, the Union Government has taken the following steps:

1. Construction of 9,300 sq. metres (one lakh sq. ft.) of office accommodation and 1,400 residential units in Faridabad.
2. Alternative accommodation either in the general pool or in the private sector was arranged for the office concerned in such places to which they are to be shifted.
3. Certain amount of incentives in the form of C.C.A., educational facilities for the children etc., were provided in the case of Faridabad.
4. The availability of suitable office and residential accommodation in the various States is being explored for the possibility of shifting some of the offices, without it being detrimental to their administrative efficiency.
5. Land has been purchased in Faridabad and Ghaziabad. The feasibility of purchasing suitable land in cities like Bangalore, Ahmedabad etc. is being explored for constructing both office and residential accommodation there.

In pursuance of these steps, about 11 offices were shifted outside Delhi, of which 5 were shifted to Faridabad*. However, due to the shortage of suitable accommodation, both office and residential in other cities, the reluctance on the part of officers to move

*Four Central Government Offices and one Quasi-government Office. have been shifted to Faridabad.

from Delhi, the necessity for liaison with the Secretariat and other administrative and functional inconveniences, much headway has not been made in the decentralisation of Government Offices in the period (1961-68). Consequently, the urban crescendo has been rising at a higher rate in Delhi.

Recommendation On Decentralisation of the Central Government Offices:

The accelerated growth of population in Delhi has to be kept within manageable limits. Taking into consideration the spurt in the growth between 1961-69, the land available at present in Delhi, the optimum densities at which people could be housed in the National Capital, capacity for ~~xxx~~ augmenting the water and sewerage lines (these are major constraints to the growth of Delhi), the Regional Plan proposes that urban Delhi should be planned for a population of about 52 lakhs by 1981. The urbanisation process may, however, be rationalised by dispersing various economic activities especially that of Government away from the Metropolis. Some of the important measures which may be helpful in decentralisation of Government Offices are suggested below:

1. Restraint on the Expansion of Central and Quasi-government Offices in Delhi:

It is imperative that among other things there should be a curb on the expansion of the existing Central Government and Quasi-government Offices and especially on the creation of new offices in the Capital. This is essential not only for the efficient functioning of the

Metropolis but also in the larger interest of the development of other towns in the Region. The main criterion for the location of such offices in the Capital would depend upon whether they perform the National capital functions for which they have to be in close contact with the main Ministries of the Government of India. Even some of the offices which satisfy this criterion can function efficiently from one of the 'ring towns' with improved road, rail and telephone communications between the 'ring towns' and Delhi.

2. Need for High-Level Implementation of Decentralisation.

Decentralisation of Central Government Offices from Delhi is an urgent and continuing task and should be pushed through purposefully. For achieving this purpose, the Cabinet Sub-Committee which was earlier screening applications for the setting up of new offices be revived, so that decisions taken at a high level are not easily waived aside. Further, a separate Cell should be established in the Ministry of Works, Housing and Urban Development to study matters pertaining to decentralisation of Government offices from Delhi. A small Committee of Secretaries, with the Cabinet Secretary as its Chairman, should process cases for shifting of offices, expansion of existing offices and setting up of new offices in the Capital and obtain the approval of the Cabinet Sub-Committee for such proposals.

3. Development of Central Government Offices and Residential Areas in the Ring Towns:

Some of the offices can be shifted to towns all over the country but others which have day-to-day contact with the main Ministries could be located in the 'ring towns' within a distance of 65 kms. from Delhi; these towns should have easy and cheap communications with the Capital. The Delhi Master Plan recommended that 50,000 workers in the Central Government may be lodged in these towns by the year 1981; these are to be distributed as follows:-

Ghaziabad	20,000
Faridabad	15,000
Gurgaon	5,000
Narela	10,000

As a follow up measure, the Central Government, has already purchased land in Ghaziabad and Faridabad. In Ghaziabad about 380 hectares of land is owned by the Government. Of this, two sites measuring about 10 hectares have been recently allotted to the Post & Telegraph Department for the construction of a Tele-communication Training Centre; the remaining area has not yet been utilised. This land should be developed and Government offices and residential units be built with a definite programme to shift some of the existing offices from Delhi as well as allocate office space for the new offices that should be located in close proximity to the National Capital.

Similarly, land owned by the Central Government in Faridabad has to be fully utilised. The Government owns about 90 hectares there. Of this, 40 hectares have been fully developed; three office buildings have been constructed in which 12 offices have been housed; 1,402 residential units have also been constructed with 4 shopping centres, one higher secondary school, one primary school, one nursery school, one community hall and one cinema hall. The remaining land, i.e., 50 hectares should also be fully developed, office buildings as well as residential houses should be constructed. In addition to this, about 160 hectares are required. The required land may be obtained from the Directorate of Urban Estates, Haryana and developed in accordance with the Master Plan for Faridabad. Early steps in this direction will have to be taken with the State Government.

Master Plans for both the towns of Ghaziabad and Faridabad have been prepared by the State Governments. In Ghaziabad development is taking place in the two sectors adjoining the plot of land owned by the Central Government and two others are being developed currently by the Improvement Trust. Power lines and main sewer lines are also available in the periphery of the Central Government land. Also for immediate purposes, primary, higher secondary schools, colleges and dispensaries are available in the adjoining sectors. Major roads have to

been laid. Tube-well water will also be supplied. Thus, the necessary infrastructure is already available in Ghaziabad. In Faridabad, tube-wells for water supply and oxidation ponds for sewerage have been constructed by the CPWD. Schools and dispensaries in the other sectors are also available. In this town there is a great pressure on land. The required land should be urgently acquired by the Central Government.

It is, thus, necessary to have a programme of construction which should be spread over two Plan periods in which 50,000 Central Government workers could be employed and housed in the 'ring towns'. A tentative programme of development for Ghaziabad and Faridabad has been worked out by the CPWD which involves a cost of Rs. 58.86 crores. This amount will have to be diverted from the Plan allocation for the construction of Central Government Offices and residential units in Delhi into these towns during the two Plan period. It may be mentioned in this connection that the cost of land in these two towns is cheaper than in Delhi and though the development and construction costs are about the same. However, the level of development, services and amenities could be of a lower standard as compared to Delhi. Two to four storeyed construction can be resorted to which is cheaper than multi-storey construction at Delhi. A part of the cost of the infrastructure will be shouldered by the respective State Governments.

Other towns in the National Capital Region such as Gurgaon, Bahadurgarh and Sonapat in

Haryana and Hapur and Meerut in U.P. are also suitable for the location of Government offices and their programmes may have to be drawn up in a phased manner taking into consideration the expansion of employment in the Central Government.

4. City Compensatory, House-Rent Allowance and C.G.H.S.

In order to make living in the 'ring towns' attractive, it is necessary that the City Compensatory Allowance, House Rent Allowance and C.G.H.S. facilities are extended to all towns within a radius of 65 kms. from the National Capital. These facilities may attract even those people who are working in Delhi; they may prefer to stay in the 'ring towns' and commute to Delhi in view of the acute shortage of housing, high rents and lack of community facilities. These inducements will go a long way in relieving Delhi from the pressure of population and the high cost of augmenting the infrastructure in Urban Delhi. These will at the same time give a fillip to development of the 'ring towns'.

The Effects of the Rapid Growth of Delhi on
the Transportation Structure.

CHAPTER - V.

THE TRANSPORT STRUCTURE

(and accelerating) The growth characteristics of Delhi have been discussed in Chapter-I. While many factors have contributed to such a growth, it would not be an exaggeration to say that transportation has played a major and important role in assisting this growth. From time immemorial, Delhi has been on the cross roads of the major transport routes of Northern India. In recent years there has been a tremendous concentration of activities causing a great convergence of goods and people. Five National Highways - viz. N.H. No.1, 2, 8, 10 & 24 - converge on Delhi. It is also a major junction on the Rail Map of India. It is linked up with all parts of the country, with direct and through rail services running to all important metropolitan cities like Bombay, Calcutta, Madras etc. Being a major metropolitan city, it draws a great inflow of people and goods from a vast hinterland. Being a hub of economic activities, it induces a daily commutation of a large number of people from nearby areas. Being a major centre of trade and commerce, it imports and exports considerable quantities of goods. Being on the cross roads of national trade routes, considerable quantities of inter regional traffic pass through it. All these varied and conflicting movements have strained the transportation system of the City causing delays in transit resulting in heavy economic losses.

Note: For a detailed study of the transportation reference is invited to the two NCR work study reports entitled "Traffic & Transportation - Roads - Regional Network, Pattern Development Programme, TCPO April, 1969 & Traffic and Transportation Railways-Regional Route Sections, Development Programme, TCP June, 1969.

The phenomenal growth of Delhi has caused many problems on the varied aspects of urban life and have been discussed earlier. Its effect on the transportation system has been indeed strenuous. While the availability of transport aided the growth in the earlier phases, the rapid growth, both in terms of population and size of urban area, has caused severe congestion, inordinate delays, slow movement along the transport network and increasing number of accidents.

The number of motor vehicles on the road has increased from 12,490 in 1950 to 1,50,994 by 1970, showing an increase of nearly twelve times. But failure to develop equivalent road capacity has resulted in decreasing operating speeds. While on the other hand the City Bus Service system, which is the main mass transportation system, is not able to cater to the increasing demands, on the other hand its operating efficiency has declined as reflected by the average number of trips per day. From 13 trips per bus per day in 1965 it had reduced to 11 trips by 1968. This reduction in trip turnover is partly due to low operating speeds due to congestion on the road network. The loss is equivalent to 1.36 lakh passengers per day which amounts to 18% of the total passengers carried per day by the entire system. Inordinate delays, at many bottleneck points in the network, have become a common experience. A study* by the Central Road Research Institute has estimated that the economic loss due to delay at one such point was Rs.3.06 lakhs per year. On the social side, the rate of increase of road accidents is alarming. Within a span of

* C. R. R. I., 'Preliminary Traffic and Transportation Planning Study of Delhi', 1968 Page.24.

eight years, road accidents have increased from 2,838 in 1958 to a staggering figure of 8,347 in 1966.

Transportation as an Important Factor in Restructuring Economic Activity in the Region.

In the preceding Chapters the reorganisation of the physical, spatial and economic activities in the Region has been stressed. Following the recommendations of the Master Plan for Delhi new large and medium scale industries were to be discouraged from locating in Delhi. This had a limited success. Many of the industries that have gone to Faridabad and to some extent to Ghaziabad, are the result of this policy, though the positive measures on the part of State Govts. to attract them was an important factor. But the transportation system has not been a corresponding improvement between the Mother City and the towns of the Region which have complementary economic functions, with the results that the intense interactions between the cities have been distorted. This has discouraged other entrepreneurs from locating away from Delhi urban area which has seen a steady improvement in its intra-urban road network, thanks to the Master Plan.

The Delhi Master Plan had a larger perspective. It envisaged the development of the 'ring towns' around Delhi, with a view to disperse the growing economic activities, distribute the commercial activity now concentrated in Delhi and organise the population growth over a wider region so as to avoid over congestion in the capital city. The policy envisaged for the development of these 'ring towns' was that they would be developed as self-contained economic

entities offering employment as well as other social facilities for the population. The success of this policy depended on many policy decisions. An important one being the development of a suitable transport network and transportation system between these towns and Delhi which did not materialise. Thus, it is evident that efforts at restructuring the economic activity in the Region should be synchronously followed by determined efforts at restructuring the transportation system. The action on the former, following the recommendation of the Master Plan for Delhi, has not met with the desired results because among other things, the absence of any move in the latter sphere. These two areas of activity are complementary and cannot be pursued independently with any measure of success.

To achieve the pattern of regional development as envisaged in the Regional Plan would mean a sustained effort over a long period of time. Delhi by its size, importance and economic dominance has a great force in attracting further growth. Thus its size itself has been an accelerating force in its growth. The absence of basic infrastructure facilities in the 'ring towns' has been a deterrent in their growth. A good transportation system could break this vicious circle. Though there has been growth of economic activities in these areas, the rate of growth has been insignificant. The problem is that while the industries have come to these towns, the workers do not have suitable facilities like housing, education, health, recreation, utilities and services. The outward movement of residential areas into these towns has been inhibited by the absence of facilities to commute to Delhi within reasonable time and low costs.

Development of a regional traffic network and transportation system could aid in accelerating this process. It would induce definite actions for the development of the infrastructure facilities in these towns, which, would in turn accelerate their growth. The availability of a fast transport system, which would nullify the barrier of distance in terms of accessibility time factor which would greatly encourage development of housing activities in these areas (which will definitely be economical as compared to investment in Delhi) on a large scale inducing outward movement of residential areas away from the congestion and squalor but well within the Metropolitan Area. Again the same transport system would induce dispersal of economic activities, for the entrepreneur would benefit from lower land values and its availability and lesser local taxes but would be free from investment on housing and other overheads to attract the labour. The workers in the first stage would still reside in Delhi and commute to work in these centres. On the other hand, the present migration of residents of these towns to Delhi would also be discouraged since on securing jobs in Delhi they could continue to stay in these towns and commute to Delhi. To start the process of growth of the 'ring towns' this phenomenon could be accepted and welcomed. Once the impetus is given and other accelerating processes carried out by the different agencies the 'ring towns' would attain a dynamism of their own for their further growth both in economic terms and physical dimensions.

Another important aspect is the dominance of Delhi in its distributive trade function. It receives innumerable commodities from all parts of the country, determines their price values and distributes them to all parts. In

this process a two-way movement of goods takes place. The incidence of this two-way movement has been found to be considerable. This two-way movement, though entailing additional transportation costs, is induced, among other factors, by the highly developed transportation facilities like rail and road routes oriented towards Delhi. The restructuring of the transportation system in the Region, with the regional towns inter connected with each other, would greatly reduce this two-way movement to and from Delhi.

Thus the thesis has to be accepted that the restructuring of the traffic network and transportation system within the National Capital Region will induce and accelerate the process of restructuring the economic activities. For this purpose effective policies have to be drawn out. The measures suggested for the above restructuring cover both road and rail network. If implemented speedily, it will lead to a more balanced development of the Region which is the most important goal of planning for the NCR.

Analysis of the Existing Transport System:

Of the four systems of transportation - road, rail, water and air - waterways has not developed within the Region. Delhi is an important centre both on the maps of the National and International Air routes. Though the importance of this means of transport and its concentration in Delhi will continue, none of the regional towns are likely to be connected by air in the present stage of development of air traffic. Thus in the transport development programme for the Region, only Roadways and Railways are considered and discussed.

Before analysing the characteristics of the existing road and rail systems, the probable types and quantum of movement both of people and goods, on the transport network of the Region and their modal share are discussed below.

We have already noted that Delhi by its size, dominates over a vast hinterland from which it draws goods and people. Also, by virtue of its location on the cross roads of national transport routes, considerable quantum of inter-regional traffic passes through it. Thus the movements along the transport network of the NCR can be classified under the following headings:

- (i) Originating outside the NCR and destined to outside areas.
- (ii) Originating outside the NCR, but destined to places within the NCR.
- (iii) Originating within the NCR and destined to outside areas.
- (iv) Originating within the NCR and destined to places within the NCR.

This complexity of movements causes considerable difficulties in a reasonable estimation of the total quantum of movement and their share on the road network. The high volume of food-grain movement from Punjab and Haryana to Delhi, Rajasthan, U.P. and other areas and the movement of raw and processed commodities like coal, cement, industrial goods in the reverse directions cause variations in intensity of flow and seasonal fluctuations.

The Modal Split of the Traffic Movement:- Of the total commodity flow, it can be safely assumed that the Railways would carry a fairly large share. But it has been estimated that as a commercial proposition for freight with less than 200 kms. lead, movement by Railways would be uneconomical and as such Road traffic would have to cater for this. Also, of the total traffic, the proportion of Railways would be about 70% and that of roads 30%. Thus we see that of the flow types listed above, maximum under items (i) and portions (the share depending on the haul) of (ii) and (iii) would be catered to by the Railways and that under (iv) would have to be catered to by the Roads almost in their entirety. In addition, those movements on roads from the rail heads to the centres of distribution would also have to be taken into account. This would be partly on the intra-urban network and partly on the regional network. It has also been observed that a major portion of goods reexported from Delhi to the surrounding areas is by road.

The estimates made in the following paragraphs are of the total movement on the transportation system mainly by roads and railways. To estimate the intensities on either of these two systems, the findings of the study carried out by NCAER on Regional Transport Survey of Madras State and Pondicherry (1965) would be a useful guide. After analysing road and rail traffic in rice in 1963, the share of road and rail traffic was estimated as follows:

- Upto 150 miles -- Mainly road transport.
- 150 to 500 miles -- 53% by road and 47% by rail.
- Over 500 miles -- Mainly by rail.

The above could be a general guide to estimate the share of road and railways out of the total movements of different commodities.

Passenger Movement:- Delhi's population has increased to nearly 58 lakhs, and there is a high intensity of people moving daily in and out of Delhi. On an average 40,000 persons come into Delhi urban area daily by rail. This figure gives an idea of the daily passenger movement that takes place to Delhi via the Railways. Exact figures for daily commutation by road is not available. It is estimated that it could be equal to that on the railways. The magnitude of passenger movement by road can be realised with reference to the number of trips by buses plying on the different routes:

	<u>No. of trips each way.</u>
i) G.T. (Karnal) Road	111
ii) Rohtak Road	137
iii) Gurgaon Road	98
iv) Mathura Road	107
v) G.T. (Ghaziabad) Road	384
	<u>837</u>

Source:- By enquiry at the Enquiry Office/and of the Inter State Bus Terminal, Kashmiri Gate, Delhi, 1968.

The daily incoming passenger traffic (commuter) to Delhi urban area by railways was about 40,000 in 1968. The population along the corridors is proposed to be increased by 3 times the 1961 size i.e. from about 11 lakhs to 34 lakhs by 1981. As an approximate estimate at this stage, it could be taken that the commuter traffic would increase in proportion to the population at the existing level of services. This would give a figure of 1,23,000 commuters incoming per day. To serve this high intensity the level of railway services would have to be considerably improved by providing a greater number of services at frequent intervals and at a faster speed. This improvement would have an effect of diversion from the other system and induce more traffic on to this system. Added to this, we must take into consideration the increase in the rate of commutation, the increase in social movement between Delhi and other centres due to increase in leisure time, social interaction between the centres etc. Thus a total of 1,50,000 incoming passengers per day could be expected on the railways. The rail routes within the NCR will have to be geared to take this intensity of load.

The Table 5.1 gives at a tentative estimate, the probable increase in commuter traffic into Delhi and its share by road and rail systems with or without electrification on the rail-way systems.

The details regarding the intra-urban traffic aspect within Delhi has not been discussed here except to note that, with the increase in the population of Delhi, extension of its physical size and expansion of its economic and social activities, a mass-transportation system is an

Table 5.1

Growth of Intra-regional Commuters into Delhi by Road and Rail.

Year	Road		Rail		Total
	No.	Growth rate	No.	Growth rate	
1	2	3	4	5	6
1957	22,000	3%	15,000	-	37,000
1964	33,500	6%	-	-	-
1968	42,000	5.7%	38,000	8.8%	80,000
1971	50,500	@6%	59,500	@ 9%	1,00,000
1976					
a) without electrification.	65,500	@ 6%	76,000	@ 9%	1,41,500
b) with electrification.	61,000	@ 4%	87,000	12%	1,48,000
1981					
a) without electrification.	85,500	@ 6%	1,20,000	@ 9%	2,05,000
b) with electrification.	70,000	@ 4%	1,53,500	@ 12%	2,26,500

Note : 1. Assumed that electrified service on the railways will start by 1971.

2. Above figures indicate commutation each way per day.

absolute necessity to cater to its increasing travel demands. The road transport service will hardly be able to meet the demands. Under the present limitations this could be provided only by the railways whatever be its type-surface, underground or elevated. The intensity of loadings and lines of travel desire etc. for the mass transportation system is being worked out in the transportation Plan for Delhi urban area now under preparation. It is presumed here that the existing rail corridors within the urban area will advantageously be made use of for the mass-transportation system.

It could be assumed that the bulk of the goods coming to Delhi from long distances is by rail. But still considerable quantities of the goods movement takes place by road also. In recent times road transport has been taking over an increasing share of the goods movement from the railways. While short lead hauls would have a natural preference to road transport, even hauls of long lead show a tendency to prefer the road transport. In recent times this aspect of competition between the two systems has been the subject of much thought and discussions and efforts are being made to evolve a policy for co-ordination between the two systems. In the NCR, it may be emphasised that movement of men and material would be intense on both the systems, thus to meet the demands of both, measures have to be geared up. Another special feature of the area is that many of the goods imported into Delhi from distant places are again exported out into many of the surrounding areas. In this movement it is seen that while the first movement takes place by the railways, the latter is invariably by the roadways. A Survey* in Delhi carried out as *NCAER, 'Commodity Disposition Survey in Delhi', Occasional papers No.4, New Delhi, 1953.

early as 1953 showed that out of (an average of) 5,56,60,000 yards of cloth exported out from Delhi, 80% of it was moved out by trucks; out of about 3,00,000 cycles exported, 70% was by trucks; out of 2,81,01,040 gallons of oil and 52,201 pounds of greases, imported into Delhi from ports like Kandla, Bombay and Calcutta, nearly 30% were re-exported of which 50% was by road; about 435,000 tons of the food-grains imported, 40% was by roads. The above figures, though very much outdated show that large quantities of goods move out of Delhi and the share of the movement on the road system is high.

In another study by NCAER* an analysis of the outward movement of goods from Delhi on the Rajasthan route (1956-57) revealed that "during the four months covered, about 11,700 tons were moved to Rajasthan on the route studied. The traffic to Gurgaon and Rewari Districts was about 2800 tonnes. The estimates for the annual movement would therefore, seem to be of the order of 35,100 tons and 8,400 tons respectively. This would amount to 6.7 million ton miles". There could be no doubt that this movement would have increased tremendously.

Commodity movements:- While a planning programme for the distribution of the population in the Region has been formulated, it is to estimate the commodity flows between these centres and Delhi and between themselves many detailed projections based on the economic characteristics of each other, their flow characteristics etc. require to be carried out. Also these studies would not give a quantum of inter regional traffic passing through the net work of the Region. *NCAER, 'Some Aspects of Goods Transport by Road in the Delhi Region', Occasional papers, No.2, 1953.

Table 5.2

Anticipated Movements of Wheat in 1970-71.

		(In Tonnes)
From	To	Quantity
Rohtak District	Gurgaon District	22,000
	Mohindergarh Distt.	14,000
Karnal District	Mohindergarh Distt.	22,000
	Delhi	95,000
Jind District	U.P. State	100,000
Punjab State	Delhi	90,000
	U.P. State	528,000
	Bihar State	346,000
Rajasthan State	Delhi	100,000
	U.P. State	73,000
Meerut District	Shahjanpur Distt.	11,000
	Sitapur District	35,000
	Kheri District	6,000
	Bahraich District.	8,000
Bulandshahr District.	Mirzapur District	41,000

Anticipated Movements of Rice in 1970-71.

		(In Tonnes)
From	To	Quantity
Karnal District	Rohtak Distt.	6,000
	Gurgaon "	17,000
	Mohindergarh Distt.	7,000
	Delhi	26,000
	U.P. State	61,000
	Bihar State	54,000
Jind District	Rohtak Distt.	5,000
Ambala District	Delhi	5,000
	Bihar State	30,000
Banswara District	Alwar District	4,000
	U.P. State	45,000
Saharanpur Distt.	Meerut District	24,000
Pilibhit Distt.	Bulandshahr Distt.	9,000
Bauda Distt.	Bulandshahr Distt.	73,000
Rai Barielly Distt.	Bulandshahr Distt.	16,000

Source : Planning Commission, 'Commodity Transport Studies - Foodgrains', JTG/Report/No.13.

As such, reference to "Commodity Transport Studies" of some of the principal commodities carried out by the Planning Commission have been made to give an idea of the quantum of goods movement.

In terms of foodgrains it is estimated that there will be a very heavy movement from Punjab and Haryana States to Delhi and also from Punjab, Haryana and Rajasthan into Uttar Pradesh. The anticipated movements of wheat and rice in 1970-71 are given in the Table 5.2.

The coal needs of the Region are mostly met from the Dhanbad fields. It is estimated that in 1970-71 the movement of coal into Delhi alone would be nearly 360 million tonnes. Delhi is a major cotton consuming centre. It is estimated that the consumption of raw cotton would be 225,000 bales, nearly 80% of which is anticipated to move by roads. The Region, in view of its population size and economic development programmes would be a major consumption centre for such items as sugar fertilizers, cement etc., the quantum of consumption of each being very high. The Tables 5.3 and 5.4 give the estimated requirement of fertilizers and consumption of cement within the Region.

Delhi being the major metropolitan centre and an important commercial and distributive trade centre, the high intensity of goods movement is to be expected. Goods like petroleum, coal etc., from distant parts and mines are being moved by the Railways. With the development of industries within the Region, and the expansion of the capacity of the existing thermal power plants and the new plant at Badarour, increasing quantities of coal will have to

Table 5.3.

Estimated Fertilizer Requirement in 1970-71.

District	Quantity (in tonnes - Nutrient)		
	Nitrogenous	Phosphatic	Potassic
Gurgaon	7,500	1,300	2,500
Rohtak	19,500	4,000	7,200
Bulandshahr	16,250	6,250	6,600
Meerut	14,250	4,000	4,100
Alwar	3,125	1,000	-

Source:- Planning Commission, "Commodity Transport Studies - fertilizer," JTG/Report/No.10.

Table 5.4

Estimated Consumption of Cement in Major Centres within the Region in 1970-71.

Delhi	800,000	Tonnes
Rohtak	35,000	Tonnes
Meerut	25,000	Tonnes
Alwar, Rewari	25,000	Tonnes

Source:- Planning Commission, "Commodity Transport Studies - Cement", JTG/Report/No.3.

be hauled into the Region from Dhanbad - Jharia and Singaroli coal fields. (The Railways are pressing the NCDC to obtain coal for these thermal power plants only from Singaroli as the rail section above Mughalsarai is saturated). The full intensity of this will be felt on the rail-

ways. An analysis of movement characteristics by railways within the Region, based on data on movements for a calendar month is made in the following paragraphs.

Urban Delhi itself is a major source of originating and destinating traffic. Nearly, 14,000 quintals of freight traffic originated within Delhi urban area during December, 1968. Of this barely 2% was destined to areas within the National Capital Region and the rest to areas outside. The Table 5.5 gives the details of quantity of originating traffic and their destination.

Table 5.5

Rail Freight Traffic Originating from Delhi Urban Area, December, 1968.

Total Originating Traffic.	(Quantity in Quintals)		
	Destinating within the NCR	Destinating the National Capital Region	Destinating outside the National Capital Region
		Within Northern Railway	Outside Northern Railway
140,291	1,877 (1.33%)	56,904 (40.55%)	81,537 (58.12%)

Source: Analysis by TCPO of movements data received from Northern Railway.

An idea of the quantity of freight traffic destinating to Delhi urban area can be had from the Table 5.6 which gives the originating traffic in Northern Railway and its destination

with respect to National Capital Region.

Table 5.6

Freight Traffic Originating within Northern Railway, December, 1968.

Total Originating Traffic (within Northern Railway)	(Quantity in Quintals)	
	Place of Destination Within NCR	Outside NCR
10,993,096 (100%)	426,937 (3.88%)	10,666,099 (96.12%)

Note : Out of 426,937 quintals in the NCR, 218,967 quintals or 51.29% was within the Delhi Urban Area.

Source: Analysis by TCPO of movements data received from Northern Railway.

Of the total traffic originating within Northern Railway only 3.88% was destinating within the National Capital Region. Of this nearly 51% was destinating within Delhi urban area itself. This also shows that nearly 96% of the originating traffic was destined to areas outside, some of which would be originating within Delhi urban area or passing through it.

Again of the total originating traffic within the Northern Railway, only 6% was originating within the National Capital Region as given by the Table 5.7.

Table 5.7

Freight Traffic Originating with Northern Railway - 1967 areawise, December, 1968.

(Quantity in Quintals)		
Total Originating Traffic (within Northern Railway)	Originating within the NCR	Originating at other areas of Northern Railway
10,993,036 (100%)	620,650 (5.65%)	10,372,386 (94.35%)

Source: Analysis by TCPO of movements data received from Northern Railway.

The originating traffic within the National Capital Region district-wise and destination area-wise shows an interesting picture. The originating traffic was maximum in the District of Meerut with 312,729 quintals during December, 1968 with the Union Territory of Delhi coming second with 142,833 quintals. Districts of Rohtak, Bulandshahr, Karnal and Gurgaon came next in that order in terms of the originating traffic. This shows that as compared to Meerut District, originating traffic in the Union Territory is less than half. This may perhaps be due to the predominance of agricultural commodities originating in other districts.

Regarding the areas of destination of the above originating traffic, only about 5% of the quantity was destined within the Region and 32.74% within other areas of Northern Railway and the rest outside Northern Railway. This pattern was almost the same even by district-wise component except in the case of Gurgaon

District where nearly 26% of the originating traffic was destined within the Region.

The Table 5.8 furnishes the details regarding the quantum of originating traffic within the NCR - district-wise and their areas of destination.

Of the traffic destined within the Region, as given in Table 5.8 nearly 50% was destined within the Union Territory. About 23% was destined within Meerut District. The rest of the traffic was divided between the other districts. The details are given in the Table 5.9.

Characteristics of the Existing Transport System.

A. Roads:- The National Capital Region is endowed with a good network of roads which links the different parts of the Region, as well as other areas of the Nation with Delhi. National Highways 1, 2, 8, 10 and 24 converge on to Delhi. Considering the availability of road lengths as an index to total area, the Region has 20.63 kms. per 100 sq.km. (33 miles per 100 sq.miles) which compares favourably with the All-India index of 20.0 km. per 100 sq.km. (31.97 miles per 100 sq. miles). There are 683 kms. of National Highways and 2089 kms. of State Highways in the Region. The Table 5.10 furnishes the road lengths within the NCR.

Quantitatively the NCR has adequate road lengths, especially of major roads. The availability of National and State Highways length-wise is more than the projected requirements as suggested by the formula in the Chief Engineers' Report on 'Road Development for 61-81'. Against

Table 5.8

Originating Traffic within NCR: District-wise and area of destination: December, 1968.

Component District	Total Originating Traffic	(Quantity in Quintals)					
		Destinating within NCR		Destinating Outside NCR but within Northern Railway		Destinating Outside Northern Railway	
		Quantity	Percentage to total	Quantity	Percentage to total	Quantity	Percentage to total
Karnal	23,760	1,217	5.12	1,948	8.20	20,595	86.68
Rohtak	60,041	1,790	2.98	37,373	62.25	20,878	34.77
Gurgaon	23,566	6,114	25.94	7,096	30.11	10,356	43.95
Bulandshahr	57,721	2,727	4.72	12,622	21.87	42,372	73.41
Meerut	312,729	17,885	5.71	87,206	27.89	207,678	66.41
Union Territory of Delhi	142,833	1,877	1.31	56,982	39.90	83,974	58.79
Total	620,650	31,610	5.09	203,227	32.74	385,813	62.13

Source: Analysis by TCPO of movements data received from Northern Railway.

Table 5.9

Destinating Traffic in NCR (of Originating Traffic from Northern Railway) - District-wise: December, 1968.

(Quantity in Quintals)		
Total Destinating Traffic within NCR (of the Originating Traffic from Northern Railway).	Quantity	By %age (100%)
Destinating to Karnal Distt.	12369	2.65
Destinating to Rohtak Distt.	81324	17.3
Destinating to Gurgaon Distt.	15081	3.22
Destinating to Bulandshahr Distt.	15196	3.23
Destinating to Meerut District.	111460	23.84
Destinating to Union Territory.	222164	49.67

Source: Analysis by TCPO of movement data received from Northern Railway.

Table 5.10

District-wise Highway Road Lengths in the NCR.

District	National Highway (km.)	State Highway (km.)
Rohtak	119	899
Gurgaon	265	797
Karnal (NCR Portion)	32	25
Meerut	80	180
Bulandshahr	-	188
Alwar (NCR Portion)	83	-
Delhi U.T.	104	-
Total (NCR)	683	2089

a requirement of 640 kms. of National Highways and 1310 kms. of State Highways, there are 683 kms. of NH and 2089 kms. of SH. (Map 5.1) already available in the Region.

The disposition of the road pattern within the Region, from the point of view of accessibility of areas to a major road (NH, SH, or Major D.R.) is also very good. Except for certain areas in the districts of Bulandshahr and Alwar, and small pockets in other districts, all areas of the Region are 'highly' accessible from a major road (High accessibility is taken as areas within 8 kms. from a major road - NH, SH or MDR.) (Map 5.2).

While thus both quantitatively and by accessibility the availability of road network within the Region is adequate, quantitatively the road pattern has certain shortcomings. Except for certain stretches, the average width of surfaced carriage way of all the roads is of only one lane varying from 8 ft. to 12 ft. The standard of maintenance of these road surfaces also leaves much to be desired. Apart from these, there is serious drawback in the network pattern. With Delhi dominating the Region and all traffic flows converging into it, with lower importance of other urban centres and little traffic between them, there is a great disparity in the development of radial roads linking Delhi and ring roads linking the other urban centres with one another. In fact the ring roads are not complete with many missing links. Except for the bridge across Yamuna at Panipat and a ferry at Sonapat, there are no links between the Eastern and Western parts of the Region, except through Urban Delhi. Another drawback of the road network is the need for

'minor roads' (Minor District and Village roads) of desired pattern, capacity and standard, which would link the rural areas of the Region with the major roads thus completing the network in all its hierarchies.

The types and probable quantum of movement both of goods and people has been discussed in the earlier paragraphs. To assess the intensity of traffic flows on the major road network of the Region, a volumetric survey by vehicle type at 13 count points along an outer cordon around the NCR was carried out by the concerned State Town Planning Departments. The Central Road Research Institute had earlier carried out a traffic survey along a cordon around Delhi Urban Area. To compare the traffic flows between these two cordons, the 'Days' of survey at the different count points along the Outer Cordon were selected to coincide with 'Days' of survey at comparable count points along the inner cordon (Cordon around Delhi Urban Area).

Map 5.3 indicates the two cordon lines with the location of count points and the 'days', 'dates' of survey along the outer cordon.

The flow data of the count along the outer cordon* indicates that the intensity of traffic at these points is not very high. The daily volume of traffic exceeds 5,000 PCU's only at count points 2, 5 and 13. Another feature is that the slow/traffic is nearly in

* The Outer Cordon Count in Haryana was conducted by the Haryana Town Planning Department; in U.P. it was undertaken by the U.P. Town & Country Planning Deptt. in collaboration with the TCPO.

equal proportion at almost all count points.

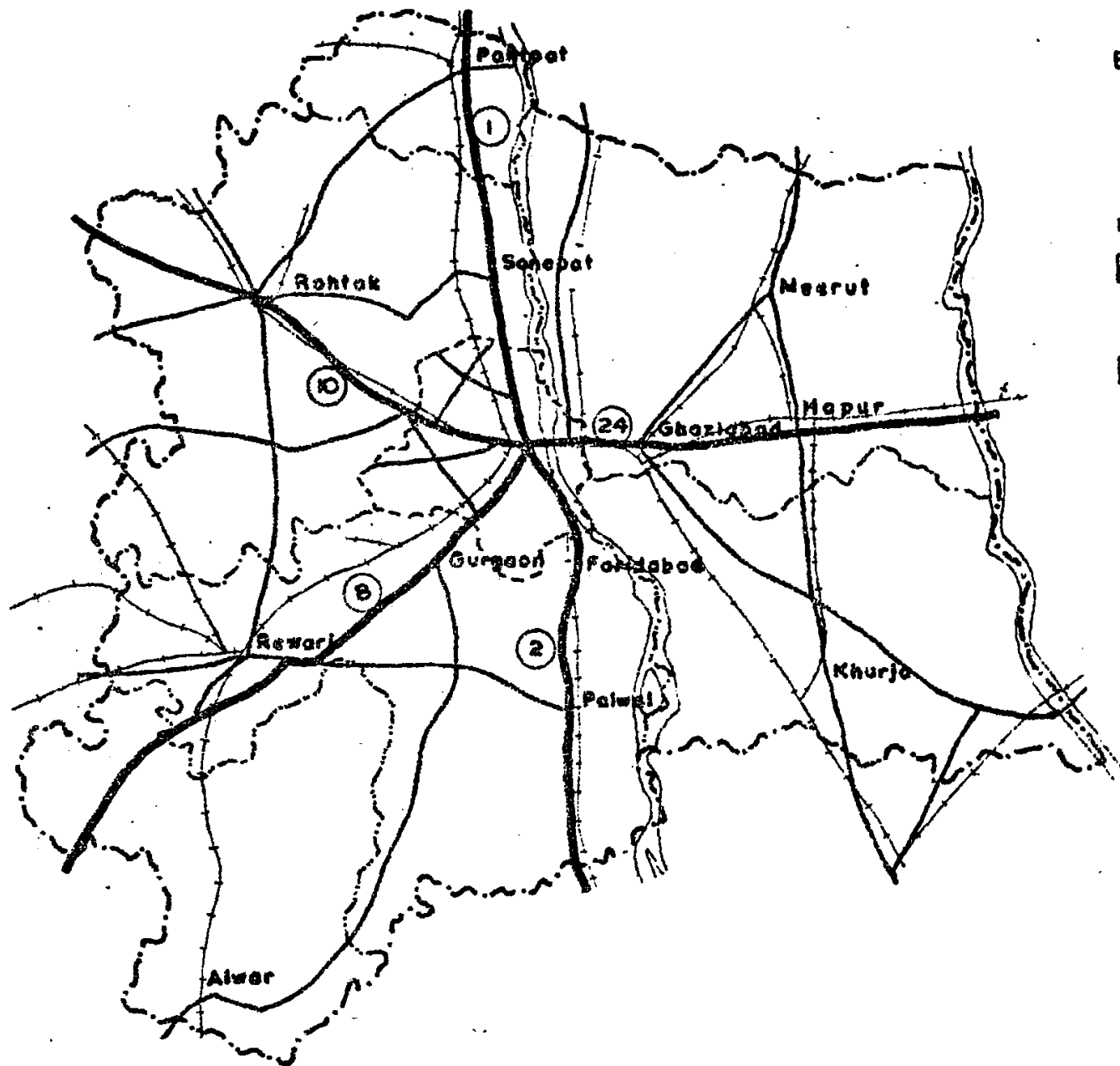
The volume of traffic at count points along the inner cordon is in contrast with that at comparable points along the outer cordon. The volume is quite high and above 5000 PCU's at all points except at two (7 & 9) especially at count points 8, it is 16,177 PCU's and at count point 1 it is 13,383 PCU's. Though there is a considerable volume of slow moving traffic at all points, fast moving traffic predominates. This variation in flow volume at two cordons indicates that there is a considerable generation of traffic within the Region mostly of fast moving type, mainly oriented towards Delhi (Map 5.4).

The Survey, though limited in its scope reveals

- i) that the intensity of inter-regional traffic is not very high.
- ii) that inter-regional slow moving traffic is in equal proportion to fast moving traffic.
- iii) that there is a high intensity of intra-regional traffic.
- iv) that the intra-regional traffic is mainly oriented to Delhi.
- v) that fast moving types predominate over 'slow moving' in the intra-regional traffic moving into Delhi.
- vi) that probably there is a high intensity of intra-regional traffic generated within Delhi Metropolitan Area (including the inner ring towns).

TRANSPORT

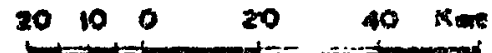
EXISTING ROAD NETWORK



LEGEND.

 NATIONAL HIGHWAYS

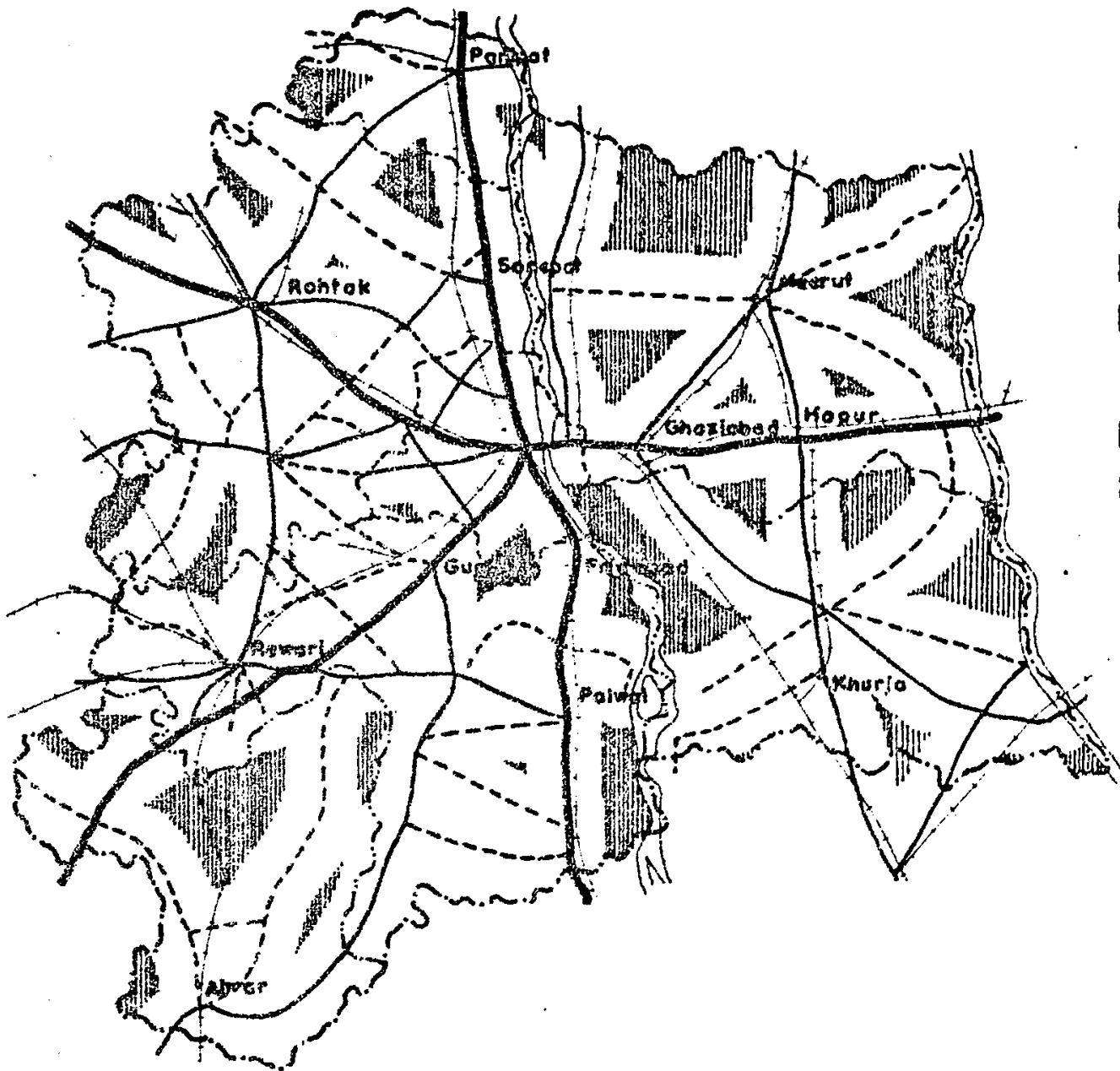
 STATE HIGHWAYS








NATIONAL CAPITAL REGION

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TRANSPORT ACCESSIBILITY BY ROADS



LEGEND.

-  National Highway
-  State Highway
-  Major District Road
-  Areas Of High Accessibility.
-  Areas Of Moderate Accessibility

NOTE:-

High accessibility areas are taken as those which are within eight kilometers of a national highway or a state highway or a major district road.

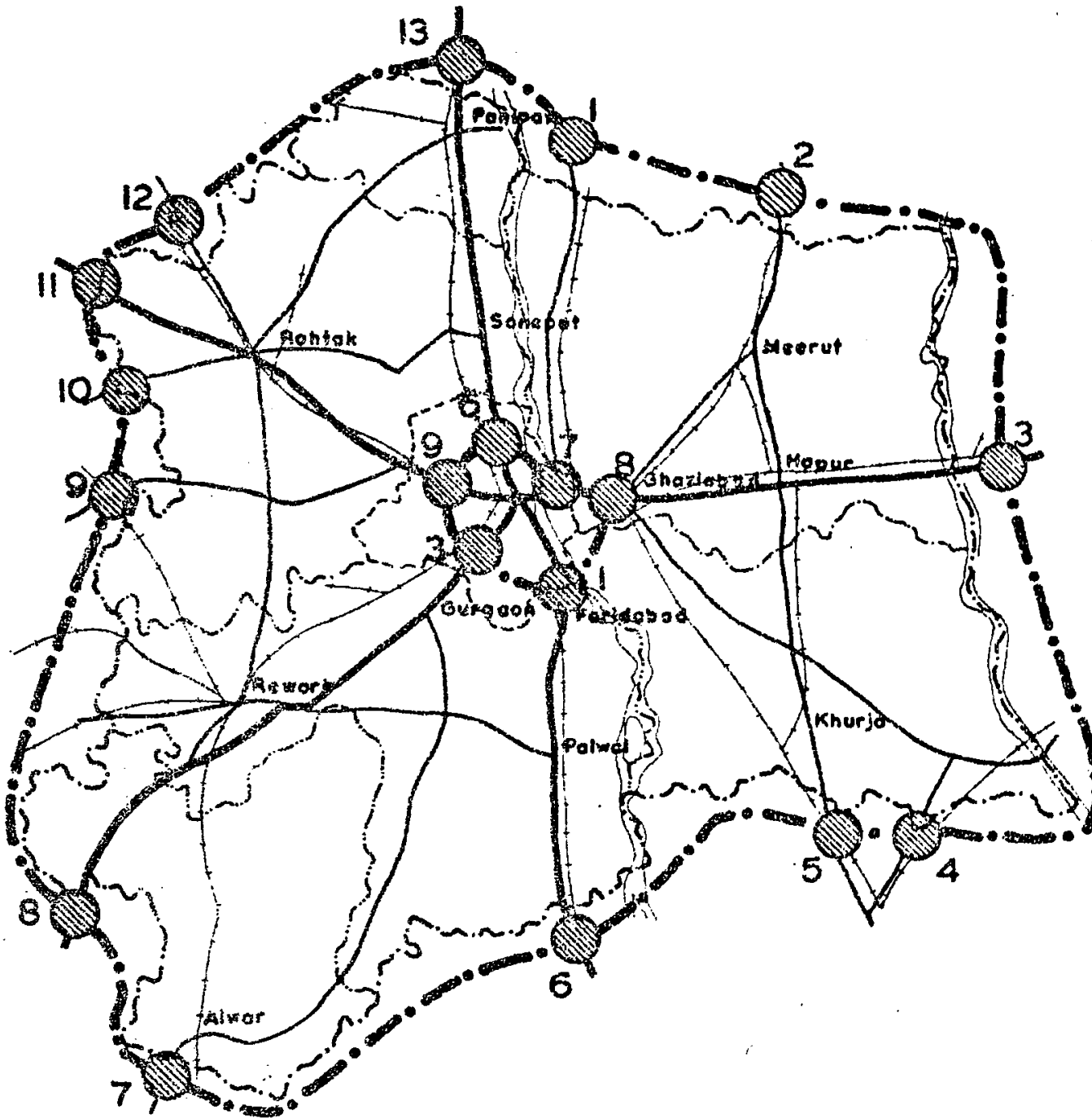


NATIONAL CAPITAL REGION





TOWN & COUNTRY PLANNING CEN.
MINISTRY OF H, P, W, E. & U. D.

TRANSPOR

ROAD CORDON SURVEY-VOLUME COU



LEGEND.

-  National Highway.
-  State Highway.
-  Cordon Line.
-  Count Point.

PROGRAMME.

Outer count point	Cordon date	Day	Inner count point	Cordon date
1	8.12.69	Monday	7	10.3.70
2	28.11.69			
3	5.12.69	Friday	8	27.8.70
4	12.12.69			
5	21.11.69	Monday	1	24.2.70
6	17.11.69			
7	23.8.70	Tuesday	3	25.2.70
8	24.9.68			
9	20.11.69	Thursday	4	17.12.69
10	13.11.69			
11	6.11.69	Wednesday	9	17.12.69
12	13.11.69			
13	6.11.69	Thursday	6	5.3.70

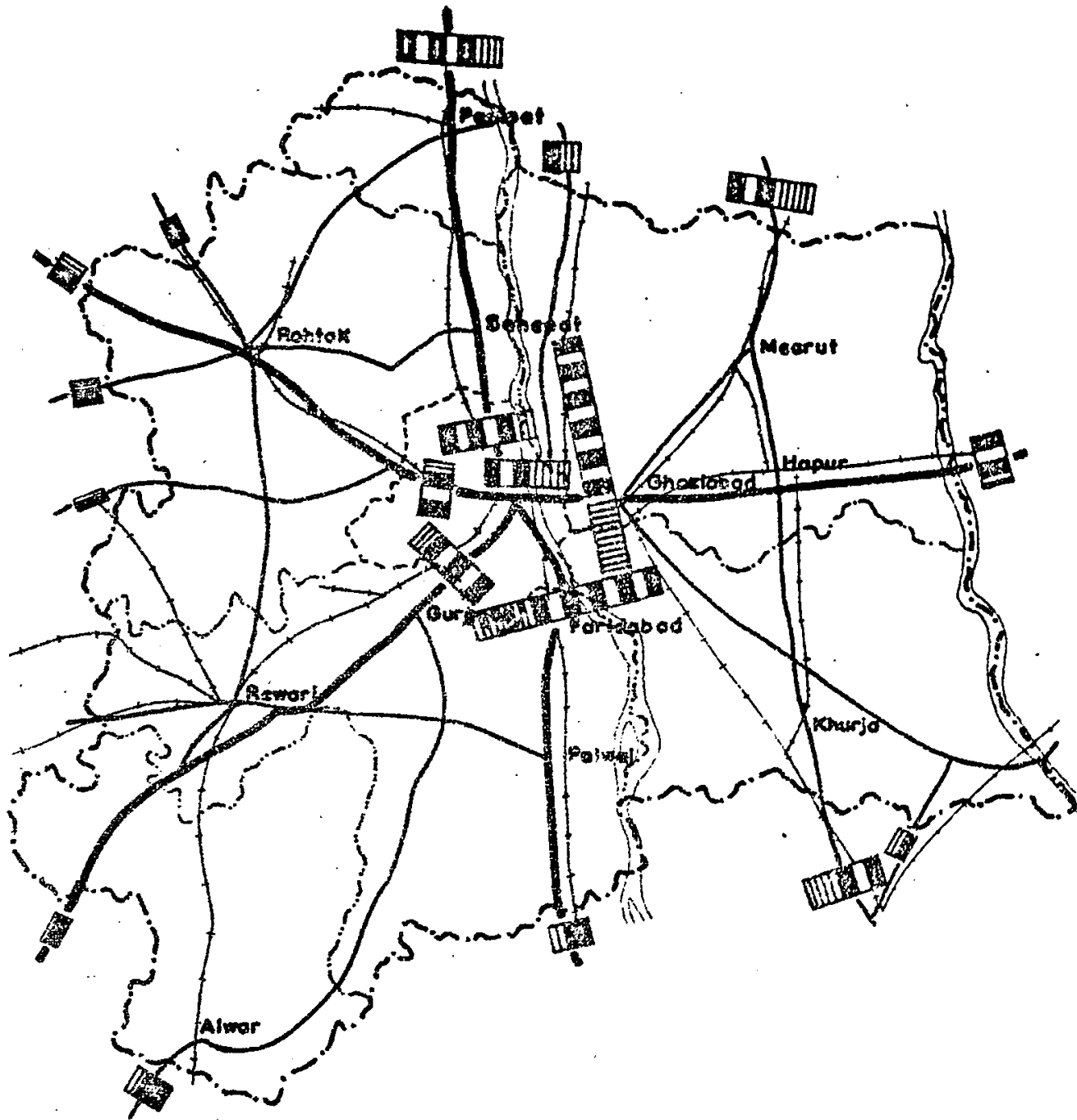


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TRANSPORT

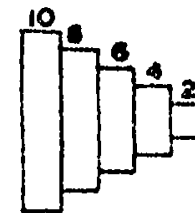
ROAD TRAFFIC-INTER & INTRA REGIONAL



LEGEND

-  Fast Moving Traffic
-  Slow Moving Traffic

FLOW SCALE



In Thousand. p. c. u's for 24 hours day

NOTE:-

Traffic survey carried out and data furnished by:-

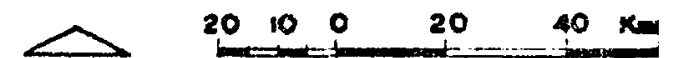
Inner cordon— C. R. R. I. New Delhi

Outer cordon—

C.P. 1 to 5 T. P. Deptt. Meerut U. P.

C.P. 6 & 9 to 13 T. P. Deptt. Rohtak

C.P. 7 & 8 T. P. Deptt. Jaipur Rajasthan



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H., F. P., W. H. & U. D.

B. Railways:- Seven railway routes converge into Delhi from different directions in a star pattern. These are parts of -

- Karnal-Panipat-Delhi
- Muzaffarnagar-Meerut-Ghaziabad-Delhi
- Moradabad-Hapur-Ghaziabad-Delhi
- Aligarh-Khurja-Ghaziabad-Delhi
- Agra-Palwal-Delhi
- Jaipur-Rewari-Delhi
- Jind-Rohtak-Delhi.

Apart from the above route sections, there are other sections running in other parts of the Region. They are:

Parts of -

- Dadri-Rewari
- Mahendergarh-Rewari
- Narnaul-Rewari
- Alwar-Rewari.

and:

Meerut-Hapur-Khurja.

Part of Panipat-Jind line and Aligarh-Chandausi lines run within the Region.

In addition parts of the route section Saharanpur-Shahjahanpur (Narrow Gauge railway run by a private company) also falls within the Region. Of the lines converging at Delhi all are of broad gauge except the Jaipur-Rewari-Delhi line which is of metre gauge. Thus Delhi becomes a transshipment point also. All the lines converging at Rewari are of metre gauge.

The number of lines along the routes varies between the different sections. The Delhi-Ghaziabad, Delhi-Palwal-Agra, Ghaziabad-Aligarh sections have a double line. The

Delhi-Rewari route also has a double line except between Garhi Harsu and Khalilpur.

There are 711 kms. of BG and 254 kms. of MG route lengths within the Region. (This excludes the S.S. Light Railway). This gives 32.7 kms. per 1000 sq.kms. of area. Thus the availability is on the higher side as compared with the All-India index of 18 kms. of length per 1000 sq.kms. The length of Railway line per lakh of population was 9.0 km. as against 12 kms. for All India in 1967-68.

Table 5.11 gives the route sections within the Region with their gauge, route kilometres and the number of lines. (Map 5.5)

Considering all areas within 2.4 kms. from a railway line as highly accessible, it is seen that the Region is endowed with a good distribution of rail network making most of the area highly accessible. Only in the south-western portion, a part of the Region has low accessibility. (Map 5.6)

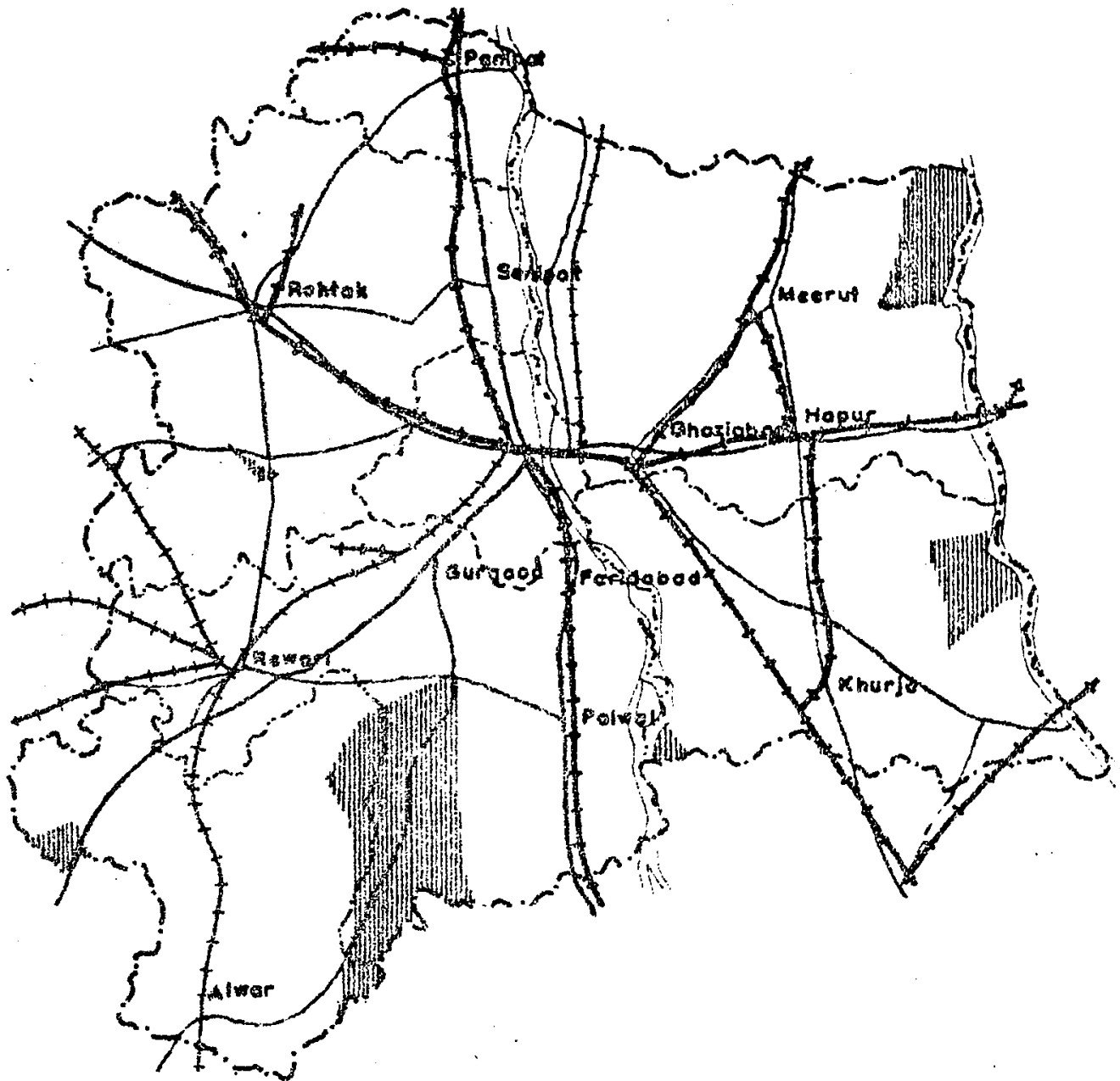
The capacity of the different sections in terms of the number of trains per day (each way) and the percentage utilisation of capacity varies considerably. This is to be expected considering the difference in the number of lines and other aspects like signalling etc. The Delhi-Ghaziabad section has the maximum capacity ranging from 55 to 63 trains each way, per day. On an average, the main inter-regional lines like Delhi-Agra, Delhi-Panipat, Delhi-Rohtak, Delhi-Rewari, Ghaziabad-Meerut have a capacity ranging from 20 to 35 trains per day, each way.

Table 5.11





Regional Rail-Route Sections

Route Section	Gauge	No. of Lines	Length within NCR
1. Karnal-Panipat-Delhi.	BG	Single	98 kms.
2. Muzaffarnagar-Meerut-Ghaziabad-Delhi.	BG	Single upto Ghaziabad and then double.	97 "
3. Moradabad-Hapur-Ghaziabad.	BG	Single	83 "
4. Aligarh-Khurja-Ghaziabad.	BG	Double	81 "
5. Agra-Patwal-Delhi.	BG	Double	90 "
6. Alwar-Rewari-Delhi.	MG	Single (Double between Delhi & Rewari except Garhi Harasu and Khalilpur).	157 "
7. Jind-Rohtak-Delhi.	BG	Single (Upto Shakurbasti and then double)	93 "
8. Meerut-Hapur-Khurja.	BG	Single	93 "
9. Narnaul-Rewari.	MG	Single	23 "
10. Mehendragarh-Rewari.	MG	Single	28 "
11. Dadri-Rewari.	MG	Single	46 "
12. Rohtak-Gohana.	BG	Single	32 "
13. Part of Panipat-Jind.	BG	Single	24 "
14. Part of Aligarh-Chandausi.	BG	Single	20 "

TRANSPORT RAILWAYS-ROUTES & ACCESSIBILITY



LEGEND

-  Broad Gauge
-  Metre Gauge
-  Narrow Gauge
-  Areas Of Low Accessibility

NOTE:-

Areas of low accessibility take to include those areas beyond 24 kilometers from a railway line.

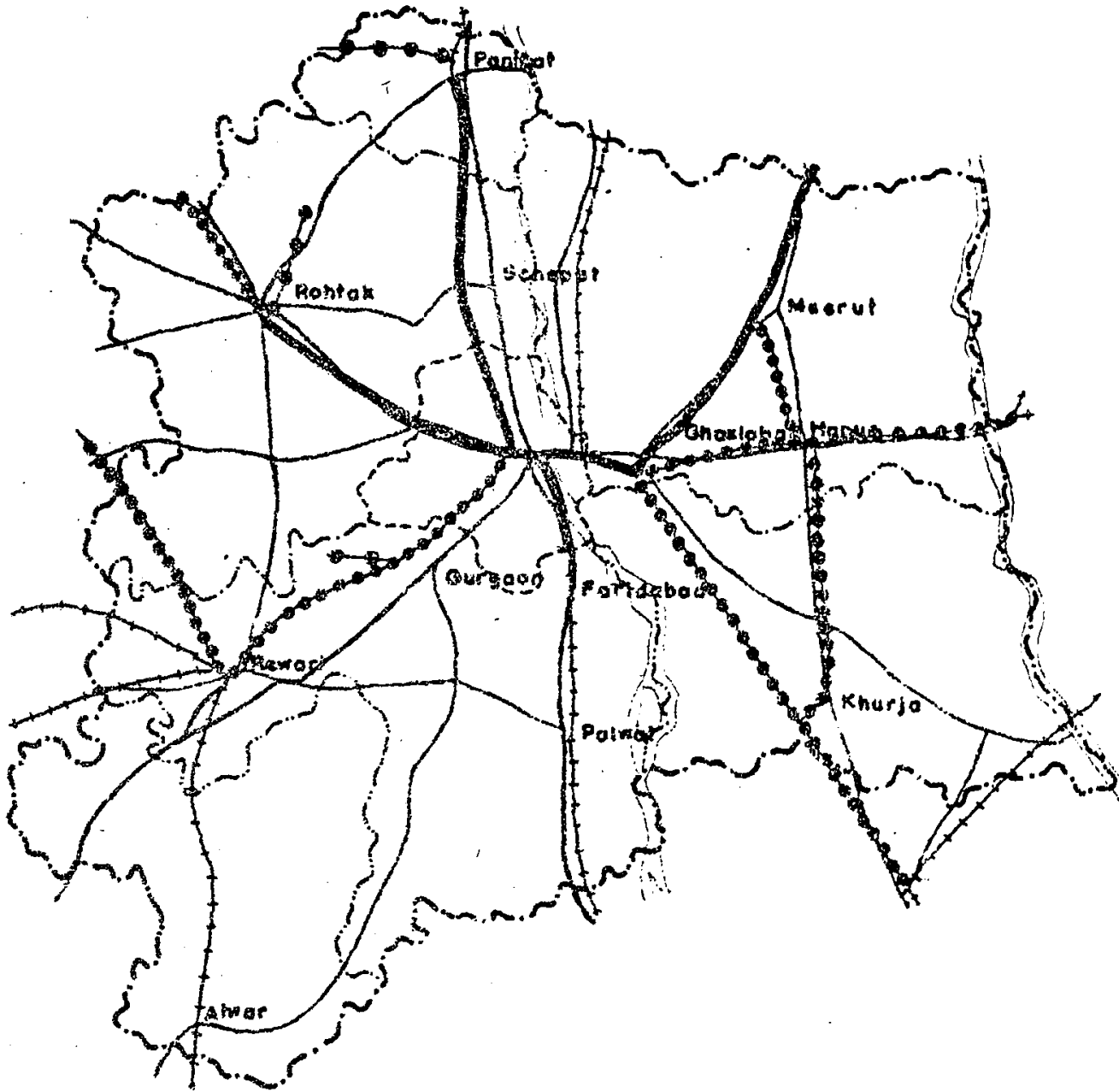


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
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TRANSPORT

RAILWAYS - CAPACITY AND USAGE

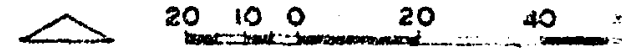


LEGEND

-  Usage 80% & above of capacity
-  Usage 50% - 80% of capacity
-  Usage less than 50% of capacity
-  Other lines - (data not available)

SOURCE

Northern Railway for basic data



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Taking the allowable usage at 80% of the capacity (allowing for flexibility for operation), it is seen that the intensity of usage has reached or is reaching saturation point on all routes converging into Delhi. The Delhi-Ghaziabad section has the highest number of trains running, an average of 60 per day on a part of the stretch as against a capacity of 63. (Map 5.7)

Passenger trains outnumber goods trains in the Region by 1.5 to 2 times. ~~xxxxxx~~ On the Delhi-Sonepat section the proportion is nearly five times. Against 2.6 goods trains per day each way (average), 13.5 passenger trains are run in this section. This predominance of passenger trains on the different sections indicates the high incidence of passenger traffic either of long distance or of daily commuters.

Table 5.12 gives the anticipated line capacities by 1971 of the different sections and their usage.

Delhi Main and New Delhi are the main terminals within the Region and Delhi urban area. They serve the originating and destinating traffic of goods, long distance passenger and daily commuter traffic. This multiple demand and their increasing quantum has saturated the capacity of the two terminals and has caused severe bottleneck in their working. A total number of 78 trains per day at Delhi Main and 53 at New Delhi are received. In addition 61 trains at Delhi Main and 18 trains at New Delhi originate. The above two terminals were till a few years ago the main yards for all goods traffic originating from Delhi and destinating to Delhi or passing through Delhi. Recently measures have been taken to divert some of this traffic away and a yard at Tu-

ghalakhabad on the Delhi-Mathura line has been developed. Some of the goods traffic destinating to Delhi is still received and much of the outward booking is done at these two places. The increasing passenger traffic and the virtual incapacity for further expansion has put the operation of these two terminals to severe strain.

Sarai Rohilla and to a minor extent Shakurbasti, are the transshipment points for goods between the metre and broad gauge.

To relieve pressure on the New Delhi and the Delhi Main yards, a new yard at Tughlakabad on the Delhi Mathura line has been developed and is being expanded. It aims at bypassing all goods traffic passing through Delhi. Towards this, "goods avoiding line" linking Delhi-Ghaziabad line with the Tughlakabad yard and a 'Delhi avoiding line' linking the yard with Delhi-Rohtak line have been laid out. The 'Goods avoiding line' takes off from the Ghaziabad-Delhi line at Sahibabad and connects it with Delhi-Mathura line near Purana Quila. The 'Delhi avoiding line' branches off from the Mathura Delhi line near Lajpat Nagar and runs through Delhi urban area, flying over the M.G. line and links with Delhi-Rohtak line and then on to Delhi-Karnal line near Azadpur. Thus these two lines form a half-circle around the Delhi Main and the New Delhi stations. With these two lines and the Tughlakabad yard the Railways aim at bypassing all goods traffic originating from or destinating to any area east or west or north or south of Delhi, thus relieving pressure on the 'saturated triangle' (Delhi Main-New Delhi-Subzimidandi).

Table 5.12

Rail Track Capacity and Usage Eachway Per Day Anticipated by 1971.

Section & Sub-Section	Charted line capacity as in 1968	Anticipated line capacity as in 1969.	Anticipated No. of Trains each way as of 1971.		
			Passenger	Goods	Total
1	2	3	4	5	6
Delhi-Delhi Shahdara	55	57	35	11.0	47.0
Delhi-Shahdara-Salibabad	56	58	36	12.9	48.9
Salibabad-Ghaziabad	63	73	42	24.6	66.6
<u>Ghaziabad-Saharanpur</u>					
Ghaziabad-Meerut City	20	20	10	8.9	18.9
Meerut City-Muzaffarnagar	20	20	10	8.5	18.5
Muzaffarnagar-Saharanpur	20	20	10	7.9	17.9
Subzimandi-Sonepat	17	20	14.5	2.8	17.3
Sonepat-Panipat	17	20	13.5	2.9	16.4
Shakurbasti-Bahadurgarh	20	20	11	7.4	18.4
Bahadurgarh-Rohtak	20	20	12	7.4	17.4
Rohtak-Jind	20	20	7	6.4	13.4
Jind-Panipat	9	9	3	1.1	4.1
Rohtak-Gohana	9	9	3	-	3.0
Delhi-Delhi-Subzimandi	14	14	8	3.5	11.5
Delhi-Delhi-Kishanganj	25	25	9	11.0	20.0
Delhi Kishanganj-Dayabasti	31	31	14	16.5	30.5
Dayabasti-Shakurbasti (BG)	31	31	14	14.4	28.4
Dayabasti-Shakurbasti (MG)	15	-	-	3.6	3.6
Dayabasti-Delhi Cantt. (BG)	15	15	-	4.7	4.7
Dayabasti-Delhi Cantt. (MG)	15	-	-	3.6	3.6
New Delhi-Delhi-Kishanganj	12	12	5	9.9	14.9
New Delhi-Subzimandi	12	12	6	2.1	8.1
Delhi-New Delhi	30	30	55	9.0	24.0

Table contd...

Table contd..

	1	2	3	4	5	6
New Delhi-Tilak Bridge 'A'	63		63	31	20.8	51.8
Tilak Bridge 'A'-Nizamuddin	48		53	26	13.3	39.3
Sahibabad-Tilak Bridge 'B'	22		24	25	14.8	19.8
Sahibabad-Tilak Bridge (BG)						
Nizamuddin-Tughlakabad	48		52	21	23.5	44.5
Tilak Bridge 'B'-Nizamuddin	13		13	-	9.9	9.9
Nizamuddin-Delhi Safdarjang	12		12	6	1.7	7.7
Nizamuddin-Tughlakabad (G.A.L.)	13		13	-	9.9	9.9
Aligarh-Dankaur	34		34	12	7.7	19.7
Dankaur-Ghaziabad	35		35	13	7.7	20.7
Garaula-Hapur	20		20		5.3	13.3
Hapur-Ghaziabad	20		20		1.3	14.3
Khurja-Hapur	3		3	3	1.2	4.2
Hapur-Meerut City	8		8	3	1.9	4.9
Palam-Garhi-Harsau	33		33	17	7.9	24.9
Garhi-Harsau-Khalilpur	25		27	13	7.9	20.9
Khalilpur-Rewari	33		33	13	7.9	20.9
Rewari-Hissar	11		11	5	2.4	7.4
Garhi Harsau-Farukhanagar	14		14	3	-	3.0

Policies for the Development of a Transport System for the Region.

The programmes and policies for the physical, demographic and economic restructuring within the National Capital Region have been discussed in earlier chapters. Earlier in this chapter the important role of transportation in the restructuring of economic activity and population distribution has also been discussed. It should be realised that urban transportation is the basic spatial organiser of the metropo-

litan region. At the same time "the critical interdependence between the use of space and the means for interaction between accessibility and land use" should be recognised.

The basic policy recommendations for the overall development of the Region in general and the transportation system in particular are given below:-

- (1) The basic goal of the regional development decentralisation of growth from Delhi and

promotion of urban growth in the Region should be implemented with all other planning assumptions involved therein.

- (ii) The proposed urban centres should be developed with distinct economic characteristics, best suited to and in the interests of the National Capital Regional growth.
- (iii) These urban centres should be planned to have socio-economic interlinks with Delhi and between themselves.
- (iv) In terms of commodity movements within the National Capital Region, taxes, laws and restrictions in different parts of the four States should be equalised or at least rationalised so that the entire Region will act as one homogeneous area in terms of such laws, taxes and other restrictions.
- (v) In programming the commodity movement, 'the least distance movement factor' should govern. (This is especially important for such commodities whose movements are controlled like foodgrains, sugar, cement etc.)
- (vi) A policy of co-ordination between the Rail and Road transport systems should be evolved, so that, each would be complementary to the other.

Strategy to Restructure the Transport System.

As a Regional Development Strategy, the Radial Corridor and the Multi Town Pattern have

been selected for the spatial organisation of major centres of population concentration and distribution within the National Capital Region. The various aspects of this and other possible patterns of development, the inherent advantages of the Corridor pattern over others in the case of the NCR, etc., have all been discussed in Chapter II. In Chapter III the major urban settlement pattern has been discussed indicating population distribution in Delhi and in a number of urban centres along the various corridors of the transport network. (Please see Tables 3.5 and 3.6). The proposed organisation indicates a high concentration of population along the North-South and East-West axes with Delhi as the Nodal Centre.

We have already seen that ~~xxxxxx~~ there is a high concentration of intra-regional movement oriented towards Delhi. With the development of urban centres along the corridors, the intensities of these movements would increase many times. The probable commuter flow to Delhi has already been indicated. Thus the future network would require to provide for these intense movements into Delhi at high speeds. Again, with functional specialisation of each of the urban centres, there would be an interdependence among them which will be reflected in the movement of goods and people between these centres. The fact of inter-regional traffic moving through the regional network has also been discussed earlier. With no bridge across the river Yamuna in the Region except at Urban Delhi and with a poor linkage of radial routes, all such inter-regional traffic is compelled to pass through the road network of Delhi, thus adding to the congestion and resulting in economic losses and social problems as reflected in delays and acci-

dents. Another short-coming of the existing network system noted is in the level of development of village roads. The future network pattern should provide for all these new demands and correct the present deficiencies or short-comings. Thus the strategy of development of the Road Network could be listed as:

- i) to provide for an intense and fast movement along the corridors.
- ii) to interlink the various urban centres with each other.
- iii) to integrate the rural areas and interlink them with the urban centres.
- iv) to provide for inter-regional movement at the regional level so that such traffic could avoid passing through the intra-urban road network of Delhi.
- v) to integrate the intra-regional network system of Delhi and other urban centres with the intra-urban network systems.

The Strategy of Development of Railways within the NCR:

The main problem of efficient operation by the railways is due to the increase in traffic both of people and goods and their intermixing at the Delhi Main and the New Delhi Stations. The latter aspect has already been recognised and schemes have been implemented to bifurcate the two types.

The Strategy for Goods Traffic: (i) To cater to

the increasing loads of originating and destinating traffic within the Region.

(ii) To relieve the Delhi Main and the New Delhi Stations in terms of originating and destinating traffic despite resistance from vested interests.

(iii) To relieve Delhi of avoidable 'bypass' traffic.

The Strategy for Passenger Traffic: (i) To provide an efficient mass-transportation system within the Delhi Urban Area.

(ii) To provide an efficient service for the intra-regional commuter traffic coming into Delhi.

(iii) To relieve the pressure on to Delhi Main and the New Delhi Stations in terms of passenger traffic (both long distance and commuter) and disperse this traffic at suitable points.

Selection of a Geometric form for deriving the Regional Road Network Pattern.

The report on the 'Road Development Plan 61-81' provides formulae for working out mileages of different classes of roads based on factors such as area, population, state of present development and future developments. As per these formulae and making allowance for future development at 20% instead of 5% as given in the report, the requirement in the NCR for the different classes of roads are given below:-

National Highways - 640 kms.

State Highways - 1310 kms.

Major District Roads - 4500 kms.
6450 kms.

This requires about 28 kms. of Major Roads to be provided per 100 sq.kms. of area. But this mileage is already available in the NCR. We find that against a requirement of 640 kms. of National Highways there is already 683 kms. and against a requirement of 1310 kms. of State Highways, there is 2089 kms. There is already adequate lengths of the above two types of roads, but the standard of some of the roads are not upto the mark. The data on other types of roads are not readily available. The Region generally lacks in the lower type of the road systems like 'Other District Roads' and 'Village Roads' which serve to link up the areas with the main arterial roads. Also in the first two types, the existing alignments require strengthening of the system by providing the missing links, improving lane capacity and surface conditions.

The river Yamuna divides the Region into two halves. It is seen that the interconnections between these two parts is only at Delhi. Thus the parts of the Region, though physically adjacent are intrinsically bifurcated without suitable linkages. This has also caused the flows to converge into Delhi. The linkage of these areas at suitable places are essential to open up areas for development as well as ease the flow of cross regional traffic without overcrowding Delhi's intra-urban network.

When the first comprehensive planning strategy for road development in post independent India was drawn up, under what is known as the Nagpur Plan of 1941-51, the roads were classified as (1) National Highways (2) State Highways (3) Major District Roads (4) Other District Roads and (5) Village Roads. The pattern of development adopted was the 'Grid and Star; with the National Highways, State Highways and Major District Roads conceived as 'grids' traversing the country with the urban nodes standing out as 'Stars' to which the traffic flow converged. The Other District Roads and Village Roads provided the approaches to outlying areas and connect such areas with the main Road System.

The second Road Development Plan (known as the 1961-81 Plan) which takes into consideration the needs of the country in the wake of its economic growth and to meet the needs of increased traffic on the roads, has adopted the same classification of the road system as in the earlier Nagpur Plan. In addition, mention has been made of 'Express Ways'** to cater for an uninterrupted flow of heavy and fast moving traffic in highly

* Chief Engineers 'Report on Road Development Plan for India (1961-81)' New Delhi, 1958.

** Express ways:- 'divided highways fit for all weather use and should have at least a four-lane modern type surface (i.e. bituminous or concrete surface) with controlled access and grade-separation at a road and rail crossings. The bridges should be designed for the prescribed high I.R.C. loading.'

industrialised and thickly populated areas. Though suiting the needs of the country then, these classifications have been based mainly on 'crust capacities' rather than 'functional characteristics'.

The principle of road development in the above Plans has been based on 'accessibility distance' and standards prescribed for developed, semi-developed and undeveloped areas. The target prescribed in 1961-81 Plan envisages an achievement of 52 miles of road for 100 sq. miles of area overall. The same works out to 70 miles per 100 sq. miles of agricultural and developed land.

In this Regional Plan, as earlier in the Delhi Master Plan* a policy of planning the National Capital Region with the development of a hierarchical system of the urban centres has been enunciated. In the hierarchy Delhi Urban Area occupies the apex below which come the second order towns termed as the 'ring towns' which will absorb certain major urban growth in terms of population and economic activities to be diverted from Delhi. Next come the rural areas which are to be organised in two tiers. The area is to be divided into 'Rural Planning Districts' with a town or major village as the focus. The rural planning district in turn will consist of clusters of villages. This 'cluster of villages' are groups of certain number of villages around one selected village which will act as a 'central place village'.

* Delhi Development Authority, Delhi Master Plan - Work Studies New Delhi, 1962.

In this village certain amenities are to be provided which will cater to the secondary services, like market facilities, small industrial estates, craft sheds etc. to all the villages in the cluster. These 'central place villages' in turn will depend on the 'district centre or rural town' which would be predominantly non-agricultural in nature with all centralised amenities and facilities in the field of higher education, wholesale and retail shopping, civic and cultural buildings, recreational centres, etc. including organised industrial areas.

According to the community structure proposed above, the basic village, 'the central place village' and the district centre or rural towns would be functionally related and inter dependent on each other. The rural towns would have a similar relationship with 'the ring towns' and they on the central city thereby creating a regional structure of functionally related communities.

The functional organisation would be successful only when these different units are interlinked with their nodal centres. Each basic village in a cluster should be provided with a ready and direct access to the 'Central Place Village' and the 'Central Place Village' with the District centre or Rural town; only then would there be the effective utilisation of the organised services and facilities provided in the 'Central Place Village' and Rural town. The district centres in their turn are to be linked with 'ring towns' by a higher order of transport network and the 'ring towns' with each other and with Delhi with a road network which facilitates speedy and intensive movement of men and material.

Thus we see that the central city should be connected with the 'ring towns' with a suitable road system which should have sufficient carriage capacity both in terms of volume flow and speed. These roads would be mainly radial in nature diverging from the central city. Next, the ring towns should be linked with each other by one or more circumferential or ring roads. Thus, the pattern of the two road system would resemble the 'spider web'. Coming to the 'rural areas' the roads connecting the basic village to the central place village will have an exclusively local utility of providing inter-village communications. The rural centres forming a block, should be interlinked with the next higher category of roads. Each block should have a circulatory system... and they should integrate with the main highway system*. By the superimposition of the regional network on the 'Spider-Web' pattern we get the 'Web and Lattice' pattern which consists of the main arterial roads as diagonals (or webs); grids providing the internal regional system and boundary roads providing for (a) grouping of villages and providing inter-village links and (b) by-passes avoiding the congested areas.

Thus we find that the 'Web and Lattice' pattern suits as a form of road network in the NCR both in pattern and principle. This will serve the proposed hierarchical system of development of urban and rural centres.

* Report D.G. 'Regional concept for Highway planning - The Web and Lattice Pattern' Paper No. 222, I.R.C., 1960.

Sketch 1 shows a road network requirement on the basis of linking each centre with the other. Theoretically this would be a perfect system.

An examination of the distribution pattern of the population concentration shows that the maximum number of urban centres devolve on two major axes, viz., the North-south axis and the South-west crescent intersecting at Delhi, the pivotal centre.

On the North-south axis are Panipat (2.0 lakhs), Sonapat (2.0), Narela (0.6), Delhi and Faridabad-Ballabgarh (3.5) and Palwal (0.5).

On the East-west crescent are Rohtak (2.0) Bahadurgarh (0.75) Delhi, Ghaziabad (4.0) Modinagar (2.6) and Meerut (8.0).

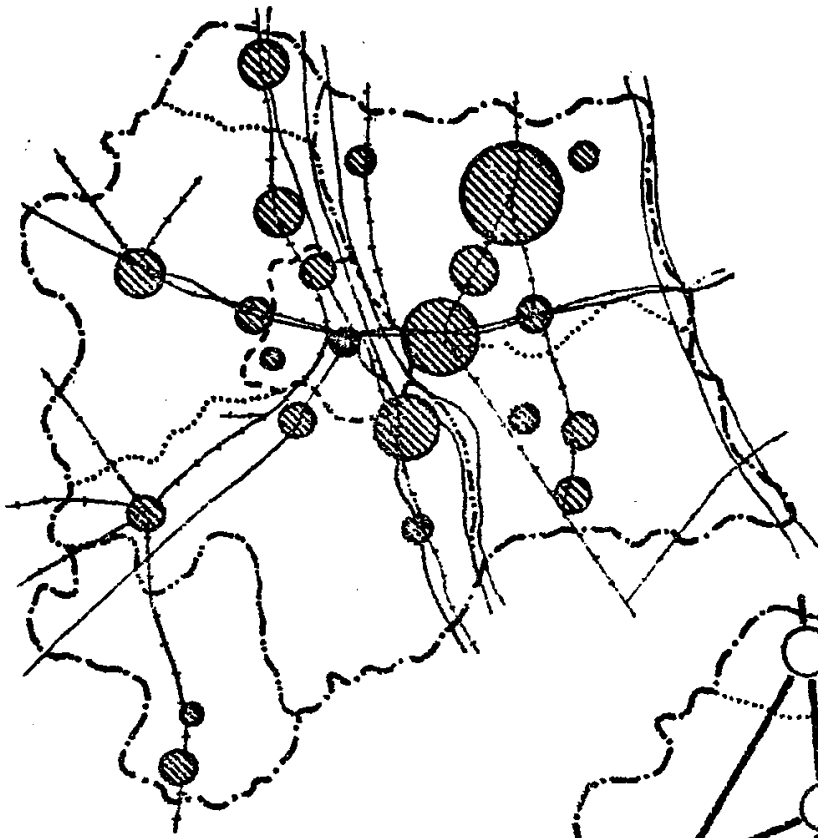
Thus the two roads form the axes or the 'webs' of the road network.

Working around these two webs, and eliminating the superfluous roads in the form in sketch 2, we get the system of network at sketch 3, with the two ring roads linking the centres and the radial webs. Sketch 4 replaces the two rings with one placed in between them.

These ring roads with other distribution roads form the 'lattice' of the network.

Working out this 'form' on the existing road network pattern we find that the existing pattern is very much in accordance with the 'form' at sketch 3. The National Highways (1) and (2) form the North-south web. The National

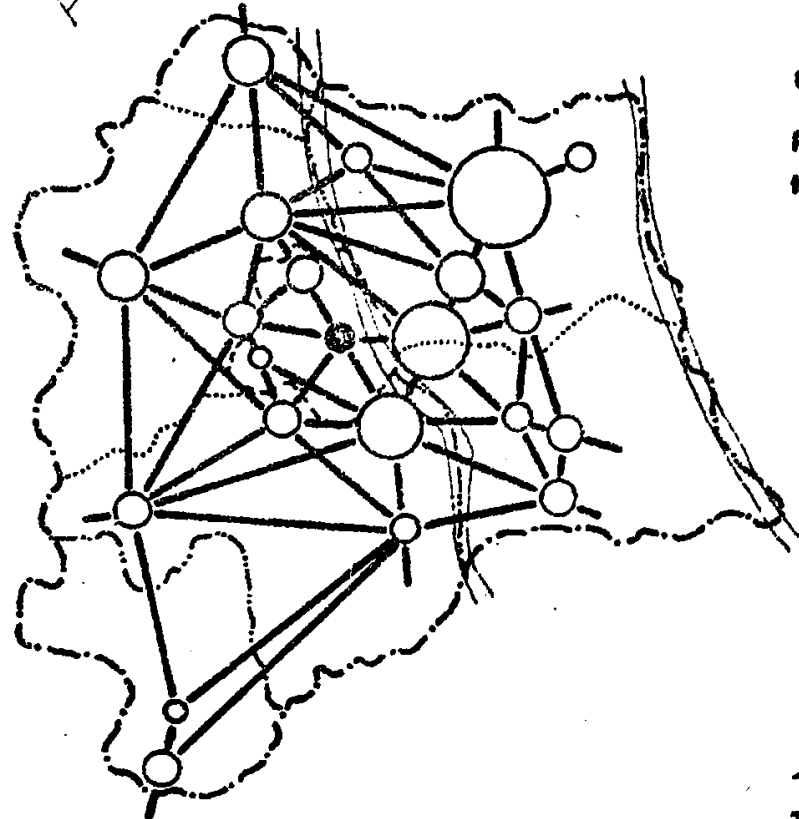
TRANSPORT
REGIONAL ROAD NETWORK - FO



SKETCH 1

SKETCH 1

Spatial organisation of centres of population concentration.



SKETCH 2

SKETCH 2

Pattern with every centre directly connected to the other.



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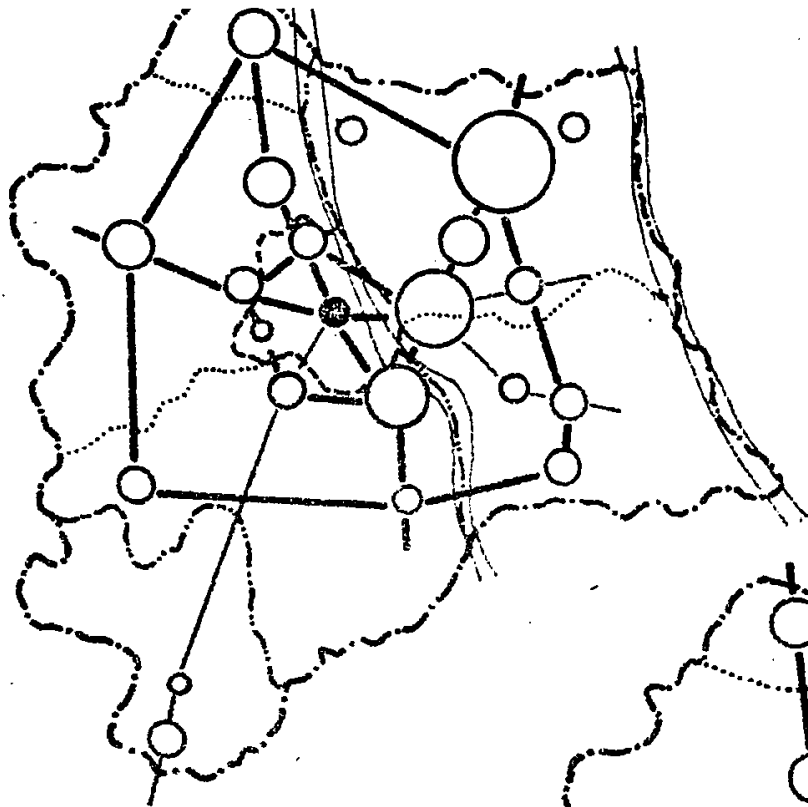
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T R A N S P O R T
REGIONAL ROAD NETWORK - FORM

← SKETCH 3



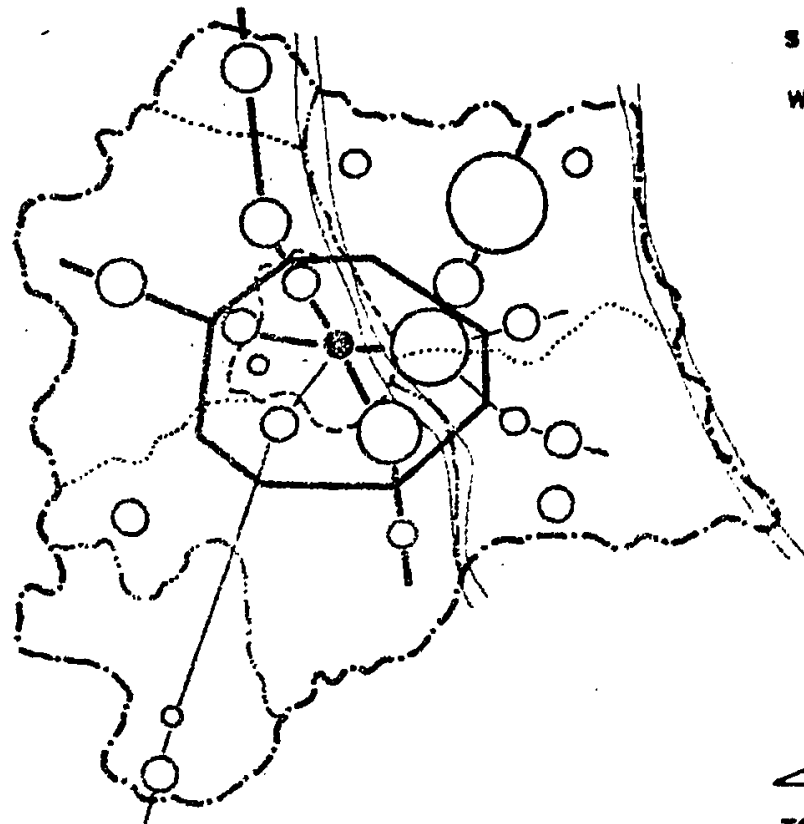
SKETCH 3

With two axes connected with two ring

SKETCH 4

With two axes & one ring replacing two.

SKETCH 4 →



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Highways (10) and (24) from Delhi to Ghaziabad form part of the East-west web. The State Highway from Ghaziabad to Meerut forms the other part of this web. These National Highways are inter-connected by a system of State Highways and Major District Roads. Thus, but for the missing links, we can discern the two circumferential roads, one connecting Sonapat-Baghpat-Meerut-Hapur-Bulandshahr-Sikandrabad-Dankaur-Ballabgarh-Gurgaon-Jhajjar-Rohtak-Sonapat as the inner and the other connecting Panipat-(Mujaffarnagar)-Meerut-Hapur-Bulandshahr-Khurja-Jewar-Palwal-Sohna-Rewari-Jhajjar-Rohtak-Panipat as the outer circumferential road.

In addition to the above roads (a) the continuation of the National Highway - (24) eastwards beyond Ghaziabad (b) N.H.(8), (c) the earlier-NH(8) now declassified as SH-connects Gurgaon and Alwar and (d) State Highway connecting Ghaziabad-Bulandshahr-Dubai act as other important radial roads.

Thus we find that but for reclassification and provision of missing links, the existing pattern of road network provides an efficient basis for the future network system for the National Capital Region.

Regional Transportation Development Proposals.

Regional Road Network - Development Proposals.

To develop a Regional Road Network, suited to meet the needs of the Region, both in its form and capacities, the following development proposals are made : (Map 5.7).

(1) Development of North-south expressway.

A North-south expressway connecting Panipat-Sonapat-Narela-Delhi-Faridabad-Ballabgarh-Palwal is proposed to be developed. This would mean reclassification and development to expressway standards of the stretches of present National Highway (1) from Panipat to Delhi and National Highway (2) from Delhi to Palwal.

(2) Development of East-west expressway.

An East-west expressway connecting Meerut-Modinagar-Ghaziabad-Delhi-Bahadurgarh-Rohtak is proposed to be developed. This would mean reclassification and development to expressway standards of the stretches of State Highway from Meerut to Ghaziabad; National Highway 24 from Ghaziabad to Delhi and National Highway 10 from Delhi to Rohtak.

The expressway to be of dual carriageway of sufficient lane width, all intersections grade separated and at intervals 3 to 5 kms. (2 to 3 miles) apart; access controlled with no frontage access, with full restrictions on standing vehicles and designed for a speed of 100 kms. per hour.

The above two expressways form the major axes of the Regional Road Network.

(3) Development of an inner grid.

An inner grid, of National Highway standard, connecting Sonapat-Baghpat-Meerut-Hapur-Bulandshahr-Sikandrabad-Dankaur-Ballabgarh-Gurgaon-Jhajjar-Rohtak-Sonapat.

This would require:

(a) Reclassification and development to National Highway standard, the following stretches of

- (i) Major District Road from Baghpat to Meerut.
- (ii) State Highway from Meerut to Bulandshahr.
- (iii) State Highway from Bulandshahr to Sikandrabad.
- (iv) Major District Road from Sikandrabad to Dankaur.
- (v) Major District Road from Badli to Jhajjar.
- (vi) State Highway from Jhajjar to Rohtak.
- (vii) State Highway from Rohtak to Sonapat.

(b) Construction of new stretches, to National Highway standards to complete the missing links, as under:-

- (i) from Sonapat to Baghpat including a bridge across the river Yamuna.
- (ii) from Dankaur to Ballabgarh including a bridge across the river Yamuna.
- (iii) from Ballabgarh to Gurgaon to Badli.

The above grid would inter-connect all the inner ring towns in the Region. Also it would serve to by-pass inter-regional movement from Delhi Urban area.

(4) Development of an Outer Grid.

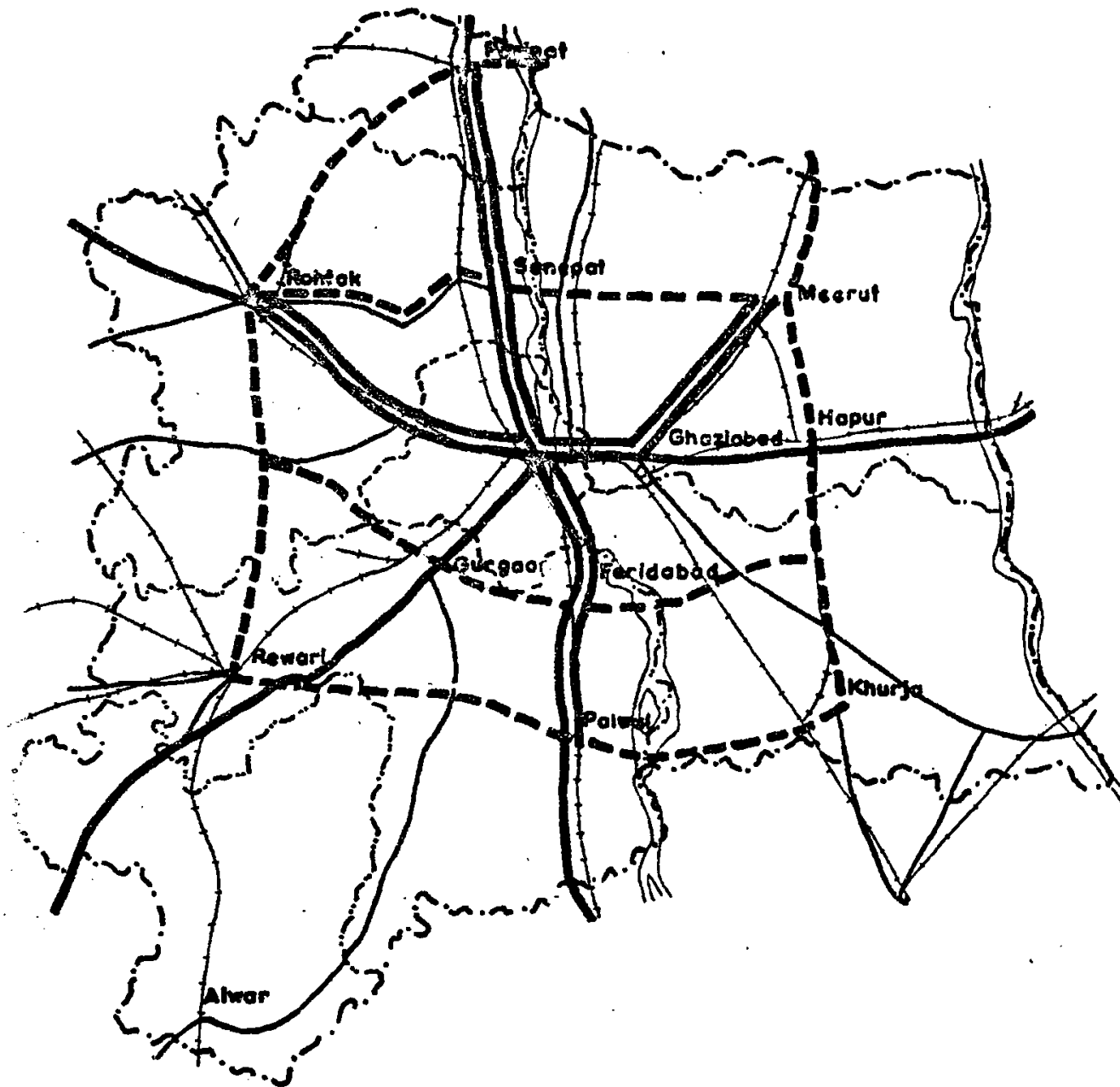
An outer grid, of National Highway standard, connecting Panipat-(Muzaffarnagar)-Meerut-Hapur-Bulandshahr-Jewar-Palwal-Rewari-Jhajjar-Rohtak-Gohana-Panipat. Of course certain stretches of this grid are common to the inner grid also and a part lies outside the National Capital Region.

The above proposal would require:





- (a) Reclassification and development to National Highway standards, the following stretches of -
 - (i) State Highway from Panipat to Muzaffarnagar.
 - (ii) State Highway from Muzaffarnagar to Meerut.
 - (iii) State Highway from Meerut to Khurja.
 - (iv) Major District Road from Khurja to Jewar.

TRANSPORT

PROPOSED REGIONAL ROAD NETWORK



LEGEND

-  Expressways — Proposed
-  National Highways — Proposed
-  National Highways — Existing
-  State Highways — Existing



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- (v) State Highway from Palwal to Rewari.
- (vi) State Highway from Rewari to Rohtak.
- (vii) State Highway from Rohtak to Panipat.

(b) Construction of new stretches, to National Highway standards, to complete the missing links, as under:-

- (i) from Jewar to Palwal including a bridge across river Yamuna.

The Grid roads to be of dual carriage-way, controlled access with no frontage access, intersections at grades or grade separated at intervals of 1 to 1.5 kms. ($\frac{1}{4}$ to 1 mile) apart, with full restriction of standing vehicles and designed for a speed of 80 kms. per hour.

(5) The above Road Network development programme, for its effective implementation, requires to be further elaborated and detailed out. The physical inventory of the existing network needs to be carried out to assess its capacities, standards and probabilities of improvement to desired levels. Detailed Traffic Surveys are to be carried out to chart out the intensities of flow along different routes and their desires. Quantitative estimates of the future flow patterns with their intensities and desires at different time periods, in consideration with the regional development in other spheres. These are required to design the levels of service of the future road network and phase of their programme of development. In specific terms the 'Expressways' and 'Grids' of the proposed regional road network require to be detailed out in all their aspects - alternate

alignments, rights of way, lane capacity, surface type, cost estimates etc. These require detailed studies. For example in working out the alignment, the existing road network needs to be studied in detail to assess its optimum utilisation in the proposed network; and the regional land use will have to be studied in fixing the new alignments. The future capacity of the roads could only be derived by estimating the future traffic flows. This needs traffic surveys and other related studies. Also the optimum alignment of the roads could only be selected after drawing out the alternate alignments and working out their cost-benefit estimates.

Thus to statistically substantiate and qualitatively define the regional road network pattern, preparation of Functional Plans for the different parts of the network is proposed. This would require carrying out necessary surveys and studies. These Functional Plans would aid the preparation of the detailed project Plans for implementation of the schemes.

Regional Rail Network - Development Proposals.

To develop the Regional Rail Network to cater to its share of movement demands in the Region as well as ~~xxxxxx~~ accelerated development of the Regional towns by interlinking them, with Delhi, the following development proposals of the Railway Network System are made. (Map 5.8).

A. Interim Measure:

As interim measures for optimising the existing railway network by increase in line capacities of the route sections and the operating efficiency the following measures are suggested:

- (1) Improved automatic signalling with centralised control over the whole Region.
- (2) Lengthening of platforms at all stations to take in rakes of 12-coaches or more so that the carrying capacity of the trains, especially for regional mass transportation are increased.

B. Long Term Measures:

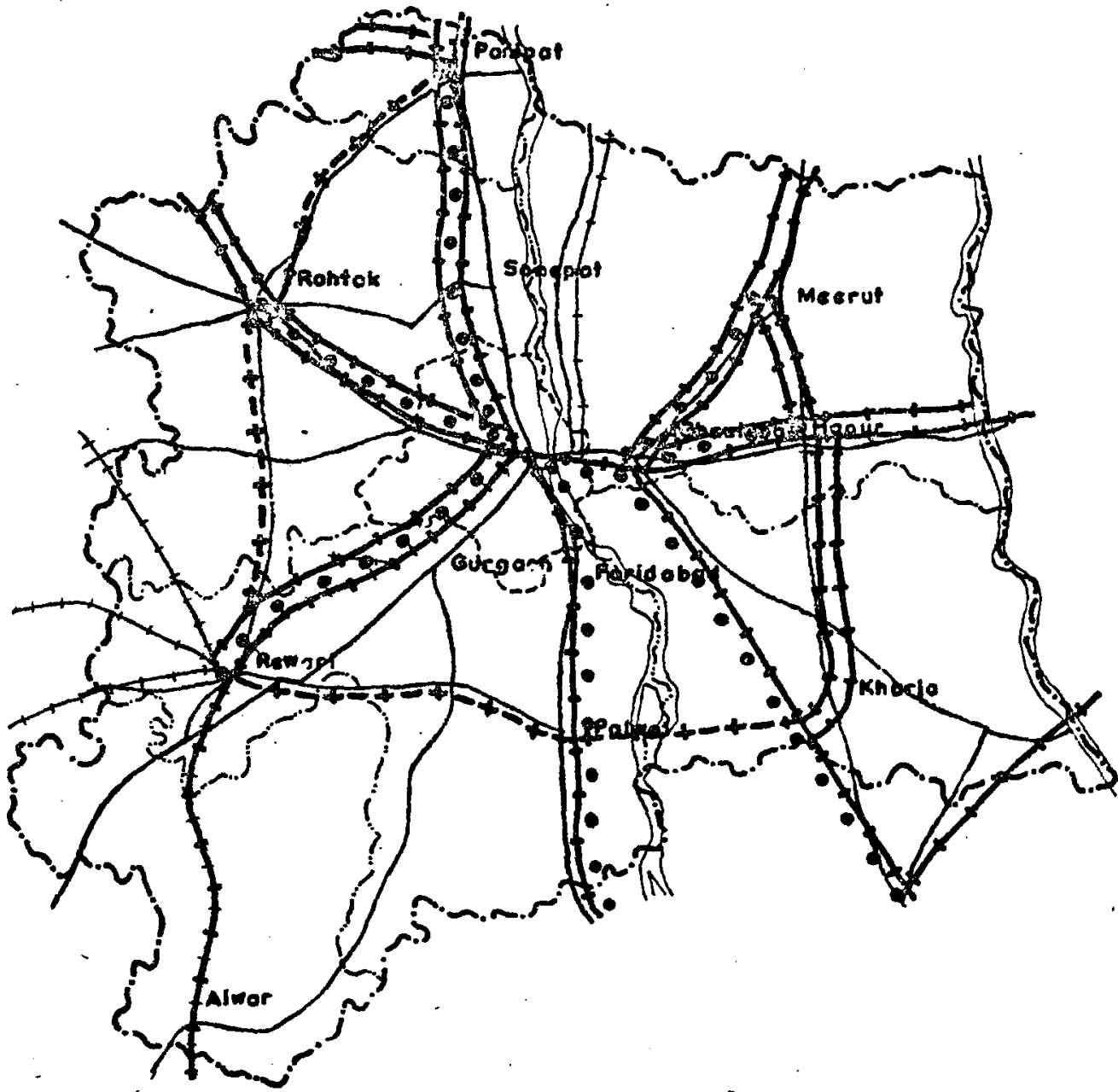
- (1) It is proposed that an immediate programme for the doubling of all route sections within the Region be carried out. This would increase the line capacities considerably. (Other measures like dieselisation and electrification are discussed separately).
- (2) The following New Lines to bypass Delhi are proposed:
 - (a) Palwal to Khurja.
 - (b) Palwal-Rewari-Jhajjar-Rohtak.
 - (c) Gohana-Panipat (Restoration).

The lines should be broad gauge with a single line in the first phase and double lines in the second phase.





The above lines would help in diverting goods traffic to bypass Delhi. Thus they would serve the same purpose for which the 'goods avoiding line' and 'Delhi avoiding line' have been constructed. But the alignment of the lines within Delhi urban area has caused problems in their effective usage. The Delhi avoiding line running through the Delhi urban area and connecting the residential areas in the south, with its high concentration of people, to the industrial areas in the west, business and office areas in central Delhi, would be very much required for the intra-urban mass transportation system. But it may not work efficiently as such, if the goods traffic is also imposed on it. Also, with the two types of traffic combined, the aim of relieving congestion and smooth and quicker transport of goods traffic would not be realised. Perhaps it would result in shifting the problem area from Delhi Main to some other stations.

To effectively serve the purpose of by-passing Delhi, the route should not only be sufficiently away from the Delhi Urban area but also from the near by fast developing urban centres. The proposed Palwal-Khurja line links the Delhi-Agra line, with the Ghaziabad-Aligarh line and the Meerut-Khurja line serving the eastern and northern areas. The Palwal-Rewari-Rohtak-Panipat line would link western and northern areas connecting the Delhi-Rohtak-

TRANSPORT PROPOSED RAILWAY DEVELOPMENT



LEGEND

-  Doubling
-  Electrification
-  New Lines
-  Gauge Conversion

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Jind line and the Delhi-Panipat-Karnal line. Thus the two links proposed would effectively serve to bypass the goods traffic from Delhi and they would also be free from the intra-urban passenger traffic, as well as the future urban growth.

The Palwal-Rewari-Rohatak line would also help in shifting the transshipment point between MG and BG from Sarai Rohilla to Rewari thus relieving congestion at Sarai Rohilla which is being proposed as a terminal-cum-exchange point.

(3) A new yard at a suitable location south of the proposed 'goods-avoiding line' is proposed.

To relieve congestion at the Delhi Main and the New Delhi stations and to marshal wagons to bypass Delhi, Tughlakabad yard has been developed. But with the proposals for diversion lines down south at Palwal, the question of its utilisation would have to be considered. Though new links have been proposed to take off from Palwal, for sometime to come, the Tughlakabad yard could be utilised for marshalling purposes. This would involve extra density of traffic on Tughlakabad-Palwal section as the rakes would have to travel twice on this. But with the growth of Delhi urban area and the increase in economic activities and the necessity for keeping the Delhi Main and the New Delhi and other stations within the Delhi urban area exclusively for passenger traffic, a time would come when the Tughlakabad yard would be completely required to handle traffic

booked into and out of Delhi. At that time it is proposed that a new location for a yard exclusively for marshalling goods traffic by-passing Delhi be selected and developed. Probably this could be at Palwal itself or somewhere to the south.

(4) Development of an Intra-urban Rail Network for running an Intra-urban Mass Transportation System for Delhi is proposed.

It is proposed that the existing rail corridors within the Delhi Urban Area, with suitable modification and additions be used for running the intra urban mass transportation system.

With the increase in the area and population of Delhi as well as in economic activities, the travel demand on its intra-urban transportation system has increased manifold. The present mass transportation system is mainly provided by the bus service. In 1968 it carried nearly 8,00,000 people on an average in a day with about 850 buses on the road. An average of 11 trips per day per bus, indicates the heavy overcrowding in the buses especially during peak traffic hours. Again this does not indicate the total demand on the transport network as many of the trips are diverted to other modes for want of accommodation in the bus service. Nearly 5 lakh persons commute to their work by bicycle which is quite strenuous considering the climatic rigours and physical distances. Provided a fast mass transportation system at reasonable economic fares, considerable portion of these trips could be attracted towards it. Also the

system should be one which hauls a large number of passengers at a time and provides fast service at frequent intervals. At the present level of technology, only the Railways could immediately provide such a transport system, whatever be the type - surface, underground or overhead.

Detailed Traffic Surveys are being carried out under the auspices of the Metropolitan Transport Team set up by the Planning Commission to estimate the travel demands and their desire lines and determine the suitable corridors for this mass transportation system.

While the findings of the above study are awaited it is hoped that the optimum utilisation of the existing lines would be made use of. This would be important from the point of economy and more important for immediate introduction of the mass transportation system.

Within the Delhi Urban Area, the railway network (including the 'Goods avoiding line' and 'Delhi avoiding line') resolves itself into three distinct rings. They run through the residential areas in the south, industrial areas in the west, business and commercial areas in the north and newly developing industrial and office complexes in the east. The exact travel desires, including all 'trip purposes' need to be analysed and charted out to estimate the usefulness of these corridors. There are already certain programmes for development of work centres like development of a commercial centre near the Diplomatic Enclave, Government Office Complex in Indraprastha Estate, redevelopment of Connaught Place and its

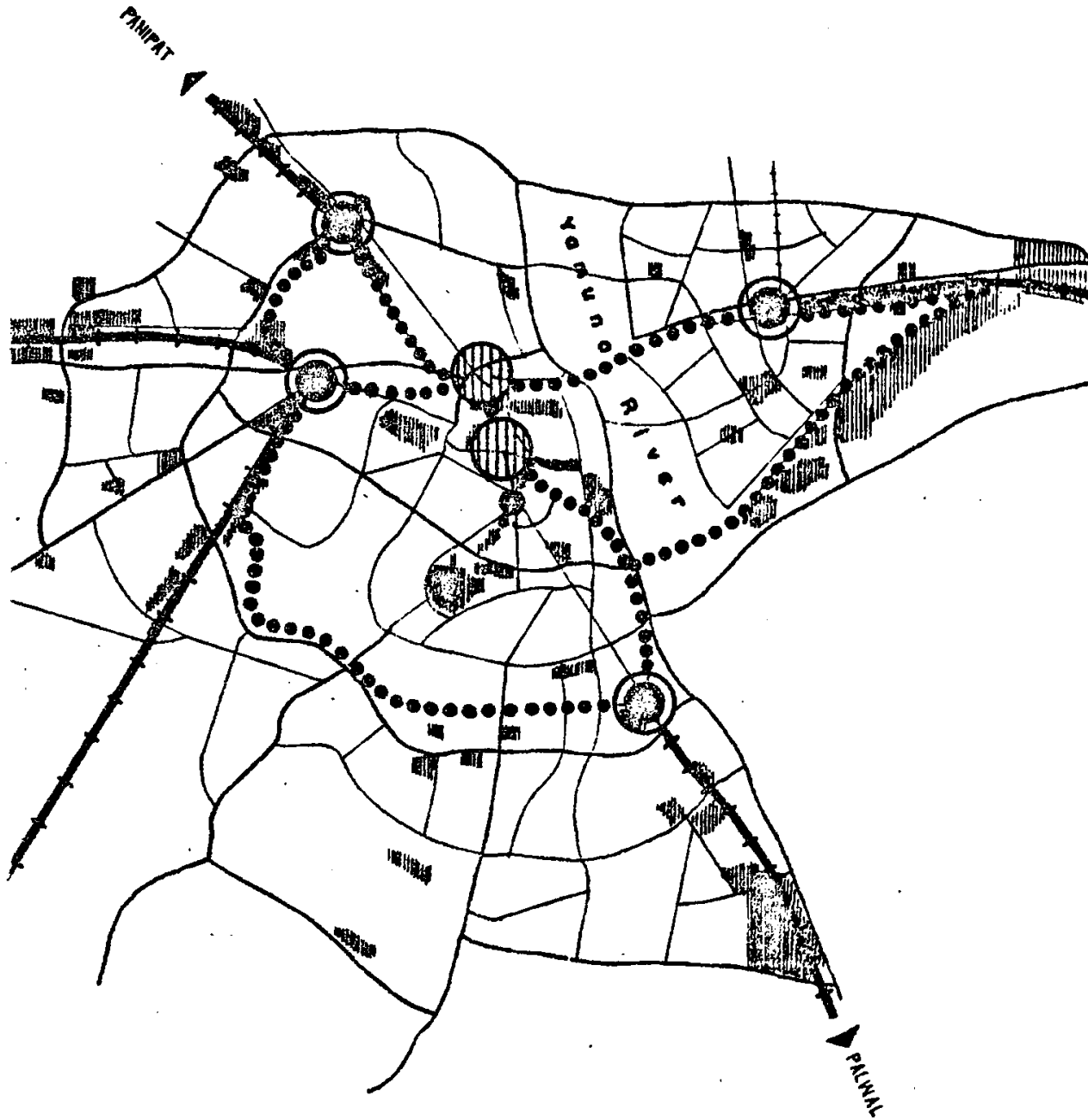
Extension which lie along these railway lines. Perhaps with more intensive development of such work centres and redensification of residential areas along these lines and with provision of one or two new lines linking the existing rings with the central areas like Central Secretariat and Connaught Circus, these rings could be advantageously and efficiently used for running the mass transportation system. On this network a series of permutations and combinations may be obtained for running the route services as per travel demands and desires.

(5) Integration of intra-urban and intra-regional networks is proposed. (Map 5.9).






The above proposed intra-urban network system and the inter-regional rail routes should be suitably integrated with development of necessary terminal-cum-exchange points.

The Delhi Main and the New Delhi stations are already saturated, with little room for expansion. Already a need is felt for a third terminal to disperse the passenger traffic. To this must be added the strain due to the increase in commuter traffic. Preliminary estimates show a probable figure of more than 2 lakhs persons per day each way. Of this, taking the peak hour traffic at 30%, an intensity of 60,000 to 75,000 persons during the peak hour would be felt. To load this intensity on the existing terminals would cause severe strains on the terminals themselves, which would not be able to handle them. This will lead to disruption in the operation of the mass transportation system itself. In addition, this intensity of flow would effect severely the road transport network system

TRANSPORT REGIONAL AND INTRA URBAN RAILWAY NETWORKS - PROPOSED INTEGRATION



LEGEND

-  Major Work Centres (D. U. A.)
-  Intra Urban Network (D. U. A.)
-  Regional Network
-  Existing Termini
-  Proposed Termini Cum Interchange Points.

D. U. A. — Delhi Urban Area



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causing severe congestion and serious bottlenecks. Thus with the increase in commuter traffic and high cost of expansion of existing terminals, more than one additional terminal would become a necessity.

It is proposed that four more terminals be developed at points where the regional rail routes meet the urban area network, as for example at Nizamuddin, Sarai Rohilla, Azadpur and Shahdara. These are to be developed as terminal-cum-exchange stations so that a part of the long distance passenger traffic is also dispersed at these points thus reducing considerably the strain on the Delhi and the New Delhi stations.

The location and development of these terminal-cum-exchange points must be co-ordinated with route organisation of the intra-urban bus system so that the latter acts as a feeder as well as a dispersal system for the former. This would also help in relieving the congestion on the urban area road network, especially the access roads to the Delhi Main and the New Delhi stations.

(6) It is proposed that dieselisation and electrification of all regional routes leading to Delhi be carried out.

The probable intensity of intra-regional commuter traffic and goods traffic has already been discussed. To serve these densities of traffic, the existing level of services has to be improved. The increase in line capacities by additional lines and an improved signalling system have been recommended earlier under interim measures. The next stage should be the electrification of the regional network to increase the line capacities and also to provide fast sub-urban service for the commuter traffic. In

the first phase dieselisation of trains and discarding steam locomotion within the Region has been suggested.

It is proposed that the following route sections within the National Capital Region be electrified.

Panipat-Delhi.
Meerut-Ghaziabad-Delhi.
Hapur-Ghaziabad.
Khurja-Ghaziabad.
Palwal-Delhi.
Rohtak-Delhi.

The policy of dieselisation and electrification of high density routes has already been accepted. To quote from the Draft Fourth Five Year Plan, under the Chapter on Railways: "It is proposed to electrify or dieselise fully the high density routes which are at present under mixed traction". The Region requires top priority in this programme.

(7) It is proposed that the metre gauge line from Rewari to Delhi be converted to broad gauge and electrified and the transshipment point between the metre and broad gauges be shifted from Sarai Rohilla to Rewari.

At present of all the lines converging into Delhi, only the Ahmedabad-Jaipur-Rewari-Delhi line is of metre-gauge. This has required transshipment of people and goods at Delhi. At present Delhi Main is the main transshipment point for passenger traffic and Sarai Rohilla for goods traffic. Transshipment results in delay in movement and also considerable damage to the goods - a bottle-

neckin the smooth operation of the railways.

It is proposed that the entire route line from Delhi to Ahmedabad be converted to broad gauge. This is in consonance with the accepted policy programme. To quote the Draft report of the Fourth Five Year Plan; "The pace of conversion from metre gauge to broad gauge will be accelerated in areas of rapid economic development and high traffic potential"; and again "The programme of conversion of metre gauge into broad gauge lines is intended to eliminate delay and damage, particularly at the transshipment points and improve the economics of railway operation. In this fourth plan, a programme of converting 1500 kilometres of metre gauge lines into broad gauge lines will be taken up as part of long-term plan. The ultimate aim is to provide broad gauge connection from one end of the country to the other".

Within the regional context of the above suggested programme, as a first phase, it is proposed that an additional broad gauge line from Rewari to Delhi be laid with electrification and Rewari be developed as a goods transshipment point, shifting the present one from Sarai Rohilla. This would help in developing Sarai Rohilla as a terminal-cum-exchange point. This broad gauge line would cater to the commuter traffic and the metre gauge line for bringing the long distance passenger traffic upto Delhi. In the second stage the metre gauge line be converted to broad gauge with electrification as part of the change over programme from metre gauge to broad gauge.

(8) A Note on the Narrow Gauge Line within the Region.

A narrow gauge rail route between Shahdara and Saharanpur runs within the Region northwards immediately east of the river Yamuna. The same is operated by a private agency. It is understood that a survey by the Railways has been taken up to assess the economic and engineering feasibility for laying a broad gauge line along this alignment. While the findings of the survey are to be awaited, a note on the usefulness of investment on the broad gauge line along this alignment regarding the National Capital Region is made here.

In the 'Corridor Pattern' adopted for development for the spatial organisation of the settlement pattern, the main centres of concentration are proposed along the existing main transport routes both road and rail. Along the alignment of the broad gauge line now under investigation, only two major centres, Baghpat and Baraut - each having a population of less than one lakh are proposed for development. As such there are no major urban centres along the proposed alignment.

A State Highway is also running parallel to the route connecting Shahdara with Saharanpur. As such, road transport could easily provide for the expected traffic along this route. In addition as the route is immediately east of the river Yamuna, its catchment area on the west is very small. It is also learnt that there are certain engineering difficulties in integrating this line, when converted into broad gauge, with the main broad gauge lines now

existing. There is already a broad gauge line connecting Delhi with Ghaziabad-Meerut-Saharanpur at an average distance of less than 20 miles east of the proposed route alignment. As part of the regional development programme, certain measures for improvement are suggested from Delhi to Meerut. These measures could be extended upto Saharanpur, if need be, to strengthen this route to take any of the expected additional traffic.

It can be concluded from the reasons given above that the usefulness of the above proposed route alignment to serve the National Capital Region is very limited. It is, therefore, suggested that instead of investments on this route, they could be more profitably utilised for the development programmes stated earlier.

Necessity for a Regional Land Use Policy:

In a Regional Plan, as in an urban plan, the necessity for a clear enunciation of a land use policy is increasingly becoming evident, because in the face of competing demands for land by various sectors of the economy, it becomes imperative to optimise the use of land for agriculture on the one hand and urban uses on the other. In the National Capital Region two themes of development have been discernible in the past:

- (i) The development of Delhi, as the Nation's Capital, as a dominant commercial and financial centre of north-western India, as a metropolitan centre for education, religion, science and arts and a tourist centre of world-wide attraction, which perforce gives Delhi an unique position.
- (ii) The development of other small urban centres around Delhi, taking advantage of the seat of the Central Government where policy decisions regarding the various sectors of the economy are made and whose benefits these towns have used in accelerating their own economic activities.

These two themes will continue to characterise the future development of the Region, with one addition, namely, the impact of the green revolution on developmental activities. All the three themes will have to be harmonised with the Regional Plan objective of balanced development of the Region by dispersal of economic activity and population concentration away from Delhi, with the synchronous restructuring of the transport

CHAPTER VI

REGIONAL LAND USE: POLICY AND CONTROL:

net-work within the Region. Detailed and specific land use policy recommendations will emerge from the above considerations and will have to cover all aspects of regional development - physical, economic, and social and the concomitant settlement pattern. In this task of developing a regional land use policy four major areas for future development can be identified:

- (a) Areas which require internal recognition by sustained re-development of the core and rapid development of the peripheral area - Urban Delhi and the 17 priority towns.
- (b) The areas which should be in the scene for accelerated new development but on a lower key - the 31 small towns.
- (c) The areas which remain stable in scale and function but nonetheless humming with intense activity such as the 'green revolution' and the resulting dispersed development-the rural areas of the Region.
- (d) The specific areas in which economic development by way of providing employment opportunities are to be encouraged in an effort to decentralise population from the Metropolis.

Land-Use - A Regional Perspective:

Extent of Land in the NCR:

The National Capital Region as delineated covers an area of 29,780 sq. kms. and is as large as the State of Haryana. The smallest unit of the Region is the Union Territory of Delhi with

1,484 sq. kms. Next in area is the Rajasthan Sub-region with 3,978 sq. kms. The U.P. Sub-region covers an area of 11,000 sq. kms. The largest unit of the Region is the Haryana Sub-region with 13,318 sq. kms. (Table 6.1). There is not only a good deal of homogeneity in the physical features, climate and other factors but also the problems faced in the use of land and in development are common and similar.

Land-Use Characteristics: Two main themes have characterised the urban growth of the Region in the past. The first has been the continuous rapid increase in economic activity in Urban Delhi and the consequential rise in population within it, mainly due to in-migration. It has been stated before that in 1961 nearly 87% of the total urban population of the Region lived in Delhi and Meerut and the rest of the 13% distributed over the 48 towns. It was also stated that this concentration of economic activity not only led to population concentration in Delhi but also to the economic impoverishment of the rest of the Region.

The second theme has been the increase in sporadic development of industries on the traffic arteries leading away from Delhi, and the premature and speculative sub-division of land for residential and industrial purposes outside Delhi. This factor which was evident earlier has emerged strongly after 1962 when the Delhi Master Plan came into force. This was the result of lack of control outside the Master Plan Area. The development of industrial areas outside Delhi was given a fillip by the Delhi Master Plan proposals of discouraging large

industries within Delhi and the shifting on non-conforming industries to either suitable locations outside the Union Territory of Delhi or outside the Urban Area of Delhi. The consequential development of such industries along the traffic arteries and the great imbalance of social infrastructure in the 'ring towns', and the comparative low growth of the other towns in the Region in the shadow of the Metropolis have characterised the present land-use demands in the Region.

The above two developments have had their effect on the pattern of urbanisation and the employment trends. In 1961, the trends of urbanisation in and around Delhi indicated that out of a total population of 106.8 lakhs nearly 34% lived in the urban areas of which Urban Delhi accounted for 22%. Thus, the Region is heavily rural, both in population component, as well as in its occupational structure with more than 50% of the working force employed in the primary sector. The only redeeming feature is the role of the National Capital reflected in the higher percentage (71%) of employment in the tertiary sector. If only the urban areas of the NCR are considered, the tertiary sector employment as a whole accounted for 67% of the total urban employment. All these are indirect indicators of economic preponderance of primary activity in the Region as a whole and tertiary activity in the urban sector of the Region.

The dominant role of the economic development of the Nation's Capital has influenced to a large extent the present urban structure within the Region, with Delhi ever-growing and

developing at the cost of the other parts of the Region in so far as urban structure is concerned. The preponderance of Delhi's growth is reflected in its interlinkages with other centres both within and outside the Region and in the country as a whole. Thus, the road and rail routes converge on Delhi and diverge in the opposite direction for movement outside Delhi. This has resulted in a flourishing wholesale market in Delhi for the entire north-western India and the establishment of trade routes both historical and new. This is reflected in the present endowment of land use viz., main urban centres along the arteries, and also, to a certain extent, industrial agglomeration as post 1962 developments. In the agricultural sector the perennial sources of water from Yamuna and Ganga, along with its distributories, which flow within the areas, have shaped the agricultural economy of the Region with its concomitant development of rural settlements. The vast network of canals in the J.P. Sub-region originating from these two river sources has given an edge to it over other Sub-regions in so far as the agricultural development and economy is concerned. However, most of the land in the Region is fertile and is basically good for agricultural purposes. The vast underground resources of water, as also new irrigation schemes designed to bring water from other sources, is bound to play a part in the development of the agricultural economy in the rest of the Region. Table 6.2 gives the characteristics of the present land use in the Region. Please also see Map 6.1 for existing land use.

Table 6.1

The Land Area of the Sub-regions
of the NCR

Distt./Tehsil	Area in sq. miles	Area in sq. kms.	Area of Sub-regions sq. kms.
1	2	3	4
1. Union Territory of Delhi.	573	1,484	1,484 (5.0)%
2. Meerut District	2,323	6,016	11,000 (36.4)%
3. Bulandshahr District.	1,924	4,984	
4. Rohtak Distt.	2,332	6,040	13,318 (44.9)%
5. Gurgaon Distt.	2,350	6,085	
6. Panipat Tehsil (Karnal Distt.)	462	1,193	
7. Alwar Tehsil (Part)	480	1,243	3,978 (13.7)%
Behror Tehsil)	1,056	2,735	
Mandawar Tehsil)			
Kishangarh Tehsil)			
Tijra Tehsil)			
(Alwar District)			
Total NCR	11,500	29,780	29,780 (100)%

Source: Census Publications 1961.

Table 6.2

Existing Land Use in the NCR

Land Use	sq. kms.	sq. miles	Percen- tage to total
1	2	3	4
A. Built up Land	673	260	2.3
B. Forests	251	97	0.8
C. Rocky Land	254	98	0.9
D. Recreational Reservation	111	43	0.4
E. Low Lying Land	34	13	0.1
F. Barren Land	200	77	0.7
G. Agricultural*	28,252	10,908	94.8
Total Land	29,775	11,496	100.0

* 736 sq.kms. (284 square miles) of land under this use are subject to floods.

Source: Computed by T.C.P.O. from exist-
ing land use surveys made by
State Town Planning Departments

Land Use Trends in the Region: During the period of the Regional Plan, the primary sector and the agricultural economy will continue to form the main stay in the Region, although the urban structure in the future perspective will come to play a more dominant role and a gradual change from the present endowments will take place. Thus, broadly speaking, major employment opportunities will continue to be in the agricultural sector during the Regional Plan period, although by dispersal of economic activity away from Delhi a different hierarchical order of urban centres will emerge which will increasingly provide employment opportunities in the non-agricultural sector.

Most of the changes in the employment pattern will take place, provided that in pursuance of the regional aims and policies, adequate communication facilities are made available in the Region. The proposed transport system, which signifies a new development strategy based on the Radial Corridor Pattern, provides the key for rationalization and reorganization of land uses in the Region. However, any attempt to bring new employment to the urban centres along the corridors to create more employment in the secondary and tertiary sectors, thereby bringing about a concentration of urban population in these centres, has by necessity to anticipate the need to make these centres more attractive. This will entail taking measures to meet the requirements of the new employment by providing housing, services etc. by way of expansion of urban centres on a pre-planned basis and to that extent there will be a shift in

the land requirements from non-urban to urban purposes.

Instead of concentration of housing in the main metropolis, attention should be increasingly given to the new employment areas in selected priority towns. This task will have to be approached in a systematic way by conservation of good housing, rehabilitation and re-development of the older parts of the town and new areas developed to provide housing for the increase in population, all as part of comprehensive development plans.

The continued evolution of these developments will further intensify the volume of traffic both in the corridors selected, and in the urban-rural hinterland. The expected increase in employment opportunities and the general overall economic development will induce greater movement and a different pattern of traffic on roads and rail routes within the Region. This new future urban structure policy will, therefore, create a need for an efficient primary road system which has three main strands:-

- (i) Express Highways.
- (ii) National Highways.
- (iii) State Highways.

The first is the construction of an adequate ~~network~~ north-south and east-west expressway system along the corridors linking Delhi with the growing urban centres to provide a fast commuter service for men and material between the metropolis and the urban centres. This would need either a realigned route or a widening of the present highways linking these centres.

The second is the construction of a series of circumferential and east-west National Highways (trans-Yamuna, and trans-Ganga) to link up the two Sub-regions, namely, U.P. and Haryana and as well the hinterland. The third is the linking of the rural-urban hinterland within the Region by a series of State Highways linking the agricultural areas to the main markets and urban centres.

A large proportion of these developments in the traffic and transport network (including railways), will result in developing the economy at its very root viz., the rural areas of the Region, thus, providing considerable amount of dispersed development in the rural areas though they are on a stable scale in physical terms. The construction of the east-west trans-Yamuna routes, would provide the required interaction between the two parts of the Region as well as a quicker transportation of commodities and people to the major employment areas from the major production centres in agriculture.

Notwithstanding the above developments, there will be the development and investment in industries as a major employment factor, to provide the necessary economic opportunities for the anticipated urban population. As a major aspect of the regional policy, these industrial areas are to be developed as part of the existing and/or anticipated urban centres. On this basis, the requirements of land for industries will become part of the requirements of urban land use. Nonetheless, these industrial lands along the

corridors need to be developed on a rational basis so as not to cripple the arteries and their functioning, so that, they not only help the development of the urban centres but also of these corridors themselves on the scale envisaged.

Another aspect of increased urbanisation and industrialisation is the use of technology for the development of land, construction on buildings and for industries. In an earlier Chapter, it has already been stated that in the choice of the development pattern, instead of taking recourse to sophisticated technology and organisational structures, intermediate technology and readily available organisations at the local level, streamlined as far as possible, should be made use of in the coming decade. If we are to benefit from the experience of the western countries, which have suffered environmental pollution and social upheavals due to the indiscriminate use of high level technology for intense concentration of population and the use of the private automobile for commuting purposes, a system has to be devised in this Region which will eliminate such adverse effects. The trend in this Region (which is now confined mainly to the urban areas) points out to the increasing pollution of air, land and water due to smoke and effluent from industries and inefficient disposal of sewage. These will pose major problems in the future. But no less are the threats in the countryside due to the drift of sand from the desert, water logging and increasing salinity of soil which require to be tackled in a scientific manner.

Regional Land Use Proposals:

In an earlier Chapter the regional goals and objectives have been stated. These have been derived no doubt from many considerations among which the physical endowments of the Region, especially, the land endowments is the most important. If the plan objectives are to be attained, especially the urban structure, a number of Regional land use proposals have to be made. These are as follows:-

Land for Agriculture: Agricultural development of the Region, which has already attained a very high level in most parts of the Region, is not of greater importance than the dispersal of population from the Metropolis and its concomitant urban structure for the Region. But in view of the anticipated changes in land use there would be a major impact on land requirements of the agricultural sector. To the extent, new employment opportunities are proposed in the non-agricultural sector and consequent concentration of new population, the existing urban centres would need expansion and this expansion would have to be met mostly from the existing agricultural land. To that extent the land available for agriculture would be diminished, putting a premium on land for agriculture. This obviously necessitates a rational policy of utilisation of less valuable agriculture land for urban expansion, and as far as possible unproductive land for the location of new urban centres. It also calls for an intensive utilisation of available agricultural land for production purposes based on irrigation proposals. Such land,

as well as those that would be reclaimed by flood protection have to be reserved for agriculture. The second cause of change in the agricultural land would be on account of the creation of lakes, reservoirs, flood protection works, urban water schemas, irrigation network etc. This would be more than off-set by the third cause of change in the agricultural land, which will be the additional land available due to various irrigation and flood protection works both within and outside the Region. Some of this category of land will be reclaimed but others would only increase the availability of land for agricultural purpose on a perennial basis.

The fourth and the last cause of change in agricultural land will be due to the advent of the 'green revolution' and improvements and modernisation in agricultural production techniques, thereby providing a farming structure conducive to the economic development of the Region as a whole. This would entail marginal adjustments in the use of land, within the agricultural use in certain specific sub-uses. While these internal adjustments would significantly contribute to the development of the Region as a whole, it would specifically bring about a change in the development of agriculture infrastructure, such as, transport net work at the sub-regional level for commodity transport, storage and marketing facilities and such other social facilities concomitant to agricultural development.

Land Use for Urban Centres: In the Regional Plan it has been proposed that out of the

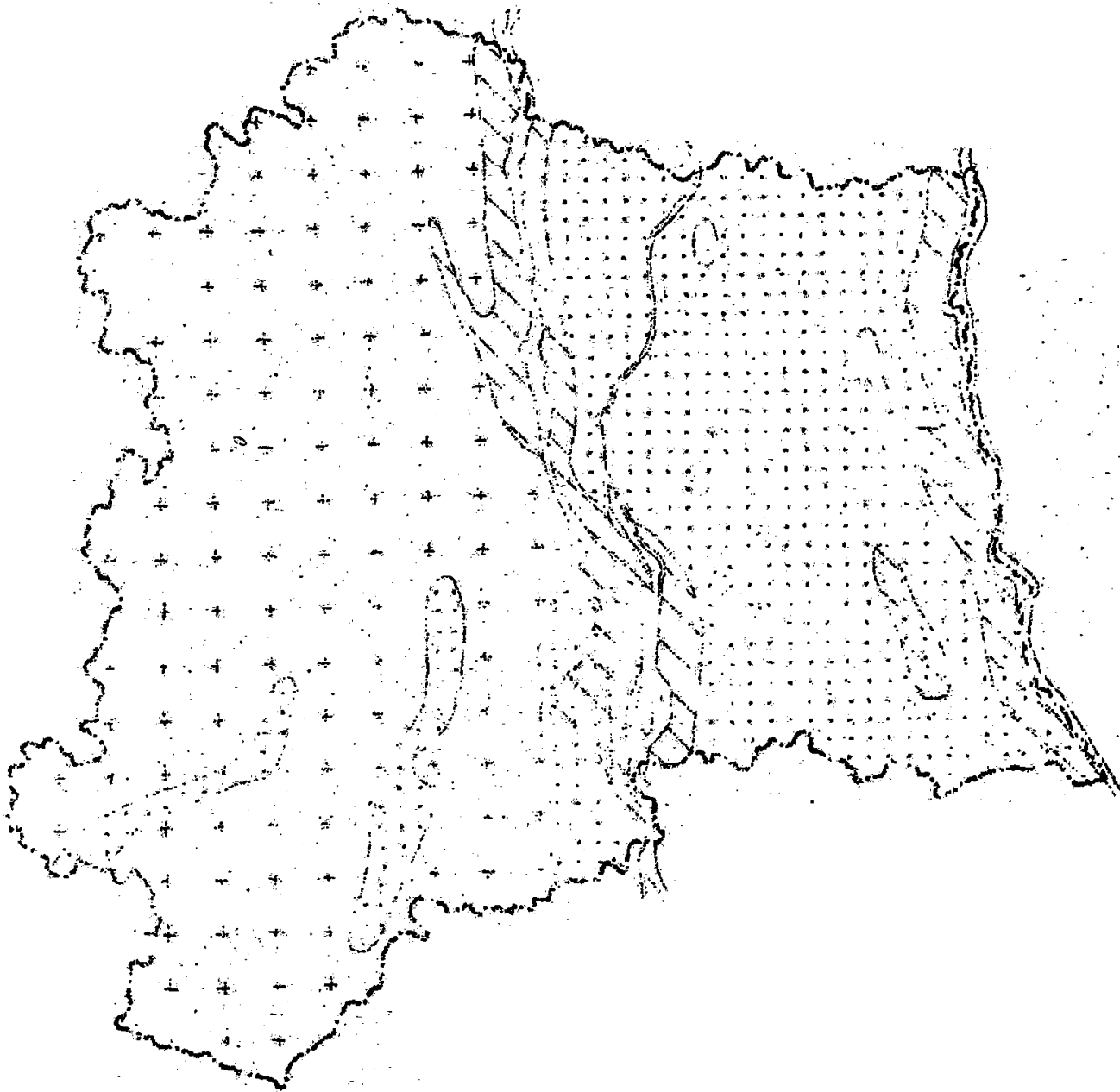
estimated population of 211 lakhs in 1981, about 93 lakhs would be accommodated in urban areas giving a 44% urban and 56% rural break-up in the Region. Also in order to ensure a balanced regional development, three themes have been proposed. (i) Containment of Delhi's growth to a population size of 52 lakhs within the area already notified for acquisition. (ii) Dispersal of about 10 lakh population from Delhi to selected centres. (iii) Development of other urban areas by way of location of industrial, commercial and other employment opportunities at the sub-regional level. This would entail land requirement for urban use on a substantial scale. Keeping in view the need to economise on land and cost considerations, the Plan proposes a new urban structure which takes into consideration the existing conditions for physical development of land and the provision of urban and industrial infrastructure and their cost in the various urban centres. See Maps 6.2.0, 6.2.1 and 6.2.2.

One of the major components of future urban land requirements would be the land required for industrial purposes. On a rough basis by 1981 about 3 lakh industrial jobs would be created in the selected towns of the Region in addition to about 3.4 lakh jobs in Urban Delhi. While tremendous efforts will be required to create this employment, in terms of land use this would mean the reservation of land for industrial purposes in suitable locations in the Region. This industrial land use should form an integral part of the land development for the urban centres and not as isolated pockets of industrial growth. The other major




requirement of land would be for housing, including community facilities. It is very essential that these two major uses together with commercial uses should form part of the future comprehensive urban structure. Further it should be a general policy that only public agencies should take up large scale urbanisation and for this purpose land would have to be publicly acquired. Suitable organisations should be designated or new ones set up for the purposes of land acquisition and development. Each participating State should devise means to undertake this task expeditiously.

Density in Urban Areas: The physical quality of a good part of the urban fabric in the Region is worn out and obsolete. Much of the core of Delhi and other towns are old, congested and dilapidated. Today many of the buildings, in these areas, are either structurally unsound, or more likely, no longer suitable for the existing uses. The solution to these problems lie in urban renewal at a faster rate either by clearance and redevelopment, or rehabilitation. This and the amount of land that will have to be recommended for development on a long term basis, both industrial and residential, therefore, gives the basis for an opportunity to explore new paths for parcelling of urban land in NCR and calls for a vigorous urban land policy. The other opportunities arise out of the potential strength of technology in the building industry, social changes in living, character of development and financial resources. Suitability from climatological consideration and

FACTORS FOR URBAN GROWTH



LEGEND

-  Subsurface Water Available.
Drinking Water Supply Possible For Urban Growth.
-  Subsurface Water Brackish Or Saline.
Integrated Drinking Water Supply System
Required For Urban Growth.
-  Floodable Areas.
Development Possible Only After Flood
Protection Works.



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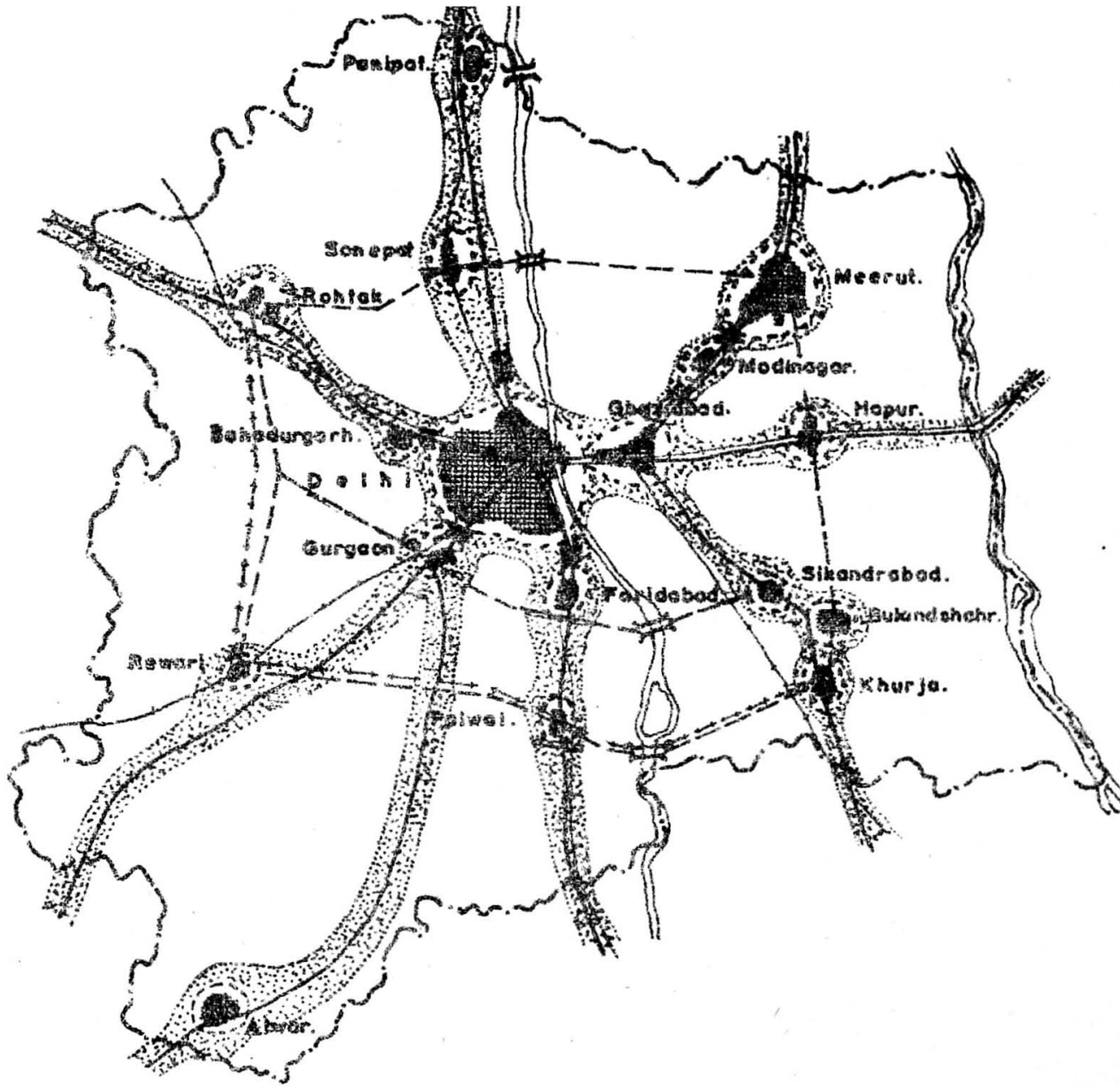
CAPITAL

REGION









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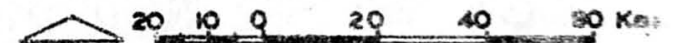
LAND USE PROPOSALS 1981

I. URBAN GROWTH AND TRANSPORT ROUTES



LEGEND.

-  Priority Towns.
-  Existing Built-up Area.
-  Rapid Transit Routes.
-  Trans-Yamuna Linkages.
-  Proposed Ring Roads.
-  New Link Rail Route.
-  Area For Zoning & Preservation.
-  Preservation Of Ribbon Development.



NATIONAL CAPITAL REGION

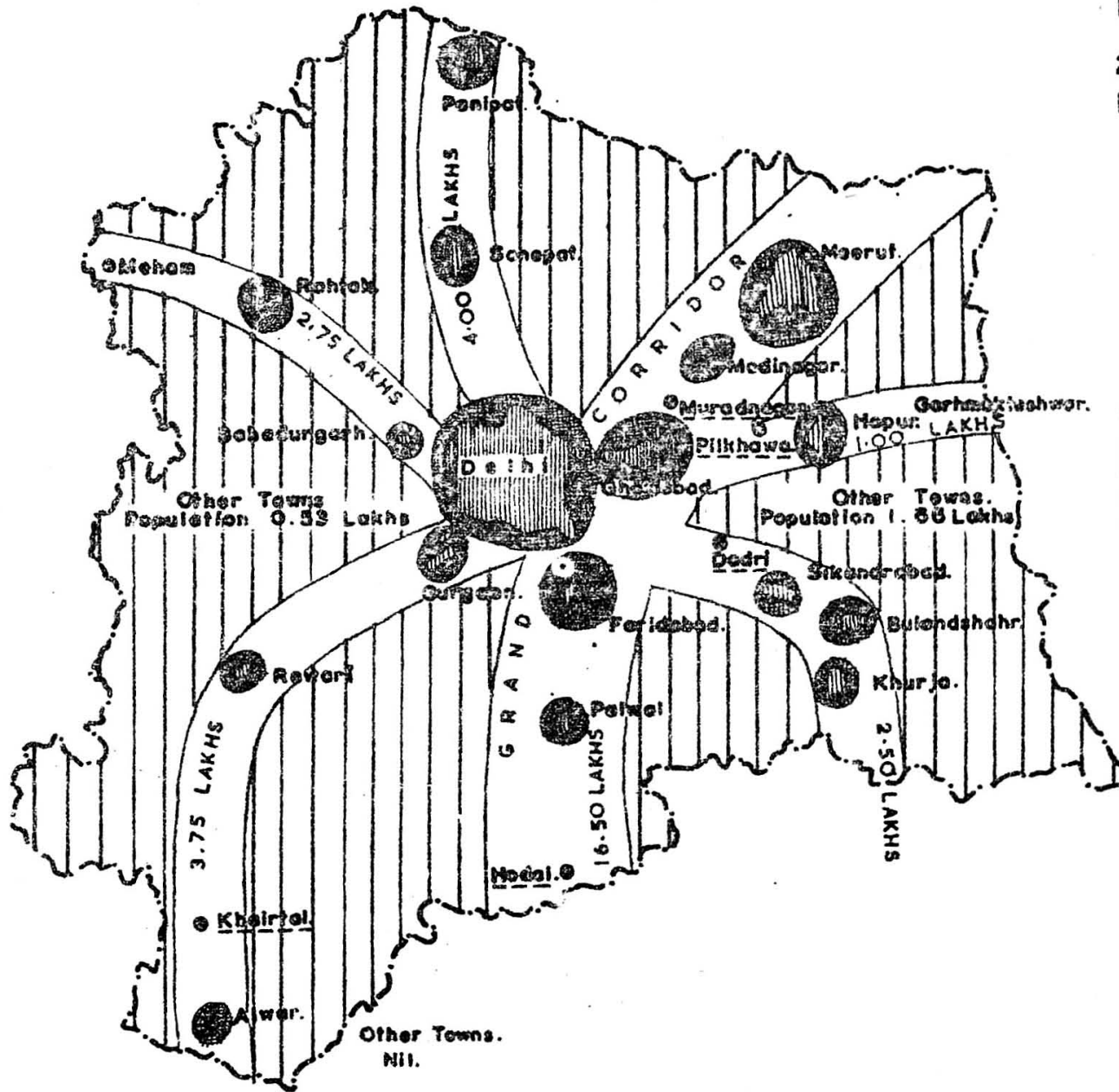
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
LAND USE PROPOSALS 1981

2. URBAN SECTOR

POPULATION GROWTH IN CORRIDOR



LEGEND.

-  Priority Towns.
-  Non Priority Towns.
-  Corridors.

Corridor Population Figures For Priority Towns Only, Excluding Delhi.



NATIONAL CAPITAL REGION

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standards of community facilities and services do play a major role in shaping the future type of development.

Studies on density patterns indicate that density gives a measure of the intensity of occupation of land or in other words, the intensity at which land could be developed on a comparative basis for assessment of living standards. Density also establishes a distinct relationship between the standard of services to be provided and the amount of land that needs to be provided with such facilities in the context of a particular set of local circumstances. Density has a significant bearing on the cost of development. In view of this, it is imperative that in urban development, densities have to be rationalised in order to gain economic support for the policy of dispersal.

In the core of Metropolitan Delhi, where a case for re-densification has been made in the Master Plan for Delhi with densities of 494 persons per hectare (200 ppa) and above, a judicious mixing of multi-storey buildings and four storey buildings, with small pockets of two and half storey construction should be considered within the overall purview of densities and land use suggested in the Master Plan. However, a correct assessment can only be made by a review of such factors like housing and work-place, transportation network, investment in land development and housing etc., within the technological feasibilities. This holds good for the core areas of other towns in the Region.

From the point of view of cost mainly as a comparative investment for developing outlying areas in Delhi, Meerut and other small towns in the Region (as recommended in the NCR study*) it would be essential (i) to develop outlying areas in Delhi at densities varying from 371 to 494 persons per hectare (150 to 200 ppa) in four and two storeys with a judicious mixing of point blocks; (ii) to develop a density of 309 persons per hectare (125 ppa) in a city like Meerut and (iii) 247 persons per hectare (100 ppa) in other small towns in the Region. This pattern would ensure comparatively cheaper and economical investment, e.g. for a 30,000 population diverted from Delhi and housed in Meerut, a 309 persons per hectare (125 ppa) development would involve a savings of Rs. 200 lakhs. Similarly, to optimise investment by the public sector, and to achieve economy in the overall development of urban areas in the Region, it is imperative to have an optimum density of 247 persons per hectare (100 ppa) in smaller towns in the Region which would also result in similar savings.

Protection of freshness of air, water and land:
The rapid increase in urbanisation and industrialisation in the Region and the increasing trend towards pollution due to these two factors, necessitates measures to be initiated to prevent large scale despoilation of land, air and water and consequent environmental health hazards. Pollution is tending to become a regional rather than a local problem.
* "Density Patterns in the NCR - Cost & Investment Criteria", TCPO, February 1969.

This calls for immediate attention to be paid to 80 per cent purification of water for drinking purposes and the efficient treatment of sewage and its disposal. Together with these, measures to effectively treat industrial effluent and diminish the hazards due to industrial smoke and other nuisances are also required to be taken. Hence, organisations for the quality control of water supply, sewage disposal and industrial nuisance control will have to be set up and standards and regulations on a uniform basis for the whole Region will have to be drawn up and enforced.

Land for Regional Recreational purposes:

Recreation as an amenity in the Region has to meet four competing types of demand: from the urban population of the Region using the countryside as an amenity, from a wider urban population coming to the Region for selective recreational purposes, from the agricultural community whose demands will slowly emerge and from the continuing physical development of the Region itself. How this demand is to be met and the proposals regarding recreational areas are given in Chapter VII.

The land use policy on recreational areas will meet the demand in the following way:

- (i) Areas of general level amenity as regional parks in the proximity of the Metropolis.
- (ii) River fronts as recreational areas by developing them and making them more accessible for such use.

(iii) Historical monuments as tourist attractions.

(iv) Parks in rural areas noted for their landscape and scenic beauty which could be used as picnic spots.

(v) National parks in the vicinity of the Region.

These recreational uses should be recognised as an amenity at the regional level and land will have to be acquired and developed in a phased manner. In addition, recreational amenities should be available within the urban centres and rural settlements in the form of the open space system. Such an urban open space system has been provided in the Master Plan for Delhi and is now being developed. This would offer recreational amenities of a substantial nature in the form of playing fields, parks and landscaped areas. These amenities will also be available to the inhabitants of the other urban centres and the rural population on a limited scale. The distinction between these open spaces and the other recreational areas in the Region is one of scale and intensity of use. In addition the vast agricultural areas of the Region should not be allowed to be eroded by indiscriminate uses. This, together with the preservation of the existing flora and a vigorous afforestation policy would provide the needed environmental freshness in the Region. These will have to be ensured by legislative measures and administrative actions.

Legislative Measures for Land Use Control:

Implementation of the Regional Plan for NCR depends on the existence of:

- (i) Adequate and effective planning legislation.
- (ii) Proper and efficient organization and administration.
- (iii) Adequate financial support and budgetary arrangements.

As it exists at present, at the State level there is no comprehensive legislation for the preparation of a Regional Plan or a Sub-Regional Plan. The present Regional Plan has been prepared under the direction of the High Power Board set by the Government of India to co-ordinate Town & Regional Planning activities in and around the National Capital and to formulate and implement development plans for the Delhi Metropolitan Area and the National Capital Region. The High Power Board being an advisory body, the Regional Plan is not mandatory. However, since the Chief Ministers of the concerned States and the Representative of the Union Territory of Delhi are Members of the High Power Board, which has the Union Minister for Home Affairs as its Chairman, the Regional Plan when approved by the High Power Board becomes the responsibility of the participating governments. Its enforcement and implementation will have to be carried out by them with the help of the existing legislative measures available and by administrative action. This is a piece-meal approach and a thoroughly unsatisfactory process devoid of comprehensiveness in its totality. While measures to remedy this by the creation of a Statutory Regional Board has been suggested in Chapter IX as the "next steps" here in

this chapter, ways and means of using the existing legislative framework and organization set-up are suggested as follows:

1. To tackle the problem of unauthorised colonisation and sub-division of land for speculative purposes, which has assumed staggering proportions in Delhi and in the adjoining areas in the States of Haryana and Uttar Pradesh, two steps will have to be taken. First, to prepare Master Plans for the 17 priority towns in the Region. Secondly, with a view to check speculative and unauthorised sub-division of land within the master plan areas, as well as in its vicinity and in the countryside, the following legal measures have to be taken:-

- (i) Registration and licensing of colonisation as a trade.
- (ii) Reforms in municipal and other acts to incorporate new legal provisions to curb unauthorised sub-division.
- (iii) Using the existing legislation on "Prevention of Ribbon Development Acts along Highways".
- (iv) Using periphery control acts around urban centres.
- (v) Introducing a ceiling and floor for the sub-division of agriculture land by suitably amending the present agrarian laws in the States.

2. More effective use of existing legal provisions for the preparation of master plans or urban development plans have to be resorted to. Thus, in the Haryana Sub-region, the "Scheduled Roads and Controlled Areas Restriction of Un-regulated Development Act, 1963" should be applied around 8 kms. of existing priority towns along the highways in order to prepare Master Plans for these towns and regulate development on the basis of the recommendation of the Regional Plan. Development inside the existing urban centres will have to be, however, controlled with the aid of the "Punjab Municipal Act, 1911" and the "Punjab Town Improvement Act, 1922" as applicable to the State of Haryana. In the Rajasthan Sub-region, Master Plans could be prepared under the Rajasthan Urban Improvement Act of 1959 with such other amendments as are being pushed through at present. In the U.P. Sub-region, under the "Regulation of Building Operations Act, 1968", Master Plans for the priority towns should be prepared. Also certain critical areas which are potential areas for development have to be protected by the application of the above Act by declaring them as 'controlled areas'. This will also have to be done for certain other critical areas which are not suitable for development but are often sub-divided on paper for speculative purposes. In the Union Territory of Delhi, where the Master Plan for Delhi is under operation, effective legislation in the Delhi Development Act of 1957 is available but steps to curb speculative sub-division, as suggested in 1(i) above have to be adopted. In all the Sub-regions proper organizational set up for the

control of land use and the enforcement of Master Plans and a modicum of enforcement staff should be created.

3. Under the present planning legislation, except perhaps in the Union Territory of Delhi, the Regional Plan cannot be implemented as a regional development programme as such. Separate schemes will have to be prepared and dovetailed into the State Five Year Plans under the various budgetary heads: for example, schemes for urban water supply and sewerage, for land development, for augmenting education, health and other facilities etc. In the U.P. Sub-region, the present Ghaziabad 'Regulated Area' may be extended to cover Hapur and Modinagar and the present Ghaziabad Improvement Trust, which has done useful work, should be delegated powers to carry out urban development programmes in these areas. This will entail up-grading of its functions and financial resources. Meerut should have its own Improvement Trust with enhanced financial resources. Similarly the Urban Estates Department of Haryana could undertake programmes in all the priority towns. In the Rajasthan Sub-region, this could be done by the Improvement Trusts of the respective towns. In the Union Territory of Delhi, the Delhi Development Authority can also undertake development work in Narela and Najafgarh towns besides the work which is being done for Delhi.

4. Another task would be to evolve uniform standards for urban-development in the priority towns which need not necessarily be as high as in Delhi but should be uniformly of a high

standard in order to make these towns attractive enough for the dispersal of population. This calls for a uniform regional land use policy of acquisition, development and disposal.

5. The Regional Plan in its implementation by the respective State Governments will require to be detailed out and precise plans within the framework of the Regional Plan will have to be prepared. In this process constant mutual collaboration and consultations between the State Governments, and the Delhi Administration on the one hand and the Town & Country Planning Organisation on the other, would be necessary. The "Planning Advisory Committee" set up by the High Power Board should be made an effective instrument in the co-ordination of the Regional Plan proposals. Thus, it will have to take particular note of matters affecting industrial location, development of 'priority towns', major road and highway networks including construction of new bridges, interstate water supply and drainage and development of regional recreational areas. For this purpose, the plans prepared for these should be scrutinised by the Planning Advisory Committee to ensure conformity with the Regional Plan. It should also give attention to the enforcement and implementation of these plans. General approval of the financial outlays and its inclusion in the Five Year and Annual Plans should be made by the Planning Advisory Committee in order to ensure co-ordinated and

integrated implementation of the regional proposals. This will be facilitated by treating the National Capital Region as a 'special area' requiring more than ordinary accommodation on the part of Planning Commission, Ministries of the Government of India, as well as the State Governments.

6. However, all these measures are of a piece-meal character and would not be comprehensive enough to effectively channelise development to conform to the growth pattern envisaged in the Regional Plan and more specifically the land use policy. Comprehensive legislation for a Statutory Regional Planning Board and development programmes with its concomitant Revolving Fund are dealt within succeeding Chapter IX.

*It is necessary to create larger planning regions and to provide by law that the plans formulated by the regional authority are implemented by the local authority or authorities. Planning to be effective requires the full legal structure for formulation and implementation" p. 399. Fourth Five Year Plan 1969-74. Planning Commission, Government of India, New Delhi.

The Regional Imperative:

In order to maximise economic activity, it has been stated before, that one of the goals of regional planning is to achieve an integrated and co-ordinated development of water supply for drinking purposes and irrigation, drainage, flood control measures and power supply, as well as the provision of housing and regional community facilities within a broad regional framework. In Chapter II the problems involved in an integrated regional development have been broadly dealt with in order to define the scope of regional planning in the NCR. Here, in this Chapter, problems requiring action on a regional basis are identified and measures and programmes are recommended to tackle them with a view to realising the overall objectives of the Regional Plan.

Climate as a Factor for Developmental Activities in the NCR:

The entire Region experiences a hot and dry summer from mid-March to June, a cold and dry winter (with occasional showers) from December to February and a hot and humid rainy season from July to September. The rainfall of 25-50 cms. (10-20 inches) in the west (Haryana and Rajasthan Sub-regions) and 75-150 cms. (30 - 60 inches) in the Ganga-Yamuna Doab (Meerut and Bulandshahr districts), and about 60 cms. (25 inches) in the Union Territory of Delhi, gives a fairly wide range of rainfall variations in the NCR from west to east, which puts a natural constraint to intensive agricultural developments within the Region. Even though the land is productive, agriculture will

CHAPTER VII

COMMUNITY FACILITIES, UTILITIES AND SERVICES

not flourish unless dependable means of all weather irrigation facilities are provided. The scanty rainfall in the western reserves being available either for agriculture or for drinking purposes. Development in most sectors of the NCR, therefore, has to meet its water requirements from the adjacent areas outside the Region.

The highest temperature in the NCR varies between 39.2°C to 44.3°C during summer and 25.1°C to 29.6°C during winter; while, the lowest temperature ranges between 14.3°C to 23.6°C during summer and 3.0°C to 6.1°C during winter. Such a variation in temperature makes the Region experience extremes of climate during the summer and winter months. Housing constructions in the NCR, has to suit the climatic conditions, i.e., the houses have to be kept warm and cosy during the winter and at the same time have to be provided with open and unobstructed ventilation as well as minimum of exposure to the sun during the summer. A compromise between a compact housing unit and an open unit has to be evolved for the design of houses. The wind directions, in the NCR, varies from an easterly direction during the summer and the rainy season (which brings the monsoon) to a north-westerly direction during the winter, with occasional interruptions of hot dust-storms from the low pressure areas of the Rajasthan desert from the west during May-June, and cold chilly winds from the north during December and January.

∟ half of the NCR, presents little possibility of water.

Rainfall, within the NCR, is brought by the monsoon winds from the east. Rains occur in concentrated downpours, which bring about large scale flooding because of the inadequate water-carrying capacity of the drainage channels and drainage systems, particularly in Haryana and Delhi. Repetition of this phenomenon of flooding every year during the rainy season, renders most of the areas unsuitable for developments without comprehensive and dependable drainage programmes and projects.

Summer, in every part of the NCR, is hot and dry. The shallow and surface water reserves become parched and dry. Parts of the Region lying west of the Yamuna, are generally enveloped by hot, sandy dust-storms. This introduces a climatic phenomenon, which forces many people in some parts of the south-west to a pastoral life. This further aggravates the conditions because over-grazing denudes the soil of even the scanty vegetation.

The NCR has to develop its land resources within the frame work of the existing climatic constraints, in order to serve the full benefits to the people living in the Region. Winter, in the NCR, is a boon to agriculture. But the summer, as well as the rainy season, brings in its wake natural problems in various parts of the Region, which require to be tackled for a full utilisation of the land resources.

General Characteristics of Water Sources in the Region:

Rainfall in the Region being scanty, the two rivers Yamuna and Ganga, as well as the

sub-surface reserves of water tapped by means of tubewells wherever the conditions are favourable are the sources of water supply in the Region.

The area to the west of the Yamuna has, as a rule, scanty reserves of sub-surface water; and, where these exist, evaporation of sub-soil water through capillary action is generally prominent. This results in higher saline contents in the porous layers below the surface which, in turn, increase the salinity of the sub-surface water. The area having brackish to saline are distributed almost all over Haryana (including portions in the NCR) with localised and significantly limited reserves of sweet water encountered nearer the Yamuna flood plains and inside the inter-bedded porous layers along the Aravalli ridges. The axis along which sub-surface reserves of sweet water are encountered have provided the base for the existing population settlements of various sizes. Towns like Panipat and Sonapat in Rohtak district, Faridabad, Ballabgarh, Palwal and Hodal in Gurgaon district have grown in a belt having sweet water reserves. A separate stretch with limited reserves of sweet sub-surface water is found along the Aravalli ridges which forms the basic source for drinking water supply to towns like Gurgaon, Pataudi, Nuh etc. The sweet water reserves over the Aravalli ridges are trapped inside the inter-bedded porous layer of felspar found present in the granite strata of the Aravallis which do not permit direct evaporation of the sub-surface water.

The Exploratory Tube well Organization of the Government of India had also carried out underground surveys for Gurgaon district and have reported that large quantities of sweet and potable water are available in Dahina - Zainabad - Darauli area. In addition, a sweet water belt capable of giving small quantities of water through open wells also exists along the foot of the ridge from Gurgaon to Sohna towards Ferozpur Jhirka. Some sweet water wells have also been encountered on the banks of the Sahibi Nadi; but in Gurgaon district the sub-soil water is generally brackish and unfit for human consumption. (See Map 7.1.1).

In Meerut and Bulandshahr districts of Uttar Pradesh, which lie east of the Yamuna, the sub-surface water is found to be generally sweet and suitable for domestic and other uses. However, brackish sub-surface water is found in some parts of the low flood plains of the Ganga, along its western bank and also in the low and marshy lands between the eastern bank of the Yamuna and Ghaziabad which are subjected to inundations during rainy season. The sub-surface reserves of sweet water have so far been dependable sources of water supply; in both Meerut and Bulandshahr districts of Uttar Pradesh.

In the absence of detailed surveys of the quality and the quantity of the surface and sub-surface reserves of water, it is rather difficult to assess the adequacy of the various sources of water supply in the National Capital Region. For Regional development such a survey and assessment and thereafter a programme

for the provision of safe water supply for domestic as well as industrial and agricultural consumption is very much needed. The exploitation of the available resources of water supply from surface sources, in order to meet the existing requirements and to ensure the growing demands of water supply in the National Capital Region, requires inter-state co-operation and shall have to be tackled on a regional basis. Attempt is made in this section to assess, in general, the problems of the regional water supply for irrigation, for drinking purposes and for industrial consumption.

1. Regional Water Supply for Drinking Purposes:

Sources of Water Supply: The existing sources of drinking water supply include the surface water resources as well as the sub-surface reserve.

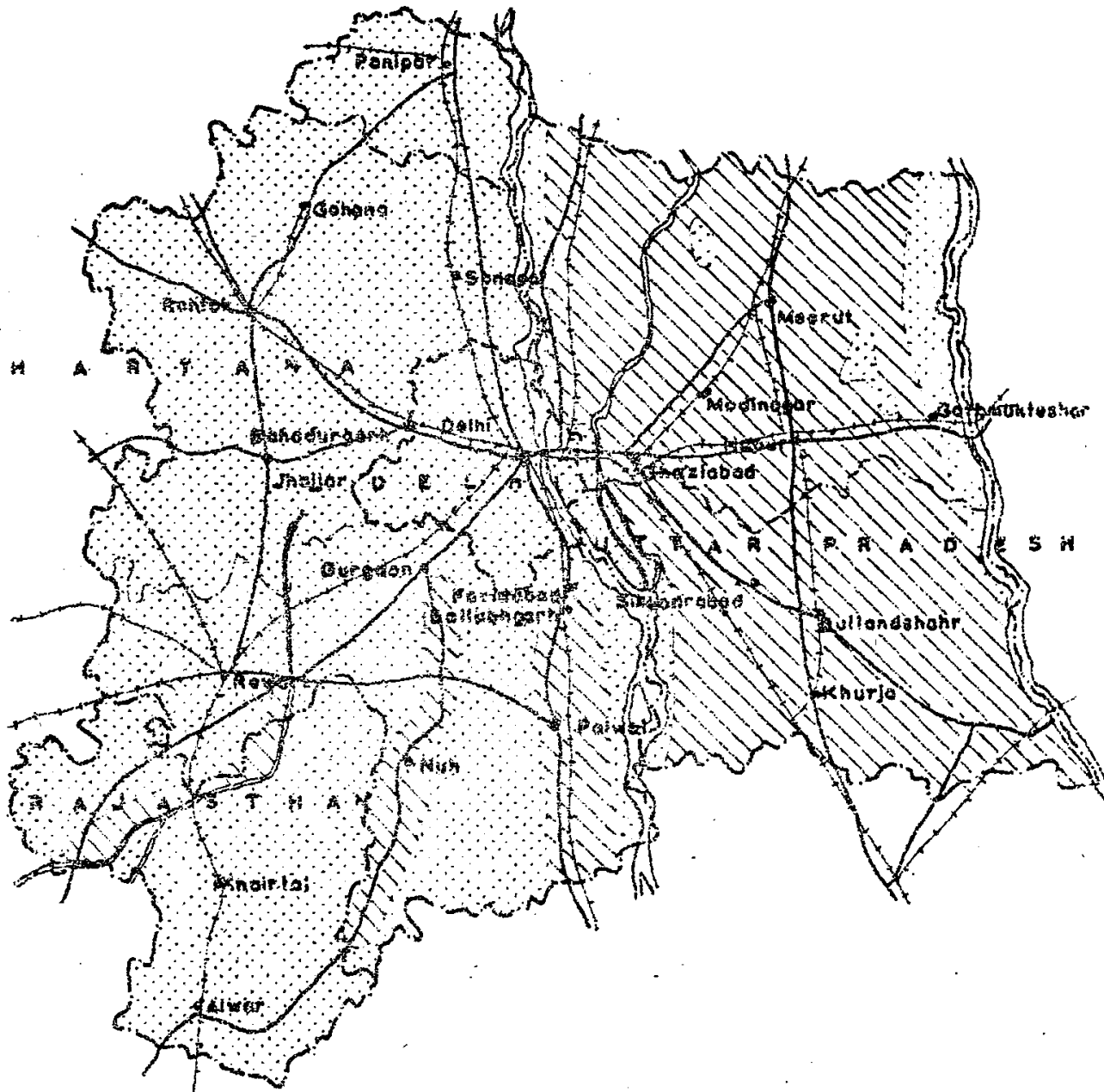
Surface Water Resources: The main sources of the existing surface water supply in the NCR is the river Yamuna which provides the bulk of the water supply (of about 146 m.g.d.) for the Delhi Urban Area. Other surface resources for the supply of drinking water include the river Ganga and some of the irrigation canals, namely, the Eastern and Western Yamuna Canals, the Upper Ganga Canal and the Hindon Cut. However, very little water from these resources are actually used for drinking purposes. There appears to be sufficiently large scope for utilizing the Ganga waters and the existing irrigation canal system to meet the existing deficiency, as well as the

growing demand for drinking water supply inside the Region.



Sub-surface Water Reserves: In the Delhi Urban Area sub-surface water is used to supplement the city's drinking water requirements to the extent of four million gallons per day, with the help of 25 tube wells which are in operation. However, the Geological Survey of India and the Municipal Corporation of Delhi have indicated that Delhi cannot get substantial supply of water from tubewells. The MCD is investigating the possibility of tapping ground water through deep infiltration galleries in the bed of the river Yamuna. Even this source, it is stated, will not give any substantial supply.

The reserves of sub-surface water lifted by tubewells and hand-pumps form the main source of drinking water supply to the towns as well as the village abadis within the NCR. The portion of the NCR in Uttar Pradesh located east of the Yamuna, are totally dependant on sub-surface supply for drinking purposes. The reserves of sub-surface water in Meerut and Bulandshahr districts are adequate in quantity and are generally sweet and suitable for drinking purposes. The supply of drinking water through tubewells has generally proved cheaper and more dependable. The problem arises in cases where argumentation in the capacity of the supply is needed. It is interesting to note that even parts of the Delhi Urban Area, lying east of the Yamuna, are presently being supplied with water for domestic uses from sub-surface sources only. Table 7.1.1. shows the municipal

WATER ZONES



LEGEND

-  Brackish To Saline
-  Sweet



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Table 7.1.1

Water Supply in Towns East of the Yamuna

Sl. No.	Urban Area	Popula- tion 1961	Exist- ing Mu- nicipal water supply lakhs mld	Exist- ing Mu- nicipal water supply mgd	Existing Water Sources		
					Canals	Tube wells	Hand pumps
1.	Delhi Shahdra.	-	18.1	4.0		X	X
2.	Meerut	2.84	25.4	5.6	X	X	X
3.	Ghazia bad	0.70	5.0	1.1		X	X
4.	Hapur	0.55	3.6	0.8		X	X
5.	Buland shahr	0.44	7.8	1.5		X	X
6.	Khurja	0.41	3.2	0.7		X	X
7.	Modina gar	0.24	1.8	0.4		X	X
8.	Sikan drabad	0.26	1.8	0.4		X	X

Source: Town and Country Planning Depart-
ment, Government of Uttar Pradesh
except item 1.

Table 7.1.2

Water Supply in Towns West of the Yamuna

Sl. No.	Urban Area	Popu- lation 1961	Exist- ing Mu- nicipal water supply lakhs mld	Exist- ing Mu- nicipal water supply mgd	Existing Water Sources		
					Canals	Tube wells	Shal- low Hand Pumps
1.	Rohtak	0.88			X		X
2.	Pani- pat	0.67				X	X
3.	Farida bad	0.51				X	X
4.	Sone- pat	0.45	1.4	0.3		X	X
5.	Gurgaon	0.38	0.9	0.2			X X
6.	Rewari	0.37					X X
7.	Palwal	0.28				X	X X
8.	Behadur garh	0.15	0.5	0.1		X	X
9.	Ballab garh	0.08				X	X

Source: Town Planning Department, Government
of Haryana. (The quantity of water
supply to many of the towns was not
available)

water supply and the sources of drinking water in some of the important urban centres of the NCR located east of the Yamuna. (Map 7.1.2).

In certain portions of the NCR west of the Yamuna, the reserves of sub-surface water are small and mostly brackish to saline in quality rendering it difficult to depend upon these sources for domestic consumption. However, there are patches of sweet water zones suitable for domestic consumption where population settlements have consequently come up as in Faridabad and Panipat. But in general due to the receipt of scanty rainfall, the reserves are obviously limited and the tubewells go dry in many localities during the dry season (April to June). Thus, the sub-surface supply of water in these areas is not dependable and insufficient to cope up with the growing demands. Table 7.1.2. gives the water supply in some important towns of the NCR located west of the Yamuna and the sources of drinking water.

Regional Drinking Water Requirements:

For Urban Delhi: The main source of water supply to Urban Delhi is the river Yamuna. It is also fed to a small extent by the Sutlej system in the north. The Hindon river running east of the Yamuna supplies water to the Hindon Cut which discharges into the Yamuna between Wazirabad and the Okhla Barrages. Table 7.1.3 gives the rated capacity of the supply of water in Urban Delhi.

Table 7.1.3.

Water Supply in Urban Delhi.

Sl. No.	Water Works	Existing capacity	Remarks
1	2	3 m.l.d.	4 m.g.d.
1.	Chandrawal	407.7	50
2a)	Wazirabad	181.2	40
b)	-do-	45.3	10 (Only 10 m.g.d. out of a total capacity of 40 is supplied)
3.	Okhla	27.1	6 (Likely to be given up).
4.	Tubewells supply to Shahdara.	18.1	4
<u>Total</u>		<u>679.4</u>	<u>150</u>
5.	Raw water from Raj Ghat.	172.1	38 (Used for horticulture but this is a source of health hazard).
<u>Source: Water Supply Undertaking, Municipal Corporation of Delhi.</u>			

The above supply of water gives an average of 181.2 litres (4) gallons) of filtered water per capita per day. The supply, however, drops during the summer months when the Yamuna carries

a very low surface flow especially for about 100 days from April to June. As such during this period some water is released from the Western Yamuna Canal. During this period while there is a general shortage of water supply, some areas of Delhi in the south and south-west suffer from an acute shortage. The Wazirabad Barrage with the Chandrawal and Wazirabad water works at the northern end of the city are the main supply points with three pumping stations located upstream. The Okhla Barrage is located a few kilometres down-stream where a pumping station and water works were installed in 1952 which now supply on an average about 27.1 million litres (6 million gallons) per day.

The supply of water during the dry summer months at Wazirabad entails an arrangement with the Haryana Government, which has not proved very satisfactory. The quality of water supply from the Okhla Water Works has occasionally not been upto the standard. The adhoc arrangement with the U.P. Government for the supply of water to this water works has been found unsatisfactory.

Due to recent pollution at the Okhla water works, it has been tentatively decided to close this down.

The Naskar Committee set up by the Government of India, Ministry of Health gave its recommendation in 1965 on the requirements of drinking water for Delhi. This was based on two assumptions. First that the per capita requirement should be of the order of 317.8 litres (70 gallons) per day consisting of 50 gallons for domestic use and 90.8 litres (20 gallons) for industrial and other uses. Secondly, it assumed that the trend of rapid population growth would continue upto the year 2,000 when Urban Delhi would reach a figure of 100 lakhs. The water requirements of Urban Delhi based on these two assumptions are given in Table 7.1.4

Table 7.1.4

Naskar Committee Recommendations on
Water Requirements of Urban Delhi

Year	Population in lakhs	Total Water requirements		
		m.l.d.	m.g.d.	cusecs
1956	30.5	1,241.2	274	508
1971	40.0	1,304.6	288	532
1975	52.0	1,658.0	366	679
1981	63.0	2,079.3	459	841
2001	100.0	3,470.0	756	1,418

It has been stated earlier that there are several constraints to the unlimited growth of Delhi. Water will be a critical determining factor. Table 7.1.5 gives the average per capita water supply in some of the important cities of India which varies roughly between 68 to 226 litres (15 to 50 gallons) per capita per day. The supply position in other towns is even worse. The resources needed for augmenting the water supply on a country-wide basis for all the towns as well as to the rural areas would be enormous. It would be futile to expect funds to be available to Urban Delhi to provide water at the rate of 318 litres (70 gallons) per capita per day. It may be seen that for a population of 38 lakhs in 1969 the supply is only 662.8 million litres (146 million gallons) per day of treated water as against nearly 1225.8 m.l.d. litres (270 mgd) envisaged in the Naskar Committee Report.

Table 7.1.5

Per Capita Water Supply in Towns

Towns	Litres/day	Gals/day
1. Bombay	249.7	55
2. Calcutta	136.2	30
3. Madras	81.7	18
4. Nagpur	116.0	25
5. Kanpur	168.0	37
6. Varanasi	181.2	40
7. Delhi	213.4	47
8. Allahabad	199.8	44
9. Agra	136.2	30
10. Ahmedabad	190.7	42
11. Bangalore	86.3	19
12. Hyderabad	136.2	30
13. Indore	116.0	25
14. Jabalpur	116.0	25
15. Lucknow	222.5	49
16. Patna	213.4	47
17. Gwalior	99.9	22

Source: Committee Report on Rural Urban Relationship, Government of India, Ministry of Health, 1966.

In the coming decade agriculture would be increasingly competing for the use of water and Delhi would not be able to secure water for drinking purposes on such large scale. The Regional Plan has made it clear that the rapid growth of Delhi will pose many problems and the regional imperatives make it necessary that the future growth should be at a lower rate in order to maximise the economic growth in the Region on the one hand and provide for orderly growth and better amenities to the population of the National Capital on the other. This premise has to be accepted and a more rational water development programme has to be worked out based on realistic standards as far as the per capita consumption is concerned but the quality of water provided should be of a higher standard than now obtaining. Also, as far as Urban Delhi is concerned, more attention has to be paid to the development of the water distribution system, keeping in mind the growth of the city in relation to the development of the priority area. Hence, there is a need for a Master Plan for the supply of water for Urban Delhi which should take care not only of the development of the water sources but also the distribution system, with a phased programme for its development.

The per capita water requirements of Urban Delhi may be raised from the existing 181 litres (40 gallons) per day to 227 litres (50 gallons) per day by the year 1981 and thereafter efforts may be made to raise it to 318 litres (70 gallons) per day as envisaged in the Naskar Committee Report. It may be pointed out that the Regional Plan has recommended that Urban Delhi will not encourage water based

industries and hence the requirements of water for industries may not be of a high order. Based on this standard the requirements of water for a population of 53 lakhs in 1981 as envisaged in the Regional Plan would be of the order of 1,203 m.l.d. (265 m.g.d.)

Requirements of drinking water for the whole Region: Any proposal for regional development which does not make provision for the supply of drinking water is bound to fail. Water supply is one of the crucial items of the required infrastructure for the development of urban centres because without safe water sources and a unified network of water supply large scale development cannot be successfully planned. One of the points in favour of dispersal of population away from Delhi is that lower standard of services can be provided in the regional towns at lesser cost. Table 7.1.6 gives the proposed per capita water supply in the National Capital Region. In the regional towns per capita requirements for industrial and commercial purposes has been estimated at 27.2 litres (6 gallons) per day. In towns like Faridabad, Sonapat, Panipat Ghaziabad, Mojnagar and Meerut the water requirements for industries would be substantial, but their requirements for commercial purpose would be correspondingly lower. Hence, the proposed figure would be adequate. However, in drawing up a city development programmes the water requirements of each town will have to be properly assessed in advance so as to have a realistic estimate of the regional requirements. Table 7.1.7 gives the total requirements of water for drinking purposes in the National Capital Region by 1981 based on the development pattern recommended in

the Regional Plan. This gives a total requirement of about 2,724 m.l.d. (600 m.g.d.) with a break-up of 1,203.1 m.l.d. (265 m.g.d.) for Urban Delhi 726.4 m.l.d. (160 m.g.d.) for the other towns of NCR and a slightly larger amount for the rural settlements. The financial outlay in the next decade should be geared to develop the sources of drinking water supply, as well as for the distribution of water in the pattern envisaged. It would be wrong to plan for a larger water supply for Delhi as it would involve not only a higher outlay but also deprive the other urban centres of water, thereby preventing them from growing to a larger size.

Table 7.1.6

Proposed Per Capital Requirements in the NCR.

Type of supply	Requirements gals/day by 1981		Requirements gals/day by 2,000 A.D.			
	Urban Delhi	Regional towns	Rural hab-dis	Urban Delhi	Regional towns	Rural hab-dis
Domestic	35	30	15	45	35	20
Commercial & industrial	10	6	-	15	10	-
Fire and other uses	5	4	-	10	5	-
Total in gals.	50	40	15	70	50	20
Total in litres	226.4	181.1	62.9	317.1	226.4	90.6

Table 7.1.7.

Drinking Water Requirements for 1981 in the NCR.

Type of settlement	Proposed population (lakhs)	Per capita requirement (litres/gals/m/day)	Total requirements (litres/m.gals./day)
Urban Delhi	55	226.2	1,203.1
Regional towns	40	181.2	726.4
Rural areas	118	67.9	803.6
Total	211	175	2,733.1

Proposals for Drinking Water Supply:

1. Expeditious development of water sources and distribution system: In India, as well as in the other parts of the world, there is a keen competition for water supply for various uses such as irrigation, industry, mining and drinking purposes. In the context of the balanced development of the National Capital Region, it is imperative to deal with the problem of drinking water supply in an unified manner for the Region as a whole. It is essential to lay down long range programmes for meeting the requirements of drinking water supply for a systematic development of the National Capital Region. First, the demands of water should be optimised by a proper distribution of urban settlements in the Region. Secondly,

the major future sources for augmenting water supply are the Ramganga Project, the Beas Sutlej Link Project, Dhauj and Kot Water Reservoir Project to impound monsoon water and the Kesheu Project. (Map 7.1.3 and Table 7.1.8). There are other sources like tubewells which may yield water for the interim period but cannot be relied upon on a long term basis. These sources have to be developed to ensure drinking water for the NCR. Thirdly, plans should be drawn up for a co-ordinated distribution of water from its sources as well as efficient distribution in Urban Delhi, regional towns and the rural areas of the NCR.

(i) Ramganga Project:

When the Ramganga Project is completed in 1971 the Government of Uttar Pradesh has agreed to supply 200 cusecs through the Hindon Cut to Delhi. Under this Project there is a proposal to construct at an estimated cost of Rs. 6.7 crores a filtration plant on the eastern side of the Yamuna for the urban areas of Delhi east of the river. So far no work has been started on this project. But when this project is completed by 1974, Delhi will receive about 454 m.l.g. (100 m.g.d.) of water. This will require further negotiations between the Delhi Administration and the Government of Uttar Pradesh as to the point of delivery, etc.

The possibility of using water from the Ramganga Project for supplying drinking water to the towns of Meerut district will also have to be considered by the Government of Uttar Pradesh as it would be unwise to rely entirely

on tubewell supply for the cities of Meerut, Ghaziabad, Hapur and Modinagar where nearly 14 lakh population are envisaged by 1981. The three towns of Bulandshahr, Khurja and Sikandrabad in Bulandshahr district could have an integrated water supply scheme from the Eastern Yamuna Canal.

(ii) Bhakra source (Beas-Sutlej Link)*

At present 325 cusecs of water are being made available to Delhi at Wazirabad from Bhakra sources (Beas-Sutlej link) through the Western Yamuna Canal. The Sutlej water is being fed into the river Yamuna at Moonka point about 160 km. (100 miles) up-stream. After the completion of the Mangla dam in Pakistan, some more water from the Ravi and the Beas rivers is expected to be available for Delhi. The share of Delhi in the water supply from the Beas-Sutlej link project is 0.119 million acre ft. out of the total of 7.2 million acre ft. allotted to Punjab. It is suggested that as there is an acute shortage of supply for Delhi for only a 100 days during the year, negotiations could be made with the Bhakra and Beas Board for the release of 0.119 million acre ft. of water in the period during the months of April, May and June, instead of spreading it over a 9 month period as now agreed to by the Board. With this arrangement it would be possible to obtain about 400 cusecs of water, excluding the losses at Wazirabad throughout the year.

*C.W.P.C. - Note No.Dlh.67/66-UT(FFU) dated 4th December, 1967 on requirements of water supply to Delhi.

Table 7.1.8

Drinking Water Supply Projects

Sl. No.	Water Sources	Quantum of water to Urban Delhi		Remarks
		m.l.d.	m.g.d.	
1	2	3	4	5
1.	Ram Ganga Project	454.0	100	Final agreement still pending. This could serve as an additional source to augment the water supplies to towns in the U.P. Sub-region, presently served by tube wells.
2.	Bhakra & Beas-Sutlej Project	908.0	200	Negotiation is still going on.
3.	Keshav Project	794.5	175	Negotiation has not yet been started. This could serve as a source for the towns of the Haryana Sub-region as well.
4.	Bhauj and Kot	454.0	100	This project is being actively considered & could also serve as a source for Faridabad-Ballabgarh in Haryana.
5.	Other Sources	454.0	100	Still in the negotiating and investigating stage.
	1. Exchange of Okhla effluent			
	2. Tubewells in Loni etc.			
	3. Tubewells in Yamuna river bed.			
	Total	3,064.5	675	

Please see map 7.1.3 for the location of the sources.

(iii) Keshau Project:

Keshau dam is proposed on the Tons tributary of the river Yamuna. It has been recently reported that the first phase of its construction is to be completed in the Fourth Plan period. The Delhi Administration should negotiate with the Governments of Uttar Pradesh and Haryana, who are planning this as a joint project to earmark at least 350 cusecs for drinking water supply to Delhi.

The Government of Haryana should actively consider and draw up projects for supplying drinking water to the towns of the Sub-region. The failure to plan in this respect poses a major danger to the continued growth of the urban areas in the Haryana Sub-region which as stated earlier are handicapped by brackish and saline sub-surface water sources. If suitable link canals are built the canal network in this Sub-region will provide a good distributory system for the supply of water to the various towns in the NCR.

(iv) Storage of monsoon water in reservoirs at Dhauj and Kct:

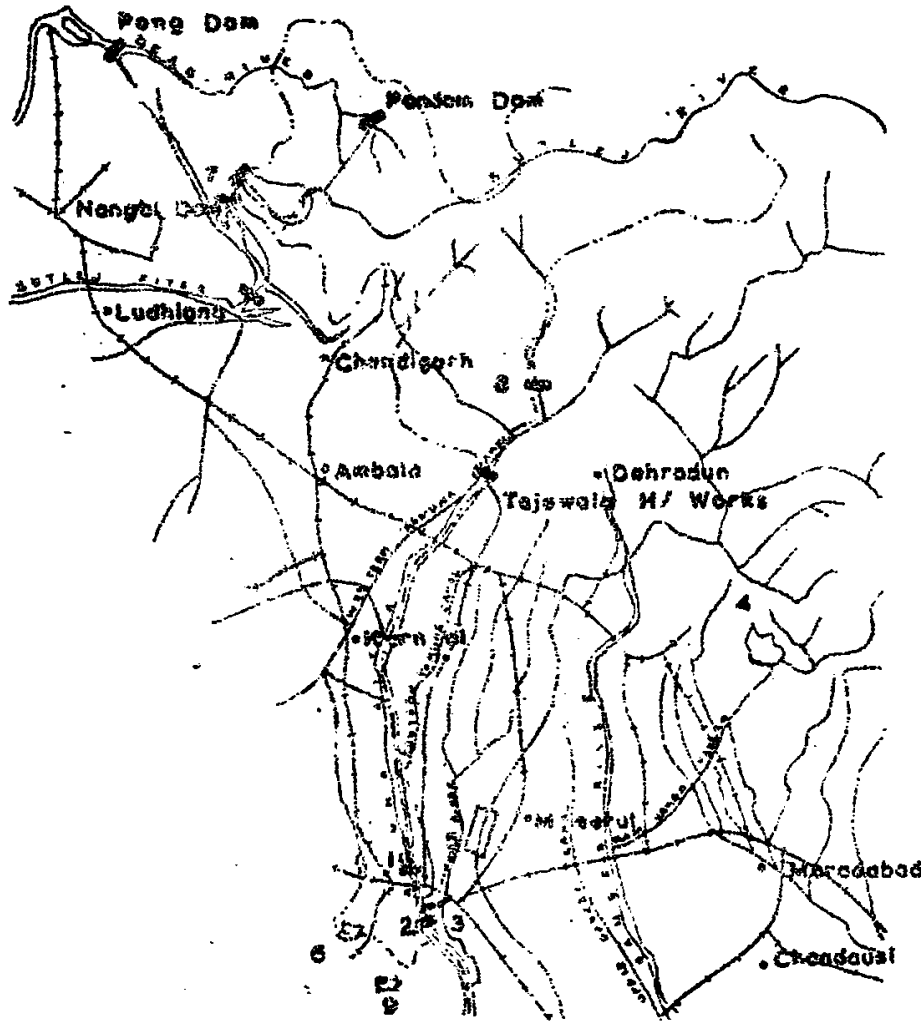
For the supply of water to Urban Delhi investigations and studies have been made for the creation of reservoirs at Dhauj and Kct, by the construction of dams at the mouth of the natural gullies along the eastern edges of the Aravalli ranges in the vicinity of Faridabad and Ballabgarh in Haryana. It is proposed to store water in these reservoirs during the monsoon months by pumping water

from the Yamuna. The estimated cost of this project is about 24 crores including a filtration and treatment plant. A preliminary feasibility report of this project has been prepared according to which it will be possible to obtain raw water supply of nearly 200 cusecs in the first stage or about 454 million litres (100 million gallons) per day at the filtration point near Badarpur. In the second stage, it will be possible to double the raw water supply from this source to 908 m.l.d. (200 m.g.d.). This source could also serve the Faridabad-Ballabgarh complex in future as it would not be prudent to rely entirely on tubewell supply, especially, when the population of this complex is bound to reach several lakhs.

(v) Other sources:

One of the possible sources of water supply for Urban Delhi is the exchange of water up-stream with the Government of Haryana in return for the effluent from the Okhla sewage plant. Another source is the tubewells in the Loni and Ghaziabad area of U.P. The third is the tubewells in the sandy river bed of the Yamuna. Some of the regional towns and the entire rural area can best be served by tubewells, except for those abadis, lying on the distributory system to be planned for serving the bigger urban centres. These can be easily fed from the distributory.

EXISTING & POTENTIAL SOURCES OF DRINKING WATER SUPPLY



LEGEND

- ① Wazirabad Water Works.
- ② Ohla Head Works.
- ③ Hindun Cuf.
- ④ Ramganga Dam.
- ⑤ Area For Tube Wells.
- ⑥ Najafgarh Lake.
- ⑦ Ghakra Dam.
- ⑧ Keshau Dam.
- ⑨ Dhauj & Kot.



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7.1.3

2. Adequate funds in the Fourth Five Year Plan:

It is seen that not only expeditious action will have to be taken to secure the sources of water supply but also adequate steps to plan the distribution of water will have to be taken. The Delhi Water Supply and Sewage Disposal Undertaking has a provision of Rs. 32 crores in the Fourth Five Year Plan which includes a filtration plant near the Hindon Cut, the Dhauj and Kot Reservoir Project, and water supply to a number of villages in Rural Delhi. The allocation will have to be stepped up adequately to meet the needs indicated in this plan. Also the Governments of Haryana, Uttar Pradesh and the Ministry of Health, Government of India should consider allocation of adequate funds for water supply in the Fourth Five Year Plans for the regional towns and the rural areas of the NCR.

3. Setting up of a Water Board for the NCR: The Naskar Committee had recommended the setting up of a follow-up Committee of engineers of Delhi, U.P. and Haryana for immediate action on the technical recommendations. It had further recommended the setting up of an Authority or a Board to plan, design, implement and maintain all water supply and sanitation schemes in an integrated manner for the National Capital Region, with suitable powers to execute the plans in a phased manner. This commends itself for more than one reason. For the regional development, water supply is a critical infrastructure,

supply of which cannot be met by ad hoc measures but requires integrated planning and co-ordinated action. Prevention of pollution of water is another function of the Board to which immediate attention will have to be paid. Rather than a local problem, water pollution is tending to be a regional problem requiring inter-state action. Adequate treatment of industrial wastes and human sewage before disposal, ensuring the purity of drinking water supply, protection of fish in reservoirs, lakes and rivers are some of the tasks to which the Regional Board should pay attention.

2. Water Supply for Irrigation:

In its physical setting, the National Capital Region comprises parts of the Indo-Gangetic Divide Plains and the Ganga-Yamuna Doab Plains which lie at an average height of 120 metres (500 ft.) to 225 metres (750 ft.) above sea level. The Region is sub-divided by the river Yamuna flowing from north to south. The Region in the east includes Meerut and Bulandshahr districts of Uttar Pradesh which form part of the fertile Ganga-Yamuna Doab, and extends from the Yamuna in the west to the Ganga in the east. This Doab displays an overall slope southwards with the main water-dividing line (between the Ganga and the Yamuna) running parallel to the course of the two rivers, almost along the middle. Notably, the Upper Ganga Canal runs along this water-dividing line across this Doab plain, enabling the irrigation to cover all the areas in the U.P. Sub-Region of the NCR. Areas towards the west of the river Yamuna include the southern-most part of the Indo-Gangetic Divide Plains which forms the plains of Haryana (part of which is also included within the NCR). This part of the Region lies between 210 metres (700 ft.) to 225 metres (750 ft.) above sea level with an overall slope southwards. The southern limit of this marks the limit of flow irrigation southwards, as also the command areas of the Western Yamuna Canal.

The gradual southerly slope of the Haryana plains get abruptly reversed by the

Aravalli Ridges which emerge south of the line joining the Majafgarh - Jahajgarh depression. The Aravalli Ridges within the NCR include rocky outcrops covering almost two-thirds of Gurson district, the southern part of the Union Territory of Delhi and the Alwar district of Rajasthan. The ridges, which rise from 210 metres (700 ft.) to over 300 metres (1,000 ft.) above sea-level within the NCR, obstruct the southward flow of the drainage lines of the Haryana plains and cause water-logging and checked drainage conditions along its base. The areas over the 'ridges' suffer from acute problems of irrigation. Flow irrigation is out of vogue here and lift irrigation is generally the system followed. Also, there is a system of putting up a series of dams to store rain water which could be used for irrigation in these areas during the kharif season. Dry season irrigation is almost absent which should be borne in mind while preparing irrigation schemes.

Existing Irrigation Facilities: The existing irrigation networks in the NCR are well established and have been in use since several decades. For the areas located west of the river Yamuna, which suffer from conditions of extreme drought and receive very little amount of rainfall, the Western Yamuna Canal, its branches and distributaries form the life giving lines for agricultural, as well as for drinking purposes. The Western Yamuna Canal also supplies water for irrigation to cultivated areas in Rohtak, Karnal and parts of Delhi. The cultivated areas located east of the river Yamuna in Uttar Pradesh receive water for irrigation from the Eastern Yamuna Canal and the Upper Ganga Canal. The former

irrigates the doab plain between the Yamuna and the Hindon river in Meerut district of Uttar Pradesh. The Upper Ganga Canal with its Anupshahr branch supply water for irrigation to the rest of the Doab plains between the Ganga and the Yamuna rivers. Agra Canal also irrigates the eastern portion of Gurgaon district. (Map 7.2).

Table 7.2.1 gives the existing canal system and these form the major irrigation schemes in the NCR.

Table 7.2.1
Major Irrigation Canals in the NCR; 1967
(Areas in hectares-(acres))



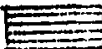
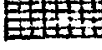





Sl. No.	Irrigation Canals	State	Gross Command Areas (hectares)	Culturable Areas (Hectares)	Actual area irrigated (hectares)
1.	Western Yamuna Canal its branches and distributaries.	Haryana	5,16,728 (12,76,320)	4,44,891 (10,98,880)	2,86,853 (7,08,528)
		Delhi	41,174 (1,01,700)	33,198 (82,000)	
2.	Eastern Yamuna Canal its branches and distributaries.	U.P.	5,57,902 (13,78,020)	4,78,089 (11,80,880)	2,86,853 (7,08,528)
		Delhi	94,577 (2,33,700)	3,32,384 (8,21,060)	1,49,575 (3,69,450)
3.	Upper Ganga Canal including Anupshahr Branch.	U.P.	6,65,034 (16,43,300)	-	-
4.	Agra Canal (including Gurgaon Canal)	Haryana	-	46,540 (1,15,000)	Not available
Total:			13,17,513 (32,55,020)	8,57,013 (21,16,880)	4,36,428 (10,77,978)

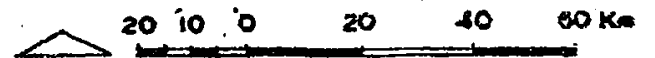
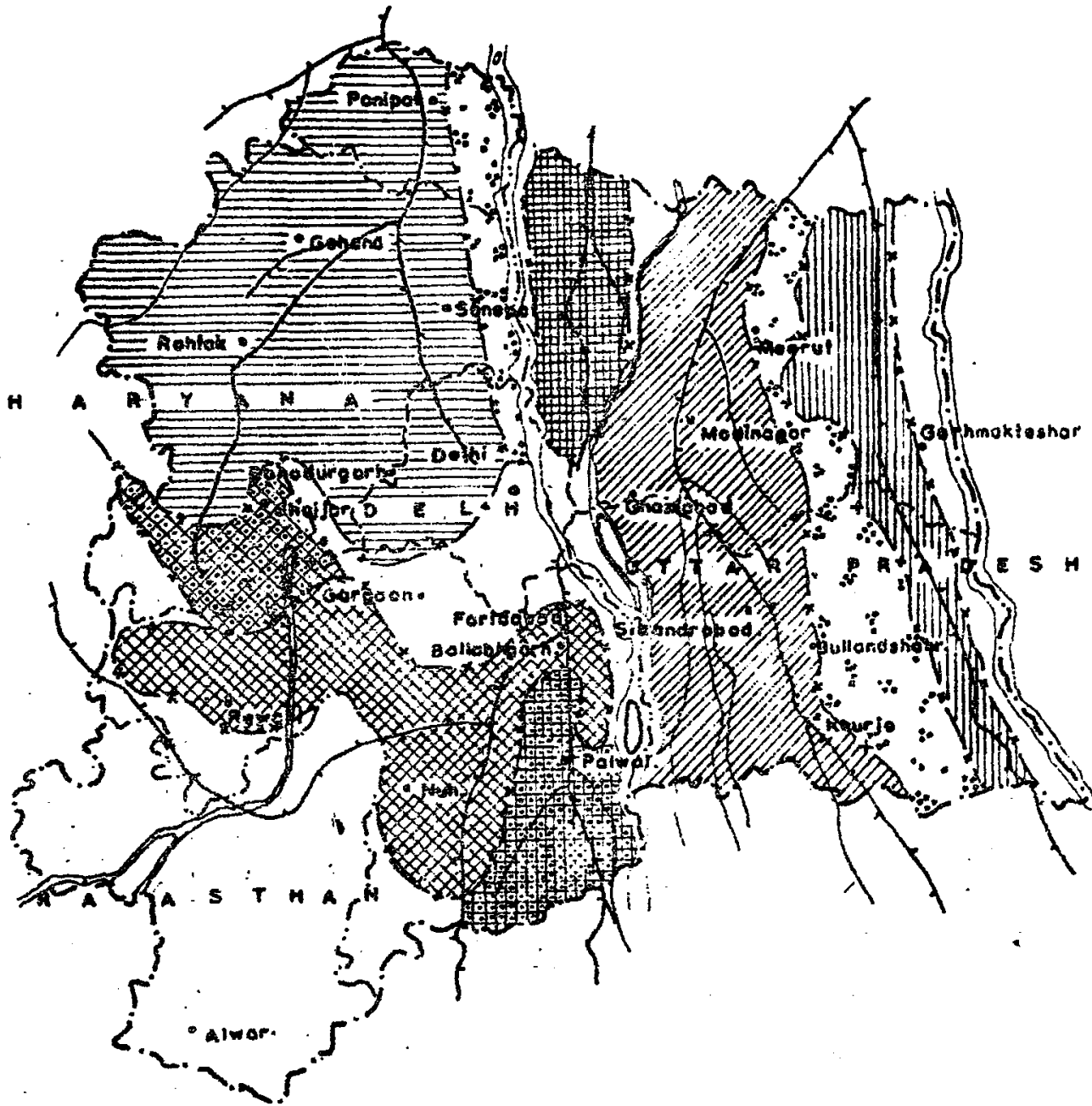
Source: C.W.P.C's note No. DLH-67-66-UI (FFU) dated 4.12.67

The table shows that the culturable area under canal irrigation in the NCR comes to nearly 8,57,036 hectares (21,16,880 acres) and forms nearly 65.6 per cent of the gross command area covered by the total canal system. The intensity of area irrigated by the Western Yamuna Canal comes to about 60% and 45% on the Upper Ganga Canal and the Eastern Yamuna Canal. A total area of nearly 4.36 lakh hectares (10.78 lakh acres) is receiving water for irrigation from the three above mentioned canals. Statistics regarding the actual areas receiving irrigation water from the Agra Canal in the NCR is not available. We may assume that nearly 445,344 hectares (11 lakh acres) out of its gross command

IRRIGATED AREAS UNDER DIFFERENT SCHEMES

LEGEND

-  Upper Ganges Canal Commanded Area.
-  Ganges Canal Commanded Area Anupshahr Branch
-  Wn. Yamuna Canal Commanded Area
-  En. Yamuna Canal Commanded Area
-  Gurgaon Canal & Rewari Lift Irrigation
-  Sohna Lift Irrigation Scheme Not Yet Finalised
-  Agra Canal Commanded Area (Part)
-  Well Irrigation
-  Mainly Unirrigated Area



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area of 13.16 lakh hectares (32.5 lakh acres) are presently receiving canal water for irrigation, the total culturable areas being nearly 8.50 lakh hectares (21 lakh acres).

In the NCR, out of the total cultivated area, of nearly 21,49,554 hectares, only 49% of the area has so far been brought under irrigation. The remaining 51% of the cultivated area suffers from absence of irrigation facilities. A large chunk of the area which does not have irrigation facilities falls in Gurgaon district of Haryana and in the southern portions of the Union Territory of Delhi. Small pieces of cultivable areas having no irrigation facilities are also found in Rohtak district of Haryana, Alwar district of Rajasthan and the U.P. Sub-region of NCR. There exists, however, everywhere, a system of damming up valleys by a succession of bunds, thus forming small tanks which are utilised for irrigation purposes. But there are also large tracts where little has been done and a large part of the crop is dependent upon the vagaries of the monsoon.

Irrigation in the NCR is carried on with the help of canals, wells and tubewells. At present the canal system provides water for irrigation to nearly 46% of the total irrigated areas of the Region. The remaining 54% are irrigated through wells, tubewells and other means. Even the canals, except the Western Yamuna Canal (upper reaches), Upper Ganga Canal and the Eastern Yamuna Canal are not a dependable source of irrigation on which farmers can plan prospective cropping

patterns. Irrigation from tanks, wells and other means is uncertain, available for few waterings only, and, is totally dependant upon the rainfall. Consequently, irrigation from these sources is of limited use in the planning of crops and the application of inputs.

The highest percentage of irrigated to cultivated area in the NCR is found in Meerut (80.80%) followed very closely by Bulandshahr (75.92%), Union Territory of Delhi (55.08%), Rohtak (36.85%), Gurgaon (26.) and Alwar (17.90%). The concentration of canal irrigation is maximum in the district of Rohtak (71.69%) followed by Meerut (45.48%) Gurgaon (32.32%) Bulandshahr (32.30%) and Delhi (26.53%). Well and tubewell irrigation is much more popular in the Region, as it irrigates nearly 54% of the total irrigated areas as against a national average of 30.04%. The areas under irrigation by tubewells, wells etc. have a maximum concentration in Alwar (100%) followed by Delhi (73.47%) Bulandshahr (67.70%), Gurgaon (67.68%), Meerut (54.52%) and Rohtak (28.31%). (Table 7.2.2.).

Thus, the principal agricultural areas of the Region, generally receive water for irrigation from the canal networks. Wells and tubewells supplement the canal irrigation all over the Region except in the U.P. Sub-region where wells are economical and water is suitable for crops. In most cases, surface wells used for irrigation are not high yielding. Irrigation from them is mostly for kitchen gardens and very small plots of cultivated lands are irrigated on a regular basis. The water level goes down during the rabi season and during the summer.

Table 7.2.2

Existing Irrigation Facilities in the NCR (1968-69)
(Areas in hectares)

	Total culti- vated area	Total irri- gated area	% of irri- gated area to total cultivated area.	Irriga- tion by canal	% of canal irrigation to total irrigated area	Irrigation by tubewe- lls, wells, and other sources	% or irri- gation by tube wells, wells and others.
1	2	3	4	5	6	7	8
Delhi	77,296	42,597	55.08	11,703	26.53	30,894	73.47
UTTAR PRADESH							
(i) Meerut	4,61,491	3,72,919	80.80	1,69,644	45.48	2,03,285	54.52
(ii) Bulandshahr	3,72,066	2,82,473	75.92	91,258	32.30	1,91,215	67.70
HARYANA							
(i) Rohtak	4,84,968	1,78,700	36.85	1,28,300	71.69	50,400	28.31
(ii) Gurgaon	4,59,951	1,21,255	26.36	39,199	32.32	82,056	67.68
(iii) Panipat Tehsil	79,548	53,898	67.70	22,066	40.94	31,832	60.56
RAJASTHAN							
(i) Alwar	2,83,782	50,817	17.90	-	-	50,817	100.00
Total	22,19,102	11,02,669	49.70	4,94,288	44.82	6,59,198	59.78

Source: Revenue Records of the respective State Governments.

There are not many tubewells in the Region. The Government has, however, undertaken to explore the potential of ground water resources in various areas of the Region. Information available from the Geological Survey of India, shows that there is not much likelihood of ample ground water resources within the Region except in the U.P. Sub-region, for embarking on a large scale programme of tubewell construction for irrigation purposes. However, a thorough assessment of the underground water in the Region for irrigation appears necessary. The suitability of the water, for irrigation purposes, would also require to be tested chemically. This may result in increasing the irrigation potential through tubewells and shallow wells. For a successful implementation of this programme, concerted efforts from the concerned State Governments and willing co-operation of the cultivators would be required.

Lift irrigation schemes include works where water is lifted from natural ponds or created reservoirs. This is practised in the southern portion of the Haryana Sub-region of the NCR in Gurgaon and Alwar Districts, mainly during the monsoon periods in the Kharif season and following it. The run-off is preserved in natural low lands and in created reservoirs by a system of damming up valleys by a succession of bunds. The water, thus stored, is used for kharif crops. This system of irrigation is completely dependant upon the rainfall. Because of this, the irrigation facilities prevalent in the Region except by canals is only of a supplementary nature. In years of drought, water for

storage and for irrigation is absent and, hence, farmers cannot extensively depend on these irrigation facilities in the years of acute shortage of rainfall.

To sum up, the utilisation of irrigation in the Region seems to be greatly limited due to (1) inadequate facilities, (2) seasonal character of water sources, (3) unsuitability of ground water due to salinity and (4) under realisation of the major and medium irrigation proposals during the stipulated period of the Five Year Plans.

Major and medium irrigation project in the NCR:

The major and medium irrigation projects have not made very good progress in the Haryana Sub-region, although in the U.P. Sub-region, many small schemes have been completed and some are still in progress. Such schemes, generally include strengthening of bunds, extension of irrigation channels and creation of reservoirs to be used for irrigation during the rains and afterwards.

The Haryana Sub-Region:

(a) Major irrigation schemes: In the Haryana Sub-region of the NCR, irrigation facilities are not properly developed, as only 36% of the total cropped area is at present irrigated. There is, therefore, great scope for extension of irrigation in this Sub-region.

In the Haryana Sub-region (as also in Haryana State) no major irrigation projects

were completed during the first three Plan periods, although several projects were undertaken. During the First Plan, the remodelling of the Western Yamuna Canal was taken up as a major irrigation project, and this project is still underway. During the Second Plan, the Gurgaon Canal Project, which is an inter-state project with Rajasthan was taken up and is still in progress. During the Third Plan and the Fourth Plan periods, no fresh major irrigation project was started. In addition to the above projects, Haryana shares the benefits accruing from the Bhakra Nangal, Beas I Beas II projects which are inter-state projects with Punjab, Haryana and Rajasthan. Under the Bhakra Nangal project, Haryana is to get the benefit of irrigating 0.68 million hectares (1.67 million acres) out of the total irrigated areas of 1.46 million hectares (3.6 million acres). This project has been completed. The Beas I project may be completed during the Fifth Plan period and will provide irrigation to 0.53 million hectares (1.3 million acres) with intense irrigation of 62% for Punjab and Haryana combined. The Beas II project during the Fifth Plan will provide irrigation benefits for 0.65 million hectares (1.6 million acres) both for Punjab and Haryana. The Beas I and Beas II projects were started in 1961.

The Western Yamuna Canal takes off from Tajewala headworks and serves the State of Haryana and particularly the Haryana Sub-region of the NCR. The command areas of the Western Yamuna Canal covers almost the whole of Rohtak district and parts of the Union Territory of Delhi lying north - west of the Delhi Ridge, except

for the depressed low lands of Najafgarh and Tahajgarh areas in Jhajjar. The scheme provides for the remodelling of the Western Yamuna Canal and its branches. The discharge at the head of the Western Yamuna Canal is 53.64 cubic metre/second (1894 cusecs) and the length of the main canal is 629.03 km. (390.87 miles). This project, at a cost of Rs.95.2 million, will provide benefits of irrigation to 2,64,887 hectares (6,61,269 acres) in new areas and better irrigation facilities to 0.425 million hectares (1.05 million acres) in the existing areas. This project is expected to be completed during the Fourth Plan period. The Western Yamuna Canal commands a gross area of 5,14,100 hectares (12,70,000 acres), of which the cultivated areas of 4,48,583 hectares (10,98,000 acres) are being served with irrigation facilities. The intensity of irrigation achieved is 60%. Cropping pattern is approximately 40% rabi and 20% kharif.

The Gurgaon Canal Project which comprises of a branch canal taking off at 8 kms. below the off-take of the Agra Canal from the Okhla headworks near Delhi, serves Rewari, Ballabgarh, Ferozpur Jhirka and Nuh tehsils of Gurgaon district. The canal discharge at the head will be 0.59 cubic metre/second (21 cusecs), and Haryana would derive benefits for irrigation upto nearly 1,01,580 hectares (2,51,000 acres) of the total of 1,26,671 hectares (3,13,000 acres) covered by this project which is to be completed during the Fourth Plan period.

(b) Medium Irrigation Schemes: The medium irrigation schemes in the Haryana Sub-region of the

Table 7.2.3

Medium Irrigation Schemes in Haryana Sub-Region
(Rs. in Lakhs; Figure in '000 hectares)

Sl. No.	Name of the Scheme	Estimate cost	Ultimate benefits	Potentials to the end of III Plan.
I. Completed				
<u>First Plan Schemes:</u>				
1.	Dadri Irrigation	-	Benefits in Mahendargarh district included under Western Yamuna Canal remodelling.	
2.	Raising & strengthening of Banks	Includes Punjab, & Haryana separate figures not available	8.50 (21.00)	8.50 (21.00)
3.	Spill-over schemes	"	27.92 (69.00)	27.92 (69.00)
<u>Second & Third Plan Schemes:</u>				
II. Continuing First Plan				
Second Plan.				
1.	Extension of Irrigation (lift) Western Yamuna canal to Rewari and Adjoining areas.	107.00	27.82 (68.75)	8.09 (20.00)
2.	Western Yamuna Canal Feeder	339.75		No direct benefits.
I	Irrigation Tubewells in Western Yamuna Canal Tract State I (128 number)	90.00	26.02 (64.30)	-
II	New Schemes approved in Fourth Plan.	Nil	Nil	Nil

Source: Figures supplied C.W.P.C. Water Wing.

Note 1. Figures in brackets are in thousand acres.

Table 7.2.4

Minor Irrigation Scheme in
Haryana Sub-region.

<u>Schemes</u>	<u>Cost Estimates</u>
1. Bhindwar lift irrigation	Envisaging irrigation of 3,561 hectares (8,800 acres) at the cost of Rs.5.87 lakhs.
2. Diverting water of Sahibi Nadi for charging brackish water of Rewari area.	Project cost Rs.2 lakhs.
3. Kund and Manethi bund	At the cost of Rs.0.57 lakhs
4. Ujjan lift irrigation schemes,	At the cost of Rs.4.21 lakhs.
5. Kotla lift irrigation scheme.	At the cost of Rs.4.64 lakhs.
6. New schemes.	At the cost of Rs.18.20 lakhs.
<u>Total Rs.34.03 lakhs.</u>	

Note: C.W.P.C.'s note No.DLH-57/56-UT
(FFU) dated 4.12.67.

The outlay for the Fourth Plan for the U.P. Sub-region of the NCR which include Meerut and Bulandshahr districts of Uttar Pradesh are given in Table 7.2.5.

Table 7.2.5

Irrigation Schemes in the U.P. Sub-
region - outlay for IV Plan.

<u>Irrigation schemes</u>	<u>Outlay for Fourth Plan</u>
Ranganga Project:	
(a) In Meerut	
i) Major & medium Irrigation	Construction & remodelling of channels Rs.21.40 lakhs
ii) Minor Irrigation	construction of Tubewells Rs.38.40 lakhs
(b) In Bulandshahr district	
i) Major & medium Irrigation	Construction and remodelling of channels Rs.25.00 lakhs
ii) Minor Irrigation	construction of tubewells Rs.44.80 lakhs
<u>Total outlay Rs.129.60 lakhs</u>	

Source: U.P. State Government.

NCR are given in Table 7.2.3. The medium irrigation schemes taken up in the Sub-region during the Second Plan are still continuing. During the Fourth Plan period, no fresh medium irrigation schemes have been approved. Among the medium irrigation schemes in progress in the Haryana Sub-region, is the Western Yamuna Feeder Canal scheme and the extension of the Western Yamuna Canal to Rewari and the adjoining areas for lift irrigation which was expected to be completed during the Third Five Year Plan. The feeder canal will give no direct benefit to the Haryana Sub-region. But the extension of the Western Yamuna Canal to Rewari and the adjoining areas is expected to extend benefits of irrigation to 27.82 thousand hectares.

(c) Minor Irrigation Scheme: The minor irrigation scheme taken up in hand by the Haryana State are given in Table 7.2.4.

The drainage and irrigation department of Haryana has been also considering a scheme in which flood water will be stored in the farmers' fields for a few months every year. The fields will then be handed over to the farmers for cultivation after draining the water into the canal systems. This will leave enough moisture in the fields for the cultivation of crops.

U.P. Sub-region: The total area of the U.P. Sub-region of the NCR which was covered under canal irrigation by the end of the year 1969 comes to roughly 2,60,000 hectares which forms

39.8% of the total irrigated area (6,55,402 hectares). This shows that the two districts of U.P. in the NCR receive maximum share of irrigation water from wells and tubewells which is roughly 3,94,500 hectares. The Eastern Yamuna and Upper Ganga Canals pass through the U.P. portions of the NCR. The former provides water for irrigation to the Doabs between the Hindon and the Yamuna in Meerut district of U.P., and the Upper Ganga Canal with the Anupshahr Branch supplies water for irrigation to the rest of the areas between the Ganga and the Yamuna.

The U.P. Sub-region of the NCR forms part of the fertile Doab area between the Ganga and the Yamuna. But in spite of its large share in the Region's economy, agriculture is not progressive as the sizes of holdings are small and the cost of cultivation high. There is, however, scope for intensive irrigation in this area if remedial measures are adopted.

The medium irrigation project which is likely to provide greater benefits to the U.P. Sub-region is the Ranganga project. The Ranganga project envisages a dam across the river Ranganga 3.2 kms. upstream at Kalagarh in Pauri Garhwal District of U.P. to create a reservoir with the gross storage of 0.80 million hectometres (1.78 million acre feet) and low storage of 0.70 million hectometre (1.57 million acres ft.). The project includes a 108 km. long feeder canal and will provide irrigation benefits to 0.691 million hectares (1.71 million acres) at a total cost of Rs. 680 million.

The minor irrigation schemes in the U.P. Sub-region include:

1. Slight increase in the existing areas served by the Upper Ganga Canals.
2. Augmentation of the areas under irrigation by bringing additional cultivable areas under irrigation.

Rajasthan Sub-region: Out of the total cultivated area only 18% in Alwar district is under irrigation. Irrigation is carried on by wells and tubewells. Canal irrigation is absent.

The Rajasthan Sub-region of the NCR includes five tehsils of Alwar district and does not have any major irrigation scheme for the present. Table 7.2.6 gives the statement showing irrigation and flood control schemes.

Table 7.2.6.

Statement showing irrigation and flood control schemes in the Rajasthan Sub-Region of the NCR:

Name	District/Tehsil	Cost
Sahibi irrigation cum flood control Scheme. This scheme is under preparation.	Alwar Behror	Rs. 240 lakhs (Rajasthan shares only Rs. 50 lakhs.)

Source: C.W.P.C.

Delhi Sub-region: The area irrigated by canals comes to roughly 16,134 hectares (40,849 acres) under minor irrigation works to 22,000 hectares (54,340 acres) and by wells nearly 4,315 hectares (10,658). The total area under irrigation is 39,630 hectares (97,886 acres) out of the total cultivated area of 48,235 hectares (1,19,140 acres).

Irrigation in the Delhi Sub-region is at present provided from the following sources:

1. Canal irrigation system consisting of Western Yamuna Canal system under the Punjab Irrigation Department and Eastern Yamuna Canal System under the U.P. Irrigation Department.
2. Effluent irrigation system from Keshopur, Corporation Pillar and Okhla Sewage plants under the Municipal Corporation of Delhi.
3. Large sized Katcha irrigation wells and State owned ~~canals~~ tubewells under the Development Department, Delhi Administration.
4. Minor irrigation under the Flood Control Wing of the Delhi Administration, viz., Bijwasan bund, Mahipalpur bund, Rojokori bund, Sultanpur bund, Godiabundh, Dero bund, Asaula bund, Deoli bund and Fulhpur bund.
5. Tubewells and wells.

6. Lift irrigation schemes in the Najafgarh Block and reclamation of the lands which have become saline or water logged.

Under the crash programme, during 1965-66 a scheme for providing lift irrigation to areas adjacent to the Najafgarh drain near Kakrula village was taken up by the Delhi Administration to provide irrigation for 95 hectares (235 acres). Possibility of providing lift irrigation facilities from Najafgarh drain to the areas on its right bank needs investigation, so that dry weather flow of Najafgarh drain can be utilised to the maximum possible extent instead of being fed into the river Yamuna.

Water requirement for irrigation in the NCR: At present, in large parts of the Region under cultivation, crops are dependent on irrigation mainly during one season. The second season crop is grown by secondary means. Where the farmers consider that a rabi crop will be more rewarding but do not have facilities for irrigating the land during that season, the land is left fallow during the kharif season in order to conserve moisture. The large proportion of wheat cultivation which covers 29.43% of the total cultivated land of the Region is accounted for by these type of areas. In areas of undulating surface, the farmers practise 'bunding cultivation'. For this purpose bunds are constructed enclosing the upper reaches of the fields. During the monsoons, water gets stored above the bunds. This water is utilised for irrigating the kharif crops grown in the lower

areas lying below the bunds. By September-October the impounded water in the bunds dries up leaving adequate moisture in the bunded area itself for cultivating the rabi crops.

If adequate irrigation facilities are made available, it may be possible to bring most of the agricultural areas under kharif crop. Thus, provision of better irrigation facilities would appear to be the primary need of the Region. This will not only act as an insurance against failure of crops due to untimely and deficient rains, but also encourage cultivation of a large number of crops in other than the monsoon season, thus diversifying agriculture and increasing productivity.

It would be worthwhile, therefore, to bring ~~the~~ larger areas of the National Capital Region under perennial irrigation system and to increase the capacity for storage of rain water. There is also a great need for practical demonstration of scientific agronomic practices and economic use of water for irrigation. This is all the more necessary in cases of lift irrigation from rivers and canals, as a considerable recurring expenditure has to be incurred in lifting water and making it available for irrigation to the cultivators.

The cropping pattern within the National Capital Region is given in Table 7.2.7 for the year 1968-69. On the basis of the cropping patterns for the year 1968-69, the water needs for irrigation have been worked out in Table 7.2.8 and 7.2.9. The standards of water

Table 7.2.7

Statement giving cultivated areas under various Crops in the
NCR (1968-69)

Name of the crops	Delhi	U.P.	Haryana	Rajasthan	Panipat	Total areas	Percentage
		Subregion	Subregion	Subregion	tehsil		
I AREAS UNDER FOOD CROPS (CEREALS & NON CEREALS)							
1. Wheat	41,482	405,443	356,062	33,741	41,198	877,926	29.43
2. Rice	3,138	51,411	16,776	115	8,359	79,799	2.67
3. Jawar	8,012	16,871	102,979	2,322	2,454	132,628	4.45
4. Bajra	19,130	70,344	199,668	100,380	2,929	392,351	13.15
5. Maize	1,413	153,887	10,663	1,615	2,362	169,940	5.70
6. Barley	2,456	40,926	73,970	24,414	1,450	143,216	4.80
7. Millet	25	2,378	138	9	3,424	5,974	0.20
8. Other cereals	-	4,829	782	-	-	5,611	0.19
9. Pulses	7,788	46,524	239,657	59,046	2,235	360,250	12.08
10. Sugarcane	2,337	174,114	47,930	164	10,525	235,070	7.88
11. Oil seed	512	707	30,159	41,614	-	72,993	2.44
12. Other food crops	390	71,555	6,825	-	2,494	81,264	2.72
							85.71%
II AREAS UNDER NON - FOOD - CROPS							
13. Tobacco	63	277	-	201	-	541	0.02
14. Cotton	313	18,771	12,459	3	1,670	32,216	1.11
15. Fodder	13,035	154,988	84,360	45,741	12,626	310,750	10.42
16. Other non-food crops	-	14,548	57,656	2,651	6,813	81,668	2.74
Total: Areas under crops.	100,095	1227,573	1239,984	312,016	103,539	2983,207	100%

Source: Based upon the Revenue Record of the States.

Table 7.2.8

Water used for Important Crops in the NCR
(U.P. Sub-Region)

Name of crops	Area under Crops	Sowing period	Harvesting period	Water requirements		
				No.s. of watering	Depth for each watering	Total water requirement (in hectometres)
1	2	3	4	5	6	7
1. Wheat	4,05,443	15th Oct. to 15th Nov.	15th March to end of April	3	10.2 cms.	1,24,065
2. Rice	51,411	June-July	Sept. to end of Nov.	6	22.9 cms.	70,639
3. Jawar	16,871	March beginning	June beginning			
4. Bajra	70,344	June last week	July end.			
5. Maize	1,53,887	June-Sept.	Sept.-Nov.	3	7.6 cms.	35,085
6. Barley	40,926	15th Oct. to 15th Nov.	15th March end of April.	2	10.2 cms.	8,349
7. Millet	2,378	Oct.	Feb.-March	5	6.42 cms.	763
8. Pulses	4,829	Sept.-Oct.	March-April	1	7.5 cms.	357
9. Sugarcane	46,524	15th Jan-end of March	Nov.-April	6	15.2 cms.	42,430
10. Oil seeds	1,74,114	July-Aug.	Oct.-Nov.			
11. Tobacco	707	July-Sept.	Dec.-Feb.			
12. Cotton	18,771	April-July	Sept.-Jan.	5	7.1 cms.	5,664
13. Fodder	1,54,988	May-July	Oct.	2	8.1 cms.	3,25,110
Total water requirements						3,13,473

Source: 1) Area under crops (1968-69) based on the Revenue Records of the States.
2) Sowing & Harvesting periods and water requirements based on Irrigation Statistics of India (1960-61) published by C/IPC.

Table 7.2.9

Water Used for Important Crops in the NCR
(Haryana Sub-region, Rajasthan Sub-region & Delhi)

Name of the crops	Area under crops	Sowing period	Harvesting period.	Area in hectares		
				No. of watering	Depth for each watering.	Total water requirement (in hectometres)
1	2	3	4	5	6	7
1. Wheat	4,72,483	Oct. - Dec.	April	4	7.4 cms.	1,39,855
2. Rice	28,388	June - July	Sept.-Oct.	20	7.62 cms.	43,263
3. Jawar	1,15,757	March beginning	June beginning.			
4. Bajra	3,22,007	June last week	Oct. end.			
5. Maize	16,053	June - Sept.	Sept.-November.	3	10.0 cms.	4,815
6. Barley	1,02,290	Oct. - Nov.	March -April.	4	7.4 cms.	30,278
7. Millet	3,596	Oct.	Feb. - March	5	5.42 cms.	11,543
8. Pulses	782	Sept. - Oct.	April.	1	8.9 cms.	696
9. Sugarcane	3,13,726	March..	Oct. - Feb.	12	7.7 cms.	28,89,828
10. Oil seeds	72,286	July - Aug.	Oct. - Nov.			
11. Tobacco	264	July - Sept.	Dec. - Feb.			
12. Cotton	14,445	April - July	Sept. - Jan.	5	10.0 cms.	7,222
13. Fodder	1,55,762	Oct. - Nov.	Dec. - Jan.	3	10.0 cms.	46,728
Total water requirements						31,83,230
U.P. Sub-region						3,13,473
Total NCR						34,96,703 or 3.50 hectometres.

Source: 1) Area under crops (1968-69) based on the Revenue Records of the States.
2) Sowing & Harvesting periods and water requirements based on Irrigation Statistics of India (1960-61) published by CWPC.

requirements for different crops have been based upon the irrigation statistics of India (1960-61) published by the Central Water and Power Commission. The total existing water used for irrigation in the NCR comes to nearly 3.50 million hectometres, out of which nearly 90% of water (3.18 million hectometres) is used exclusively in the Haryana, Delhi and Rajasthan Sub-regions, while the U.P. Sub-region uses only 10% (0.32 million hectometres) of water for irrigation. The reasons for this difference lies in the fact that sugarcane requires 12 waterings in Haryana, Rajasthan and Delhi Sub-regions, as compared to over 6 waterings in the U.P. Sub-region. Also the soil in the U.P. Sub-region absorbs and retains more moisture as it is formed of alluvium, while in other three Sub-regions, due to rocky as well as sandy and kankar soil, the loss of moisture is exorbitant. Further more, the U.P. Sub-region receives more rainfall as compared to others thus supplementing irrigation to a greater extent. This shows that in the future the total water requirements for a more intensive irrigation would be higher in the three Sub-regions as compared to the U.P. Sub-region. This calls for more mobilisation of resources for irrigation purposes in the three Sub-regions especially in Haryana.

The augmentation of the irrigation facilities in the Region is likely to change the cropping pattern substantially. At this stage it is not possible to calculate the exact water needs for irrigation within the National Capital Region on the basis of a changed cropping pattern and improved

irrigation facilities for the future. But the intensity in the use of available water for irrigation requires to be increased and methods for economy in the use of water to be practised. For example, substantial economy in water use is possible if it is applied in furrows after properly levelling the land and sub-dividing the large fields into smaller compartments (kiaris) instead of allowing it to flood the whole field. The water requirements of new varieties and high yielding crops call for a change in the distribution of water from the canals and an emphasis on adoption of intensive irrigation in place of extensive irrigation, necessitating the introduction of supplementing irrigation from ground water sources wherever it is feasible. Co-ordinated efforts from the Agriculture, Irrigation and other concerned Departments would be required to bring about the necessary changes in water management in accordance with the requirements of the new cropping pattern adopted.

3. Regional Drainage and Flood Control Measures:

Regional drainage and measures for flood control are inter-related problems. Hence, it is extremely necessary to study these two aspects in detail in connection with the development of the NCR for a fuller utilisation of regional land resources. First, the regional drainage and then the flood control measures required have been dealt with.

Regional Drainage:

The principal rivers which provide natural surface drainage to the Region are the Yamuna, the Ganga, the Sahibi, the Kaswati and the Badshahpur river. The river Yamuna flows from north to south and bisects the Region. The river Ganga forms the eastern boundary of the NCR. The Sahibi, the Kaswati and the Badshahpur rivers flow northwards from the 'Ridge' area of Rajasthan and Delhi and terminate in the depression of the Jahajgarh - Najafgarh lakes which is south west of Delhi. Also, several long and short drains from the Punjab and Haryana having a southerly flow, find their dead ends in this depression. The existing Najafgarh drain provides the only outlet for the accumulated water from this depressed low land by the creation of a 'reverse slope', (though the general slope of the drain is towards the Jahajgarh - Najafgarh lake areas). The water finds its way into the river Yamuna near Wazirabad in north-west Delhi. This requires continual dredging of the bed of the drain in order to keep a good flow. Even then,

been

the Najafgarh drain has not/able to drain the depressed low lands of the Jahajgarh - Najafgarh lake areas very satisfactorily.

Principal drainage zones within NCR:

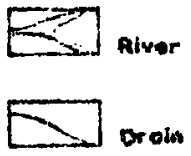
The study of the Region reveals that the areas within the NCR can be grouped into three distinct and characteristic drainage zones on the basis of the existing drainage conditions as given below: (Map 7.3.1.)

1. Yamuna Drainage Zone;
2. Najafgarh Drain Catchment Zone; and
3. Ganga Drainage Zone.

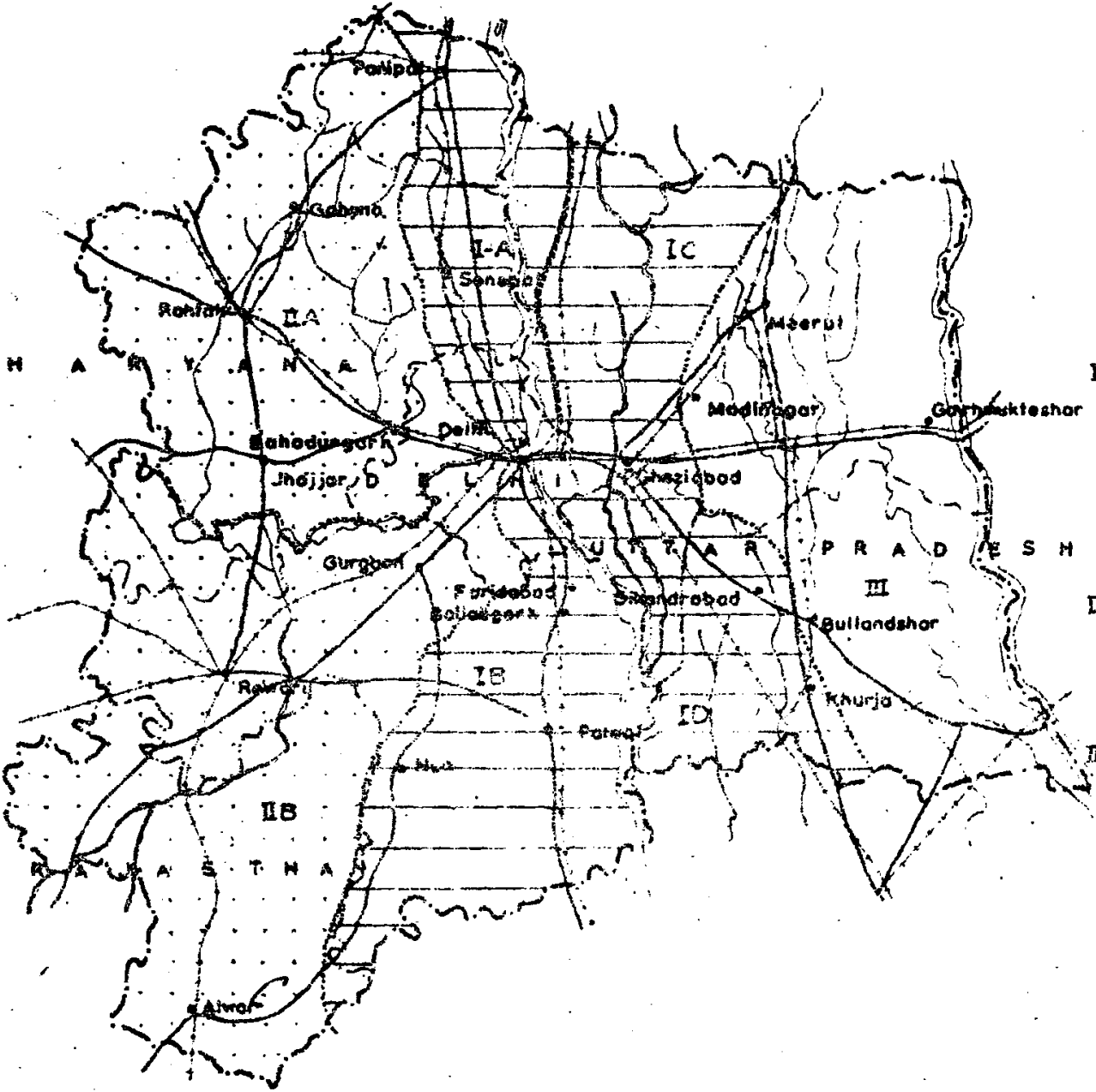
The Yamuna drainage zone, which includes the areas under the direct catchment of the Yamuna river, covers 35.00% of the total areas of the NCR. The eastern boundary of this drainage zone follows the water dividing line between the drainage areas of the Ganga and the Yamuna, along which the Upper Canal runs from north to south in the U.P. Sub-region of the NCR. The western boundary of the Yamuna drainage zone follows the water dividing line between the catchment areas of the Najafgarh drain and the drainage areas of the Yamuna, along which the Western Yamuna Canal flows, from north to south. The southern half of its western boundary follows the crest line of the 'Ridge' (Aravalli ranges). The Najafgarh drain catchment zone, and the Ganga catchment zone which lie to the west and to the east of the Yamuna drainage zone cover nearly 44.00% and 21.00% of the NCR respectively. Table 7.3.1 gives the drainage zones with their respective catchment areas (See also Map 7.3.1).

DRAINAGE BASIN

LEGEND



- I Yamuna Drainage Zone
 - A. Yamuna Flood Plain
 - B. Yamuna Alluvial Plain
 - C. Hindon Basin
 - D. Patwaha Basin
- II Najafgarh Drainage Catchment Zone
 - A. Haryana Plain
 - B. Haryana Sandy & Rocky Upland
- III Ganga Drainage Zone



NATIONAL CAPITAL REGION

Table 7.3.1

Drainage Zones of the NCR.

Drainage Zones	Area in thousand	
	hectares (thou- sand acres)	Percentage
a) Yamuna Drainage Zone.	1,030.50 (2,545.30)	35.00
b) Najafgarh Drain Catchment Zone.	1,316.58 (3,251.92)	44.00
c) Ganga Drainage Zone.	631.64 (1,560.10)	21.00
	<u>2,978.72</u>	<u>100.00</u>

Source: T.C.P.O. Map 7.3.1.

a) The Yamuna Drainage Zone:

The Yamuna drainage zone in the NCR which covers a total area of 1,030.50 thousand hectares (2,545.38 thousand acres) is drained principally by (a) the river Yamuna and its tributaries viz: the Hindon, the Patwaha and the Karwar Nadi, in Meerut and Bulandshahr districts; (b) the storm-water drain which has its origin south of Panipat and runs side by side with the Delhi-Panipat railway line to the west of the Yamuna, and enters the Yamuna north of Delhi; (c) and the numerous seasonal rivulets which flow eastwards, down the eastern edge of the Aravalli ridges, to the south of Delhi. The drainage system in this zone is of a perennial

nature except for the easterly flowing seasonal nullas, which act as storm water drains. There is a tendency of localised floods during the monsoons because of the irregular sections of these drains.

Nearly 31.50% of the total area covered by this zone is subject to wide-spread flooding. After the extensive floods during the year 1958, a Committee was set up under the Chairmanship of the then Union Minister for Works, Housing and Supply, for planning flood control measures, improvement of drainage conditions and minimization of water logging in Delhi. This Committee made several recommendations. Though many years have elapsed since these recommendations were made, no proper drainage plan has been prepared so far. It is, therefore, very essential that the preparation of such a drainage plan is taken up without delay in order to provide guide lines for the implementation of an integrated and a safe drainage system within the NCR which shall take care of the urban areas of Delhi as well.

The Yamuna drainage zone has been further sub-divided into four drainage basins. The area under each of these along with the areas subject to floods are listed in Table 7.3.2.

Table 7.3.2

Extent of Floods (Basinwise) in the Yamuna Drainage Zone.

Sl. No.	Drainage Basins	Area in thousand hectares (thousand acres)		
		Areas covered	Area subject to flood	Per centage of areas subject to flood in Yamuna Drainage Zone and its basins.
1. Basin I.	Yamuna Flood Plains (north of Delhi).	226.82 (560.26)	116.25 (287.14)	51.00%
2. Basin II.	Yamuna Alluvial Plains (south of Delhi).	396.02 (978.20)	156.95 (387.67)	39.50%
3. Basin III.	Hindon Drainage Basin.	274.16 (674.72)	44.30 (109.44)	16.00%
4. Basin IV	Patwaha Drainage Basin.	134.50 (332.20)	10.14 (25.03)	7.5%
Total(Yamuna Drainage Zone).		1,030.50 (2,545.38)	327.64 (809.28)	31.50%

Source: T.C.P.O., Study.

Basin I. Yamuna Flood Plains(north of Delhi).

This drainage basin represents the actual flood plains of the river Yamuna. A study of the characteristic features of these areas reveals the presence of a series of ox-bow lakes, low-lands and marshes, particularly, on the western side of the river, which indicate that this basin has been carved by the river Yamuna itself. The existence of drains flowing towards the south

which meet the Yamuna river at both the ends, prove more or less, that the main river, which once flowed along these drains, has shifted eastwards leaving its old course derelict, unflushed and choked with deposits of silt at its ends. This part of the NCR is knitted with drains and low-lands having outlets into the main river. Nearly 51.00% of this drainage basin has been subjected to floods by a spill over of the river Yamuna, invariably,

during the rainy season. To check this flooding, several earthen embankments and bunds have been constructed along the banks of the main river, from time to time viz: Dhansoli bund (Panipat tehsil), Takola bund (Rohtak district) Jauntipur bund (Delhi Territory) on the right bank, and, Shahdara bund on the left bank. Floods, in this basin, are generally confined between G.T. Road (Delhi-Karnal) in the west and Shahdara bund in the east. The towns and cities have been kept safe from floods during the monsoons both by the construction of regular bunds and embankments keeping enough space between them for holding the flood waters.

The total area under this basin comes to 226.82 thousand hectares (560.26 thousand acres). The flooded areas account for nearly 51.00% of the total area of the basin.

Basin II. Yamuna Alluvial Plains (South of Delhi).

This drainage basin is located east of the Aravalli hills and is bounded by the river Yamuna in the east. The basin represents the older flood plains of the river Yamuna, the ground level being relatively higher than the bed of the river. This basin is being drained by 16 drains (7 of which flow into the Agra Canal). The biggest amongst them is the Buria Nalla with its outlet into the Yamuna river.

A close study of this drainage basin reveals the presence of a series of submerged hills occurring in a northeast-south west

axis, from Ferozpur-Zhirka to Ballabgarh and Faridabad, bisecting this basin into two distinct parts as given below:

- (a) The plains between the hill-ranges and the Aravalli Ridge in the west have a north-eastward slope, with ~~low~~ land-locked lowlying areas which are often marshy. Most of this part of the basin is sub-merged under water during rainy season due to poor natural drainage condition.
- (b) The plains east of the hill ranges slope towards the river Yamuna and are drained by numerous nallas. This part of the basin is subjected to floods when the Yamuna is in spate. No bunds have been built in Gurzaon district to check these floods. There has also been an occasional shift in the course of the main river near Chamsa in Ballabgarh teshil. A vast area between the old course and the Zahar Nalla is subject to floods during the rainy season.

The total areas under this basin comes to nearly 396.02 thousand hectares (978.20 thousand acres). Nearly 39.50% of the total area of the basin suffer from floods during the rainy season.

Basin III. Hindon drainage basin:

The Hindon river with its perennial source at the foot hills of the Himalayas below the Dehradun plateau, drains part of ~~the~~ Meerut

district which falls between the river Yamuna in the west and the Upper Ganga Canal in the east. The Hindon drainage basin has a natural drainage system and is, generally, free from flooding, water logging or spills from rivers. However, at the lower reaches, near the confluence of the Hindon with the Yamuna, this basin includes several distributaries of the Hindon river which ultimately drain into the Yamuna. These distributaries are in spate during the rainy season submerging vast areas around. The rise in the water level of these distributaries is the result of the spill over from the Yamuna itself. The total area covered by the basin comes to nearly 273.16 thousand hectares (674.72 thousand acres). Flooded area accounts for nearly 16.00% of the total area covered under this basin.

Basin IV. Patwaha drainage basin:

This drainage basin, which includes the upper reaches of the Patwaha and the Karwar river in Bulandshahr district of U.P., lies between the Hindon drainage basin and the Yamuna river in the west, and the Upper Ganga Canal in the east. The total area of this drainage basin comes to nearly 134.50 thousand hectares (332.20 thousand acres). Like the Hindon drainage basin, the Patwaha basin also forms part of the rich agricultural tract of U.P. This basin is generally free from flooding during the rainy season, except for the areas along the bank of the Yamuna river which gets flooded as a result of the spills from the main river. The flooded areas, in this basin, account of only 7.50% of the total.

2. The Najafgarh Drain Catchment Zone:

The Haryana Sub-region of the NCR, including parts of Alwar district of Rajasthan having the Aravalli Ridges and the Western Yamuna Canal (main) as its eastern boundary, slope towards the Najafgarh drain including Jahajgarh link drain. The part of the zone located towards the north show a southerly drainage formations, generally, in the form of drains or nullas; while, those lying towards the south, have north-flowing drainage systems, viz. the Sahibi Nadi, Kaswati Nadi, Balshahpur Nadi and several other storm water streams. The drainage system of both these parts converge along the Najafgarh drain (including Jahajgarh link drain), which has one regulator at Dhansa for 350.46 cubic meter/sec. (3,000 cusecs). The Najafgarh - Jahajgarh lake depressions drain into the river Yamuna via Najafgarh drain. During the dry season, water in most of these drainage channels evaporates and the drains get dried up; but during the rainy season, they bring large amount of water from as far as Karnal in the north and Jaipur in the South. This situation creates serious problems of drainage congestion in this area resulting in large scale flooding with consequent damage to the village abadis and agricultural lands. The danger of submergence due to floods cover approximately one-fourth of the Rohtak district, the adjacent parts of Gurgaon district as well as the Najafgarh block in the Union Territory of Delhi.

On the basis of the nature of the drainage system, in this area, the catchment areas of Najafgarh drain has been sub-divided into two distinct drainage basins as given below:

1. Basin I: Haryana plains, north Najafgarh Drain and Jahajgarh link drain.
2. Basin II: Haryana sandy and rocky uplands, south of the Najafgarh Drain and Jahajgarh link drain.

These two basins together account for nearly 1,316.58 thousand hectares (3,251.92 thousand acres), out of which nearly 29.00% of the area is subject to floods during the rainy season. The statement of areas of these basins as well as the percentage of the total area covered by floods are given in Table 7.3.3.

Table 7.3.3.

Extent of Floods (Basinwise) in Najafgarh Drain Catchment Zone.

Sl. No.	Drainage Basins	Areas in thousand hectares (thousand acres)		
		Area covered hectares (acres)	Area subject to floods hectares (acres)	Percentage of areas covered by floods
1.	Basin I: Haryana plains north of Najafgarh Drain and Jahajgarh link drain.	521.52 (1,288.15)	197.90 (488.30)	38.00%
2.	Basin II: Haryana sandy and rocky uplands, south of Najafgarh Drain and Jahajgarh Link drain.	795.06 (1,963.77)	65.86 (162.66)	8.00%
Total (Najafgarh Drain Catchment Zone).		1,316.58 (3,251.92)	263.76 (650.96)	29.00%

Source: TCPO Study.

Basin I. Haryana Plains, north of Najafgarh Drain and Jahajgarh link drain:

This drainage basin represents the southern-most part of the Indo-Gangetic 'dividing-plains' and has a southward slope. The basin is drained by several drains flowing southwards cutting across the branches of the Western Yamuna Canal. Initially, there was the old Drain No.8, which collected storm water of the Chautang and Rakshi Nallas, called Nai Nalla near Gohana, and flowed into the Jahajgarh Lake. The Drain No.8 has been bringing large quantities of water which has submerged xx Rohtak town, in quick successions, during the period 1958-64.

After that, as a preventive measure, the active catchment of Rakshi and Chautang nalla has been diverted to the river Yamuna in Karnal district. A large part of the subsequent catchment of Drain No.8 has also been diverted to the river Yamuna via Indri drain - to the main Drain No.2 system, flowing through Panipat tehsil, close to its northern boundary. The Nai Nalla near Gohana has also been diverted to the Yamuna river via diversion Drain No.8. At present, a large number of tributaries starting from Panipat, collect the rain water and drain it into the diversion Drain No.8. The most important amongst these are tributary Drain Nos.1 to 4, Dobeta drain, west Jua drain and Drain No.6. South of the diversion Drain No.8, the basin is drained by the original Drain No.8 flowing into the Jahajgarh lake, and, other tributary drains collecting into the Najafgarh lake, as also, the Najafgarh drain.

The important tributaries to the Najafgarh drain from the north are: ()

(a) The Mangeshpur Drain: This drain starts near Mangeshpur village in Delhi Territory, and as it flows into the Najafgarh drain, it is joined by Bazidpur, Bawana, West Jha and Madanpur drains. Portions of Drain No.6, lying south of the diversion Drain No.8, empties into the Bawana Escape which joins the river Yamuna. The Mangeshpur drain is reported to have a total catchment area of 491.52 sq. kilometers and its present capacity is 94.15 cubic meter/sec. (806 cusecs).

(b) Kurari Suleman Nagar Drain: This drain starts from near Kurari Suleman Nagar and has a catchment area of 20.48 sq. kilometers which suffers from serious drainage congestion due to inadequate capacity of the culvert on the Delhi-Rohtak road and railway line.

(c) Nangloi Drain: This drain is entirely in the Union Territory of Delhi and has a catchment area of 81.92 sq. kilometers.

Basin I includes a total area of 521.52 thousand hectares (1,288.15 thousand acres), out of which nearly 38% are subject to floods during the rainy season. It is noteworthy that generally floods in this basin are caused as a result of spill over of water from these drains to the surrounding areas due to the sub-standard capacity of the drainage channels and the culverts along these channels. Detailed surveys for remodelling the existing drainage system are being carried out by the Flood Control Wing of the Delhi Administration to check flooding within the Union Territory of Delhi. Drainage in this basin, however, needs an overall view for bringing about improvement in the existing drainage conditions.

Basin II: Haryana sandy and rocky uplands, south of Najafgarh drain and Jahajgarh link drain:

This drainage basin includes the plains of Haryana (which is sandy mixed with gravel) - flanked by the Aravalli Ridges in the east and the south (in Gurgaon and Alwar districts).

The drainage basin has an over all slope northwards, and, is drained by the Sahibi Nadi, Kaswati Nadi, and, a number of west-flowing storm water streams rising from the Aravalli Ridges. An important character of the natural drainage streams in this basin is, that all of them, including the Sahibi Nadi and the Kaswati Nadi, are seasonal rivers. These storm water streams spread out in a broad fan-like sheet, over a large area, into the depressions and sandy tracts. The Sahibi Nadi (most part of which has a dry channel) has no defined bed of its own beyond its crossing with the Delhi-Rewari railway line. During the dry season, the courses of these streams are traced as lines of sand beds along with gravels and boulders. Normally, most of the water carried by these streams gets absorbed before it flows into the Najafgarh - Jahajgarh lake depressions, which, in turn, benefits in respect of the cultivation of rabi crops. But during the years of heavy rainfall, these streams carry a large amount of water, which collects in the chain of depressions extending from Jahajgarh Jheel to Najafgarh Jheel, which results in the flooding of adjoining areas of Haryana and the Union Territory of Delhi. The total area of this drainage basin is 795.06 thousand hectares (1963.77 thousand acres), out of which only 0.00% of the area is affected by floods during the rainy season.

There is, however, a scheme to channelise the waters of the rivers like the Sahibi, in order to prevent spill over and to allow the water to flow along a single channel to meet the Najafgarh-Jahajgarh link drain. It is to

be noted that any scheme which singles-out a particular river channel may not solve the problem of flooding in these areas. What is required is the launching of such a scheme which might prove useful in the storing of the excess water brought forward by the various channels in this area, and, a programme for maximum utilisation of the stored water for development purposes during lean periods.

C. The Ganga Drainage Zone:

The Ganga drainage zone of the NCR is bounded by the Upper Ganga (main) Canal in the west and the river Ganga in the east. This drainage zone is drained by two principal tributaries of the river Ganga, namely, the Kali Nadi and the Nim Nadi. The Kali Nadi takes its origin in Muzaffarnagar district of U.P., immediately across the northern border of Meerut district, and flows southwards almost parallel to the Upper Ganga Canal, and traverses across the whole of the Ganga drainage zone. The Kali Nadi, with its four tributaries, meeting before its entry into Meerut district, provides ideal surface drainage conditions in that portion of the NCR which is east of the Upper Ganga Canal, particularly, in Meerut district. This is due to the fact that this is the most fertile, agriculturally rich and well-irrigated part of the Ganga drainage zone, on account of the existence of the Kali Nadi and its four tributaries. This part of the drainage zone in general, is also, free from the conditions of flooding, except for a strip of land along the bank of the Ganga river which

gets affected by the spill over of the river itself. In Bulandshahr district, the Ganga drainage zone is drained by the Kali Nadi and the Nira Nadi. In this area, part of the Kali Nadi and its adjoining areas, ~~xxxx~~ gets flooded during the rainy season. The Ganga drainage zone of the NCR covers an area of 631.64 thousand hectares (1,560.11 thousand acres). The areas affected by floods cover nearly 133.95 thousand hectares (330.85 thousand acres), which works out to nearly 21.00% of the total area under the Ganga drainage basin.

B. Measures for Flood Control in NCR.

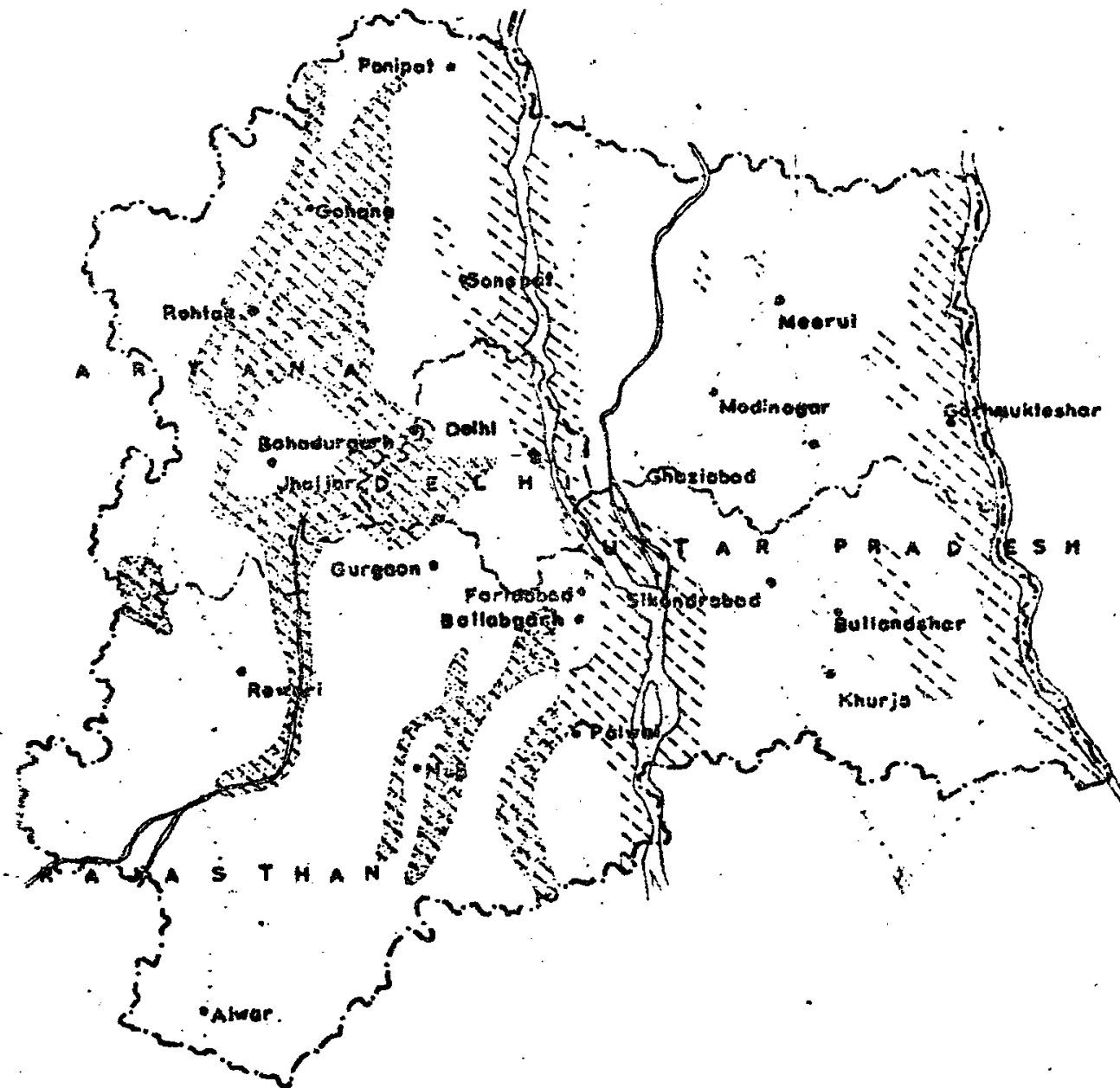
The natural surface drainage system existing in the National Capital Region has been discussed in detail in the previous paragraphs. It has been observed that acute drainage congestion normally occurs in the areas west of the Aravalli Ridges and the Western Yamuna Canal, due to the inadequate capacity of the drainage channels, as well as a lack of proper drainage system. Towards the east, floods are generally caused by the over-flowing of rivers whenever they happen to be in spate. Measures for flood control have been adopted from time to time in the NCR. These include: construction of marginal flood embankments along the river banks where floods occur due to over-flowing; and implementation of drainage schemes, which include diversion of drains, ramplelling and deepening of their beds, where floods occur due to acute drainage congestion. However, there has not been any

unified attempt by the various Governments to tackle the total problem of flood and drainage congestion in the NCR, although, several committees have been set up by the Government of India for the eradication of floods in the Delhi-Haryana area. The measures suggested by such committees have generally aimed at minimising the hazards of flood and drainage congestions in the Union Territory of Delhi. The problem of floods and drainage congestion in the NCR deserves immediate attention. It should be tackled in a co-ordinated manner by the concerned governments at the regional level.



Distribution of Flood Affected Areas in NCR: A detailed study of the flood affected areas in the NCR reveals that a little less than one-fourth (23.85%) of the total Region is exposed to the dangers of floods during the rainy season. Nearly 60.93% of the total flood affected areas in the NCR is in the Haryana Sub-region followed by 31.60% in the Uttar Pradesh Sub-region, 7.45% within the Union Territory of Delhi and 0.02% in the Rajasthan Sub-region. Table 7.3.4 gives the state-wise distribution. (Also see Map 7.3.2).

For a proper development of the Haryana Sub-region top priority must be given for the flood control measures, since this Sub-region has the largest flood affected areas in the Region. The flood affected areas cover 442.02 thousand hectares (1,091.31 thousand acres) in Haryana, which account for nearly 33.16% of the total area of this Sub-region. The affected areas are confined generally within the Najafgarh drain catchment zones on either side of

AREA SUBJECT TO FLOODS BASED ON LAND CHARACTERISTICS



LEGEND

-  Flood Due To Overflow Of Rivers
-  Flood Due To Acute Drainage Congestion



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H.F. P. W. H. & U. D.

7.3.2

the Najafgarh drain and the Jahajgarh link drain; the maximum concentration being to the north of the drains. Other areas of Haryana which suffer from flooding include the area along the banks of the river Yamuna and floods here are caused due to the overflow of the river channels whenever they are in high spate. Such areas are located between the Western Yamuna Canal (towards the north) and Aravalli Ridges (towards the south), and the river Yamuna in the east.

Table 7.3.4.

Statewise distribution of flood affected Areas in the NCR:

Name of Sub-region.	Total Area (thousand hectares)	Flood affected areas (thousand hectares)	Percentage (distribution)
1. Delhi	148.47 (366.72)	54.10 (134.00)	7.45
2. Haryana	1,332.81 (3,292.03)	442.02 (1,091.31)	60.93
3. Uttar Pradesh	1,100.51 (2,718.27)	229.13 (565.53)	31.60
4. Rajasthan	458.78 (1,133.18)	0.10 (0.25)	0.02
Total:	3,040.57 (7,510.20)	725.35 (1,791.01)	100.00

Note: Figures within brackets are in thousand acres.

Source: T.C.P.O. Study.

Compared to the Haryana Sub-region, the U.P. Sub-region has only 229.13 thousand hectares (565.53 thousand acres) affected by floods and account for nearly 20.82% of the total areas included in this Sub-region. The flood affected areas in the U.P. Sub-region are generally confined to areas along the banks of the rivers, particularly the Yamuna, the Ganga and the Kali, where floods take place due to overflow from these rivers.

The flood affected areas within the Union Territory of Delhi, cover only 54.10 thousand hectares (134.00 thousand acres). Although, the Union Territory of Delhi has only 7.45% of the total flood affected area in the NCR, but these areas account for nearly 36.43% of the total area of the Union Territory itself. The intensity of the flood problems, therefore, has been inevitably inviting attention of the Government for the implementation of effective flood control measures within the Union Territory of Delhi. Out of the total flood affected areas within the Delhi Sub-region nearly 60% is concentrated in the Najafgarh block, which lies within the catchment of the Najafgarh drain. The remaining 40% lies near the banks of the Yamuna, 25% of it being towards the north and 15% to the south of Urban Delhi.

In Rajasthan Sub-region of the NCR, the flood affected areas are concentrated on either side of the Sahibi river, which accounts for only 0.22% of the total area of the Sub-region.

Table 7.3.5Percentage of flood affected areas to the total areas of the Sub-regions:

Sub-regions of NCR.	Percentage of the flood affected areas to total area of each Sub-region.
1. Delhi	36.43
2. Haryana	33.16
3. U.P.	20.82
4. Rajasthan	00.22
Total	23.85 of NCR.

Source: T.C.P.O. Study.Measures for flood control adopted in the NCR:

The measures for flood control adopted, so far, in the NCR have been concentrated mainly within the Union Territory of Delhi and the adjoining Haryana Sub-region. Large tracts of the flood affected areas in other parts of the Region have not received proper attention of the concerned Governments. The flood control measures adopted by the authorities have generally been in the nature of relief measure, some of which have only proved, in essence, a short-term palliative.

The nature and the type of the flood control measures adopted in the NCR varies from

area to area depending upon the causes of floods in a particular areas. It has been generally established that floods in the NCR mainly occur due to (a) acute drainage congestions in areas having poor drainage conditions and (b) over-flow of rivers due to exceptionally heavy rainfall concentrated within short periods. The flood control measures of a protective type have been adopted where the danger of floods happens to be due to over-flow of rivers; while, schemes, involving improvement in drainage system and lowering of beds of drainage channels have been implemented where the danger of flood occurs due to poor drainage conditions. Table 7.3.6 gives the flood affected areas of the NCR classified by types of floods.

Out of the total area of the NCR, Delhi and the Haryana Sub-regions include such areas which are affected both due to acute drainage congestions and over-flow of the rivers. The Haryana Sub-region, which has the largest share of flood affected areas in the NCR, include 52.26% of the areas receiving flood due to acute drainage congestion and 47.74% of the areas receiving flood from overflow of rivers. As compared to this, Delhi has nearly 60% due to acute drainage congestion and 40% due to over-flow of rivers. In both the Sub-regions the areas affected by flood due to over-flow of rivers is located along the banks of the river Yamuna. Also, the areas where acute drainage congestion creates flooding is confined within the catchment of the Najafgarh drain, both in the Haryana and the Delhi Sub-regions.

Table 7.3.6.

Flood-affected areas of the NCR by types of floods.

(Areas in thousand hectares (Thousand acres))

Name of the State/ Union Territory.	Areas	FLOOD AFFECTED AREAS			
		Due to Drainage congestion		Due to overflow of rivers	
		Area	Percentage	Area	Percentage
1. Delhi	54.10 (134.00)	32.46 (80.52)	60.00	21.64 (53.48)	40.00
2. Haryana	442.02 (1,091.31)	231.00 (570.19)	52.26	211.02 (521.12)	47.74
3. Uttar Pradesh	229.13 (565.53)	Nil	-	229.13 (565.53)	100.00
4. Rajasthan	1.10 (0.25)	1.10 (0.25)	100.00	Nil.	-
Total:	725.35 (1,791.09)	263.56 (650.96)	36.34%	461.79 (1,140.13)	63.66%

Source: T.C.P.O. Study.

In the U.P. Sub-regions, almost all the flood affected areas get flood due to the overflow of rivers during the rainy season. The rivers which cause most of the floods are the Yamuna and the Ganga. As compared to this, the Rajasthan Sub-region gets all the flood due to acute drainage congestion only.

Flood Control Measure in the Delhi Sub-region:-

Within the Union Territory of Delhi, areas on either side of the river Yamuna and in south-west Delhi, particularly, in Najafgarh block are affected by floods. The proposal for the preparation of a Master Plan for Drainage in

Table 7.3.7

Measure for Flood Control in the Delhi Sub-region.

Flood Control Measures	cost estimate	Remarks
	Lakhs	
1. Preparation of master plan for drainage of Union Territory of Delhi.	30.00	To be taken up in 1970-71 and completed in 26 months.
2. Measure to control Floods caused by overflow of Yamuna river along its banks.		
i) Pumping of water in Yamuna for areas between Monkey bridge and Power House drain crossing.	19.52	Proposals by C.P.W.D. has been under scrutiny by the Flood Control Wing of Delhi Administration.
ii) pumping of water into the Yamuna for areas between Power House drain crossing and 'C' Power House.	16.14	
iii) Widening and raising of F.H. by-pass from Monkey Bridge to Yamuna Bridge near 'C' Power House	18.47	
iv) Construction of drain in Shahdara Block.		
(a) South of G.T. Ghaziabad road involving construction of 47 miles of drain.	268.80	Proposed by C.P.W.D. prepared by ISG Engineering Department U.P.
(b) North of G.T. Ghaziabad road involving each of 28.5 miles of drain.	75.00	
3. Measures for control of flood caused by drainage congestion in Najafgarh Block.		
i) Remodelling of Najafgarh drain	350.00	Flood Control wing of Delhi Administration.
ii) Construction of supplementary drain to Najafgarh drain.	700.00	
	<u>1,050.00</u>	
Alternative Proposal: Construction of connecting drain by cutting across the Aravalli Ridges.	400.00	

Source: C.N.P.C.

the Union Territory of Delhi is already included in the Fourth Five Year Plan for which provision of Rs.30.00 lakhs exists in the Plan. The work is proposed to be taken up during 1970-71 and is proposed to be completed in 26 months. The need for the preparation of this Plan has been stressed practically in all the reports of the various committees of experts appointed by the Government of India to advise on preventive measures against floods within Delhi. Measures of flood control proposed to be adopted in the Delhi Sub-region is given in Table 7.3.7.

1) Flood control measures to check overflow from Yamuna: Prior to 1954, several embankments had been constructed along the river Yamuna for protecting agricultural lands and the city from floods by the overflow of the river. During the first, second and third Plan periods, more embankments were constructed on both sides of the river and a few river-training works were carried out. These include (i) raising and strengthening of the bund between Shah Alam bridge and the Coronation Pillar, (ii) raising and strengthening of the Bela or Ring road, (iii) raising of the railway siding bund along the west bank of the Yamuna; and, (iv) construction of the 8 mile long Shahdara bund from old Yamuna bridge to Pali village in U.P. in the north and (v) raising and strengthening of the existing Shahdara bund from the old Yamuna bridge to Okhla weir along the east bank of the Yamuna. These flood protective measures, designed to check the overflow of the Yamuna waters have so far proved quite satisfactorily. There has

been, however, some damage to crops and property in the unembanked reaches in the Alipur and Shahdara blocks. About 56 village abadis had been affected. The total area affected by floods is 11.38 thousand hectares (28.15 thousand acres) out of which 4.70 thousand hectares (11.60 thousand acres) were under crops. In addition to these two blocks, nearly 10.23 thousand hectares (25.33 thousand acres) within the Union Territory get affected by floods due to over-spills from the Yamuna, both towards the north and the south of Urban Delhi.

During the rainy season, when the main river Yamuna is in spate, the storm water drains and sluices draining the urbanised area of Delhi into the Yamuna get clogged up, and the excess water submerges the adjoining areas resulting in damage to roads with consequent dislocation of traffic. The Central Public Works Department have proposed two schemes, both involving pumping of water into the Yamuna river - one for the areas between Monkey bridge and Delhi Gate (power house drain crossing) at a cost of Rs.19.62 lakhs, and, the other beyond Delhi Gate drain crossing, upto 'C' power station at a cost of Rs.16.14 lakhs. The third scheme involves widening and raising of the National Highway by-pass from Yamuna barrage bridge near 'C' power station to Monkey bridge at a cost of Rs.18.47 lakhs.

In areas of Shahdara block, the Central Public Works Department have proposed for the prevention of floods a drainage scheme. This involves the construction of 25.10 kms. of drain at an estimated cost of Rs.268.80 lakhs

to eliminate flooding south of the G.T. Ghaziabad road. To avoid floods to the north of the road, the Local Self Government Department of Uttar Pradesh has proposed the construction of a drain 45.6 kms. long at an estimated cost of Rs.75.00 lakhs. These schemes are likely to eliminate floods in the Shahdara block of the Union Territory of Delhi.

(ii) Flood control measures to check acute drainage congestion in Najafgarh Block of Delhi: A lot of flooding, with consequent damage is caused in the urban and the rural areas of Delhi by acute drainage congestion during those years when the rainfall in the Union Territory and the adjoining areas of Haryana and Rajasthan is abnormally high. The Najafgarh Jheel is a natural pan-like depression in the south-west corner of Delhi Territory, which receives water from all sides and has no natural outlet. The 49.6 km. long Najafgarh drain was excavated in the early part of the 19th century to drain the excess water of the Jheel into the river Yamuna near the site of the existing Wazirabad pumping station.

of 1958,

After the heavy rainfall/in the Reldi Committee was set up by the Government of India. It recommended the improvement of the Najafgarh drain which was then implemented in three phases. The improvements under Phase I, included the removal of dumps and obstructions in the bed of the drain. This work was completed before the monsoon of 1959. Under the later phases, the Dhasa buni connecting Dhasa village with Galipur

village of Delhi - Haryana border, was constructed in 1962 to prevent and regulate the flow of water from Jahajgarh Jheel (Haryana State) into Najafgarh Jheel (Delhi), which were further connected through a link drain. The cost of remodelling Najafgarh drain including masonry work was estimated to be approximately Rs.350.00 lakhs, on the basis of the recommendations of the Motiram Committee set up during 1964. This Committee also recommended the construction of a supplementary drain in order to drain the Najafgarh block effectively. This supplementary drain is expected to have a capacity of 4,000 cusecs at the head & 4,500 cusecs at the tail end. It is estimated that the supplementary drain will cost approximately Rs.7.00 crores.

There is also a proposal to remodel and improve the important tributary drains of the Najafgarh drain viz., (1) Palam drain, (2) Vangeshpur drain, (3) Kurari-Suleman Nagar drain, and (4) Nangloi drain. These drains bring a large quantity of water and deliver it to the main Najafgarh drain during the rainy season. To prevent retrogression of the bed above their junction with the Najafgarh drain, it was recommended that all the four drains should be provided with tail falls of a suitable height specially, when the water surface, in the latter, is low.

In one of the meetings of the Flood Control Board, presided over by Dr. K.L. Rao, Union Minister for Irrigation and Power an alternative idea was also mooted out for the construction of a connecting drain to divert the excess water from the Najafgarh depression to the river Yamuna

by cutting across the Aravalli Ridges. This proposal, if approved, is likely to cost Rs.3 to 4 crores and could be completed in twelve to thirteen months.

Flood control measures in the Haryana Sub-region: The flood conditions arising out of acute drainage congestion in the Haryana Sub-region of the NCR happens to be one of the most serious problems towards the development of the Sub-region. Flooding by spill over from the river Yamuna on its banks also poses an equally serious problem, which requires to be tackled on a priority basis. No integrated programme has been made so far, by the State Government towards the elimination of flood hazards in Haryana, although, the serious nature of the problem has been officially recognised since long. Flood control measures have been recently adopted in this Sub-region: these include primarily (i) the construction of flood protective embankments and (ii) improvement and remodelling of the existing surface drains. The progress in implementing the measures have been very slow and unsatisfactory. Table 7.3.8 gives the statement of expenditure and progress of implementation of these programmes within the Sub-region.

Four schemes for flood protection embankments have been envisaged at an estimated cost of Rs.26.55 lakhs which are, specifically, meant for protecting the settlement areas (village abadis) from submergence due to the spill over from the river Yamuna during the

rainy season. The benefits of these schemes have not been realised within the Haryana Sub-region because of the slow implementation of the envisaged projects. These schemes fall within ~~Rooxpraty~~ Karnal, Rohtak and Gurgaon districts of Haryana along the western bank of the river Yamuna.

The flood situation within the Najafgarh drain catchment areas of the Haryana Sub-regions are very much similar to that of the Najafgarh block in the south-west of Delhi. The measure of flood control adopted have generally been in the form of remodelling and improving the existing drains in these areas for better drainage facilities. The plains of the Haryana Sub-region north of Najafgarh drain and Jahajgarh link drain, pose serious problems of drainage congestions resulting in wide-spread submergence of the surrounding areas during the rainy season. Most of the continuing schemes for improvements and remodelling of drains are envisaged for areas north of the Najafgarh drain and Jahajgarh link drain. Out of the 22 continuing drainage improvement and remodelling schemes, undertaken by the State Government, 17 relate to these areas, with a total estimated cost of Rs.563.75 lakhs. The Fourth Plan provision for improvements in drainage in this area amounts to Rs.148.50 lakhs. Also, 11 out of the 16 new schemes for drainage improvement in the Haryana Sub-region relate to the areas north of the Najafgarh drain and Jahajgarh link drain. South of the Najafgarh drain and Jahajgarh link drain, the flood protection measures are being contemplated under new schemes, which include channelisation of the Sahibi Nali and remodelling of the Najafgarh lake

Table 7.3.8

Flood Control Measure in the Haryana Sub-region

(figures in lakhs)

Sl. No.	Measures of Flood Control.	Total cost estimate	Expenditure upto 1968-69	Budget provision 1969-70	4th Plan provision	Remarks
1.	Flood protection embankments; No. of Schemes - 4	26.55	5.33	3.30	20.50	Schemes taken up during 1968 and after.
2.	Remodelling and improvement to existing drains (continuing) No. of schemes-22	605.56	327.78	19.30	193.00	2 schemes 1960 1 " 1961 1 " 1963 3 " 1964 2 " 1965 2 " 1967 9 " 1968 2 " 1969 <hr/> 22
3.	Remodelling and improvements (new schemes) No. of schemes -16.	522.96	2.40	2.00	168.00	Schemes yet to be finalised.
Total:		1,155.07	335.51	24.60	381.50	

Source: Haryana Government.

and Jahajgarh Lake link drains. The drainage schemes in this area have not been formulated clearly, but the total estimated cost for flood protection works along the Sahibi river has been stated to be Rs.150.00 lakhs.

Besides the above schemes, other schemes for remodelling and improving the existing

drains to the east of the Aravalli ridges in Haryana, is also continuing for which Rs.44.50 lakhs has been earmarked in the Fourth Plan. Under the New schemes for this area Rs.127.75 lakhs is reserved for flood moderation and storage works on Landoha Nalla.

Flood control measures in the U.P. Sub-region:

Flooding in the U.P. Sub-region of the NCR, occurs mainly due to over-flow from the river Yamuna, the river Ganga and its tributary the Kali. The flood protective schemes, in this Sub-region, therefore, include improvement in the existing drainage system, re-modelling of drains and the construction of marginal embankments along the river. The proposed flood protection and drainage improvement schemes in the U.P. Sub-regions of the NCR include about 136 schemes at a total estimated cost of Rs.318.00 lakhs, to benefit nearly 24.50 thousand hectares (60.60 thousand acres). Out of this, Meerut District has about 44 schemes with an estimated cost of Rs.212.34 lakhs, while 92 schemes with an estimated cost of Rs.105.66 lakhs fall in Bulandshahr District. The area to be benefitted comes to 15.54 thousand hectares (38.30 thousand acres) for Meerut District and 9.04 thousand hectares (22.30 thousand acres) for Bulandshahr District. The State Government has included drainage projects under the minor irrigation sector of the Fourth Five Year Plan and have a provision for allocation of Rs.1.75 lakhs and 1.37 lakhs for Meerut and Bulandshahr districts, respectively. Under the drainage and flood control proposals in the U.P. Sub-region of the NCR, remodelling, extension and diversion of Satwai drain; remodelling of Sandra drain between Hindon river and Meerut-Hapur road in Meerut district; and remodelling of Neem Nadi, Karwar, Khurja drain, Harnauti drain,

Yamuna drain etc. in Bulandshahr district are important.

Measures for flood control in Rajasthan Sub-region: The Rajasthan Sub-region has only 0.2% of the total flood affected areas of the NCR. Here floods are caused by the over-flow of the Sahibi on either side during the rainy season, because of acute drainage congestion in Haryana to the north. The Rajasthan Government has included a provision of Rs.10.00 lakhs during the Fourth Plan for the Sahibi irrigation cum flood control scheme within the NCR. The total provision for works on flood control measures in the State is in the order of Rs.195.00 lakhs during the Fourth Plan.

Need for a Flood control Authority for NCR:

Presently, the governments of Delhi, Haryana, U.P. and Rajasthan have an established Flood Control Wing attached to the respective State Irrigation Departments. These flood control wings have been suggesting steps to be taken by the state governments to check flood hazards within their jurisdictions. So far as the NCR is concerned, the plans so far prepared by the State Government have been on a piece-meal basis, thereby only covering their respective areas without viewing the problem in its totality. Measures taken by these authorities have been generally of the nature of interim relief measures, and these measures have not solved the major problem of threat from floods in any of the concerned States. In fact, some relief measures adopted in isolation by a single authority in one State have sometimes

been found detrimental and have created new flood problems for the adjoining States. The recent large scale flooding in Haryana, for example, was a result of the relief measures, like the construction of the Dhasa bund that was undertaken to protect flooding in the Delhi area. In view of such happenings, it is suggested that a separate authority should be formed to deal with the total problem of flood and drainage congestion in the NCR particularly in Haryana and the Union Territory of Delhi in collaboration with the concerned irrigation departments of the State Governments.

The Fourth Five Year Plan has included the provision of Rs.30,00 lakhs for preparation of a drainage plan for the Union Territory of Delhi. It may be very useful for the regional development of the NCR, if the jurisdiction of the agency preparing the drainage plan for Delhi is enlarged or the new authority stated above is created to cover the whole of the NCR. If such an arrangement is made, it would become practical to tackle the situations that have given rise to problems of flood and drainage congestions in the NCR.

4. Regional Power Supply:

Adequate power supply is an essential infrastructure for the development of the regional economy. In the National Capital Region, (which comprises areas falling in three States and the Union Territory of Delhi) power development programmes have so far been undertaken by the State Governments, based on the priorities within their respective States only. The power development programmes, as indicated in the Five Year Plans of the States, therefore, have not been contemplated to meet the requirements for the development envisaged in agriculture, industry and allied socio-economic activities. For the proper development of the economy of the NCR, it is very necessary to review the existing sources of power and their exploitation and future utilisation within the Region.

Existing Position of Power Supply in the NCR:

The area delineated within the NCR falls within the Northern Power Zone which is supplied power through the grid system. Bulk of the power supply is generated outside the Region. Within the Region, the power generating plants, with the exception of the Delhi Electric Supply Undertaking are generally old, outdated and small in size. Even, the units of the Indraprastha Power Station of the D.E.S.U. with a capacity of 55 M.W., are considered to be very small by modern standards.

In the Haryana Sub-region of the NCR, power is distributed from the Bhakra grid system though a large number of substations spread over the Sub-region. Also Faridkot has got two diesel stations with a capacity of 12/4/8 MVA. Besides, there are several industrial establishments which produce electricity from their own generating units. There are nearly 18 such units which largely supply the needs of the industries only.

The U.P. Sub-region of the NCR receives power from the Ganga Grid system, supplemented by small hydel stations viz. Salwa, Bholu, Chitaura in Modinagar Division, and Palra in Bulandshahr Division, and three diesel power stations, one each in Meerut, Hapur and Ghaziabad. From the four small hydel stations in the U.P. Sub-region, the total power generation is 40.1 million kwh. Figures for the three diesel power stations are not available.

Delhi produces the major part of its power requirements from two thermal power stations. Delhi also receives power from the Bhakra Grid System to meet the shortfall. The total generation (D.E.S.U.'s generation and import from outside sources) came to about 1257.2 million kwh during the year 1969-70.

The Rajasthan Sub-region of the NCR receives its power supply both from the Chambal as well as the Bhakra Grid systems. The figures for the power supply in the Rajasthan Sub-region are not available. However the steam and diesel station in Alwar town in 1964-65 had a capacity of about 4000 M.W. (A.M.W.).

Power Generation and Distribution System in the NCR:

It has already been pointed out that most of the generating units outside the Region supply power through the network of transmission lines with different ranges of capacity. The total length of transmission lines with a voltage range from 11 K.V. to 220 K.V. in 1968-69 was 1,802 km (1,126 miles) in the NCR. (Table 7.4.1 and Map 7.4) The density of transmission lines of the above voltage range comes to 6.32 km./sq. km. (11 miles/sq. mile) which is very low compared to any standard and shows relative under-development of industries using power. Moreover, this clearly points out that the task is not only of generation of electricity within this Region but also more rapid installation of transmission lines according to the needs, so that there will be equitable distribution. Also there should be less irregularity and disruption of activities in industrial and other sectors due to power failures. It has also to be ensured that power is generated wherever it is cheaper and made available to the Region. Thus further mobilisation of resources for the erection of suitable transmission lines is no less urgent than the construction of new generating plants outside or inside the Region.

Rural Electrification:

In a country like ours where a majority of people live in the rural areas and a greater percentage of land is rural, the importance

Table 7.4.1

Length of transmission Lines in the NCR (in miles)

Voltage line Range	U.P.	Haryana	Delhi	Rajasthan	Total
1. 132-220-KV	134	57	73	Not available	274
2. 66 KV	18	33	13	-	64
3. 33 KV	74	254	-	-	328
4. 11 KV	-	460	-	-	460
Total:	226	814	86		1,126

Source: State Governments.

of rural electrification is beyond any doubt. Even within the NCR the percentage of rural population is about 67% and the total rural land area is 95%. The provision of electricity in rural areas cannot be questioned as uneconomic since it has indeed many of the characteristics of a social service and it can play an important part in the community development programme and in the development of agriculture, and cottage and small scale industry. The main load in the rural areas is for pumping water for irrigation, small agro-industries, the provision of drinking water supply, house and street lighting etc.

At the present moment, in the NCR the electricity rates fixed for agricultural consumers are very favourable. All the villages in Delhi and in the Haryana Sub-region are electrified and are potential places for small scale industries which could provide employment opportunities. The U.P. Sub-region has 3,019 inhabited villages according to the 1961 Census, out of which only 521 villages have been electrified under the rural electrification programme upto March 1970.

Table 7.4.2

Number of Villages Electrified in the NCR

Sub-region	District	No. of inhabited villages.	No. of electrified villages.
U.P.	Meerut	1,480	357
	Bulandshahr	1,539	164
Haryana	Panipat	168	All villages electrified
	Rohtak	761	
	Gurgaon	1,452	
Delhi	Union Territory	208	208

In U.P. there is an extensive programme of energisation of private tubewells and pumps-sets. About 900 tubewells and pump-sets in district Meerut and 870 in district Bulandshahr have been energised during 1966, another 450 tube wells and pump-sets in 1967-68. It

is expected that by the end of the Fourth Plan more than 1,000 tubewells and pump-sets will further be energised in each of the districts.

Pattern of Power Consumption:

The pattern of power consumption in the NCR is quite diverse in the various Sub-regions. The Delhi Sub-region, with its big domestic, commercial and industrial base, records the highest total consumption of 10,567 lakh kwh, as well as per capita and per sq. km. consumption. It is 278 kwh per capita and 7.1 lakh kwh per sq. km (19 lakh kwh per sq. mile), the population assumed being 38 lakhs in 1969-70. The total consumption in the U.P. Sub-region comes to 3,786 lakh kwh in 1969-70 (Table 7.4.3.). Thus the per capita consumption is 66 kwh (population taken at 57 lakhs) and 34,000 kwh/sq. km (89,000 kwh/sq. mile). The Haryana Sub-region comes second in the total consumption of power with 2,900 lakh kwh for the two districts of Gurgaon and Rohtak (figures for Panipat tehsil are not available). Thus the per capita consumption for the Haryana Sub-region is 76 kwh (population taken for the above two districts at 38 lakhs in 1970) and 24,000 kwh/sq. km (62,000 kwh/sq. mile).

Power Demand in the NCR:

For balanced regional development, abundant power supply in the NCR is a pre-requisite. But at present power is unevenly distributed in different parts of the Region. There are occasional power failures as well as fluctuations

Table 7.4.3

Power Consumption in the U.P. Sub-Region

(Figures in 10⁴ kwh)

Type of Consumption	Meerut Div.		Modinagar Div.		Ghaziabad Div.		Bulandshahr Div.		Type wise consum.
	kwh	% to total consum	kwh	% to total consum	kwh	% to Total consum	kwh	% to total consum	%
1. Domestic Consumption	758	2.03	92	0.25	505	1.33	312	0.82	4.43
2. Commercial Lighting & Allied Domestic Power	68	0.18	39	0.10	264	0.70	89	0.24	1.22
3. Industry	2,940	7.76	13,895	36.71	8,351	22.06	1,501	3.96	70.49
4. Street Lighting etc.	12	0.03	4	0.01	43	0.10	30	0.08	0.22
5. Irrigation	3,386	8.95	72	0.19	1,610	4.26	3,877	10.24	23.64
Total	7,164	18.95	14,102	37.26	10,773	28.45	5,809	15.34	100.00

Grand Total : 37,848

Source: Data supplied by Meerut Survey Division, Town and Country Planning Deptt., Govt. of U.P., 1970.

of supply both of which are detrimental to production. Also, there is considerable rise in demand and supply of power within the Region. The demand for power cannot totally be met through thermal supply as the high cost of coal is a deterring factor in the NCR. Outside the NCR, there is potentiality for generating hydel power which is expected to be adequate to meet the requirements of the Region as well as its neighbouring areas. The success in meeting the power demand will, however, depend on proper co-ordination and sound arrangements for the transmission of power from one grid to another. Nevertheless, the existing arrangements to get power through the grid system have not been encouraging because of the frequent failures in supply due to belated co-ordination and many other unforeseen reasons, such as the low level of water in the hydel dams.

In view of the envisaged development and growth of population and activities in the NCR, it is natural that there will be a tremendous increase in the demand of electricity for industrial, commercial and domestic purposes. However, the demand in the NCR will not be uniform and it is estimated to be highest in the Delhi Sub-region followed by Haryana, U.P. and Rajasthan Sub-regions.

The Haryana Sub-region has an existing demand of 309 MVA during the year 1969-70 and the estimated demand would be 713.5 MVA i.e. more than 136% increase in the course of 11 years. The power demand in the Haryana Sub-region of the NCR is given in

Table 7.4.4. Similarly, the other Sub-regions will require a doubling of their current demands by 1981.

Table 7.4.4

Power Demand in the Haryana Sub-region in the NCR

District/ Tehsil	Domestic, Commercial & Industrial (MVA) 1970	Domestic Commercial & Industrial (MVA) 1981.
Rohtak Distt.	59.70	238.40
Gurgaon Distt.	118.60	424.80
Panipat Tehsil.	130.80	78.30
Total:	309.10	731.50

Source: Bhakra Nangal Power Project (B.M.B) Supplied by Haryana Town Planning Department.

Future Programmes for the Generation of Electricity:

At the present moment the demand for power in the Region for domestic, commercial, industrial, irrigation, etc., are effectively being served by generation within the Region and receipts from outside. It can safely be presumed that because of higher growth rate in every sector of activity envisaged in the regional development proposals, there is every probability of shortage

of power, if the supply is not augmented by generating electricity within the Region or is not supplemented from outside sources.

Concerted efforts are being made by the State and Central Governments to forestall the anticipated shortage of power supply in the Region as well as its neighbouring areas. Details of the programme beyond the Fourth Five Year Plan are not available at the moment. However, during the Fourth Plan period, two thermal power stations and an expansion programme of the existing thermal units, are to come up. One of them is at Badarpur in Delhi, which will produce 300 MW of power from three sets, each having an installed capacity of 100 MW, & the other at Faridabad in the Haryana Sub-region, where a thermal power station with a capacity of 55 MW, is to be commissioned by 1973-74. Two other units at the same place will begin functioning at an interval of six months according to the present schedule. Also the Indraprastha power station has got plans for expansion which will be implemented during the Fourth Plan. It will have its 5th generating unit by 1970-71 and the 6th by 1973-74 with an installed capacity of 55 MW each.

The Haryana Sub-region, with its estimated demand of 731 MVA by 1981, has to increase the capacity of import and generation to cope with the one and half fold increase of power demand by 1981. Arrangements have to be made to share the power generation schemes in

the neighbouring areas, such as Indraprastha Power House, Badarpur, R.P.S., Rajasthan (atomic), Beas Project, Western Yamuna Canal hydel project, Salal (J & K) hydel project, Suil (H.P.) hydel project.

Besides generation of electricity, erection of transmission lines and sub-stations are to be built. The Haryana portion of the NCR will have two 66 KV sub-stations, one at Bhadas, and the other at Jhajjar; and four additional 30 KV sub-stations are to be erected one each at Gurgaon, Rohtak, Sonapat and Panipat. It has been estimated by the Haryana State Electricity Board that on an average each town in the Region will have an addition of 4 miles and 8 miles of 400/230 volts mainly by the end of the Fourth Plan. The Haryana State Electricity Board has also an ad-hoc provision of Rs. 40 lakhs in the overall estimate of Rs. 12 crores for the extension of 220 KV/132 KV line and different sub-stations needed for transmission of power.

In any case, for the formulation of a policy for the generation of power in this Region, the note prepared by the Central Water and Power Commission included in the Energy Survey Committee Report, has immense value because it has given the probable sources of hydel power just outside the Region which may be of great help in satisfying the increased power demand of the Region. The possible hydel sources outside the Region are given in Table 7.4.5.

Table 7.4.5

Possible Source of Hydel Power to augment the Power Supply in the NCR.

Source	Capacity
1. Ramganga	55 M.W. at 60% Load Factor
2. Jamuna I	34 M.W. " 60% " "
3. Jamuna II	32 " " " " "
4. Kothibhel	600 " " " " "
5. Kunau	570 " " " " "
6. Ganga Canal	70 " " " " "

Source: Report of the Energy Survey of India Committee, Govt. of India

The power potential of different states around the NCR is given in Table 7.4.6 to show the relative potential of these States.

Table 7.4.6

Power Potential of States in the Neighbourhood of the NCR

1. Punjab (including Haryana and Delhi)	1360 M.W. at 60% Load factor
2. Rajasthan	149 " " " "
3. U.P.	3764 " " " "
4. Himachal Pradesh	1867 " " " "

Source: Report of the Energy Survey of India Committee, Govt. of India.

It is not only the investment on generation of electricity which is urgently needed but also the effective distribution of power, through a network of transmission of lines, so that the power generated in one corner can economically be transmitted to the other. If this coordination is attained, there is less possibility of power shortage in any sector of development in the NCR in the future.

5. Housing in the National Capital Region:

Ever since the development of urban transportation techniques, the frontiers of housing are being pushed from the city centre. More or less homogeneous urban spread is universal with minor differences in types of houses and density of population. In guiding residential growth, the size of plots, the distribution of community facilities, like shopping centres and services, the disposition of open-spaces and the location of work centres play a definite role.

In regional planning, the layout or form of the residential development is of secondary importance. What is of real significance is the basic decision on the density of town development, types of housing and other related matters. To optimise development of urban areas in any region, it is necessary to conceive economic models for housing, and provide and guide their programming in the overall context of regional development. However, it may be said that each model would be ideal for the purpose for which it has been conceived as it is to maximise the output from certain inputs which are more akin to the region than to any other. Thus, the following housing analysis in the NCR is exclusively related to this very Region and is not comparable to any other, except in a certain broad sense.

Housing Supply:

One of the important aspects of housing is the current housing supply, as well as the existing housing stock, including both aspects - qualitative and quantitative. In the following analysis of the housing supply, based on Census data, the definitions of census household and census house etc., as given in the Census, have been adopted.*

The 1961 Census showed that in the NCR 59% of the households had one room dwellings and 26% two rooms and only 8% had 4 rooms or more. If figures for the urban sector alone are considered, it is seen that 63% of the households in Delhi lived in only one room and 24% in two rooms. In Urban areas outside Delhi the situation was more or less the same but with 50% living in one room and 30% in two rooms and 11% living in 4 rooms or more. As to the basic facilities of water, privy, and washing place in the houses, over 40% of the households living in Delhi did not have a bath room, a privy and a kitchen.

In housing, one of the basic problems is overcrowding and this situation exists ~~throughout~~ throughout the NCR irrespective of the type of housing available, i.e., from one room per household to three or four rooms. Generally, in the Region over - crowding as gauged by the maximum persons

*A Census 'household', by definition in the Census of 1961 - is a group of persons who commonly live together and take their meal from a common kitchen.

Census 'House' means a structure or a part of a structure vacant or occupied and used as a dwelling, a shop, a shop-cum-dwelling, a place of business, a workshop, a school etc., with a separate entrance.

Table 7.5.1

Urban Population, Households and Houses in the NCR and All India-1961.

	Total No. of Households	Population	Occupied Residential Houses	Persons per House-hold	Persons per House	Total No. of Census houses
1	2	3	4	5	6	7
INDIA	15,563,371	78,936,603	13,785,314	5.07	5.72	18,837,712
NCR Sub-Regions:						
1. Delhi Union Territory	466,186	2,359,408	314,198	5.06	7.51	430,250
2. Haryana						
Rohtak District	36,368	174,507	35,103	5.35	5.54	50,598
Gurgaon District	40,499	205,601	39,891	5.08	5.15	57,003
Panipat (Tehsil)	12,958	67,026	12,881	5.17	5.20	18,187
Sub-Total:	89,825	467,134	87,875	5.20	5.31	125,788
3. Rajasthan						
Alwar* tehsil	13,470	72,707	11,594	5.36	6.27	48,487
4. Uttar Pradesh						
Meerut District	193,562	587,194	94,089	5.39	5.94	135,144
Bulandshahr District	40,845	219,882	36,031	5.38	6.10	55,005
Sub-Total:	144,407	778,676	130,120	5.39	5.98	213,644
NCR (Total)	713,988	3,677,925	543,787	5.15	6.76	818,169

* In the tehsils of Beheror, Mandawar, Kishangarh and Tijara there were no towns in 1961.

Source: Census of India 1961, Volume II and IV.

Table 7.5.2

Rural Population, Households, and Houses in the NCR and All India 1961.

	Total No. of Households	Population	Occupied Residential houses.	Persons per Household	per House-	Total No. of Census houses
1	2	3	4	5	6	7
<u>INDIA</u>	68,948,516	360,298,168	65,070,272	5.22	5.54	89,019,325
<u>NCR Sub-regions</u>						
1. <u>Delhi (U.T)</u>	49,342	299,204	45,604	6.06	6.56	67,278
2. <u>Haryana</u>						
Rohtak District	186,199	1,225,884	182,975	6.58	6.70	303,914
Gurgaon District	170,058	1,035,105	168,244	6.09	6.15	278,115
Panipat Tehsil	37,520	214,917	37,088	5.73	5.79	60,193
Sub-Total:	<u>393,777</u>	<u>2,475,906</u>	<u>388,307</u>	<u>6.29</u>	<u>6.38</u>	<u>642,222</u>
3. <u>Rajasthan</u>						
Behror Tehsil	21,730	133,652	14,206			28,065
Mandawar Tehsil	14,894	86,811	10,593			28,388
Kishangarh Tehsil	18,113	102,575	14,465		7.84	20,836
Tijara Tehsil	13,867	78,671	10,326			43,165
Alwar Tehsil	28,429	155,410	21,437			
Sub-Total:	<u>97,033</u>	<u>557,119</u>	<u>71,027</u>	<u>5.72</u>	<u>7.84</u>	<u>157,545</u>
4. <u>Uttar Pradesh</u>						
Meerut District	378,125	2,154,166	359,864	5.70	5.99	574,792
Bulandshahr	273,856	1,517,515	244,596	5.54	5.20	455,877
Sub-Total:	<u>651,981</u>	<u>3,671,681</u>	<u>604,460</u>	<u>5.62</u>	<u>5.92</u>	<u>1,030,669</u>
NCR(Total)	<u>1,142,131</u>	<u>7,003,910</u>	<u>1,109,398</u>	<u>5.87</u>	<u>6.31</u>	<u>1,897,714</u>

Source : Census of India 1961, Volume II and IV.

Table 7.5.3

Population, Households, and Houses in Selected Towns of the NCR 1961.

Towns.	Total No. of households.	Popula- tion	Occupied Residential houses	Person per House-hold	Person per House	Total No. of Census Houses
1	2	3	4	5	6	7
<u>U.P.</u>						
1. Sikandrabad M.B.	4,949	26,290	4,146	5.31	6.34	N.A.*
2. Bulandshahr	8,289	44,163	8,117	5.33	5.44	N.A.
3. Khurja	7,674	41,491	5,450	5.41	7.61	N.A.
4. Ghaziabad M.B. Rly.colony	14,440	70,438	12,271	4.88	5.74	17,669
5. Modinagar	5,661	24,266	5,550	4.29	4.37	
6. Meerut M.B. & Malyana	38,780	208,663	35,817	5.98	5.82	33,250
7. Hapur	9,752	55,248	8,905	5.66	6.20	13,791
8. Meerut Cantt.	12,380	75,334	11,056	6.08	6.81	14,358
<u>HARYANA</u>						
1. Rohtak M.C.	16,638	89,193	16,588	5.36	5.38	22,767
2. Sonapat M.C.	9,145	45,882	8,262	5.01	5.55	
3. Faridabad M.C.	1,954	10,857	1,947	5.56	5.58	N.A.
4. Gurgaon M.C.	7,652	37,868	7,564	4.95	5.01	N.A.
5. Rewari M.C.	7,051	36,994	6,908	5.35	5.35	N.A.
6. Palwal M.C.	5,066	27,863	4,938	5.50	5.64	N.A.
7. Panipat M.C.	12,958	67,026	12,881	5.17	5.20	18,187
<u>RAJASTHAN</u>						
1. Alwar M.C.	13,570	72,707	11,594	5.36	6.27	18,487

*N.A. Not available.

Source: Census of India 1961, Volumes II and IV.

per room ratio is high. In case of one room dwellings in the urban areas, it varies from 4.09 to 4.45 persons per room. The situation does not improve much in the two room dwellings where it is 2.68 to 2.90 persons per room. Another factor about the existing housing which deserves mention is the lack of self-owned houses in urban areas - 50% of the households in urban areas of the NCR lived in rented houses during 1961; whereas in the whole of the NCR 25% the households lived in rented houses.

In the following paragraphs the existing situation is analysed by bringing forth the regional differences and differentiations wherever they occur. In Table 7.5.1, the Urban situation is portrayed as of 1961 and it clearly indicates that the average persons per household and per house in the NCR was 5.15 and 6.76 respectively. This is higher than the All India urban average of 5.27 and 5.72 respectively. The overcrowding is highest, with an average of 7.51 per house in Urban Delhi, and 5.98 in Rajasthan and U.P. When persons per household are reckoned, the maximum is in U.P. with 5.39, and the minimum in Urban Delhi 5.06 which is more or less comparable to the All India urban average of 5.07.

In Table 7.5.2 the situation is portrayed for the rural sector. It is seen that overcrowding is still higher than in urban areas with an average of 6.31 persons per house and 5.87 persons per household as compared to the All India average of 5.54 and 5.22

respectively. In the rural sector it is seen that the persons per house is the highest in the Rajasthan Sub-region, with an average of 7.56 and the least in U.P., with 5.92, whereas it is 6.55 in Delhi. The highest number of persons per household is 6.29 in Haryana and lowest in U.P. at 5.62, whereas in Delhi it is 6.06. Table 7.5.3 indicates the situation in selected towns of the NCR, with the average persons per house ranging from the lowest 4.37 in Modinagar to the highest 7.61 in Khurja. The highest number of persons per household 6.08 is in Meerut (Cantonment) whereas the lowest is in Modinagar at 4.29. Nearly 4.59% of the country's urban households live in the NCR of which Delhi's share alone is 3% (Table 7.5.4). The housing situation in urban NCR projects a contrasting situation in that the concentration and housing shortage is acute in urban Delhi whereas it is less acute in other urban centres.

Table 7.5.4

Population and Households in the NCR in Relation to All India 1961.

	Population of NCR as percentage of All India.	Households of NCR as percentage of All India
URBAN NCR	4.65	4.59
(Delhi urban only)	(2.98)	(3.0)
Rural NCR	1.94	1.56
Total NCR	2.43	2.20

Source: Census of India

Table 7.5.5

Overcrowding In Urban NCR 1961

Particulars	Total No. of Households.	Households with									
		1 room %	2 room %	3 room %	4 room %	5 room & Above %					
1	2	3	4	5	6	7	8	9	10	11	12
India	2,968,426	1,574,669	53.04	732,106	24.66	305,520	10.30	158,685	5.34	171,005	5.76
<u>Sub-Regions</u>											
Delhi	86,300	54,389	63.02	20,306	23.53	5,949	6.89	2,849	3.30	2,201	2.55
<u>Haryana</u>											
Gurgaon Distt.	7,862	3,677	46.76	2,562	32.58	905	11.51	382	4.86	328	4.17
Rohtak Distt.	6,820	3,283	48.14	1,977	28.98	727	10.66	377	5.52	417	6.11
Panipat Tehsil	2,684	1,601	69.57	784	29.21	178	6.63	58	2.16	56	2.08
<u>Rajasthan</u>											
Alwar Tehsil	2,742	1,224	44.64	776	28.30	329	12.00	179	6.52	226	8.24
<u>U.P.</u>											
Meerut Distt.	19,828	10,668	53.80	5,404	27.25	2,023	10.20	1,066	5.37	1,266	6.38
Bulandshahr Distt.	7,676	3,311	43.13	2,326	30.30	946	12.32	499	6.50	594	7.73
NCR	132,594	77,556	58.49	34,135	25.74	11,057	8.33	5,410	4.08	5,088	4.15

Source: Census of India 1961, Volume IV-B, 20 percent sample survey.

Table 7.5.6

Overcrowding in Rural NCR 1961.

Particulars	Total No. of		Households with											
	Households.		1 room	%	2 rooms	%	3 rooms	%	4 rooms	%	5 rooms & Above	%		
India	16,710,667	6,612,885	39.57		3,684,239	22.05		1,584,799	9.48		818,671	4.70	825,720	4.94
<u>Sub-Regions</u>														
Delhi	9,140	3,256	35.62		3,536	38.68		1,559	15.06		874	9.56	860	9.40
<u>Haryana</u>														
Gurgaon Distt.	34,019	13,420	39.45		10,425	30.64		5,118	15.04		2,383	7.00	2,599	7.63
Rohtak Distt.	37,159	9,631	25.92		12,169	32.75		7,725	20.79		3,836	10.32	3,645	9.81
Panipat Tehsil	7,385	3,114	42.16		2,158	29.22		1,049	14.20		509	6.89	550	7.44
<u>Rajasthan</u>														
Alwar Portion	19,657	8,962	45.59		5,489	27.92		2,635	13.40		1,240	6.30	1,319	6.71
<u>U.P.</u>														
Meerut Distt.	70,971	27,387	38.59		22,356	31.50		11,038	15.55		4,995	7.04	5,184	7.31
Bulandshahr Distt.	55,875	24,857	44.49		17,873	31.99		7,385	13.21		3,221	5.76	2,529	4.53
NCR.	234,206	90,627	38.69		74,008	31.59		42,000	17.93		17,058	7.28	16,686	7.12

Source: Census of India 1961, Volume IV-B, 20 percent sample survey.

Table 7.5.7

Overcrowding in Selected Towns of the NCR 1961.

Towns	Households with										Total No. of House-			
	1 room	%	2 room	%	3 room	%	4 rooms	%	5 rooms & above	%	No. regu- lar room	%	holds.	%
1. Delhi M.C.	46,544	63.40	17,402	23.70	4,980	6.78	2,406	3.28	1,702	2.32	376	0.52	73,410	100
2. New Delhi M.C.	7,037	62.34	2,486	22.02	853	7.56	353	3.13	397	3.52	162	1.43	11,288	100
3. Panipat M.C.	1,601	59.65	784	29.21	178	6.63	58	2.16	56	2.08	7	0.26	2,684	100
4. Alwar M.C.	1,227	44.75	776	28.30	329	12.00	179	6.53	226	8.24	5	0.18	2,742	100
5. Rohtak	1,878	58.61	822	25.66	250	7.80	134	4.18	115	3.59	5	0.16	3,204	100
6. Ghaziabad M.B. & Rly. Colony	1,367	46.88	885	30.35	336	11.52	162	5.56	166	5.69	0	0.00	2,916	100
7. Meerut M.B. & Maliana	2,774	56.03	969	19.57	500	10.09	299	6.04	409	8.26	0	0.00	4,951	100
8. Meerut Cantt.	924	43.06	810	37.74	213	9.93	103	4.80	96	4.47	0	0.00	2,146	100
9. Hapur M.B.	924	43.06	810	37.74	213	9.93	103	4.80	96	4.47	0	0.00	2,146	100

Source: Census of India 1961, Volume IV-B, 20 percent sample survey.

Table-7.5.8

Classification of Dwellings - Urban
Distribution of Sample Households Living in Census Dwellings
By Predominant Material of Wall and Roof.

	Wall Material				Roof Material			
	Kutcha		Pucca		Kutcha		Pucca	
	No.	%	No.	%	No.	%	No.	%
India:	999,825	33.7	1,968,601	66.3	759,780	25.5	2,208,646	74.50
<u>Sub-Region:</u>								
Delhi	13,151	15.2	73,149	84.8	20,200	23.4	66,100	76.6
<u>Haryana:</u>								
Gurgaon Distt.	1,623	20.6	6,239	79.4	3,449	43.9	4,413	56.1
Rohtak Distt.	490	7.1	6,413	92.9	5,886	85.1	1,014	14.9
Panipat Distt.	243	9.1	2,441	91.0	2,535	88.5	149	11.5
Sub-Total:	2,356	13.5	15,093	86.33	11,870	68.03	5,576	32.68
<u>Rajasthan:</u>								
Alwar Tensil	662	23.7	2,080	76.30	844	29.7	1,898	70.3
<u>U.P.</u>								
Meerut Distt.	4,124	20.8	15,704	79.20	8,549	43.1	11,279	56.9
Bulandshahr Distt.	2,299	29.9	5,377	70.1	1,281	73.9	2,003	26.1
Sub-Total:	6,423	23.3	21,081	76.7	9,830	35.7	13,282	76.65
NCR	22,572	17.0	111,403	83.0	42,744	32.00	86,856	68

Source: Census of India 1961, Volume IV-B, 20 percent sample survey.

Table 7.5.9

Classification of Dwellings - Rural
Distribution of Sample Households Living in Census by
Predominant Material of Wall and Roof

	Wall Material				Roof Material			
	Kutcha		Pucca		Kutcha		Pucca	
	No.	%	No.	%	No.	%	No.	%
India	9,797,312	76.88	2,944,929	23.12	7,811,284	56.84	5,930,957	43.16
<u>Sub-Region:</u>								
Delhi	2,642	31.57	5,725	68.43	5,715	62.52	3,425	37.48
<u>Haryana:</u>								
Gurgaon Distt.	21,483	63.15	12,536	36.85	26,244	77.14	7,775	22.86
Rohtak Distt.	22,670	61.00	14,489	39.0	33,693	90.67	3,466	9.33
Panipat Distt.	4,172	56.49	3,213	43.51	7,253	98.21	132	11.79
	<u>48,325</u>	<u>61.51</u>	<u>30,238</u>	<u>38.48</u>	<u>67,190</u>	<u>85.65</u>	<u>11,373</u>	<u>14.47</u>
<u>Rajasthan:</u>								
Alwar (Portion)	7,814	39.72	11,858	60.28	12,540	63.79	7,117	36.21
<u>U.P.:</u>								
Meerut Distt.	56,343	79.39	14,628	20.61	68,973	77.56	19,958	22.44
Bulandshahr Distt.	47,069	84.24	8,806	15.76	54,434	97.42	1,441	22.58
	<u>103,412</u>	<u>81.5</u>	<u>23,434</u>	<u>18.48</u>	<u>123,407</u>	<u>97.28</u>	<u>21,399</u>	<u>16.23</u>
NCR	162,193	69.48	71,225	30.52	208,852	82.82	43,314	18.18

Source: Census of India, Volume IV-B, 20 percent sample.

Tables 7.5.5, 7.5.6 and 7.5.7 indicate the overcrowding in housing giving the break up of number of households in a one room dwelling, two room dwelling etc., upto 5 rooms and above. It may be seen from Table 7.5.5 that in urban NCR more than 58% of the households live in a one room dwelling whereas the percentage of households living in three rooms and above per dwelling is hardly 16. In the rural area (Table 7.5.6) the situation is just the reverse with more than 38% living in a one room dwelling and the rest having more than 2 rooms per dwelling. Table 7.5.7 shows overcrowding in selected towns with the percentage of households living in a one room dwelling ranging from 43 to 63.4.

The present overcrowding in the entire NCR is comparatively higher than the All India average except in the rural areas. Added to this is the qualitative aspect of housing. In terms of predominant roof material, it was found that more dwellings were kachha in both rural and urban sectors of the NCR as compared to All India percentages. (See Table 7.5.8 and 7.5.9). The higher percentage of overcrowding and the higher percentage of kachha houses indirectly reflect the shortcomings in the existing housing stock in the NCR.

Housing shortage could be examined from another angle, i.e., from the rate of growth of dwellings in comparison to the rate of growth of population. During the decade

1951-61 in the urban areas only one dwelling was added in Urban Delhi for an increase of 17 persons; in other Sub-regions of the NCR one dwelling was added for every rise of 6.8 persons in the population. (Table 7.5.10)

Table 7.5.10

Rate of Increase of Dwellings Compared to Increase in population in Urban NCR 1951-61

	Increase in 1951-61 Population	No. of per- sons for Residen- tial hou- ses.	No. of per- sons for each increa- se of houses
Urban Delhi	922,274	54,703	17.0
Urban NCR (Ex- cluding Urban Delhi)	317,718	46,993	6.8

This is a clear indicator that the rate of housing construction is lagging behind the rate of growth of population at least in Urban Delhi, and is comparatively faster in the other urban centres in the Region though this does not portray the peculiarities or the reasons for faster rate of construction in the other centres.

Housing Requirements:

There is a need to consider the requirements for future housing in the overall

perspective of developments in the country and the Region in particular, including such aspects like technological improvements, sociological changes and socio-economic shifts. This is a very broad area to cover. Therefore, for the purposes of this study, certain assumptions to estimate the future housing demand will have to be made.

Within the Region the size of the household and the persons per house in 1961, is higher than the average for the country. However, in forecasting the composition of future housing demand and future housing supply the following factors have to be taken in view:

- (a) Most families, by 1981, would prefer to live in single family dwellings.
- (b) The number of flats compared to other types of housing construction would considerably increase as the regional population grows. This form of ~~the~~ housing will be more popular in bigger cities like Delhi and Meerut in the Region.
- (c) There will be a need to redevelop the core areas of urban centres and replace the poor quality housing by better ones.
- (d) The changes in the age structure of the population and the effect of family planning will bring new types of demands for housing. The impact of such changes would be

felt on the design, structure and types of housing; and this will lead to technological improvements in residential housing.

- (e) A planned approach to avoid mixed land uses and to provide compatible land uses with residential areas would involve a comparatively newer approach to housing and thereby demand and supply.

These would provide a handle to set up priorities in the various urban centres and the strategy to develop different types of housing, compatible with the different situations and uses of land. The technological progress in housing and the importance or role of housing vis-a-vis other competing demands for the use of land, particularly in urban centres would shape the future types of housing.

Based on these assumptions, it will be seen, that it is very necessary to draw certain broad conclusions and to assess the requirements of future housing needs keeping in view the factors mentioned above. This would provide a rough basis to estimate the future requirements.

The estimates have taken into account the need for housing improvements which in turn will result in changes in the existing housing stock:

- (a) Changes in proportion of dwelling ~~the~~ use for different purposes - percentage of dwellings to be used as

/their

- . residential, commercial, institutional or other purposes.
- (b) Development of commercial, institutional and other economic activities, which trigger change of uses in existing stock.
- (c) The economic and job opportunities in a particular place which have a big impact on age structure and general composition of the community - which hinges on the types of improvements or alternations on the existing stock.
- (d) The technological advances in building, housing construction as well as the planned efforts in improvement of environmental situations - variations in density, types of building growth either vertical or horizontal, the technical innovations to help improve the aspects of living such as, design of building apartments, gadgetery etc.

These factors have to be considered in computing the overall estimates of housing requirements and supply for a future date. Apart from this the ecological factor and the change in public mores have a big impact on the composition of the new households. It is clear that in the future the number of persons per household would be comparatively less than in 1961, and that the role of nuclei families would be much more as compared to their present role.

Besides, the other factors like the replacement of a certain percentage of the existing housing stock on account of obsolescence and other factors like change of user also need consideration.

Considering these factors the following assumptions are made for estimating future housing requirements, by 1981, in the Region:

1. First it is assumed that by 1981 there will be changes in the average size of household due to shifts in living pattern and socio-economic changes. Accordingly, it is assumed that in the NCR, the average size per household would be 4.5 persons in the urban areas and 5 persons in the rural areas.

On the future population of 211 lakhs nearly 93 lakhs would be living in urban areas and the rest of the 118 lakhs would be living in rural areas.

Assuming that each household, especially in urban areas, would be requiring a dwelling, the number of houses required by 1981 for the incremental population of 57 lakhs in the urban areas would be about 13 lakhs and in the rural areas 9.6 lakhs houses are required for the 48 lakhs incremental population. Though some of these households will be sharing a house, however, in a planned economy the ratio of one house for each household has been taken as the norm.

2. In the urban areas 30% of the existing pucca houses are in bad condition or are sub-standard according to the present day

standards. By 1981 it is also presumed that the replacement of dwellings from the existing stock would be estimated at 30% of the existing pucca houses in 1961 both in urban and rural areas of the NCR - i.e., 131,000 in urban NCR and 100,000 in rural NCR. The demand arising from the change of uses, either by shifting or by demolition, is mostly confined to urban areas and estimated at 1% of the existing stock, 5,500 houses need to be rebuilt.

3. Apart from this an estimated number of 1% of existing houses in urban areas and 3% in rural areas were lying vacant at the time of the 1961 Census due to one or another reason. For future estimation purposes it is considered that this proportion would continue and to that extent the future demand would be enhanced. The total estimated vacant houses by 1981 would be 18,400 in urban areas, and 20,300 in rural areas.

4. At present 80% of the dwellings in Urban NCR are pucca. Assuming that rest of the 20% of the dwellings need to be converted or rebuilt as pucca dwellings, an estimated 109,000 dwellings in urban areas are required. In rural areas only 30% of the existing houses were pucca. Assuming that nearly 50% of the existing kuchha houses need conversion into pucca houses by 1981 the the total demand would be 388,000 units.

5. Taking the 1961 population in the Urban and Rural Sectors and occupied residential houses, it is found that the back-log in 1961

itself in the Urban Sector was of the order of 2,01,700 dwelling units of which 1,57,700 were required in Urban Delhi, calculated on the basis of 4.5 persons per household and one dwelling per household. In the Rural Sector the back-log in 1961 itself was of the order of 2,91,400 dwelling units calculated on the basis of 5 persons per household and one dwelling per household.

Incorporating all the above requirements, Table 7.5.11 gives the overall picture of the total number of dwellings required in the NCR under the three main heads:

Missing Proposals:

From the Table it will be seen that for the incremental population 23 lakhs dwelling units are required by 1981. However, if the back-log in 1961 is included about 17.7 lakhs houses will be required in the Urban Sector of the NCR and about 17.6 lakhs in the Rural Sector of the NCR making a total requirement of 35.1 lakh dwelling units for the entire NCR. To put it in another way, to meet the needs of increasing population between 1961 and 1981 and to cover the back-log of 1961, construction of dwellings per year should be of the order of 88,500 units in the Urban Sector of which nearly 47,500 alone would be in Urban Delhi itself. In the Rural Sector the construction rate per year should be 63,500 dwelling units. However, this rate of construction may slightly change if the efforts made in Delhi and other places are taken into account and the number new dwelling units

Table 7.5.11

New Dwelling Units Required in the NCR

Particulars	1961-81 (Dwellings units in thousands)			
	Urban Delhi	Urban NCR including Delhi	Ex- Urban NCR	Total Rural NCR
	1	2	3	4
1. Total Backlog in 1961.	157.7	44.0	201.7	291.4
2. New Dwelling for incremental popu.	631.0	669.0	1300.0	960.0
3. Replacement of Substandard dwelling	75.5	55.5	131.0	100.0
4. Change of use	3.1	3.3	6.4	-
5. Provision for vacant dwelling	9.5	8.9	18.4	20.3
6. Conversion from Kutcha to pucca dwelling	63.0	46.0	109.0	388.0
Total dwellings required	939.8	826.7	1766.5	1759.7
Say	9.4	8.3	17.7	17.6
	lakhs	lakhs	lakhs	lakhs
Rate of construction of dwelling per year	47,000	41,500	88,500	63,500

which have come up in these areas of the NCR between 1961-70 are considered. As the increase between 1961-70 cannot be estimated without a primary survey, the above analysis does not take into account such increases but suffice it to say that the rate of construction has to be considerably higher and of the order of 88,500 in Urban Sector and 63,500 in Rural Sector, in order to cope up with the housing requirements in the Region.

Considering this demand for nearly 152,000 units per year in the NCR in the next decade, special efforts are required to evolve a housing policy for the NCR and to provide adequate funds to take up this housing programme in a comprehensive way, along with housing programmes, simultaneous development of social infrastructures like, water supply, sewerage, power, educational facilities etc. Although this estimate is on a very rough basis (based on census data) it portrays the need for an overall effort to improve the housing situation and housing stock in the NCR to cope up with the future requirements as well as the developmental efforts in other sectors of the economy of the Region. Unless, this aspect of housing is considered in its totality as a simultaneous development along with other developments in the different sectors of the economy of the Region, the overall economic development of the Region would be thwarted to the extent that the housing development would fall short of the requirements.

Housing Policy in the NCR:

A co-ordinated approach to housing development is very essential in the various Sub-regions of the NCR in order to effectively tackle the housing problems in the Region as a whole. In view of this, based on the analysis made earlier the following housing policy is suggested for the Region.

1. Housing development in Delhi may be linked to relieve the housing shortage but not to encourage further population concentration.
2. Housing developments on a large scale in the selected 17 priority towns should be dovetailed with economic development, especially the creation of job opportunities in industry, trade and commerce, and government office employment etc.
3. In the rural sector housing development should be encouraged on a comparatively intensive scale in selected growth centres.
4. To evolve inexpensive housing for bulk of the population, (the low income group) necessary research and development of inexpensive housing must be attempted.
5. However to tackle the housing development on a proper scale and on a co-ordinated basis, efforts need to be made to set up Housing Boards in the Sub-regions as part of the overall frame for regional development of the NCR,

and to co-ordinate the development of other infrastructure essential to housing development.

6. A revolving fund for housing development in the NCR should be instituted to help finance the various housing programmes within the overall frame of fiscal planning at the regional level.

Hence emphasis should be on a unified policy and co-ordinated approach to housing development in the NCR. The State administrations should dovetail their housing programmes into their State Five Year Plans and draw upon the revolving fund of the Central Housing Finance Corporation, set up by the Government of India.

Housing Programme in the NCR:

Considering the above housing policy enunciated for the Region, it should be the endeavour of the Regional Plan to provide for an adequate housing programme to meet the housing requirements and the short-comings in the present housing stock. Keeping in view the recommendations of the Delhi Master Plan for Urban Delhi, it is essential that the following programme in the Public and Private Sectors are envisaged for the various administrations in the NCR.

A. Urban Centres of Delhi, Ghaziabad and Faridabad:

In Urban Delhi, in accordance with the Master Plan proposals, Public Sector housing should be 20 percent of the total requirements

indicated earlier. About 12 per cent of the total requirements is to be met by the Central Government as part of its programme to provide housing to its employees.

VIII which deals with Priorities and Development Programmes in the NCR.

In case of Faridabad and Ghaziabad, Central Government housing for its employees should be 15 per cent of the total requirements, whereas the Public Sector should cater to 25 percent and the remaining 60 per cent by the Private Sector.

B. Other Urban Areas of the NCR:

In the rest of the Urban areas of the NCR efforts should be made to meet 25 per cent of the total requirements by Public Sector Housing and the rest of the 75 per cent of the requirements by Private Sector Housing. This is very essential, so that a base is built up for the overall development of the Urban Sector on planned priorities and programmes as envisaged in the Regional Plan for the NCR.

C. Rural Housing:

In the case of Rural Housing, efforts should be made to provide adequate financial assistance to promote Rural Housing on a self-help basis and to meet at least 50 per cent of the requirements in the Rural sector. The remaining 50 per cent of the housing can be provided by the Private Sector.

The Housing Priorities and Programmes are however discussed separately in Chapter

6. Regional Recreation:

Recreation as a Regional Facility:-

The physical needs of the people for ~~xxx~~ out-door recreation, as well as the ecological and biological needs to create a good environment have to be met by a system of regional recreational facilities. This will also provide the means for the diversification and enlargement of the social and cultural life of the people, thereby enriching it. There is always an instinctive urge to get away from the day-to-day work and environment, to enjoy fresh air, greenery and the open countryside, to be lost in the wilderness or to discover the bounties of nature in new surroundings. But it is also important that these regional recreational areas and out-door facilities should be accessible at a reasonable distance from the common man and cater to the active and passive recreational needs of the individual, the family, the group and in general the whole community. However, the provision of these amenities has a diverse and multifarious inter-relationship with the other land uses in the Regional Plan. Hence, it is essential to integrate these facilities within the overall fabric of the Regional Plan.

Many advanced countries have entrusted the planning of recreational facilities, both at the national and the regional level, to specially appointed commissions. These

commissions study the present day wants and needs of the people, as well as futuristic trends in the development of these facilities. They try to tackle the practical problems of land reservations, acquisition, financing and management of recreational resources. While in India a number of parks and sanctuaries have been officially designed as national parks, there has been no systematic development of recreational facilities either at the local level or at the regional level. Neither has there been any co-ordination between the States for the development of Regional Parks/areas even when the park areas have continuous extensions in the adjoining States. On the other hand there is generally a complete lack of data on planning for parks, such as, the users and their requirements, the quantitative and qualitative aspects of recreational activities, the trends and changing tastes and the future pattern for recreation.

Increasing urbanisation, increase in income and general prosperity and greater mobility would result in greater leisure time activities. Added to this, the economic and social transformation that is taking place in the rural areas, thanks to the green revolution, would gradually generate a demand for various types of recreation facilities on a mass scale. The rising tide of expectations have to be met at various levels. At the regional level, these have to be planned for now, as solutions at a later date would require larger resources and a more complex process for providing them.

Recreational Needs of the Region:

In planning for recreational facilities in the NCR, the basic approach should revolve around the people and their needs on the one hand and its potential for recreational development on the other. The population characteristics, its composition and the socio-economic background that would influence the interest pattern and the types of recreational activities have to be taken into consideration. This in turn would get related to the area requirements which has to be finally rationalised within the available recreational resources that this Region offers. The local needs of urbanites for recreational open spaces would continue to be met within the compact urban areas. However, for larger parks and regional recreational activities the countryside would have to be developed. In the NCR the central location of Urban Delhi with its heavy concentration of urban population desiring an outlet for recreational will be a major factor in planning recreational facilities. A dry and hot summer, with scanty rainfall and a cold and sunny winter sets the pattern not only for the recreational needs for the people but also some limitations on the type of facilities that can be provided in the Region. The influx of a large number of tourists from abroad, existence of road connections as main arteries diverging from Delhi are some of the favourable factors that should facilitate planning. More than anything, recreation should be planned as an essential civic amenity co-related with the other activities at the

regional level, like educational, social and cultural activities of which it is an integral part.

An examination of the overall physical endowments of the Region shows that it has generally flat land, mostly under agriculture, with rocky land features - the low ridges of the Aravalli ranges running across the central part of the Region upto the river Yamuna in Delhi. The river Yamuna and the Hindon flow north to south, as also the Ganges which forms the eastern boundary of the Region. Most of the larger water bodies, namely Najafgarh lake Jahajgarh Jheel, Badkhal lake etc., are in the central part of the Region, whereas the Siliserh lake and marshy land of Ghana are in the southern periphery of the Region. The Eastern and the Western Yamuna Canals flow on either side of the Yamuna. The entire ridge formations are bereft of any thick vegetation, with only thorny bushes, shrubs, semi-deciduous trees and wild growth covering portions of the bare rocky lands. Agricultural fields provide the greenery in this Region which is otherwise devoid of thick vegetation, wood-lands or forests, except a few patches of old orchards and mango groves.

As all the major urban settlements are concentrated in the central and north-eastern part of the Region, but in the physical setting of the NCR it is interesting to note that the main concentration of the regional recreational areas is in the central and

southern part of the Region. (Please see map) The Delhi Urban Areas and its immediate environs, particularly the historical monuments and gardens and other popular spots and a host of other attractions, provide for the largest number of regional recreational areas. The central and southern part of Delhi and the outskirts are popular for the Buddha Jayanti Park, Qutab-Mehrauli historical monuments and parks, Yamuna river front including the Okhla picnic spot and the historical ruins of Tughlakabad Fort. In close proximity, across the Haryana border is also located the Suraj-Kund regional park extending upto Badkhal lake and its catchment area. Then there are potential sites for regional recreation that could be developed with the construction of the proposed dam and reservoir at Dhauj and Kot presently under investigation as a source of water supply for Delhi. In the same sector, not very far off, are located the popular natural hot water springs at Sohna in the Haryana Sub-region.

In the south western part of the Haryana Sub-region and in the adjoining areas of the Rajasthan Sub-region, though there are very few settlements and the area is sparsely populated, there is a beautiful lake by the name of Siliserh, near Alwar. Just across the delimited boundary of the NCR and to its south are located the Sariska Wild Life Sanctuary. The Bird Sanctuary of Ghana is in nearby Bharatpur. These two sanctuaries and the Suraj-Kund area are likely to be recognised as parks of national importance. The Ghana Bird Sanc-

tuary has already attained world wide popularity where a large variety of migratory birds flock together from far off parts of the world. Added to these are the religious cum cultural areas located at Garhmukteswar and Rajghat-Narora on the banks of the river Ganges and its tributaries. The natural vegetation and jungle growth along the banks of the Ganges abound in birds and are the favourite haunts of bird watchers and naturalists.

The climate and season is an important consideration and the planning and development of each area would have to be viewed in the context of the climate and the seasonal changes in the requirements of outdoor recreation. The usual summer exodus from Delhi and the other towns to hill stations in the Himalayas or the rush for winter sports and snowfalls, are confined to a small section of the population. For bulk of the population the recreational facilities at the regional level seem to be the answer.

There is a little variation in the climatic conditions of various sub-regions in the NCR, being hot in summer and cold in winter reaching extremes for short periods. The rainfall is mainly during the monsoon and there is little variation in the Region. The semi-arid tropical climate calls for planning of extensive water based outdoor recreational areas in the Region.

Trends in regional recreation reveal that there is a wide-spread interest for outdoor activities. The big fairs and seasonal melas of this Region, some of the most colourful and cosmopolitan, need special attention. There are recent innovations in the revival of historical and traditional festivals of regional importance, such as the Phool Walon-ki-Sair. The annual sports, tournaments and test matches in Delhi attract a huge number of sports fans. These events are of regional importance but are generally treated as local events resulting in unsatisfactory arrangements. The overspill is caused due to limited seating capacity in the stadia as well as the failure of the transport system. The people's participation in organised sports both participants and spectators is a growing phenomenon and the regional recreational system has to be geared to face these requirements.

An efficient and economic transportation facility is a must for the system of recreation facilities. The one rupee holiday ticket, an all inclusive trip to tourist centres in and around Delhi provided by the Delhi Transport Undertaking at nominal cost, the advent of the Delhi-Igra tourist train - the 'Taj Express' and express tourist buses are some of the facilities that contribute to the success of the limited recreational facilities. In the Region, it may be said, that there is reasonable accessibility to recreational areas, as all recreational spots are connected by metalled roads

served by public buses. Nevertheless, at places the approach roads are under constant pressure due to unauthorised encroachments and require immediate attention.

Problems, Prospects and Proposals:

The Region covers an area of 29,800 sq. kms. with an estimated population of about 140 lakhs at present, with nearly 60 lakhs of urban population, most of which is concentrated in Urban Delhi and the 17 towns located along the main traffic arteries. This gives us the physical setting and an indication of the magnitude of the efforts needed in the Region. There are however certain trends discernible in the Region which point to destruction of natural features in the suburbs and environs of urban areas on the one hand and on the other an increasing neglect of the areas reserved in urban plans as open spaces, available water fronts, scenic spots and historical monuments. Undeveloped land earmarked for recreational uses has been under unauthorised occupation causing problems in their development for recreational uses. This may be seen in the undeveloped Yamuna river front, colonisation around Tughalabad and Suraj Kund, and indiscriminate quarrying operations in many parts of the ridge, close to picnic spots etc. The gullies that despoil the landscape and skyline of the countryside, particularly around picnic spots, require timely preventive actions. As part of the efforts in this direction, the Delhi Development Authority

and the Department of Tourism have initiated some beautification and development schemes for provision of landscaped gardens, rest houses, shelters and cafeterias and other on-site facilities. Side by side interim measures for the exact delineation of regional recreational areas for the purposes of reservations for the future have to be taken immediately.

This brings us to the question of measures for preventing haphazard growth and unauthorised development around potential regional parks in various parts of the Region. One way to tackle this is to make the recreational areas part of the Master Plan of the towns and preserve them by enforcing the zoning regulations. However, as required by law, within a specified period, the areas earmarked for such uses will have to be acquired. Also a phased development programme has to be carried through without which the acquired land would be again squatted upon. Other regional recreational areas far away from urban areas, which do not form part of the urban development plans, should be preserved by earmarking them as recreational areas in the sub-regional plans. However, in the absence of any legal validity to the Sub-regional Plans, administrative measures can prevent haphazard growth till such time as funds are available for their acquisition and development for recreational uses.

Another problem is to provide easy accessibility to regional recreational areas. This does not end with providing good road

connections, but inexpensive road transport has to be organized for the common man. There would be marked improvements in accessibility, when the expressway system proposed in the Regional Plan takes shape. This would interlink all the regional recreational spots and would go a long way to cut travelling time and will attract more people from all parts of the Region. In addition, parkways passing through natural and land-scaped areas, with emphasis on visually attractive driveways would lend a charm of its own to the environment. A programme for afforestation, tree planting along highways and canals, protection of rivers and lakes from pollution, has to be urgently drawn up.

An essential requirement for comprehensive planning for recreation is that all the potential sites be explored and each area be brought under the purview of an integrated plan. It is through a planned and well patterned dispersal of recreational areas, each offering its own characteristic facilities that a coordinated and comprehensive system for regional recreation can function. Preliminary investigations however, indicate that the planning of recreational facilities are piecemeal and only a few picnic spots and recreational areas are being developed. Recreational areas are often clubbed as appendages to other primary uses such as, water reservoir or dam, canal head works, historical monuments and the surrounding green, religious fair and mela ground, public open spaces for staging event of national and international importance. As a result, the existing

recreational areas are under constant pressure from competing uses, leading to encroachment of recreational areas by subsidiary uses. This situation is further aggravated by the absence of appropriate legal measures to protect parks and open spaces from unauthorised encroachment. Thus, in the interim stage, even if man made features are not developed but recreational resources are preserved, we would have done much for which posterity would be thankful. It would not be out of place to mention that it would be rather difficult to pay compensation for land to be acquired for recreational purposes under the provision of the existing acts. It should be possible to amend or frame suitable laws with a reasonable formula for compensation for land, mostly unproductive, to be acquired for regional recreational purposes.

Another important problem relates to the implication of both capital outlay and recurring expenditure, as substantial costs are involved in the acquisition and development of recreational areas. Development of regional recreational facilities should be entrusted by the State Governments to sub-agencies with adequate funds. Such agencies should enlist the cooperation of local bodies, welfare organisation and charitable trusts. The help of state and national tourist agencies should be solicited to help in the development of recreational facilities. In this endeavour, commercial houses and philanthropic individuals could also give a helping hand. Also revenue should be raised

by entry fees, leasing out restaurants and other eating establishments, as well by the provision of certain recreational facilities on a commercial basis.

All these problems call for a comprehensive planning for regional recreational facilities. There should be a detailed study on the nature of recreational uses and their requirements, on the quantitative and qualitative aspects of recreational activities, trends in the changing recreational needs of the population, existing recreational resources and its potential for future development, ways and means of land acquisition and development, augmenting resources and a phased development, on a modest scale under the present circumstances.

What are the facilities that are now available for recreation and what is the potential? The Delhi Master Plan has comprehensive proposals for providing recreation at the local, district, city and at the regional levels. The land required for the purpose has been fortunately acquired or in the process of acquisition but development is getting geared up only now. Delhi offers facilities of a sophisticated and specialized nature, such as golf, polo, horse racing, flying, boating, yachting, vintage car rallies and numerous other activities for the sports fan. In addition, there are the zoo, exhibitions and annual tournaments. The parks already offer a rich fare but much remains to be done if they are to measure up

to the expected demands. There are potential parks in the other sub-regions which when developed, would provide a wide variety and good recreational facilities for the people of this Region. The sharing of these will bring the people of the Metropolis, the small town and the countryside a little bit closer to each other and reduce the social gap between them. It is of the utmost importance that the following recreational facilities, identified as of regional importance, should be developed. (Please see map 7.6 for their location). Bus services for tourists and for people going on picnics would make these very popular.

A. Delhi Sub-Region:

i) The Ridge and the Buddha Jayanti Park: The entire ridge area, comprising the northern, central and southern ridge areas, has been earmarked in the Delhi Master Plan for reservation as a regional park. It covers an area of approximately 1100 hectares, only a portion of this has been developed as a beautiful garden with an undulating terrain, to mark the 2500th birth anniversary of Lord Buddha. The locale of the Buddha Jayanti Park is very picturesque. From here one gets a panoramic view and can pick out all the landmarks of Delhi at a glance. As a picnic spot and a place for garden parties and passive recreation, it is amongst the most popular gardens and is an ideal spot for recreation. The garden layout is informal and pleasing, with terraced gardens, rockeries, beds of

multi-coloured flowers, pathways, grassy lawns shady trees, shelters and pavilions, water channels, restaurant and adequate parking facilities. It is also centrally located and easily approachable by road from all parts of Delhi and the Region.

This park may be suitably extended. But there is a great need, first to safeguard the whole ridge from other encroaching uses, secondly to preserve most of it in its natural state with the under growth cleared to facilitate hiking and thirdly to undertake a judicious growth of trees and selective afforestation on its outer periphery to break the fury of dust laden winds.

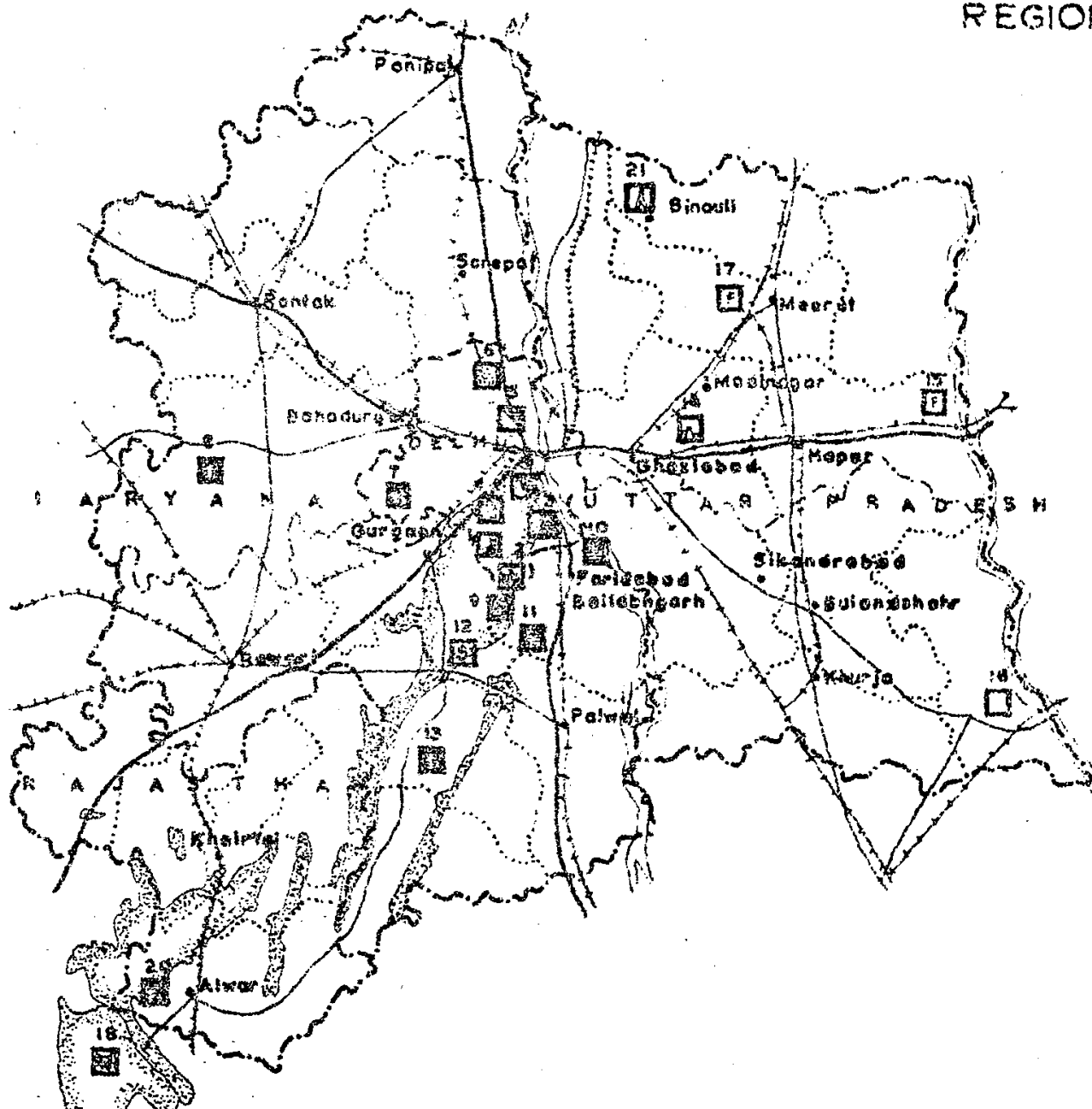
ii) Qutab-Mehrauli Complex: Situated at a distance of about 10 kms. from Central Delhi on the Mehrauli Road, the historical monument of Qutab Minar forms a significant landmark of South Delhi. There are a number of other historical ruins including forts, tombs, places of worship around the village of Mehrauli. A large number of tourists from all parts of the country and abroad come to visit this picturesque high tower built in medieval times. The Iron Pillar which stands close by is of great technological interest. The surrounding green has some good orchards and mango groves. The rocky uplands and low ridges dotted with historical ruins and its seclusion from the urban hustle and bustle, give it a typically peaceful environment. As a place of tourist attraction and for picnics, it ranks among the

most popular places of Delhi and the Region. It has good road connections and public transport facilities. A tourist rest-house and a restaurant have also been constructed for visitors. The Master Plan for Delhi had earmarked this area as a regional park and a good part of it is to be developed as a botanical garden. At a little distance from Qutab Minar is the 'Phool Walon-ki-Sair' a tank around which is celebrated an annual festival of great cultural interest. There is further scope for development of this complex, for provision of better facilities of transport and refreshments, and to make it more attractive as a regional facility.

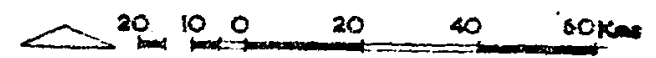
iii) Tughlakabad Fort: Situated about 15 kms., on the southern edge of Delhi Urban Area and nearly 8 kms. east of Qutab on the Mehrauli-Badarapur Road, Tughlakabad Fort is a marvellous relic of a medieval kingdom of the 14th Century B.C. The Fourth city of Delhi lies in ruins here. The tombs of many kings are scattered around, of which one mausoleum is still well preserved. The Fort proper and the surrounding ruins form a complex of popular picnic-spots. This has been proposed as a regional park covering an area of about 700 hectares in the Delhi Master Plan. The development of this regional park should envisage a chain of picnic spots, landscaped gardens, preservation of ruins and provision of large areas for passive recreation with adequate facilities.

iv) Yamuna River Front, Raj Ghat, Shanti Vana & Vijaya Ghat: The river Yamuna flows north to south between Delhi and its suburb-Shahdara. The western embankments have always been popular for bathing ghats, religious fairs and community baths. But the river water is extremely polluted all along and there is also a burning ghat here. The Eastern side being floodable has not been popular though it also has a potential for development as a recreational area. Till recently except for Raj Ghat the whole area presented a dismal picture of neglect. The area has now been cleared of jhuggis and landscaped grassy lawns and fountains have been laid out north of the old road-rail bridge across the Yamuna. Tree plantations have also been undertaken. The coming up of Shanti Vana and Vijaya Ghat, in memory of the national leaders has further accelerated the development and beautification of the river front. The large expanse of open space, grassy lawns, walkways and landscaped gardens are becoming popular resorts for sight seeing, rest and recreation by the public in general and the tourists in particular. At a later stage rose gardens and deer parks are to be included in the development of these Ghats. When the entire water front is developed with the back-drop of the Old City wall, the Red Fort, the Purana Qila and the Humayuns Tomb, the area is bound to become a star attraction with visitors and tourists from far and wide.

REGIONAL RECREATIONAL AREAS 1969



- 1 Outab Minar
- 2 Tuglakabad Fort
- 3 Okhla Picnic Spot
- 4 Budha Jayanti Park
- 5 Yamuna River Front
- 6 North Ridge
- 7 Najafgarh Lake
- 8 Jahajgarh Lake
- 9 Suraj Kund
- 10 Sakhhol Lake
- 11 Salabgarh Lake
- 12 Sohna Hot Water Spring
- 13 Ujina Lake
- 14 Dusha Water Bund
- 15 Garhmukteshwar Fair
- 16 Rajghat—Narene
- 17 Nauchandi Fair
- 18 Sariska Wild Life Sanctuary
- 19 Bharatpur Bird Sanctuary
- 20 Siliserh Lake
- 21 River Confluence — Bineuli



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN.
MINISTRY OF H. F. P. W. H. & U. D. 7.6

v) Okhla Picnic Spot: Situated about 13 kms. down south along the river Yamuna is the Okhla Canal headworks. A few canals emanate from the river here. A small barrage controls the flow of water into various channels. This area dotted with shady trees has been one of the most popular spots for picnics, boating, yachting and fishing and is connected by road and public transport. The area has development potential for water based sports and such other recreational activities, but the road connection, parking areas and arrangements for providing refreshments would have to be considerably improved.

vi) Delhi Zoo: Situated at about 5 kms. on Mathura Road near Purana Qila, an important addition to regional recreation is the zoo where a large variety of animals and birds are on view in their natural surroundings. These include magnificent species of tigers, Himalayan black bears, the spotted deer and every type of animal. Of particular interest is the swamp created for the migratory birds which has more or less become a bird sanctuary. The backdrop of the Purana Qila walls provide a charming setting. This place is a tourist attraction of considerable merit as well as a popular picnic spot. Delhi can be legitimately proud of this Zoo. It has to be nurtured and further developed.

vii) Najafgarh Jheel: Situated about 22 kms. on the road to Alwar past Najafgarh

in the western part of Rural Delhi is the Najafgarh Jheel. The land around is a big marshy area covered with weeds. This Jheel has been popular for duck shooting. Due to its situation in a shallow land zone, rain water used to get drained into this Jheel. However, recent flood control measures have greatly reduced the free flow of rain water and the Jheel and water sheet have become too small to attract hunters or people seeking outdoor recreation in the countryside. It may be still possible to revive portions of this for fishing etc.

B. Haryana Sub-Region:

The Regional parks of Suraj Kund and Badkhal Lake, the Sohna springs and Ujina lake and Jhajjhar Jheel lie in the Haryana Sub-region. Interestingly, enough the Suraj Kund and Badkhal lake are located in the immediate periphery of the Union Territory and quite close to and almost interlinked with other regional recreational areas of Tughlakabad and Qutab-Mehrauli. Further down, the ridge and valley area at the proposed Dhauj Kot dam and reservoir site has immense potential for the development of a regional park. Thus Haryana Sub-region offers to the people of the Metropolis the maximum number of potential sites for regional recreation easily accessible after a short and pleasant countryside drive on Mathura Road.

i) Badkhal Lake: Situated about 30 kms. from Delhi and 4 kms. off Mathura Road

near Faridabad, Badkhal Lake is one of the most popular recreational spots in the entire Region. The rocky terrain, curvilinear and deeply cut-up crevices and a backdrop of low cliffs lend a charming and scenic setting to this lake. The lake proper and embankments cover an area of about 3 hectares. However the catchment area extends over large tracts of rocky slopes. Rain water and surface drainage provide water to this lake. This is contained by a bund which forms the eastern embankment. The water is a clear blue and the atmosphere is refreshing with a cool breeze blowing. As the locale is in rural surrounding far away from urban settlements, this spot is becoming increasingly popular for weekend trips for sight seeing, picnics, fishing and angling, boating and stroll along the bund. The tree lined bund is also a delightful place for bird watchers. This lake is probably the best in the Region for scenic beauty, photography and outdoor excursions. Facilities such as public transport: parking space, a newly constructed cafeteria at a vantage point, which affords a panoramic view of the lake waters and the green fields have been provided. A metalled road-link with the Mathura Road provides easy accessibility to the lake and cuts short the distance for holiday crowds from the Delhi end.

A programme should be drawn to enlarge this area by including more of the surrounding areas as part of the regional park which may eventually be extended upto the Suraj Kund regional park in the north and the Dhauj Kot

park in the south. The land required for this should be reserved and acquired in phases.

ii) Suraj Kund: Suraj Kund, a seventh century monument signifies "Phool of the Sun God". It is located amidst the scenic hillocks of the Aravallis about 17 kms. from Delhi and 5 kms. south of the Tughlakabad Fort. The circular amphitheatre was built for the recreation of nobles. The central tank stores water and the terraces around it are reminiscent of a royal spectacle and the grandeur of the olden days.

The tourist department has initiated a beautification and restoration scheme to revive its past glory. Landscaping, afforestation, illumination of the tank, arrangements for staging folk dances and cultural shows are part of the scheme, to make this popular picnic resort a major tourist attraction. A cafe and garden pavilions have been provided. A metalled road linking it to the Mehrauli-Badarpur road has been constructed. The haphazard and unauthorised development of colonies in this area has been belatedly put a stop to by the authorities. Enlargement of the regional park by reservation and acquisition of land cannot be delayed any longer and a phased development programme has to be given a high priority.

iii) Sohna Springs: These are situated about 56 kms, from Delhi on the Delhi-Alwar road amidst low hills and mounds with mild cultivation. The hot water springs are a natural gift believed to be of medicinal

value. It is a fascinating place for visitors. An integrated plan envisaging construction of hot water baths, tourist huts and landscaping of the area around the springs has to be undertaken.

iv) Other Lakes: There are a number of small lakes, like Ballabgarh lake, Ujina Lake and Jhajgarh Lake in the Haryana Sub-region. Another potential area for recreation is at the proposed Dhauj and Kot water reservoir. These lakes offer water based sports and facilities for recreation and weekend trips for fishing and bird shooting etc.

v) Kurukshetra: (Outside the NCR) Although the southern part of the NCR has the maximum area for regional parks, the northern periphery of the Haryana Sub-region has the attraction of Kurukshetra, the spot divine, famous for its temples and sacred tanks for holy baths. This place is identified with the epic times of the Mahabharata. The solar eclipses fairs, when millions of pilgrims participate, are a special feature here. There are other tourist attractions, such as a museum of old sculptures and other interesting places with many tell-tale stories. The place being hardly 100 kms. to the north of Delhi has attractions for weekend drives for a holy dip and sight seeing.

C. Rajasthan Sub-Region:

The Rajasthan Sub-region by itself, part of the delimited NCR, has hardly any

established recreational spot except for the potential areas of natural vegetation and wild shrubbery covering the rocky terrain of the Aravalli ranges. However, outside the NCR boundary to its south, some well known recreational areas are located which are of great importance to the NCR. These are the Sariska Wild Life Sanctuary famous for tigers, the Siliserh lake and other attractions in Alwar district and at an off beat is the world famous Bird Sanctuary of Ghana near Bharatpur. These places also attract visitors from all over the country, as well as world tourists interested in game and bird watching. Their development is of great importance as they would meet a great need of this Region.

i) Sariska Wild Life Sanctuary: (Outside the NCR) situated nearly 200 kms. south of Delhi on the road to Jaipur, this sanctuary covers an area of about 45,000 hectares (180 sq. miles). The dense vegetation in the low valleys provides an ideal habitat for striped tigers and panthers, the spotted deer, sambar, wild boar and a wide variety of denizens. A number of allweather roads provide easy accessibility within the Sanctuary. There are two watch towers for a night long watch for viewing tigers and wild animals in their natural surroundings.

ii) Siliserh Lake: (Outside the NCR) The lake and its environs have a charming and scenic beauty. The old city of Neelkanth has been partially excavated which gives a glimpse of a thousand year old temple, sculpture and

the historical Fort of Kanwari. A few hot water springs also attract visitors. An old royal pleasure resort and lakeside palace has been converted into a hotel for tourists.

iii) Bharatpur Bird Sanctuary: (Outside the NCR) Located some 176 kms. south of Delhi and only 5 kms. from Bharatpur, this world famous sanctuary is spread over an area of 2900 hectares. It has large extensive shallow and low lying lands divided by small roads and dykes. The seasonal rain waters convert the entire area into a large swamp full of aquatic vegetation, reeds, trees and shrubs. Also fish, frogs, insects and watery creatures fill up the swampy lands, thus providing food to birds and making it an ideal place for migratory birds. The birds perch on trees, build nests and stay for the breeding season. There are indeed many write-ups and commentaries on the variety of birds that flock to these swamps. The bird sanctuary is a store house for bird watchers, zoologists and ornithologists. A few migration studies reveal that birds come from as far as Siberia, Mongolia, Ladhak and Tibet. Small boats that ply in the shallow waters provide a closer look at trees full of nests and birds. In addition to the recreational setting, this is an ideal spot for nature photography.

D. Uttar Pradesh Sub-Region:

The U.P. Sub-region has some good forest area as well as mango groves and orchards, a few large ponds and places like Dasna area,

Bhola falls which have a potential for development for recreation. Meerut also has a race-course which is very popular with enthusiasts from Delhi and other cities. The sub-region has good greenery and water channels which offer good locale for picnics and outings in the countryside. Outside the NCR are the famous places of pilgrimage - Mathura and Brindaban which attract pilgrims from all over the country. Extra efforts will have to be made to develop recreational areas as there are not many in this Sub-region.

i) Garhmukteswar: The sacred Ganges flows along the eastern boundary of the NCR. Garhmukteswar on the river bank about a 100 kms. on the national highway from Delhi is the pilgrim centre famous for the Kartika-bathing fair. This annual fair attracts over one lakh persons. The place is also known for aquatic and terrestrial fauna in the thicker growth along the embankments. Naturalists and conservationists find it a treasure trove with a wealth of bird life, rarely found even in well known wild life sanctuaries.

ii) Rajghat-Narora: (Outside the NCR) This interesting and scenic spot around a weir of about 100 metres long on a river is outside the NCR further eastwards about 150 kms. from Delhi. One can enjoy here a picnic in good surroundings, do bird watching or fishing. It is accessible via Debai town by a metalled road. Rajghat point and Narora are 5 kms. apart and offer a good countryside outing.

iii) River Hindon - Krishna Confluence:

An interesting and scenic spot lies at the confluence of the rivers Hindon and Krishna near Binauli town to the west of Meerut and approachable by road via Sardhana. The forest area, greenery, vegetation and large sheets of water, quiet seclusion and the serenity of the environment make it an ideal spot for picnic and weekend outing or recreation. This scenic spot has not so far been developed at all. However, with improvements in road connections and provision of facilities for rest and recreation, this site near Binauli has good potential for development for outdoor recreation.

iv) Picnic Spot Near Murad Nagar: Another picnic spot lies on the bank of the upper Ganges Canal on the State Highway bridge near Murad Nagar about 34 kms. from Delhi. There is good greenery and natural vegetation by the side of the Canal. As it is right on the State Highway, (Delhi-Meerut) this picnic spot is bound to be a popular place provided more land from the adjoining areas is also developed and landscaped for recreational uses.

Recommendations on Regional Recreational Policies:

1. In view of the rapid development and increasing urbanisation of the Region, the provision of regional recreational facilities assume great importance. Not only is it necessary to provide for physical and social needs of the people but also to conserve and

preserve the existing flora and fauna. Development of large parks, afforestation, planting of trees along canals and highways and protection of rivers or lakes from pollution will also help in ensuring the freshness of the environment.

2. Regional recreation development, while not being remunerative, is yet a vital aspect of regional development, and can be a unifying social and cultural force. Moreover, the NCR could attract a good number of tourists. In order to derive the maximum benefit there should be an integrated planning of this facility and co-ordinated phased development as an integral part of the Regional Plan.

3. Historical monuments, natural and scenic areas both existing and potential, forest land, river fronts etc. enumerated in the Regional Plan should be preserved with the help of existing laws or by zoning them as such, in the urban Master Plans or by appropriate legislation. There should be a long range programme for land acquisition which however should be separated from the general acquisition, programme. It may be possible to frame a suitable law for compensation of land to be acquired for parks, since these are mostly unproductive.

4. The park development agencies of the respective state Governments should keep up-to-date data of parks, park properties, their assessed values, their location, area, physical survey and draw up a comprehensive recreational plan to develop the facilities

indicated, with a phased development programme. Funds for regional park development should be made available from the State Five Year Plans. Measures should be constituted for enhancing revenue from parks and recreational facilities, such as, gate money to parks, restaurants and commercial recreation. In this connection, participation of local welfare agencies, charitable trusts, commercial houses and tourist agencies in the developmental process will decrease the burden on the public exchequer.

5. When a Regional Statutory Board is constituted, Regional park development may form one of the statutory functions of the Board to be integrated with the overall development with grants-in-aid made available from the Revolving Fund.

7. Regional Facilities:

With the progress in economic development and a rise in living standards, the provision of adequate community facilities at various levels assumes an added importance. The Delhi Urban Area and the 17 major towns of this Region have bulk of the concentration of urban population followed by the smaller urban centres. The rural population which constituted 66% of the total in 1961 is spread over large villages and the smaller rural settlements. In Chapter II, Map 3.2 indicates the existing community facilities, by type and number, in important urban centres and the population served. It may be observed that there is a reasonably fair distribution of various community facilities in each town of the Sub-region, although there is much scope for improvement. The district towns of Meerut, Rohtak, Gurgaon and Alwar have better developed facilities, as these are also the main social and cultural centres of their Sub-regions and occupy a prime position in the administrative framework.

It is seen that most of the urban centres have community facilities of their own and these facilities mainly serve the requirement of the local residents. However, the more important and essential of these community facilities are always under constant pressure and demand by the growing population of the area where they are located. There is an additional load on these facilities as

the population living in the influence zone of these centres also depend on these facilities for their specific requirements. It is in this way that the sphere of influence of these specialised facilities also build up along with the importance of the town and the size of its population. Thus, the important facilities which command a much larger area and serve the need of its population may be brought under the purview of regional facilities. These may include facilities for recreation and entertainment, educational and institutional purpose, marketing and shopping centres, medical and health facilities and other social and cultural facilities. These regional facilities in the NCR have a distinct and vital role-to serve the diversified needs of its population. They constitute the basic socio-cultural infrastructure of the Region and provide the common links between the various Sub-regions for a more homogeneous and self-sustaining community life.

The planning strategy should be geared so as to provide regional facilities within a reasonably accessible zone for larger public use. A town by itself cannot provide and sustain these facilities but collectively these can be supported. Thus the community facilities of a regional character located in the major urban centres have to perform a dual function. They have to be provided to serve the needs of the local population as well as the population of the surrounding

settlements of the Sub-region or the Region as a whole and should form a part of the overall plan for urban and regional development.

The Delhi Urban Area in particular and the Delhi Sub-region in general more than meets the requirements for regional facilities stated above. The Delhi Sub-region being centrally located and well connected by road and rail to all parts of the National Capital Region is easily accessible and offers the best of facilities in comparison to those available in any other Sub-region. There is hardly any possibility for the other Sub-regions to reach the standards of facilities available in the Delhi Sub-region. The Delhi Sub-region would no doubt continue to meet the regional demands for many specialised facilities. However, it should not be burdened further to meet the demands of the other Sub-regions and be the sole provider of general regional facilities. At least the Sub-regional/regional facilities instead of being concentrated in the Delhi Sub-region should be decentralised and provided in each Sub-region in a co-ordinated manner. Each of the Sub-regions should have their own facilities. Due to the distance factor and administrative area limitations, it would not be practicable for people from one Sub-region to go over to another Sub-region for these facilities.

The existing community facilities in Delhi and the 17 important towns provide an established base to identify those facilities that at present have local bias but have a potential (for enlargement of their scope) to serve a Sub-region or the Region itself. These could be further interlinked on a rational basis in the form of a comprehensive plan resulting in a good bit of savings in resources and at the same time encompassing the whole Region.

Thus the community facilities included under the various Master Plans of respective urban areas would need augmentation, particularly in the specialised sectors, such as, regional educational centres, University Campus, professional and technical institutions, regional medical centres and hospitals, larger recreational centres and other social and cultural facilities. (Table 7.7.1) Viewed in this context, the location, dispersal and distribution of these facilities require appropriate reorganisation and planning framework, incorporating the existing facilities. It is only then that the facilities in the existing urban centres and the proposed new ones would be able to cater to the needs of the entire Region.

Recreational Facilities:

Regional recreation and the provision of outdoor recreational activity, such as,

Table 7.7.1

Existing Regional Community Facilities in the NCR
Educational, Medical and Shopping

Sub-Region	Urban Centres	Pop. 1981 lakhs	University	Professional colleges	Spl. Training Centres	Colleges	Hospitals	Dispensaries	Vet. Hospitals	Whole sale retail markets	Remarks
1	2	3	4	5	6	7	8	9	10	11	12
U.P.	Meerut	2.84	1	1	2	5	12	5	1	5	
	Ghaziabad	0.70	-	1	1	3	3	3	-	3	
	Hapur	0.55	-	1	1	1	3	2	1	3	
	Bulandshahr	0.44	-	-	4	4	2	3	1	3	
	Khurja	0.41	-	-	3	3	2	2	1	2	
	Sikandrabad	0.25	-	-	1	1	2	1	1	1	
	Modinagar	0.24	-	-	1	1	2	3	1	1	
Haruana	Rohtak	0.88	-	1	11	7	3	3	2	1	
	Panipat	0.67	-	-	1	2	1	1	1	1	
	Faridabad-										
	Ballabgarh	0.59	-	1	4	1	2	7	1	1	
	Sonepat	0.46	-	-	1	3	2	2	2	1	
	Gurgaon	0.38	-	-	5	2	3	3	1	1	
	Rewari	0.37	-	-	3	3	2	2	1	1	
	Palwal	0.28	-	-	1	1	2	2	1	1	
Rajasthan	Bahadurgarh	0.15	-	-	2	1	1	2	1	1	
	Alwar	0.73	-	-	2	2	3	1	1	3	
	Khairthal	-	-	-	1	-	2	1	-	2	

Source: Town Reports of the State Town Planning Departments.

large parks, woodlands, play fields, picnic spots and preservation and conservation of historical monuments and areas of scenic beauty have already been discussed. The provision of regional recreational facilities is much more land-bound whereas the provision of other regional community facilities permit a flexible arrangement for their location in the selected areas of population concentration. An exception, therefore, may be made in the case of Regional Recreational Area, the provision of which largely depends upon land resources and its potential for development for the benefit of the community. The out-door recreational areas invariably require extensive lands and are generally located on the periphery of urban areas or even in a rural setting to avail of the natural endowments of the particular site.

Educational Facilities:

The Educational facilities at Sub-regional level such as colleges or professional institutions or a university campus are required to meet the demands of a large cross-section of the student population. Apart from the central city of Delhi which has a few universities for different purposes and a very large number of professional, technical, science and arts colleges and institutions, Meerut is the second city with a University. This University affiliates colleges from a larger jurisdiction in Uttar Pradesh. At present, Meerut has facilities for

higher education including a Medical college and hostels. Its popularity in the NCR has increased as it has a provision for the admission of private candidates. The surplus student population from Delhi, thus have an alternative avenue for admission and study in this University at Meerut, including affiliated colleges at Ghaziabad. The largest number of post graduate colleges are at Meerut and Ghaziabad which are also patronised by the student population from Delhi and Haryana.

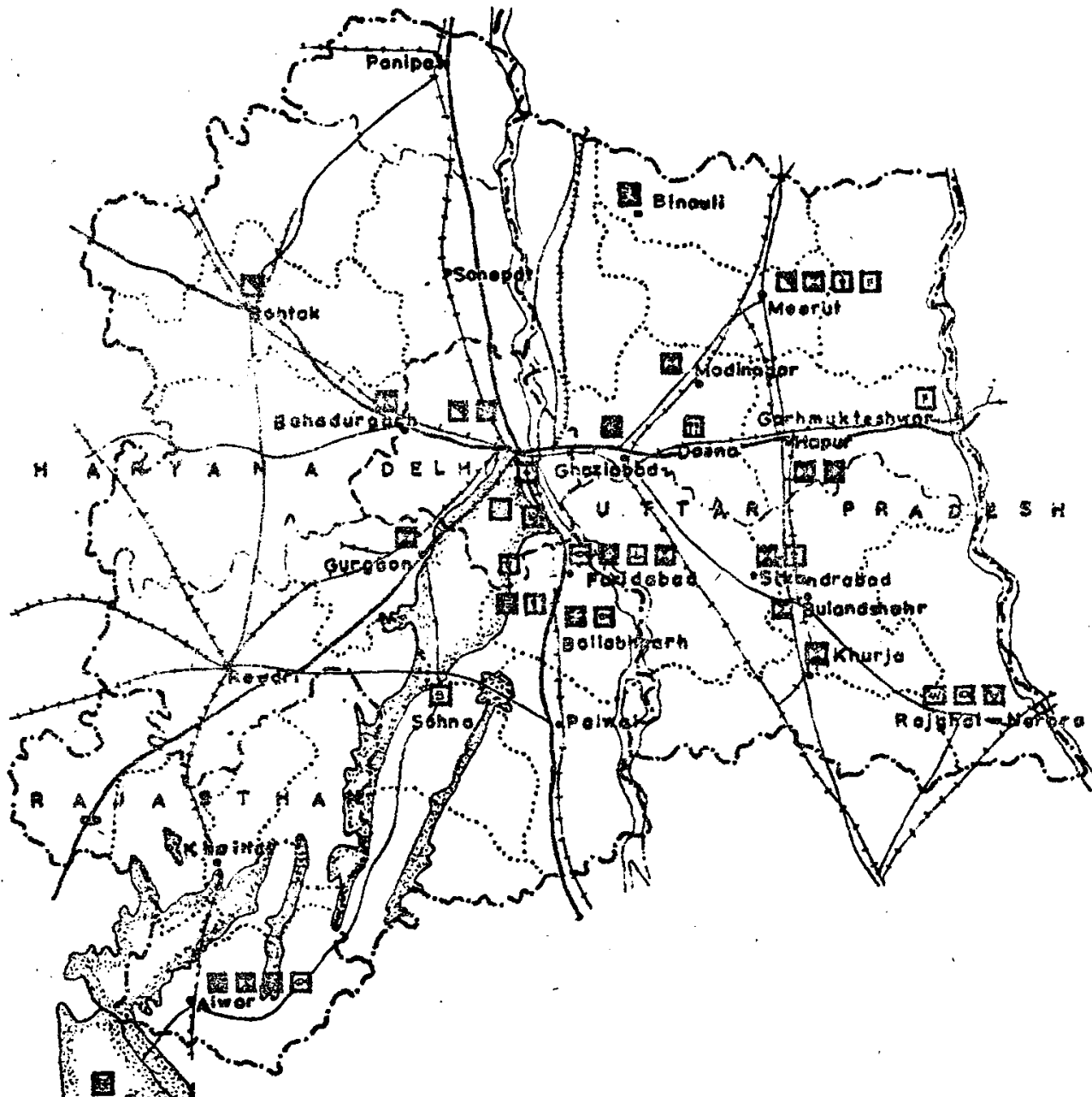
The Colleges in the Haryana Sub-region, hitherto affiliated to Punjab University, are likely to seek affiliation to the Kurushetra University just outside the NCR boundary. In case another university is to be set up in Haryana, it is likely to come up at Rohtak which would serve the Haryana Sub-region also. It may be pointed out in this connection that Rohtak already has a Regional Medical College with hostel facilities and this may become the nucleus of a new university centre.

As for the Rajasthan Sub-region, Alwar has three colleges which cater mainly to the local students and those who come from nearby areas of Rajasthan and Haryana.

Thus, in the case of general education there is a case for a university centre/sub-centre at Rohtak. In due course, at Alwar the need for a sub-regional university centre may arise. The U.P. Sub-region has

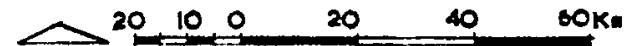
REGIONAL FACILITIES

1969



- Fair
- Parks
- Lake & River Front
- Weir
- Boating
- Fishing
- Orchard
- Bird Watching
- Spring
- Sariaka Wild Life Sanctuary
- Monuments & Parks
- University Campus
- Special Training Centre
- Professional College

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already a full-fledged University at Meerut and this would be adequate to meet the growing need for higher education in the U.P. Sub-region.

In regard to the training centres for specialised trades and professions, apart from the institutions in the district towns, these facilities are available at Faridabad and Ghaziabad. These provide for training of technicians of middle level skills. Industrial training institutes and other such facilities are available at Modinagar, Hapur, Sikandrabad, Bahadurgarh and Alwar. But these have a minor significance in so far as facilities of higher order are concerned.

In terms of education at the college and the university level, the NCR appears to have adequate facilities. However, in the case of professional colleges and special training institutes, sub-regionwise, there is a need for more such institutions and the scope for expansion of the existing facilities. With the accelerated tempo of industrialisation and around development in the Region, there is an apparent need for an adequate number of technical, specialised and professional institutions in each of the Sub-regions.

Medical Facilities:

In the major urban areas outside the Union Territory of Delhi, there are about 50 hospitals and 42 dispensaries of all types and sizes. Next to Delhi the largest

number of such hospitals are located at Meerut-12 hospitals. It also has a medical college. The other towns with 3 hospitals each are the district headquarter of Rohtak, Gurgaon and Alwar and the industrial town of Ghaziabad. The remaining towns have only 1 or 2 hospitals. In addition, each town also has a veterinary hospital.

So far as Dispensaries are concerned the largest number (7) is at Faridabad-Ballabgarh, which perhaps commands the largest areas in terms of land/space; the next largest number (5) is at Meerut. The other towns have one or two or at the most three dispensaries.

In the matter of veterinary hospitals, Rohtak and Sonapat are better off as each of them has two such hospitals. Other towns have only one each. It would appear from a comparison of this facility that the Haryana Sub-region has much better facilities. There are ten veterinary hospitals in that Sub-region, whereas there are only six in the U.P. Sub-region. This is because animal husbandary and cattle breeding are better developed in Haryana. With regard to dispensaries, Haryana is better off as it has 22 dispensaries, whereas the U.P. Sub-region has only 19. In spite of the fact that the total population residing in the Haryana Sub-region is less than in the U.P. Sub-region, the number of dispensaries is much more and this shows that adequate lower level facilities for medical treatment are available in the Haryana part. However, better hospital facilities and

middle level medical facilities are found in the U.P. towns of Meerut, Bulandshahr, and Hapur.

In the future planning of the Region, there is a clear case for more hospitals in the Haryana Sub-region, specially in the town of Panipat and in the growing industrial centre of Bahadurgarh. If Gurgaon is to maintain its attraction as a residential centre with adequate community facilities another hospital should be constructed to serve the population growth. Similarly, Faridabad-Ballabgarh has a good case for more hospitals because of the large number of industrial workers and also because in future Faridabad would have a longer residential population. On the U.P. side Ghaziabad should have more hospitals, as the development is going on at a brisk rate here.

More dispensaries should come up in the important industrial centres of Panipat and Sonapat, because of a large number of industrial workers. Sikandarabad should also have more dispensaries and the same is particularly true of Alwar which is a growing town. Augmentation of dispensaries may also be necessary in the growing towns of Meerut, Faridabad and Ghaziabad to cater to the increasing population. If Rohtak is to come up as a sub-regional centre for medical facilities, efforts should be made to increase the number of hospitals and improve the level of facilities now available in its hospitals and dispensaries.

The medical facilities of the NCR outside Delhi on the whole appear to be inadequate except in a few towns, such as Rohtak, Meerut and perhaps Gurgaon. Specially in the 17 major towns these facilities should be augmented and improved because practically in every town these facilities are also availed by the rural population of the surrounding areas and by improving them in these selected centres, the regional population as a whole would be benefitted.

Market and Shopping Centres:

Outside the Union Territory of Delhi, the 17 important towns of the NCR have about 31 organised and well established markets. In this respect the U.P. towns present a better picture. Towns in the Rajasthan Sub-region are also having good marketing facilities. But the towns in the Haryana Sub-region seem to have inadequate facilities for marketing purposes. This is borne out by the fact that each of the eight Haryana towns has only one organised market or main bazar. On the other hand there are eighteen sub-markets in the seven selected towns of the U.P. Sub-region whereas just two towns of the Rajasthan Sub-region have in all five markets.

The largest number of markets are found at Meerut (five). The towns having three markets each are Ghaziabad, Hapur, Bulandshahr, and Alwar. Khurja and Khairtal have two markets each and are well-known as they are important commercial centres.

However, in the Haryana Sub-region, even important commercial centres like Rohtak and Rewari have only one wholesale market each.

It appears, therefore, that the greatest need for augmentation of market facilities is in the major towns of the Haryana Sub-region. There is also scope for at least one more market in each of the eight selected centres. Palwal and Bahadurgarh may be small towns but they have been important commercially and if their economy is to be strengthened they should be provided with new markets with the necessary space. Some of the wholesale trades which are proposed to be decentralised from Delhi can very well form the new nuclei for enlarged commercial activity in the towns of Haryana, specially at Panipat, Sonapat, Rohtak, Rewari etc. Strengthening and improving of existing markets at Hapur, Faridabad and Khurja in U.P. may be necessary in view of the important role each market in these towns have to play because of the vast area of U.P. which they command.

The distribution of the regional facilities referred to above in the various Sub-regions are given in Table 7.7.2. and Maps 7.6 and 7.7.

Table 7.3.2.

Proposed Regional Facilities in the NCR

1. Recreational 2. Educational 3. Medical 4. Marketing & Shopping

<u>Regional facilities</u>	<u>Location in the NCR</u>
(A) <u>RECREATIONAL:</u>	
<ul style="list-style-type: none">. Sports. Large Parks. Lakes & River Water Fronts & Wier. Springs. Boating. Fishing. Wild life, Shikar. Birdwatching. Historical monuments & picnic spots. Orchards Woodlands. Fairs, festivals, melas	<ol style="list-style-type: none">1. <u>Delhi Sub-region:</u><ul style="list-style-type: none">. Delhi, sports stadia.. Yamuna river front. (Western). Najafgarh Jheel.. Qutab, Mehrauli, Monuments & Park. North ridge. Ridge - Budhjayanti Park. Tughlaqabad Fort.. Okhla picnic spot.. (p . . .)2. <u>Haryana Sub-region</u><ul style="list-style-type: none">. Suraj Kund. Badkhal Lake. Ballabgarh Lake. Dhujkand Kot Lake Area.. Sohna hot springs. Ujina Lakes. Sultanpur Jheel areas3. <u>U.P. Sub-region:</u><ul style="list-style-type: none">. Yamuna (East Bank). Hindon and Ganges (Garhganga). water fronts.. Dazza Water bund.. Wier at Rajnat Narora.. Garhumkteshwar fair. Hindon-Krishna confluence near Binauli. Picnic spot near Murad Nagar.

Regional facilities	Locations in the NCR
<p>(B) <u>EDUCATIONAL:</u></p> <ul style="list-style-type: none">. University/Sub-Centre. Higher institutions. Special Training Centres. Professional Colleges.	<ul style="list-style-type: none">. Meerut Nauchandi fair. Sardhana monuments <p>4. <u>Rajasthan Sub-region:</u></p> <ul style="list-style-type: none">. Silisrkh lakes. Sariska Wild life Sanctuary. Bharatpur & Gana bird Sanctuary <p>1. <u>Delhi Sub-region:</u></p> <ul style="list-style-type: none">. Delhi Urban area. (University) (Refer Delhi Master Plan). <p>2. <u>Haryana Sub-region:</u></p> <ul style="list-style-type: none">. Rohtak (University). Bahadurgarh. Gurgaon. Faridabad <p>3. <u>U.P. Sub-region:</u></p> <ul style="list-style-type: none">. Meerut (University). Ghaziabad. Bulandshahr. Khurja. Hapur <p>4. <u>Rajasthan Sub-region:</u></p> <ul style="list-style-type: none">. Alwar

Regional facilities:

Locations in the NCR

(C) MEDICAL:

- . General Civil Hospitals.
- . Health Centres & specialised Clinics
- . Veterinary Hospitals.

1. Delhi Sub-region:

- . Delhi Urban area

2. Haryana Sub-region:

- . Rohtak
- . Gurgaon
- . Faridabad-Ballabgarh
- . Panipat
- . Sonapat

3. U.P. Sub-region:

- . Meerut
- . Ghaziabad
- . Bulandshahr
- . Hapur
- . Khurja
- . Modinagar

4. Rajasthan Sub-region:

- . Alwar

(D) MARKETS & SHOPPING:

- . Whole sale markets
- . Retail shopping centres
- . including traditional bazars.

1. Delhi Sub-region:

- . Delhi Urban area
(Refer Master Plan for Delhi)

2. Haryana Sub-region:

- . Rohtak
- . Bahadurgarh
- . Panipat
- . Sonapat

Regional facilities:	Locations in the NCR
	<ul style="list-style-type: none">. Rewari. Palwal. Faridabad
	3. <u>U.P. Sub-region:</u>
	<ul style="list-style-type: none">. Meerut. Ghaziabad. Hapur. Khurja
	4. <u>Rajasthan Sub-region:</u>
	<ul style="list-style-type: none">. Alwar.

CHAPTER VIII.

DEVELOPMENT PROGRAMMES AND
PRIORITIES

Need for Development Programmes and Priorities:

The urban concentrations in and around the National Capital display great vitality and hold the potential for tremendous growth. These have to be channelised into orderly growth and balanced development of the Region. The Regional Plan has, therefore, envisaged the dispersal of population growth and economic activity over a wider area in the Region which has to be planned as a composite unit. Past experience makes it imperative that there should be co-ordinated and synchronous action to develop both the physical and economic structures to maximise growth. This can only be done if inter-related development programmes are implemented in a time scale. Map 8.0

The Regional Plan has a ten year perspective. This has to be phased suitably to dovetail with the National Five Year Plans. The three phases may be as follows:

- | | | |
|-----------|----------|---|
| Phase I | 1971-74, | Corresponding to the remaining part of the Fourth Plan period |
| Phase II | 1974-79, | Corresponding to the Fifth Plan period. |
| Phase III | 1979-81, | Part of the Sixth Plan period. |

If the Regional Plan is kept under constant review, as it should be, it would be

For the former, central allocation has to be made but for the latter probably allocations have to be made both at the State and Central levels and their development coordinated by the Ministry of Transport, Government of India.

Sectorwise Development Programmes and Priorities:

Phasing of the various proposals in the different sectors of the economy in the Region were enunciated in earlier Chapters of the Report. Table 8.0 gives the broad picture of the developmental programmes and priorities in twelve broad sectoral categories and in three developmental phases. Maps 8.1 to 8.3.

1. Developments in the Urban Sector and Land Acquisition:

The land use policy of the Regional Plan envisages that all future urbanization should be on a planned basis and the future industrial location should preferably be within urban centres or in extension of these centres. Besides a rational policy of utilisation of land available for urban development is also of significance. For the overall urbanisation strategy envisaged in the Plan steps are required to channelise urban development into different phases, such that, they all support the policy of dispersal of economic activities and of population from the metropolis.

The future urban development programmes necessarily lie in the seventeen urban centres which form the nuclei of the future major urban developments in the Region. The developments in these have to be on a planned and phased basis, so that the most important and the most immediate urban development takes place at the very places where it is required in order to channelise the future pattern of growth on the accepted development pattern in the Regional Plan.

In the first phase comparatively greater development would have to be in Ghaziabad, Meerut and Modinagar of the U.P. Sub-region; Sonapat and Faridabad-Ballabgarh complex in the Haryana and Alwar in the Rajasthan Sub-regions. This is based on the fact that these urban centres have greater potential as they are located along the proposed corridors of development or as in the case of Alwar - the important urban centre of the Sub-region.

In the second phase, the urban centres which lie on the outer ring (proposed in the road development programme) are to be developed. These include Bullandshahr, Khurja, and Hapur in the U.P. Sub-region; Rohtak, Gurgaon, Palwal, and Panipat in the Haryana Sub-region, and Khairthal in the Rajasthan Sub-region. In the third phase of development the rest of the seventeen priority urban

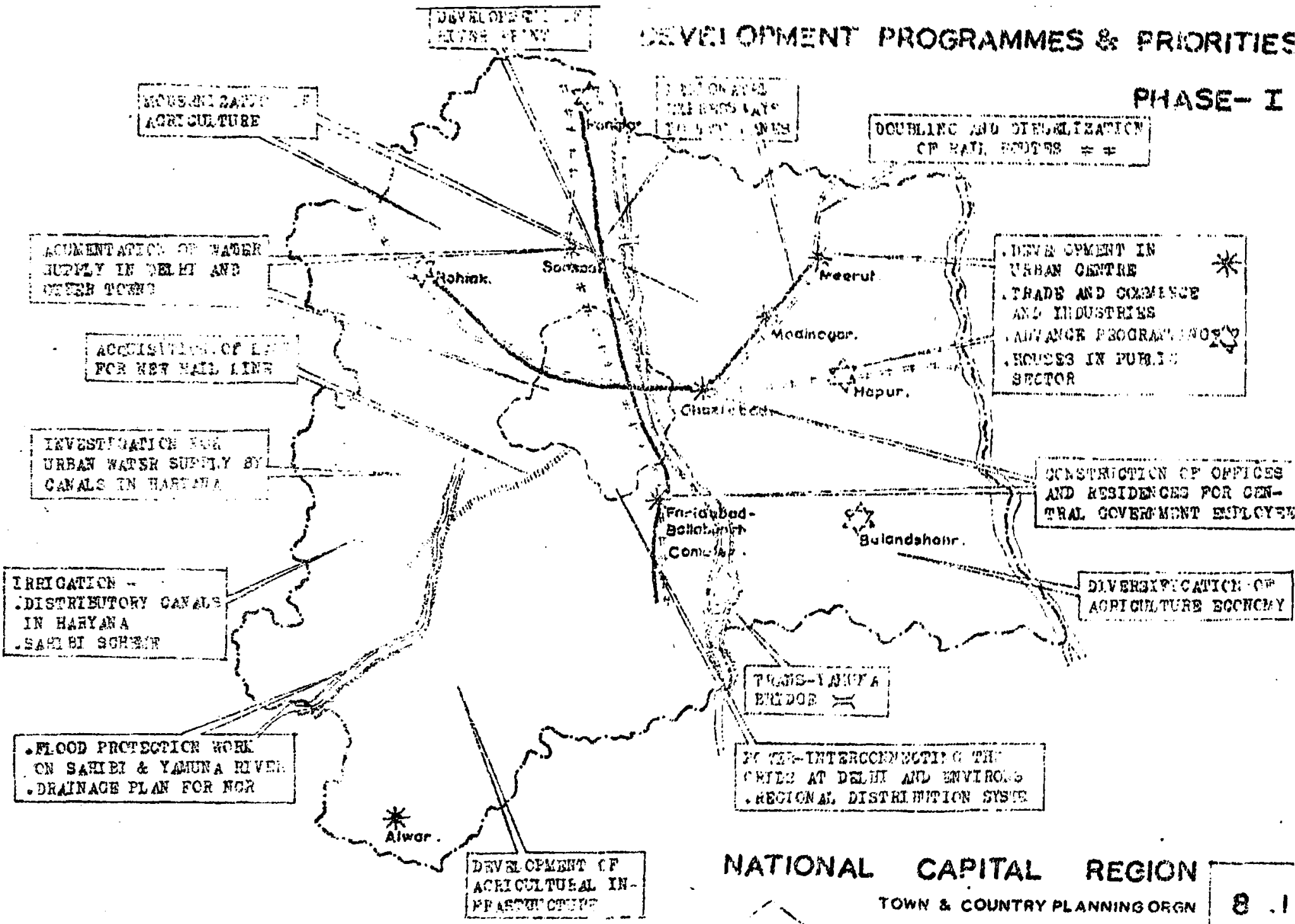
Table 8.0
Phase I

Development Programmes and Priorities

Urban Centres	Transport and communications.	Govt. Offices & residential units	Industries and trades	Housing	Recreational Areas.
1	2	3	4 & 5	6	7
(i) Ghaziabad, Modinagar, Meerut,	(i) Development of designated express ways and National Highways to two lanes.	(i) Development of land in Ghaziabad & construction of offices & residences for employees.	Development of trade and Industrial areas in towns listed in column I as part of comprehensive development.	(i) Construction of houses by Public Sector in towns listed in Column I.	(i) River front development along Yamuna, Hindon and Krishna.
(ii) Sonapat, Faridabad-Ballaogharh Complex.	(ii) Acquisition of land for new roads.	(ii) Acquisition and development of land in Faridabad and construction of offices and residences.		(ii) Loans to Private Sector.	(ii) Extensions of existing regional parks.
(iii) Alwar	(ii) Trans-Yamuna bridges near Sonapat and Palwal.				(iii) Parks legislation.
(iv) <u>Advance Programming</u> Bulandshahr and Hapur, Rohtak and Panipat.	(iii) Doubling and dieselization of rail routes along corridors. Acquisition of land for new lines.				
Agriculture	Water supply	Irrigation	Flood control & drainage	Power	
8	9	10	11	12	
(i) Modernization of agriculture in highly developed areas of the Region.	(i) Augmentation of drinking water supply to Urban Delhi and to regional towns.	(i) Inter-state linkages (Ramganga, Keshau and Beas Projects)	(i) Preparation of a drainage plan for the NCR	(i) Interconnecting the grids at Delhi & environs	
(ii) Diversification of the agricultural economy and development of infrastructure in intermediate areas.	(ii) Investigation for integrated water supply by canals to towns in Haryana.	(ii) Distributory canals in Haryana.	(ii) Flood protection works on Sahibi & Yamuna rivers.	(ii) Distribution system at regional level to be expanded.	
(iii) Development of agricultural infrastructure in less developed areas.	(iii) Setting up of an Authority for water supply in the NCR.	(iii) Sahibi Scheme (iv) Tube well energization.			

DEVELOPMENT PROGRAMMES & PRIORITIES

PHASE - I



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Phase II

Table 8.0 Continued.

Urban centres	Transport and communications	Govt. offices and residential units.	Industries and trades	Housing	Recreational areas
1	2	3	4 & 5	6	7
(i) Bulandshahr Hapur, Khurja and Debai.	(i) Acquisition of land and development of expressways to 4 lanes.	Development of land & construction of offices & residences to be continued both in Ghaziabad & Faridabad.	Development of trade & industrial areas listed in column 1 as part of comprehensive development.	(i) Construction of houses by Public sector in towns listed in column 1.	(i) Development of areas along the river Ganga and in Dhauj & Kot.
(ii) Rohtak, Palwal, and Panipat.	(ii) Acquisition of land and development of inner and outer road grids to 2 lanes and inter-change points.			(ii) Loans to Private Sector.	(ii) Development of bird sanctuaries.
(ii) Advance Programming: Sikandrabad & other small towns of the Region.	(iii) Electrification of main railway lines and a new B.G. line to Rewari.				(iii) Setting up of park authorities and acquisition of land.
(iv) Acquisition to land for new Regional route.					
Agriculture	Drinking Water Supply	Irrigation	Flood control and drainage	Power	
8	9	10	11	12	
(i) Modernization of agriculture to be extended in the Region.	(i) Augmentation of drinking water supply to Urban Delhi and to Regional towns to be continued.	(i) Further augmentation of canal irrigation system.	(i) Remodelling and improvements of existing drains & construction of new drains.	(i) Interconnecting the grid in the entire Region.	
(ii) Reclamation and conservation of agricultural land.	(ii) Integrated water supply system to towns in Haryana.	(ii) Tube well energization to be continued	(ii) Investigation to drain Najafgarh-Jahajgarh depression into Yamuna across the ridge.	(ii) Augmentation in generating capacity.	
(ii) Intensive dairy and poultry development and growing of green vegetables.	(iii) Investigations for water supply to smaller towns and village clusters.			(iii) Distribution system at Regional level to be expanded.	

Phase III

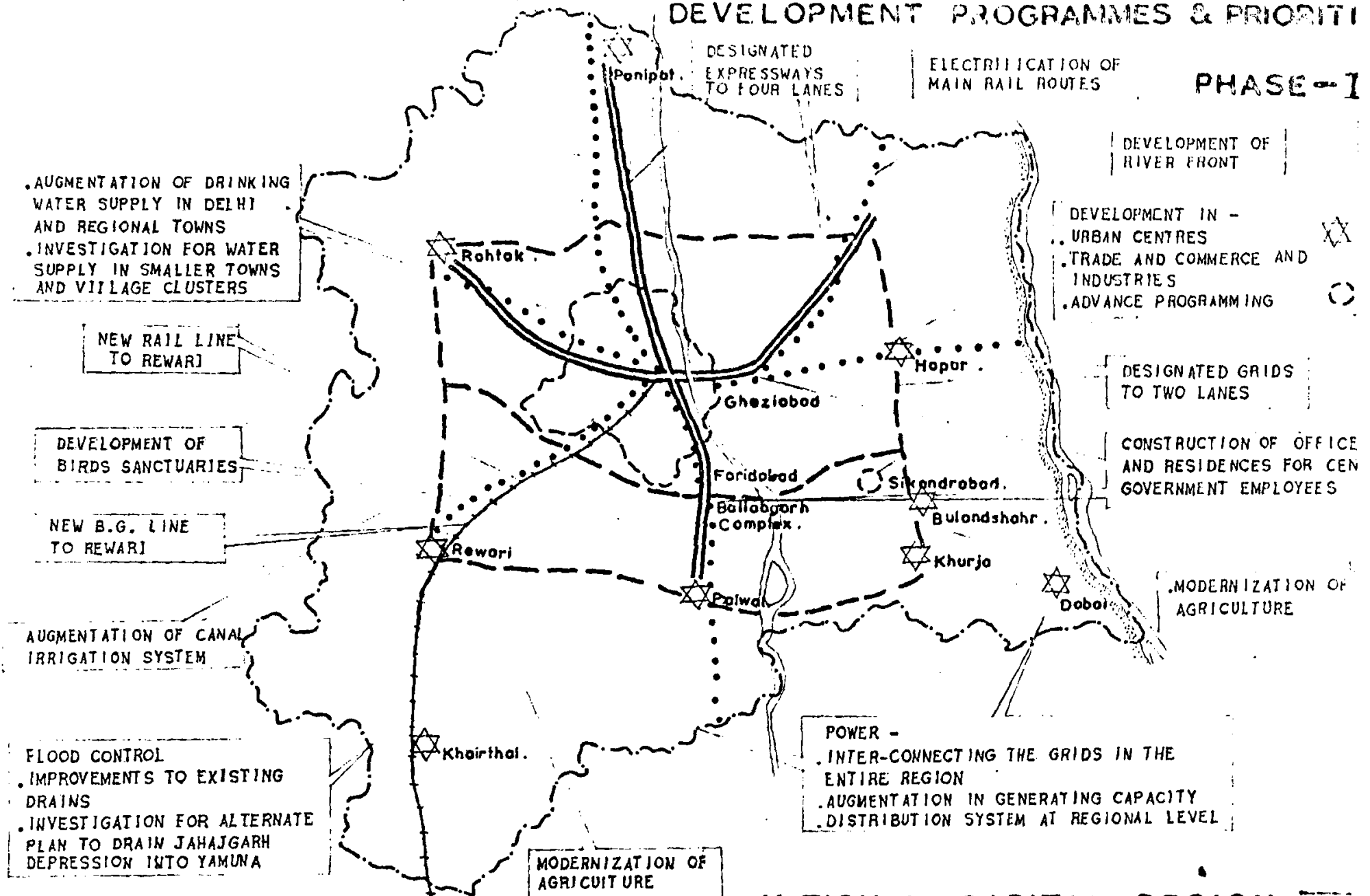
Table 8.0 Continued.

Urban centres.	Transport and communications	Govt. offices & residential units	Industries and trades.	Housing	Recreational areas.
1	2	3	4 & 5	6	7
(i) Sikandrabad and other small towns in the Region.	(i) Completion of expressways according to standards. (ii) Completion of inner and outer grids to N.H. standards.	Development of land and construction of offices and residences in Gurgaon and Narela.	Development of trade and industrial areas in towns in column 1.	(i) Construction of houses by public sector in towns listed in column 1. (ii) Loans to private sector.	(i) Development of regional parks and wild life sanctuary.
(ii) Advance Programme for next phase, including acquisition.	(iii) Yamuna bridge near Dankaur-Ballabgarh. (iv) Completion of new regional railroutes. (v) Conversion of existing M.g line to Rewari to B.g line.				
Agriculture	Drinking water supply	Irrigation	Flood control and drainage.	Power	
8	9	10	11	12	
(i) Modernization of agriculture to be completed.	(i) Water supply to small towns and village clusters.	Completion of canal distribution system in Haryana.	Construction of link drain to Yamuna from the Najafgarh-Jahajgarh depression.	(i) Augmentation of generating capacity. (ii) Completion of regional level distribution system.	
(ii) Reclamation and conservation to be completed.	(ii) Augmentation of water supply sources to urban centres.				

CONSERVATION & RECLAMATION
OF AGRICULTURAL LAND

DEVELOPMENT PROGRAMMES & PRIORITIES

PHASE - I



AUGMENTATION OF DRINKING
WATER SUPPLY IN DELHI
AND REGIONAL TOWNS
INVESTIGATION FOR WATER
SUPPLY IN SMALLER TOWNS
AND VILLAGE CLUSTERS

NEW RAIL LINE
TO REWARI

DEVELOPMENT OF
BIRDS SANCTUARIES

NEW B.G. LINE
TO REWARI

AUGMENTATION OF CANAL
IRRIGATION SYSTEM

FLOOD CONTROL
IMPROVEMENTS TO EXISTING
DRAINS
INVESTIGATION FOR ALTERNATE
PLAN TO DRAIN JAHAJGARH
DEPRESSION INTO YAMUNA

MODERNIZATION OF
AGRICULTURE

DESIGNATED
EXPRESSWAYS
TO FOUR LANES

ELECTRIFICATION OF
MAIN RAIL ROUTES

DEVELOPMENT OF
RIVER FRONT

DEVELOPMENT IN -
URBAN CENTRES
TRADE AND COMMERCE AND
INDUSTRIES
ADVANCE PROGRAMMING

DESIGNATED GRIDS
TO TWO LANES

CONSTRUCTION OF OFFICE
AND RESIDENCES FOR CENTRAL
GOVERNMENT EMPLOYEES

MODERNIZATION OF
AGRICULTURE

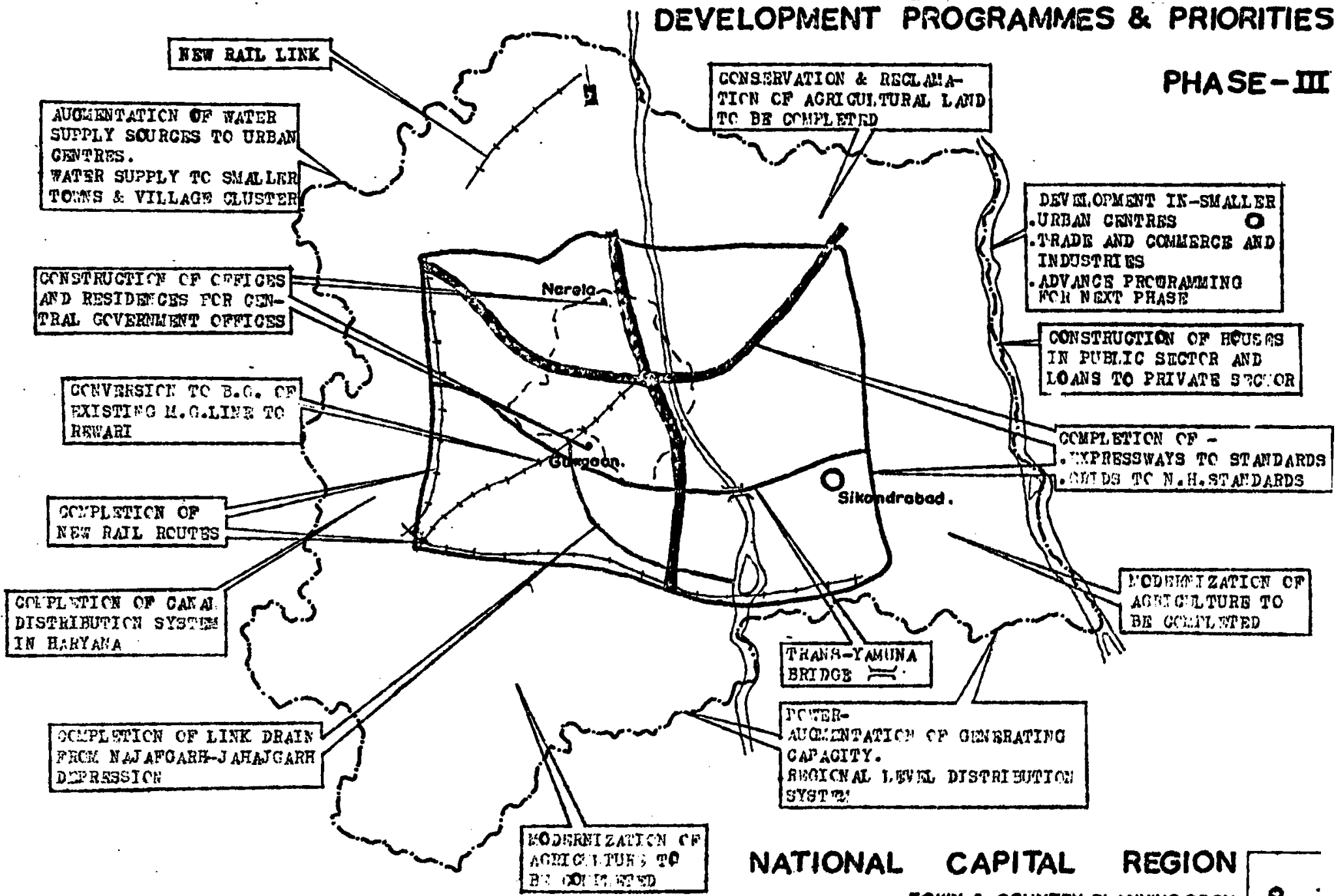
POWER -
INTER-CONNECTING THE GRIDS IN THE
ENTIRE REGION
AUGMENTATION IN GENERATING CAPACITY
DISTRIBUTION SYSTEM AT REGIONAL LEVEL

NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN
MINISTRY OF H.F.P.W.H.& U.D.

DEVELOPMENT PROGRAMMES & PRIORITIES

PHASE - III



NATIONAL CAPITAL REGION

TOWN & COUNTRY PLANNING ORGN
MINISTRY OF H. F. P. W. H. & U. D.

centres (along with other towns in the lower order of which there are thirty one) need to be developed in accordance with the developmental programmes to be envisaged in the Sub-regional Plans. These include Sikand abad in U.P., Bahadurgarh and Rewari in Haryana, Narela and Najafgarh in the Union Territory of Delhi.

However, the development programmes in the urban centres mentioned in the first phase are more related to the development of the transport and communication facilities both existing and proposed and the trans-Yamuna links providing accessibility to the eastern and western parts of the Region which form the hinterland for these urban centres, apart from the linkages these centres have with the metropolitan city of Delhi.

Financial Outlays for Urban Development:

In this section the financial outlays both for land acquisition and urban development programmes are being dealt with. (Table 8.1) The cost of land and development in smaller centres other than Delhi are much less than in Delhi. From the basic regional plan policy of dispersal of economic activities away from the metropolis and development of industries as part of existing areas or its extensions thereof, the requirements of land for development

programmes include such aspects of development like industries, trade and commerce, housing and the related development of infrastructure. Development of infrastructure such as water supply, sewerage, roads, power etc., are included but such others like education or medical facilities will have to be provided under the respective sectors so as to synchronise with the urban development programme. The outlays required on housing by the Public Sector as well as a matching housing loan to enable the Private Sector to build housing, have been included.

An outlay of 101 crores in the first phase and 98 crores in the second phase has been proposed. Beyond that, advance programming will have to be done, so that land acquisition and urban development will precede actual construction.

In assessing land requirements for housing, industries, trade and commerce., the following assumptions have been made:

- a) Residential areas required for at least 50% of the incremental population in urban areas have to be provided in the Public Sector and the land requirements have been worked out at an average density of 40 persons per hectare.
- b) In assessing the land requirements for industry, it has been assumed

Table 8.1

Outlays on Land Acquisition and Urban Development

Phase I

Category	Unit	Rate (Rs)	Amount (in Rs crores)
A. U.P. Sub-region:			
i) <u>Land acquisition and development in important urban centres:</u>			
a) Land acquisition	2,000 hec.	37,000/hec.	7.40
b) Development of land	1,400 hec.	1,23,500/hec.	17.29
c) Housing in Public Sector	12,500 units	8,000/units	10.00
d) Housing loans	-	L.S.	10.00
e) Social infrastructure including nodal works of physical infrastructure		25% of (b)	4.32
f) Development of land for other public uses (industries, Trade and commerce and others)	600 hec.	1,12,000/hec.	6.72
ii) <u>Water Supply:</u>			
a) Urban water supply		L.S.	1.00
		Total:	<u>56.73</u>
B. Haryana Sub-region:			
i) <u>Land acquisition and development in important urban centres:</u>			
a) Land acquisition	1,400 hec.	37,000/hec.	5.18
b) Development of land	1,000 hec.	1,23,500/hec.	12.35
c) Housing in Public Sector	8,600 units	8,000/units	6.88
d) Housing loans	-	L.S.	6.88

Phase I

Table 8.1 continued

	1	2	3	4
e) Social infrastructure including nodal works of physical infrastructure.		-	25% of item(b)	3.09
f) Development of land for other public uses (industries, Trade & Commerce and others)		400 hec.	1,12,000/hec.	4.48
ii) <u>Water Supply:</u> *				
a) Urban water supply			L.S.	1.00
			Total:	39.86
<u>C. Rajasthan Sub-region:</u>				
i) <u>Land acquisition and development in important urban centres:</u>				
a) Land acquisition		160 hec.	37,000/hec.	0.59
b) Development of land		120 hec.	1,23,500/hec.	1.48
c) Housing in Public Sector		1,000 units	8,000/units	0.80
d) Housing loans		-	L.S.	0.80
e) Social infrastructure including nodal works of physical infrastructure		-	25% of (b)	0.37
f) Development of land for other public uses (Industry, Trade & Commerce and others)		40 hec.	1,12,000/hec.	0.45
ii) <u>Water Supply:</u>				
a) Urban Water supply			L.S.	0.10
			Total:	4.59
			Grand Total Phase I:	101.18

* For Urban Delhi water supply, the Dhauj & Kot reservoir project is estimated to cost about Rs. 20 crores. This may supply water to some Haryana towns also.

Phase II

Table 8.1 continued

	1	2	3	4
<u>A. U.P. Sub-region:</u>				
i) <u>Land acquisition and development in important urban centres:</u>				
a) Land acquisition		2,000 hec.	37,000/hec.	7.40
b) Development of land		1,400 hec.	1,23,500/hec.	17.29
c) Housing in Public Sector		12,500 units	8,000/units	10.00
d) Housing loans		-	I.S.	10.00
e) Social infrastructure including nodal works of physical infrastructure.		-	25% of (b)	4.32
f) Development of land for other public uses (Industries, Trade & Commerce and others)		600 hec.	1,12,000/hec.	6.72
ii) <u>Water Supply:</u>				
a) Urban water supply			I.S.	1.00
			Total :	56.73
<u>B. Haryana Sub-region:</u>				
i) <u>Land acquisition and development in important urban centres:</u>				
a) Land acquisition		1,400 hec.	37,000/hec.	5.18
b) Development of land		1,000 hec.	1,23,500/hec.	12.35
c) Housing Public Sector		8,600 units.	8,000/units	6.88
d) Housing loans		-	I.S.	6.88
e) Social infrastructure including nodal works of physical infrastructure.			25% of (b)	3.09
d) Development of land for other public uses (Industry, Trade & Commerce and others)		400 hec.	1,12,000/hec.	4.48

Phase II

Table 8.1 continued

	1	2	3	4
ii) <u>Water Supply:</u>				
a) Urban water supply		-	L.S.	1.00
			Total:	39.86
<u>C. Rajasthan Sub-region:</u>				
i) <u>Land acquisition and development in important urban centres:</u>				
a) Land acquisition	60 hec.	37,000/hec.		0.22
b) Development of land	40 hec.	1,23,500/hec.		0.50
c) Housing in Public Sector	400 units	8,000/unit		0.32
d) Housing loans	-	-		0.32
e) Social infrastructure including nodal works of physical infrastructure		25% of (b)		0.12
f) Development of land for other public uses (Industry, Trade & Commerce and others)	20 hec.	1,12,000/hec.		0.22
ii) <u>Water Supply:</u>				
a) Urban centres of water supply			L.S.	0.07
			Total:	11.77
			Grand Total Phase II:	98.36

Phase III

Land acquisition and advance programming after Plan review.

that about 30 to 35% of the population will form the working force in the towns and the industrial working force would vary from town to town and would be about 25% average. The number of workers per hectare would be about 40 workers.

- c) The Public Sector would have to allot funds to build houses for at least 8% of the total population with an equal matching housing loan made available to the Private Sector.
- d) Land requirement for trade and commerce, especially for whole-sale trades, will have to be assessed in detail and included in the comprehensive development of the regional towns.

2. Development of Regional Transport Network:

The proposed Regional Road Network consists essentially of two North-South and East-West expressways with Delhi as the pivot and two regional grids of National highway standards inter-linking the different centres. For the Regional Rail Network, the Plan proposes upgrading the levels of service on the existing radial routes and a new regional route line linking Khurja-Palwal-Rewari-Rehtak-Gohana-Panipat to enable

by-passing of goods from Delhi at the regional level itself.

The Regional Transport Network development programme in the three phases presupposes that transport development would precede or go hand in hand with urban development, so as to aid and accelerate it. But on the other hand, the proposed standards of service by the transport network would be attained by the end of the programme period by which time, with full development in all other sectors movement demand on the network would require and justify the proposed standards of development.

It is to be made clear that while the Regional Transport Network Plan gives the proposed network in its form and standards of service, the actual alignment of the component routes of the network and selection between different alternative route alignment would require to be made after necessary detailed surveys and studies. To this effect, a programme to carry out necessary planning and engineering studies and preparation of functional plans has been proposed in the first phase which is stressed as a prime requisite for taking up further development programmes in the transport sector.

The development programme for the Regional Transport Network for the three phases is given in Tables 8.2. These include road as well as railway network proposals.

Table 8.2.1

Phasing of Surveys and Studies for the Road
Development Programme.

1. General.

PHASE - I

1. Commencement and completion of detailed surveys and studies for preparation of 'functional plan' including its completion showing route alignments of the different sections of the network.
2. Completion of all interchange points between Delhi Urban area network and the Expressways of the Regional Network.
3. Conducting and completion of Engineering studies and preparation of project reports for schemes proposed under Phase - II.

PHASE - II

1. Completion of all interchange points between the Urban area Network of the towns with the Regional network system.
2. Completion of all improvements to Delhi Urban area road network consequent to introduction of Mass transportation system on the Rail corridors like over-bridges etc.
3. Conducting and completion of Engineering studies and preparation of project reports for schemes proposed under Phase III.

PHASE - III

Traffic studies to review the Plan.

Table 8.2.2

Phase I

Development Programme - Road Network

Route Sections.	Existing characteristics				Proposed standards.			Development Programme
	L.	C.	R/W.	C/W.	C.	R/W.	C/W.	
1	2	3	4	5	6	7	8	9
<u>Expressways</u>								
1. Panipat-Sonepat-Delhi	88 kms.	NH	150 ft.	-	EW	100 m. (300 ft.)	4 lane divided	1. Optimisation of existing capacity. a) Improvements. b) Provision of 2-lane carriageway throughout. c) Provision of service roads in builtup areas.
2. Delhi-Faridabad-Ballabgarh-Palwal	58 kms.	NH	150 ft.	-	EW	100 m. (300 ft.)	4 lane divided	1. Provision of 2-lane carriageway with service roads from Ballabgarh to Delhi. 2. Provision of 2-lane C/W from Palwal to Ballabgarh.
3. Rohtak-Delhi.	64 kms.	NH	-	-	EW	100 m. (300 ft.)	4 lane divided	1. Improvements and provision of 2-lane carriageway.
4. Delhi-Ghaziabad-Meerut.	60 kms.	NH upto G'Bad SH from G'Bd. to Meerut.	125 ft. (av)	18 ft. (av)	EW	100 m. (300 ft.)	4 lane divided	1. Completion of 'by-pass' Connecting NH 24 and NH-2. 2. Provision of 2-lane C/W with service roads from Ghaziabad to Meerut.

Phase I

(Table 8.2.2 continued)

	1	2	3	4	5	6	7	8	9
<u>Outer Grid:</u>									
1. Panipat- (Muzaffar- nagar)- Meerut.	42kms.	SH	125 ft. (av)	18ft. to 30 ft.	NH	50 m. (150 ft.)	2-	1. lane	1. Improvements to existing road like straightening and smoothing of curves; carriageway surfacing, culvert strengthening etc.
2. Meerut- Hapur- Bulandshahr- Khurja.	86kms.	SH	100 ft.	12ft. to 20 ft.	NH	50 m. (150 ft.)	2-	1. lane	1. Improvements to existing road like straightening and smoothing of curves; carriageway surfacing; culvert strengthening etc.
3. Khurja- Jewar	32kms	MDR	80-100 ft.	12ft. to 20 ft.	NH	50 m. (150 ft.)	2-	1. lane	1. Improvements. 2. Resurfacing with 4m(av)C/W. 3. Acquisition of land for full r/w.
4. Jewar- Palwal	16kms.	-	-	-	NH	50 m. (150 ft.)	2-	1. lane	1. Acquisition of land. 2. Completion of engineering studies for Bridge across Yamuna. 3. Completion of Bridge(4-lane c/w)
5. Palwal- Rewari	77kms.	SH	80 ft.	12ft. (av)	NH	50 m. (150 ft.)	2-	1. lane	1. Improvements. 2. Acquisition of land for full r/w. 3. Engineering studies for strengthening of bridge across river Sahibi.

Phase I

(Table 8.2.2 continued)

1	2	3	4	5	6	7	8	9
6. Rewari- Jhajjar- Rohtak.	83 kms.	SH	80 ft.	12 ft. (av)	NH (150 ft.)	50 m.	2- lane	1. Improvements to existing road including provision of single lane (4 m.) C/W. throughout with embankments for flood protection. 2. Strengthening of existing and provision of new culverts and drains.
7. Rohtak- Panipat	72 kms.	SH	80 ft.	12 ft. (av)	NH (150 ft.)	50 m.	2- lane	1. Improvements.
b. <u>Inner Grid:</u>								
1. Sonapat- Meerut.	60 kms.	SH	100 ft. (av)	12 ft. to 20 ft.	NH	50 m.	2- lane	1. Improvements. 2. Engineering studies for bridge across river Yamuna and completion of bridge (4-lane C/W
2. Bulandsh- ahr-Sikan- drabad- Dankaur	34 kms.	SH	80 ft. to 100 ft	12 ft. to 18 ft.	NH	50 m.	2- lane	1. Improvements.
			from B'shahr to S'bad MDR from S'bad to Dankaur					
3. Dankaur- Ballabgarh	24 kms.	-	-	-	NH	50 m.	2- lane	-
4. Ballab- garh- Jhajjar	77 kms.	MDR (Part missing)	-	-	NH	50 m.	2- lane	1. Acquisition of land for missing link portion.

Phase I

(Table 8.2.2 continued)

1	2	3	4	5	6	7	8	9
5. Rohtak-Sonepat	54 kms.	SH	80 ft. - 12 ft.	NH	50 m. (150 ft.)	2-	lane	1. Improvements.
c. Others								
1. Alwar-Delhi	160 kms.	NH	-	-	NH	50 m. (150 ft.)	2- lane	1. Improvements and provision of two lanes 8 m. (22 ft.) c/w throughout.
2. Hapur-(Moradabad)	38 kms.	NH	-	-	NH	50 m. (150 ft.)	2- lane	1. Improvements and provision of at least single lane 4 m. (12 ft.) C/W throughout.

Note: NH SH : National Highway / State Highway

EW : Expressway

MDR : Major District Road.

C/W : Carriageway

L : Length

C : Classification

R/W : Right of way.

Phase II

(Table 8.2.2. Continued)

Route Sections.	Proposed standards			Development
	C.	R/W.	C/W.	
1	2	3	4	5
<u>Expressways:</u>				
1. Panipat-Sonepat-Delhi.	EW	100 m (300 ft.)	4-lane divided	1. Acquisition of land for Expressway requirement. 2. Provision of 4-lane carriageway.
2. Delhi-Faridabad-Ballabgarh-Palwal.	EW	100 m (300 ft.)	4-lane divided	1. Acquisition of land for full R/W. 2. Provision of by-pass to Faridabad-Ballabgarh complex. 3. Provision of 4-lane C/W.
3. Rohtak-Delhi	EW	100 m (300 ft.)	4-lane divided	1. Acquisition of land for full R/W. 2. Provision of 4-lane C/W.
4. Delhi-Ghaziabad-Meerut.	EW	100 m (300 ft.)	4-lane divided	1. Acquisition of land for full R/W. 2. Provision of 4-lane C/W.
a. <u>Outer Grid</u>				
1. Panipat-(Muzafarnagar)-Meerut.	NH	50 m (150 ft.)	2-lane	1. Acquisition of land for full R/W.
2. Meerut-Hapur-Bulandshahr-Khurja.	NH	50 m (150 ft.)	2-lane	1. Acquisition of land for full R/W.
3. Khurja-Jewar	NH	50 m (150 ft.)	2-lane	1. Provision of 2-lane C/W.
4. Jewar-Palwal	NH	50 m (150 ft.)	2-lane	1. Formation of road with 2-lane C/W.

Paase II

(Table 8.2.2 Continued)

1	2	3	4	5
5. Palwal-Rewari	NH	50 m (150ft.)	2-lane	1. Provision of 2-lane C/W (with new bridge across river Sahibi if necessary).
6. Rewari-Jhajjar Rohtak.	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Provision of 2-lane C/W.
7. Rohtak-Panipat	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Provision of 2-lane C/W.
b. Inner Grid				
1. Sonapat-Meerut	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W.
2. Bulandshahr-Sikandarabad-Dankaur	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Resurfacing.
3. Dankaur-Ballabgarh.	NH	50 (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Formation of road for single lane C/W. 3. Engineering studies for bridge across river Yamuna.
4. Ballabgarh-Jhajjar	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Road formation (single lane C/W).
5. Rohtak-Sonapat	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W.
c. Others				
1. Alwar-Delhi	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W.
2. Hapur-(Moradabad)	NH	50 m (150ft.)	2-lane	1. Acquisition of land for full R/W. 2. Provision of 2-lane C/W.

Phase III (Table 8.2.2 Continued)

1	2	3	4	5
<u>Expressways:</u>				
1. Panipat-Sonepat- Delhi.	EW	100 m (300ft.)	4-lane divided	1. Bringing upto Expressway standards.
2. Delhi-Faridabad- Ballabgarh-Palwal	EW	100 m (300ft.)	4-lane divided	1. Bringing upto Expressway standards.
3. Rohtak-Delhi	EW	100 m (300ft.)	4-lane divided	1. Bringing upto Expressway standards.
4. Delhi-Ghaziabad- Meerut.	EW	100 m (300ft.)	4-lane divided	1. To Expressway standards.
a. <u>Outer Grid</u>				
1. Panipat-(Muzaffar- nagar)-Meerut	NH	150ft.	2-lane	1. Provision of 2-lane C/W.
2. Meerut-Hapur-Bu- landshahr-Khurja	NH	150ft.	2-lane	1. Provision of 2-lane C/W.
3. Khurja-Jewar	NH	150ft.	2-lane	-
4. Jewar-Palwal	NH	150ft.	2-lane	-
5. Palwal-Rewari	NH	150ft.	2-lane	-
6. Rewari-Jhajjar	NH	150ft.	2-lane	-
7. Rohtak - Panipat	NH	150ft.	2-lane	-
b. <u>Inner Grid</u>				
1. Sonepat-Meerut	NH	150ft.	2-lane	1. Provision of 2-lane C/W.
2. Bulandshahr- Sikandrabad- Dankaur	NH	150ft.	2-lane	1. Provision of 2-lane C/W.

Phase III

(Table 8.2.2 Continued)

1	2	3	4	5
3. Dankaur-Ballabgarh NH	150ft.	2-lane	1. Formation of road with 2-lane C/W. 2. Completion of bridge (4-lane C/W).	
4. Ballabgarh-Jhajjar NH	150ft.	2-lane	1. Formation of road with 2-lane C/W.	
5. Rohtak-Sonepat NH	150ft.	2-lane	1. Provision of 2-lane C/W.	
c. <u>Others</u>				
1. Alwar-Delhi	NH	150ft.	2-lane	1. -
2. Harpur-(Moradabad)	NH	150ft.	2-lane	1. -

Table 8.2.3

Development Programme - Rail Network

Phase I

1. General

- 1) Commencement of necessary traffic and engineering studies for doubling and electrification of all regional route sections within NCR and completion for Delhi-Rohtak, Delhi-Panipat and Delhi-Meerut sections.
2. Modernisation of signal system within the Region.
- 3) Acquisition of land for doubling of the lines, if necessary.

Existing Regional Routes:

1. Delhi - Panipat

- a) Doubling
- b) Dieselisation.

2. Ghaziabad-Meerut

- a) Doubling.
- b) Dieselisation

3. Delhi-Faridabad

- a) Dieselisation/electrification.

4. Delhi-Rohtak

- a) Doubling
- b) Dieselisation

5. Delhi-Ghaziabad-Khurja

- a) Doubling between Ghaziabad and Khur
- b) Electrification.

6. Delhi-Rewari

Surveys and land acquisition for new B.G. line from Delhi Cantt to Rewari.

New Regional Route:

7. Khurja-Palwal-Rewari
Rohtak-Gohana-Panipat

Phase II

(Table 8.2.3 continued)

1. General

- 1) Completion of traffic cum engineering studies for all other regional route sections within NCR.
- 2) Commencement and completion of feasibility cum engineering studies for the new regional route line proposed.
- 3) Acquisition of land for the new regional route line.

Existing Regional Routes:

1. Delhi-Panipat
2. Ghaziabad-Meerut
3. Delhi-Rohtak
4. Delhi-Rewari

- Electrification.
Electrification.
Electrification.
a) New B.G. line (single) from Delhi Cantt to Rewari and shifting of transshipment point from Shakur Basti to Rewari.

New Regional Route:

5. Khurja-Palwal-Rewari-Rohtak-Gohana-Panipat

Restoration of discarded line between Gohana and Panipat.
Acquisition of land for the rest of the line.

Phase III

1. Delhi-Rewari

- a) Conversion of existing M.G. line to B.G.
- b) Electrification.

New Regional Route :

2. Khurja-Palwal-Rewari-Rohtak-Gohana-Panipat

Completion of route section with B.G. single line.

3. Development Programme for Central Government Offices and Residential Areas in the 'Ring Towns'

On the basis of the recommendations of the Delhi Master Plan, some of the offices of the Central Government have been shifted to the 'ring towns' - Faridabad in Haryana and Ghaziabad in Uttar Pradesh. The specific recommendation of the Master Plan was to accommodate about 50,000 employees in the 'ring towns' by the year 1981 as per distribution below:

Ghaziabad	.	.	.	20,000
Faridabad	.	.	.	15,000
Gurgaon	.	.	.	5,000
Narela	.	.	.	10,000

As a follow-up measure the Central Government had already acquired about 406 hectares (1,000 acres) in Ghaziabad and 94 hectares (230 acres) in Faridabad. Of this about 41 hectares (100 acres) in Faridabad have been fully developed and three office buildings and 1400 residential units have already been constructed. The remaining land of 53 hectares (130 acres) in Faridabad has also been developed but offices as well as residential houses are yet to be constructed.

The Regional Plan proposes that Central Government in the Fourth Five Year Plan (corresponding to phase I of the Regional

Plan) construct office buildings and residential units in 53 hectares (130 acres) in Faridabad and in about 203 hectares (500 acres) of available land in Ghaziabad. It should also acquire 162 hectares (400 acres) of land in Faridabad. In the Fifth Five Year Plan (Corresponding to Phase II of the Regional Plan), the Central Government should develop and construct in 162 hectares (400 acres) offices and residential units in Faridabad and a corresponding development and construction in 203 hectares (500 acres) of already available land in Ghaziabad.

Development of office buildings and residential units etc., in Gurgaon and Narela could be taken up in ~~the~~ Phase III of the Regional Plan, which corresponds, in part, to the Sixth Five Year Plan.

The details of the programmes are given in Table 8.3 which shows an outlay of Rs. 58.86 crores upto the end of the second Five Year Plan for construction of office buildings, residential and other ancillary units in the 'ring towns' of Faridabad and Ghaziabad. Another outlay of Rs. 34 crores would be required to develop office accommodation and residential units etc., in Gurgaon and Narela in ~~the~~ Phase III.

Table 8.3

Development Programme in 'Ring Towns' by the Central Government

Item of Work	Quantity or No.	Rate (Rs)	Amount lakhs.	1	2	3	4
1	2	3	4				
<u>PHASE I</u>							
<u>FARIDABAD:</u>							
1. Land Acquisition	162 (400 ac)	Rs. 3.6/sq.m. (Rs. 3 /sq.yd)	58.3				
2. Development of land bulk services (part development)	53 hec (130 ac)	-	21.1				
3. Residential units (average area 55.74sq.m or 600 sq.ft.)	2,820 units	Rs. 15,640/ unit	441.0				
3. Office buildings (@9.29 sq.m. or 100 sq.ft. per employee)	26,200 sq.m (2,821 lakh sq.ft)	Rs. 377/sq.m (Rs. 35/sq.ft)	98.7				
5. Non-residential buildings.		L.S.	10.0				
		Total:-	629.1				
				<u>GHAZIABAD:</u>			
1. Land Acquisition							
2. Development of land bulk services.	203 hec.	123,500/hec (50,000/ac)	250.0				
3. Residential units (55.74 sq.m or 600 sq.ft.)	7,500 units	15,400/ unit	1,155.0				
4. Office buildings	93,000sq.m (10 lakh sq.ft.)	Rs. 371/s.m. Rs. 34.50/ s.ft.	345.0				
5. Non-residential buildings		L.S.	25.0				
		Total :	1,776.0				
		G.Total Phase I:	2,404.1				24 crores.
				<u>PHASE II</u>			
1. Land Acquisition							

(Table 8.3 contd)

	1	2	3	4
2. Development of land and bulk services	162 hec. (400 ac.)	1,23,500/hec (50,000/acre)	200.0	
3. Residential units	7,030 units	15,640 each	1,099.5	
4. Office buildings	100,250 sq.m (10.75 lakh sq.ft.)	Rs. 377/sq.m (Rs. 35/sq.ft)	377.3	
5. Non-residential	-	L.S.	30.0	
		Total:	1,706.8	
<u>GAZILABAD:</u>				
1. Land Acquisition	-	-	-	
2. Development of land and bulk services	203 hec. (500 ac.)	Rs. 1,23,500/hec (Rs. 50,000/acre)	250.0	
3. Residential units	7,500 units	Rs. 15,400/unit	1,155.0	
4. Office buildings	93,000 sq.m (10 lakh sq.ft.)	Rs. 371/sq.m (Rs. 34.50/sq.ft.)	345.0	

	1	2	3	4
5. Non-residential buildings.	-	-	L.S.	25.0
			Total:	1,775.0
			G.Total Phase II:	3,481.8
				35 crores

PHASE III

GURGAON:

1. Land Acquisition	100 hec.	Rs. 37,000/hec.	37.0
2. Development of land and bulk services	100 hec.	Rs. 1,23,500/hec.	123.5
3. Residential units	500 units.	Rs. 15,640/unit	782.0
4. Office buildings	46,500 sq.m (5 lakhs s.ft)	Rs. 377/sq.m	175.0
5. Non-residential buildings	-	L.S.	20.0
		Total:	1,137.5

NARELA:

1. Land Acquisition	200 hec.	Rs. 37,000/hec.	74.0
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(Table 8.3 contd)

1	2	3	4
2. Development of land and bulk services.	200 hec.	Rs.1,23,500/ hec.	247.0
3. Residential units.	10,000 units	Rs.15,640/ unit	1,564.0
4. Office buildings	93,000sq.m.	Rs.371/s.m.	345.0
5. Non-residential buildings	-	L.S.	25.0
Total:			2,255.0
Grand Total Phase III			3,392.5
			34 acres.

4. Industrial Land Development Programmes and Priorities:

To provide a rational relationship with the developments in the other sectors of the economy in the Region and to bring about a balanced development, the development of industries, specifically in the Urban Centres, has to be in conformity with the overall development strategies of the Plan.

Out of the total working force in 1981, certain proportion would be accounted for by the industrial working force. This proportion which varies from 20 to 50 per cent of

the total working force would be of importance to the growth of industries in the urban areas. As envisaged in the Land Use Policy, the future industrial location would be preferably within the urban centre or in extension thereof. To that extent the phasing of industrial programmes are coupled to the priorities and programmes discussed earlier under the urban sector. Suitable development programmes have to be evolved in the State Sector to develop industries in these urban centres. However, item (b) in Table 8.1. includes the spatial requirements for development of industries in the various phases of the Regional Plan.

5. Development Programmes and Priorities in Trade and Commerce:

The development of Trade and Commerce, especially in the wholesale trades, being of a higher order in the NCR, and the wholesale trade being pre-dominant in the Delhi Metropolis, the dispersal of some of the wholesale trades to other selected urban areas in the Region is of utmost importance for the Regional Plan. A balanced growth in the Region. The priorities and development programmes in developing wholesale trades by dispersal from the metropolis has to be carefully drawn, keeping in view the priorities and programmes in other sectors of the economy. This aspect is of vital significance to the development of Trade and Commerce

particularly the wholesale trade development which is more related to the development of certain infrastructure like transport and communication network, storage facilities and adequate developed areas to house the various building requirements of the trade.

As mentioned earlier in Chapter IV, section 4.3 the dispersal of selected wholesale trade is to be contemplated in the Region in a phased manner. The phasing has to be dovetailed specifically with the developments in urban sector, agriculture, transport and communication network. However, these being of primary importance in the Sub-regional Plan and in State sector, the detailed programming and phasing could very well be taken up in the Sub-regional Plan. However, the land requirements, on a very broad picture, have been incorporated in the urban sector development programmes and priorities in Table 8.1 item (b).

6. Development Programmes and Priorities in Housing:

The tremendous backlog of housing in the NCR, the increased diminishing of household size, the changes in the occupational characteristics of the population and increased urbanisation in the NCR by 1981, make it imperative that housing be tackled on a first priority basis in the overall development. This is essential not only to provide the much required housing but also to the development of the Region itself in all its ramifi-

cations. With the total population of the NCR estimated at 211 lakhs by 1981, 23 lakh houses are required by 1981 for the incremental population itself. If the backlog in 1961 is included almost 17.5 lakh houses would be required each in the urban and rural sectors of the NCR making a total requirement of 35 lakh dwelling units for the entire NCR. But to put it another way to meet the needs of the increasing population between 1961-81, and to cover the backlog of 1961, construction of dwelling units per year should be of the order of 88,500 in urban sector and 63,500 in rural sector.

However, housing being a State subject, suffice it to say that efforts should be made to provide housing in the Public Sector at a much higher rate than heretofore. Housing priorities should be given separately and simultaneously for both urban sector and rural sector requirements. In the Urban Sector, priorities have to be given simultaneously and separately for Delhi and the rest of the urban centres in the Region. Efforts should be made to provide at least 20 per cent of the total requirements in the Public Sector in Delhi along with the 12 per cent by the Central Government for its employees and the rest of 68 per cent being in Private Sector. With the exception of Faridabad and Ghaziabad where Central Government Housing should be 15 per cent of the total requirements, in the rest of the urban sectors of the NCR efforts should be made to meet 25 per cent of the total requirements in Public Sector Housing. In the

Rural Sector at least 50 per cent of the requirements should be met on a self-help basis with Public Sector financial assistance. The priorities in housing development should be dovetailed with the Urban Sector development so that the developed land for residential purpose is utilised as per the priorities of their development. Table 8.1 shows that about 44,000 dwelling units are proposed in the Urban Sector as part of town development. If this effort is kept up in the State Sector also, much of the housing requirement could be adequately met.

7. Development of Regional Recreational Areas:

The development of recreational areas have to be related to other programmes of development, specially urban development and the development of road network in the Region. Also, in the first phase funds may not be available for large scale acquisition and development of parks. In view of such a constraint, in the Phase I stress has to be put on the enactment of park legislation which will enable preservation and conservation of land for regional parks and ensure development. As a priority, development of recreational areas may be confined to selected recreational areas along the river fronts and extension of already developed parks and initiation of development of one or two

potential areas, such as the confluence of the Hindon and the Krishna rivers near Binauli town in the U.P. Sub-region. These areas have been chosen, because they are in close proximity to the urban complex of Delhi-Ghaziabad-Meerut-Faridabad. Table 8.7 gives the details of the regional recreational areas proposed for development related to the major urban centres in three phases.

In Phase II, the task would be to delineate the regional recreational areas in greater detail in zones farther away from the metropolitan urban complex. In this phase, steps may also have to be taken to acquire, at least, part of the land needed for recreation. This will be facilitated by the creation of a park authority by each of the concerned State Governments. Table also indicates the areas to be developed for recreation as related to urban development proposed in the town group in the second phase of development.

In phase III acquisition of land for regional recreation have to be completed and development extended to all the areas indicated in the Regional Plan. These also include areas on the periphery of the Region.

These development programmes are of a continuing nature and there would be considerable overlapping of acquisition or development as well as operation of control measures. Although funds for regional

Table 8.7

Phasing of Development Programmes of Regional Recreational Areas

PHASE I

<u>Urban Centres related to Phase I.</u>	<u>Development Programme</u>	<u>Administrative and other measures.</u>
1. Delhi	a) West Bank Yamuna River front along Delhi Urban Area. b) Buddha-jayanti Park extensions central ridge areas. c) Suraj Kund-Restoration and Park Development. d) Qutab-Mehrauli Development; Park Improvements in areas of Historical importance.	Enactment of parks legislation regarding Zoning of Regional Parks and recreational spots, their preservation, conservation and development - Reservations of land for parks.
2. Ghaziabad, Modinagar, Meerut, Sonapat, Faridabad, Ballabgarh Complex, Alwar.	a) Hindon River front. b) Areas around River Hindon - Krishna Confluence near Binauli.	
3. Meerut, Moradnagar.	Nauchandi fair grounds, Canal picnic spot Moradnagar.	
4. Faridabad - Ballabgarh	Suraj Kund, Badhkal Lake.	

(Table 8.7 continued)

PHASE II

<u>Urban Centres related to Phase II</u>	<u>Development Programme</u>	<u>Administrative and other measures</u>
1. Bulandshahr, Hapur, Khurja	a) Forest area along river Ganga as bird sanctuary - Anupshahr area. b) Rajghat Nirora - Ramgarh - Wier, Scenic spots.	Delineation of recreational lands and their reservation and part acquisition creation of parks authorities and part development.
3. Rohtak, Palwal, Rewari, Panipat and Khairtal.	a) Najafgarh Jheel, Sohna Hot water spring, Bird Sanctuary Salempur village area, Silisere Lake Regional Park near Alwar. b) Dhauj Kot Lake front.	

PHASE III

Urban Centres related to Phase III

Sikandrabad, Mawana, Baraut and rest of the smaller towns.	Development of parks, forest area along river Ganga, Regional Park and wild life sanctuary near Alwar, Ujina Jheel, Sallabgarh Jheel.	Acquisition and development.
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recreation are generally not forthcoming, yet it is very important that as part of the conservation of the environment and the general welfare of the people; by providing them healthy recreation, this aspect of development should be taken care of. Funds should be progressively stepped up to meet this demand and adequately provided for in the Five Year Plans.

8. Development Programmes and Priorities in Agriculture:

Important development programmes envisaged for agriculture and its allied activities in the NCR are: Introduction of modern methods of farming and scientific crop planning; Development of 'central places' for servicing agriculture; Reclamation and conservation of agricultural land; Afforestation; Dairy and poultry development; Growing of green vegetables, Provision of basic infrastructure (electricity, water and effective road linkages) for each rural community in the Region.

Selection of Priority Areas:

(i) Modernisation of Farming: Certain areas in the Region are comparatively better off in agriculture than others. The main factors which differentiate such areas are : (a) availability of better irrigation facilities and (b) existence of larger number of small and large size towns. In the absence

of these factors, scientific crop planning and modernisation of agriculture by providing better inputs like seeds (H.Y.V.) fertilizers etc. may not be possible. In areas where agricultural development is comparatively higher in the Region, the modernisation of agriculture and development of small towns as 'central places' for servicing agriculture have therefore generally been given priority. These areas are also characterised by higher population density and the need for diversification of the agricultural economy in the rural areas. Development of agro-based industries and the infrastructure needed for it has been included as an important part of the development of 'central places' (small towns) in these areas. In other areas, the provision of basic needs required for agricultural prosperity and development of 'central places' (big villages) for servicing agriculture has been considered in the first instance.

(ii) Optimum Utilisation of Agricultural land: Certain parts of the Region have the scope for increasing the area under cultivation, especially from the water logged and saline land. Reclamation of this land has been given first priority. In certain parts of the Region addition in the 'area not available for cultivation' is increasing fast. Such areas have been earmarked in the Region for special emphasis in saving good agricultural land from conversion to non-agricultural

(contd in 412)

Table 8.8

Development Programme in Agriculture

PHASE I			
Development Programme	Areas	1	2
1	2		
1. <u>Introduction of modern methods of farming and scientific Crop Planning.</u>	} Districts Meerut, Bulandshahr and Rohtak and Panipat Tehsil.	2.(a) <u>Development of 'Central Places (big villages)</u>	} District of Gurgaon and tehsils of Alwar Distt.
(a) Mechanisation of farming		3. <u>Afforestation</u>	} Tehsils of Alwar District in the Region.
(b) Provision of fertilizer, better seeds and credit facilities.		(a) Protection of forests	
(c) Self-sufficiency in food grain and cash cropping programme for increasing income from agriculture.		(b) Development of dispersed forests	
2. <u>Development of 'Central Places' (Small towns) for servicing Agriculture.</u>	} ..do..	(c) Plantation of trees along roads and canals.	
(a) Provision of social and economic infrastructure for servicing agricultural and rural population.		4. <u>Reclamation and Conservation of Agricultural Land:</u>	} Tehsils of Panipat, Jhajjar, and Rohtak for reclamation schemes and Tehsils of Meerut, Hapur, Sardhana, Bhagpat and Bulandshahr for Soil Conservation.
(b) Agro-based Industries.		(a) Reclamation of water-logged and saline areas.	
(c) Linking Agricultural sector to metropolitan economy.		(b) Soil Conservation.	
		(c) Wherever possible protection of good agricultural land from conversion to non-agricultural uses.	

(Table 8.8 contd)

1	2
5. <u>Dairy and Poultry Development.</u>	} Union Territory of Delhi, Rohtak, district, Panipat Tehsil and Tehsils of Alwar District.
(a) Cattle development for meeting milk requirements of the Region.	
(b) Eggs, fowl, meat and fish requirements of the Region.	
(c) Sheep development.	}
6. <u>Growing of Green Vegetables:</u>	
7. Provision of electricity, water and metalled approach roads to rural areas.	} Haryana and Delhi in full and partially in U.P. & Rajasthan Sub-region.
<u>PHASE II</u>	
1. <u>Introduction of modern methods of Farming and Scientific Crop Planning</u>	} District Gurgaon.

1	2
2. <u>Development of 'Central Places' (Small towns and Big villages)</u>	} Spill-over of Phase I.
3. <u>Afforestation</u>	} Tehsils of Anupshahr, Nuh and Tijra.
4. <u>Reclamation and Conservation of Agricultural Land:</u>	} Tehsils of Nuh, Mawana, Ghaziabad, Bhagpat and Palwal for checking cover-up of good agricultural land for non-agricultural purposes wherever possible and Soil Conservation in Tehsils of Khurja, Mawana, Sikandrabad and Anupshahr.
5. <u>Dairy and Poultry Development:</u>	} Districts of Meerut and Gurgaon.
6. <u>Growing of Green Vegetable</u>	} Town periphery of the following towns. Bulandshahr, Hapur, Rohtak, Rewari, Palwal, Panipat and Khairtal.

(Table 8.8 contd)

1	2
7. <u>Provision of electricity, water and metallised approach road to each village community</u>	Covering the whole of the U.P. Sub-region.

PHASE II

1. <u>Introduction of modern methods of farming and Scientific Crop Planning.</u>	Tehsils of Alwar District in NCR.
2. <u>Development of Central Places (small towns for servicing Agriculture).</u>	Gurgaon District and tehsils of Alwar District in NCR.
3. <u>Afforestation.</u>	Wherever possible in rest of the Region.
4. <u>Reclamation and Conservation of Agricultural Land.</u>	Rest of the Region.
5. <u>Dairy and Poultry Development.</u>	Bulandshahr District.
6. <u>Growing of Green Vegetable.</u>	Periphery areas of following towns: Sikandrabad, Mawana, Bhagpat and the rest of urban areas.

1	2
7. <u>Provision of electricity, water and metallised approach road to each village community</u>	Rajasthan Sub-region.

(contd from p. 409)

uses wherever possible. Priority for soil conservation schemes have been mainly given on the considerations of irrigation facilities available in a particular area; areas with higher canal and tubewell irrigation have been given first priority. Afforestation schemes have been given priority in those areas where comparatively larger area under forest is available in the Region.

(iii) Meeting regional requirements of milk, eggs, fowls, meat and green vegetables: Cattle and poultry development is suggested on a priority basis in those areas where the level of agricultural development is comparatively low and dairy and poultry development has already started. This is expected to augment the income of the rural populace. Some of these areas have further scope for the development of pastures. Development of green vegetables have been recommended in the peripheral areas of towns. The priorities assigned for this are in consonance with that of urbanisation in the Region.

9. Development Programme for Drinking Water Supply:

The main source of the existing surface water supply in NCR, is the river Yamuna. Information regarding use of Ganga water for drinking purposes within NCR through direct tapping is not available. However, there appears to be good scope to augment the present supply from the Yamuna by the river Ganga to meet the existing deficiencies and the growing demand of water supply within the National Capital Region. This needs to be further investigated. This is necessary because large scale developments cannot be successfully planned without guaranteed and safe water supply sources. So far, the solutions have been sought in finding ways and means to augment the water supply at local levels, individually, to meet the requirements. In the context of a satisfactory development it is imperative to deal with the problems of water supply in a unified manner for the Region as a whole.

Augmentation of drinking water supply to Urban Delhi, which holds almost one-third of the total existing population of the Region has been earmarked to be completed in the first Phase in the Development Programme. In the Sub-regions of the NCR, in Haryana, Rajasthan and in parts of the Union Territory of Delhi, the reserves of sub-surface water are small, and mostly

brackish to saline in quality, making it difficult to depend upon these sources for local consumption. It is, therefore, necessary to initiate action for integrated drinking water supply system to the existing towns of Haryana by canals in the first phase and investigations in this regard initiated. It is imperative that the development of most of the water supply sources shall require inter-state cooperation. For this purpose, recommendations of the Nasker Committee for setting up an authority or board to plan, design, implement and maintain adequate water supply in the Region is required to be set up in the Phase I itself.

During the Phase II the programme for drinking water supply to the existing towns in NCR, particularly in Haryana, should be completed. Also, advance actions for making the drinking water supply available to the rural areas is required to be undertaken. During the Phase III drinking water supply should be made available to all the settlements within the NCR. Further, augmentation of sources of water supply from the Beas-Sutlej Link need to be completed. The development programme and priorities for drinking water supply are given in Table 8.9.

10 Development Programmes and Priorities in Irrigation:

The development of agriculture in the NCR is related to the development in irrigation

Table 8.9

Development of Water Supply

Phase I.

- I. Augmentation of drinking water supply for Urban Delhi.
- II. Setting up of an Authority or a Board to plan design, implement and maintain water supply in an integrated manner for NCR as recommended by Nasker Committee.
- III. Action to be taken towards investigation of canals as the main source for providing drinking water supply to the existing towns of Haryana.

Phase II.

- I. Drinking water supply to be made available to existing towns in the NCR, and Haryana in particular.
- II. Action to be initiated for providing drinking water supply from canal sources to rural areas and village clusters.

Phase III.

- I. Drinking water supply to be made available to all settlements in the NCR.
- II. Augmentation of water supply from Beas-Sutlej link be completed.

facilities. The development of irrigation facilities in the Haryana Sub-region being of vital significance to the development of both agriculture and consequential urbanisation in that Sub-region, it is of utmost importance that irrigation facilities and sources for irrigation are developed in the first phase and on top priority basis.

In ~~xxx~~ Phase I of the development in irrigation, the inter-state linkages from Ram Ganga, Aashau and Beas Projects and Sahibi project have to be developed to provide new sources for irrigation and new facilities, and for introducing canal distribution system in the Haryana Sub-region. In the U.P. Sub-region tubewells will have to be energised. In ~~xxx~~ Phase II, further augmentation of the distribution system in Haryana as well as augmentation of the sources of water for irrigation need be taken up. In ~~xxx~~ Phase III improvements in the internal distribution system in the entire Region have to be carried out.

11. Development Programmes and Priorities in Regional Flood Control and Drainage:

In the NCR the problems of Flood Control and Drainage are inter-connected and at present these are also being tackled by the State Governments of Haryana, U.P., and Rajasthan on that basis. Each of the State

Administrations including Delhi has established a flood control wing attached to their respective Irrigation Department and working in collaboration with the State minor irrigation works. The present steps taken by the State Administrations are in the nature of arresting floods within their jurisdiction by various schemes and diverting the water for irrigation purposes wherever feasible. Further, as part of drainage, independent schemes have also been incorporated by the respective State Administrations to drain the accumulated water which do not seep into the sub-surface. However, all the measures at present undertaken by the State Administrations are generally in the nature of interim measures and not on any overall basis for the whole of the NCR. The floods and drainage congestion in the NCR are required to be tackled in a unified manner on a regional level and it deserves immediate attention in the States of Haryana and the Union Territory of Delhi, where the problem is more acute. In the Fourth Five Year Plan, the several administrations have provisions for flood control and drainage works. But the urgent need is to dovetail these programmes on an integrated basis so that these allocations themselves could pave the way for a regional approach in the respective measures envisaged in the Fourth Plan.

In Phase I of the Development Programme, it is therefore, of foremost priority to have a drainage plan for the entire NCR and in addition a plan for remodelling and improvements to some of the important drains.

In the Phase II the Najafgarh and Jhajjar depression, which always poses problems for developments in the Haryana Sub-region and in south-west part of the Union Territory of Delhi should be completely drained by means of alternative proposals, such as drainage of these areas into the Yamuna downstream by cutting across the Aravalli ridges. In ~~the~~ Phase II, therefore, advance action programme need to be taken for alternative proposal for draining the depressions and it is suggested that this alternative proposal be completed by the end of the Phase III.

The above proposal has been discussed in one of the meetings of the Flood Control Board, Delhi, and the cost of the project has been estimated to be around Rs. 300 to 400 lakhs. It was also estimated that this project would take about 12 to 13 months for completion.

12. Development Programmes and Priorities in Electric Power Supply:

Generation and provision of electric power being of vital importance to the development of the economy of the Region, the

Table 8.11

Development Programmes and Priorities for Regional Flood Control and Drainage in the NCR

Development Phase	Development Programme	Estimated cost (Rs)
1	2	3
Phase I	Action for preparation of a drainage plan for the entire NCR either by a single agency or in close collaboration with Flood control authorities of the State Administrations Advance action for remodelling and improvements to important drains.	60 lakhs (A Provision of Rs.30 lakhs is available in the 4th Plan for the U.T of Delhi.
Phase II	Remodelling and Improvement to important existing drains. (a) Tributary drains of Najafgarh drain. (i) Palam drain (ii) Mangeshpur drain (iii) Kurari Suleman Nagar drain and (iv) Nangloi drain.	

1	2	3
(b)	Implementation of the three phase of Najafgarh-drain as suggested by the Reddy Committee.	Rs.350 lakhs.
(c)	Channelisation of Sahibi river into Najafgarh-Jahajgarh link drain to drain into the Yamuna.	Cost not known.
(d)	Advance action to initiate programme for alternative proposal to drain the Najafgarh-Jahajgarh depression into Yamuna down stream by cutting across the Aravalli ridges.	
Phase III	Construction of connecting drain to divert excess water from Jahajgarh depression via Aravalli Ridges to Yamuna.	Rs. 400 lakhs.

development of electric power and its supply and distribution has to be given top most priority. In ~~xxx~~ Phase I, it is of importance to interconnect the regional grids at Delhi and environs in order to provide ~~xxx~~ power supply on a regular footing. Simultaneous investigation for a distribution system at the Region level should be started. In the second phase inter-connection of grids in other parts of the Region should be made so that the entire Region could utilise the benefit of such inter-connections both at the intra-regional level as well as at the inter-regional level. The distribution system at the regional level has to be further augmented and continued in ~~xxx~~ Phase II.

In ~~xxx~~ phase III augmentation of generating capacity of electric power has to be under taken either by the location of an atomic power generating station within the Region or just outside it, utilising the plentiful supply of water in the river Ganga. In this phase, further augmentation of the distribution system at the regional level and improvements in the distribution system have to be under-taken in order to put the distribution of power in the Region on a sound system.

CHAPTER IX

THE LONG RANGE PERSPECTIVE AND
THE NEXT STEPS

The Long Range Prospects:

The National Capital Regional Plan proposed in the preceding chapters has spelled out the physical pattern, the development strategy and the administrative set up. The enforcement and implementation of the plan has to be done at regional, sub-regional and local levels. The present drift in the field of regional and urban development should not continue and the existing haphazard pattern of growth should not be allowed to get ingrained in the coming years but a new shape and direction must be given towards a more desirable pattern of balanced metropolitan growth.

Population growth: The proposed Regional Plan has given a ten year perspective but in a dynamic metropolitan region, such as the NCR, it is imperative that a long range perspective should be kept in mind. The population of the NCR which was 107 lakhs in 1961 is estimated at 211 lakhs in 1981 and is likely to reach a figure of about 320 lakhs by the year 2,000, thus raising the proportion of the population of the NCR to that of All India from 2.5% in 1961 to 3.6% in the year 2,000. Such a tripling of population would involve on an average an increment of 5 lakh persons per annum. At an estimated working force of 35% of the total population, 8.75 lakhs of new jobs on an average will be added to the total working force in the NCR during each Five Year Plan period.

Table 9.1

NCR Population Growth in Relation
to All India

Year	India's Popu- 'lation '(crores)	NCR Popu- ,lation , (crores)	'NCR Popu. 'to All 'India.
1	2	3	4
1961	43.9	1.1	2.5%
1981	70.3	2.1	3.1%
2000	90.0	3.2	3.6%

Source: Compiled from the Census of India for 1961. Medium projection for All India by Planning Commission and for NCR by T.C.P.O.

Growth of Urban Economic Activities: Considering the urban component of the total population, if adequate efforts are not made to channelise the migration into medium sized regional towns, bulk of the urban population would be concentrated in the central city of Delhi and on the basis of present trends Delhi might reach a figure of a 100 lakhs by the year 2,000. On the other hand, with the national urbanisation policy operating outside the Region and with vigorous implementation of the Regional policies and planned developments enunciated in this Plan, a

considerable proportion of the new population could be diverted into other urban centres in and around the NCR. The year 2,000 may find over 50% of the total population in the Region living in urban centres with a balanced distribution of economic activity and concentration of population in a framework best suited for the promotion of growth. In any case on a long range perspective there would be on an average, an annual addition of 3 lakh urban population and about 1.2 lakh urban workers in the Region. These additional workers will have to be found gainful employment in the various urban economic sectors.

The task of identifying the cities and towns for growth and giving priorities of development is a continuing process and would require a great deal of study and expert analyses. The role of the central city of Delhi with its nation capital functions and its relationship with other urban centres as also the rural areas will have to be constantly assessed and defined. The impact of the Regional Plan proposals on this relationship has to be evaluated and based on it continuous guidance and directions have to be given at all levels. It has to be emphasized here that the Regional Plan has to be flexible enough to respond to changes in economic growth, social values, technological capabilities and any changes in the relationship of the mother city, the regional towns and the rural hinterland.

Future Demands of Land and Water: Another major problem in the future will be to obtain an optimal utilisation of land. This has to be viewed in the face of competing demands from the various sectors, especially agriculture and urban sectors. It is anticipated that there will be about 20 lakhs of industrial workers by the year 2,000 in the Region, mostly concentrated in 6 or 7 industrial centres. On a rough basis 32,000 acres of land will be required for this purpose. The other big component will be land for residential use. It cannot be over emphasised that our residential areas in metropolitan regions need to be planned at optimum densities so that the cost of providing community facilities and services including transportation is minimal and at the same time urban land which is a diminishing commodity is conserved. There will be a large demand for regional recreational areas not only from the increasing number of urban dwellers but also from the farmers who in future years, with increased prosperity and leisure, would clamour for recreational facilities.

Agriculture provides the necessary balancing force, for the growth of this Region which would progressively get more and more urbanised, with a consequent increase in non-agricultural activity. The impact of the green revolution in the agricultural sector and the

agricultural economy of the Region need to be carefully assessed and channelised. It has been indicated in the Plan that the strategy in the agricultural sector should facilitate the inter-action of the rural hinterland with the 'central place' villages and towns and the bigger urban centres. This programme should be inter-linked with the dispersal of economic activity and population away from the metropolis and with the purpose of upgrading the medium sized towns. This strategy will have to be constantly reviewed under changing conditions.

The increasing demand for water, specifically for urban water supply, would be of major importance for future urban structure development. The increasing water pollution in the two rivers, especially in the Yamuna, would entail a search for future water supply sources to serve the metropolitan region. Efforts in this regard are already afoot in so far as urban water supply for Delhi is concerned. In the future this would be of a higher order, and the need for a perennial source of potable water supply to cater to the requirements of the major urban centres, in the arterial corridors including that of Delhi would become a major influencing factor in the overall development pattern of the urban structure in the Region. In the long run there would be a need for an integrated water supply system for these urban centres.

The problem of water supply is more acute in the Haryana Sub-region on account of paucity of river sources, as well as the underground resource due to salinity in the area. Specific search for water development to sustain long range urban growth in the Sub-region would be very essential.

As there are no major mineral resources in the NCR, the present pattern of non-mineral based industries would probably continue in the period after 1981. However, there is need to have an industrialisation programme for the NCR on a regional perspective, such that, with the development of industrial infrastructure on a planned basis, the momentum of development is kept in the future. Any major development of industrial infrastructure outside the Region will have a deleterious effect in the NCR and would be more specifically so in view of the majority of footloose industries so far developed in the Region. These developments will have to be anticipated and remedial steps taken.

Institutions for Regional Development: These are the long range problems and prospects. The tools with which we are now tackling this most complex structure, which holds such tremendous possibilities of growth, are inadequate to meet this challenge. The present Regional Plan has no legislative backing and is to be enforced and implemented by the sub-regional units by administrative

actions. Any deviation on the part of the sub-units from the policies laid down in the Regional Plan or failure to keep up to the programmes will spell a major danger to the metropolitan structure. The metropolitan organism in the Region which may before long get more complex, presenting a continuing challenge, ~~which~~ cannot be met by any ad hoc administrative arrangement and faulty implementation. Hence, it is imperative that regional planning development in the NCR must have a sound institutional framework backed by legislative measures.

The Present Advisory High Power Board: It has been stated earlier that there is a High Power Board in existence since 1961, under whose direction this Regional Plan has been prepared but that the State Government do not have comprehensive legislation even for urban planning let alone regional planning. Also steps to adopt the Plan, enforce and implement it under the existing situation have been stated. The policies and programmes now incorporated in the Plan have been evident for sometime and if past experience is any guide as to the prospects of their implementations, then they are indeed unsatisfactory. The High Power Board constituted in 1961 did not meet for a long time and when it met thrice between 1965-67 it was to discuss without much results the common problems of water supply, flood control and drainage, recreational facilities, unauthorised colonies and a revolving

fund. The Board finally came to resolve in its meeting held in December 1967:

"that the Board being only an advisory body it cannot effectively tackle the problem of preparation and implementation of the National Capital Region development plan. It was unanimously agreed that a Statutory Board be created to tackle this problem. It was decided that the concurrence of the State Governments bordering Delhi will be necessary for the creation of such a Statutory Board. The Minister for Home Affairs undertook to attempt and to persuade the State Governments to agree to the setting up of ~~such a~~ Statutory Board. Meanwhile the existing Board will continue to function."

Proposed Statutory Board: A Special Committee was formed to advise the Ministry of Urban Development of the Government of India on the formulation of the proposed legislation. The Special Committee after a careful study of the present situation in the Region and other legislation on regional planning in India and abroad has recommended that it is essential to prepare an inter-state regional plan, whose broad objective should be to have orderly growth, proper use of land, and balanced physical, social and economic development of the Region. For this

purpose, it felt, that it is imperative to create a Statutory National Capital Regional Planning Board.

The Committee has recommended that the functions of such a Board should be:

- (a) preparation of the Regional Plan for the NCR,
- (b) preparation of Functional Plans for different elements of the Regional Plan,
- (c) promotion and co-ordination of the preparation of the Sub-regional plans by the respective administrations,
- (d) co-ordination of the enforcement and implementation of the Regional, Functional and Sub-Regional Plans,
- (e) modifications of the Regional Plan from time to time to meet the changing needs and circumstances and review of the Regional Plan from time to time.

This proposal for the Statutory Board is at present under the active consideration of the Ministry of Urban Development in consultation with the Union Ministries of Home, Affairs and Law. Meanwhile, the participating States themselves should initiate enabling legislation for the preparation of the

Regional Plan, Sub-regional plans and comprehensive Master Plans and their implementation.

The coming decade will be one of development. The Metropolitan cities have a dynamic quality and the National Capital Region displays a vitality of its own, which if tackled properly can, with the least cost on overheads, lead to orderly physical growth and a socially desirable environment. The chances of success or failure will be largely determined by the kind of institutions that will be set up for the purpose of regional planning within whose framework the traditions of co-operative actions in plan making, enforcement and implementation would be evolved in the future.

Revolving Fund: However, the key to such an institution being a success is the availability of capital funds for investment in the urban structure. The necessity of providing a revolving fund has all along been voiced and experience has shown that such a fund should be provided to the Board without which it would become largely ineffective. The compulsions are there for all to see, that the metropolitan economy cannot be given a direction without financial investment in the critical sectors, at the proper time, in order to decisively influence the present disorderly and imbalanced growth. Hence the creation of a revolving fund along with the Statutory Board assumes great importance.

The Board will mainly advance loans to the implementing agencies for specific projects of urban development repayable in easy installments from the funds accruing from projects executed by them. The Board may also give grants to the participating State Governments for sectoral development to projects which are vital for the implementation of the Regional Plan but are non-remunerative in nature.

The Next Steps: The National Capital Regional development can serve as a model for other metropolitan regions just as the Delhi Master Plan was a pace-setter for comprehensive urban development all over the country. The labour involved in making the Regional Plan has been enormous and the expertise wholly indigenous. The Plan has to be implemented in right earnest. Much work remains to be done, such as, the preparation of Functional Plans, Sub-Regional Plans and Project Plans. The imperatives of providing legislative backing and a revolving fund cannot be long ignored. Only then can the benefits of planning be fully realised and the maximal welfare of the people achieved. This is a consumation towards which the next steps have to be taken now, the building up of a new metropolitan structure - physical, social, economic, financial and institutional.