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SOUTHERN REGION Project Study
Master Plan Report - Najran

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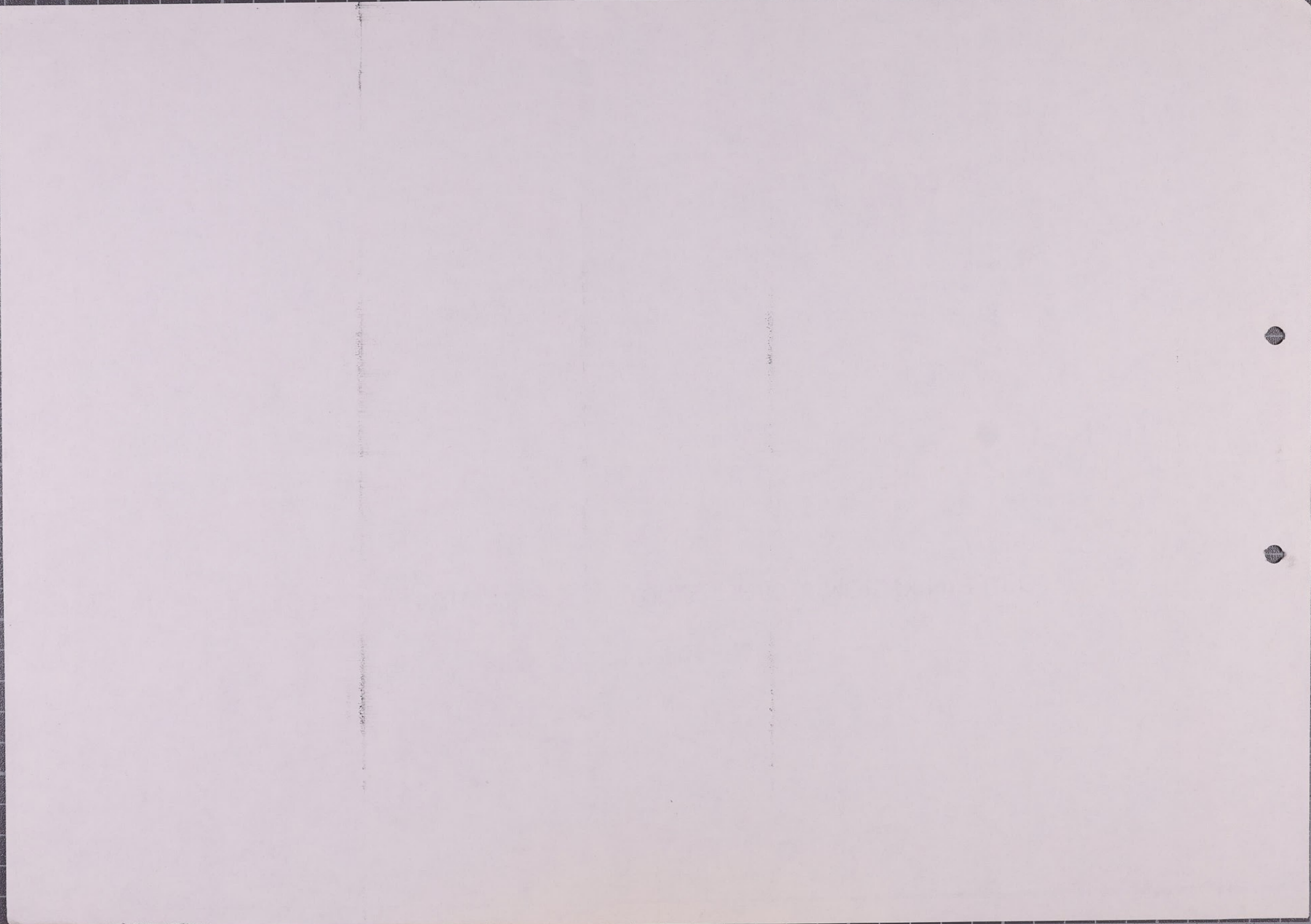
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SOUTHERN REGION PROJECT STUDY

MASTER PLAN REPORT

NAJLAN

الهيئة العامة
للموارد البترولية والمعادن
بالمملكة العربية السعودية



PREFACE

It is our great honor and pleasure to have the opportunity to participate in the studies of the regional master plan for the Southern Region and master plans for the main cities of the Southern Region in the Kingdom of Saudi Arabia.

Our participation in the project was initiated in May, 1974. Since that time, under the guidance of the Ministry and with close collaboration between our offices in Tokyo and Abha, we have done our utmost to carry forward our task.

This report presents the final results of our study for the preparation of master plans for the five main cities and a village cluster in the Southern Region. The series of six reports of which this is a part represents the work of the third phase of the third stage of the Southern Region Project Study as specified in the Agreement.

The development plans contained in this report have been based on the Existing Conditions Reports, the Initial Appraisal Reports, the Alternative Strategies Reports, and the Preliminary Master Plan reports, all of which have been previously submitted to the Ministry of Municipal and Rural Affairs. The development plans have been formulated in line with the major objectives, policies and priorities adopted by the Ministry.

The development plans cover the anticipated growth of the five major cities and the village cluster, proposed land uses, infrastructure planning, and outline programs of development, land acquisition, improvement, and zoning regulations.

We therefore submit these reports as the final Master Plans of the main cities and the village cluster in the Southern Region.

1978

Kenzo Tange

Project Principal



ACKNOWLEDGEMENT

In the process of the preparation of this report, valuable assistance has been given to us by numerous governmental organizations and officials. In this regard, we would like to express our particular and sincere gratitude to those listed hereunder of their kind suggestions and guidance on our progress of the study.

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1. introduction

1-1 SCOPE OR REPORT

The series of six reports of which this is a part presents the Final Master Plan for the five major cities and a village cluster in the Southern Region. The report reviews all the significant information on the existing conditions, presents future projections, and a physical Master Plan which outlines the development of the cities and the village cluster for the twenty-year planning period from 1975 to 1995. The report also contains a development strategy for the phasing of the plan and recommendations for an implementation program from which a capital investment program is prepared.

of the Southern Region. The master plan contains the basic strategy for the growth of the city of village cluster, the recommended directions for the change in population, the functional distribution of land use, infrastructure development, and policies toward the nomadic population. The community structure, on the other hand, identifies a hierarchy of population groupings in order to properly distribute urban services and to help establish identifiable communities. The "neighborhood" of approximately 4000 residents is the basic unit of social organization and provides a logical definition of planning districts for which projections and identification of needs may be established.

1-2 PLANNING PROCESS

1-2-1 RELATIONSHIP OF THE FINAL MASTER PLAN TO PREVIOUS REPORTS

During the course of the Southern Region Project Study, a series of five separate reports have been submitted for each of the five major cities of the Southern Region. "Initial Appraisal of Existing Conditions" and "Immediate Action" identify areas requiring immediate attention, while "Existing Conditions" and "Alternative Strategies" focus on broader issues confronting the cities and on various alternative approaches toward meeting long range planning objectives. The Preliminary Master Plan drew on all four previous reports and presented a program for the development of the city over the twenty-year planning period. These Final Master Plans were prepared based upon comments and criticism given by the Ministry and its advisers and represent a set of workable plans which respond to all the comments received by the consultant.

1-2-2 ELEMENT BY ELEMENT ANALYSIS

The various considerations affecting urban development have been classified into various "Planning Elements." Each planning element is a collection of highly interrelated topics which can be investigated in great detail and in relative independence of other elements. Taken together, however, the elements encompass an exhaustive list of issues involved in the formation of development plans. The element by element study makes possible a clear identification of trends, needs, and problems which must be addressed by the master plan.

1-2-3 COORDINATION OF PLANNING ELEMENTS

There is, at the same time, a systematic coordination of Planning Elements through the recommended Schematic Master Plan, developed in Alternative Strategies reports, and through the establishment of a "community structure," indicated by Planning Standards in the Preliminary Physical Master Plan

Planning Element	Chapter
------------------	---------

Housing	3
Industries	4
General Education	5
Public and Institutional Facilities	5
Cultural Facilities	5
Commercial Facilities	5
Recreation and Conservation	6
Transportation	7
Public Utilities	8

1-2-4 FLOW OF INFORMATION

For each Planning Element, first, the existing conditions are briefly reviewed. Next, the projections of populations developed in Chapter 3 and economic projections developed in Chapter 4 are applied to in the context of the Planning Standards. As a result, future requirements or projections for a particular Planning Element may be obtained. Third, a policy which will determine land use for the element is developed by considering the schematic master plan, the community structure, and the Planning Standards. The application of policy principles results in the element land use plan. Site considerations and local issues are discussed at this stage. The recommended overall development plan, or the Master Plan, is generated from the simultaneous consideration of all the individual element land use plans. Phasing, zoning and legal framework, and recommendations for a capital investment program are developed from the Master Plan.

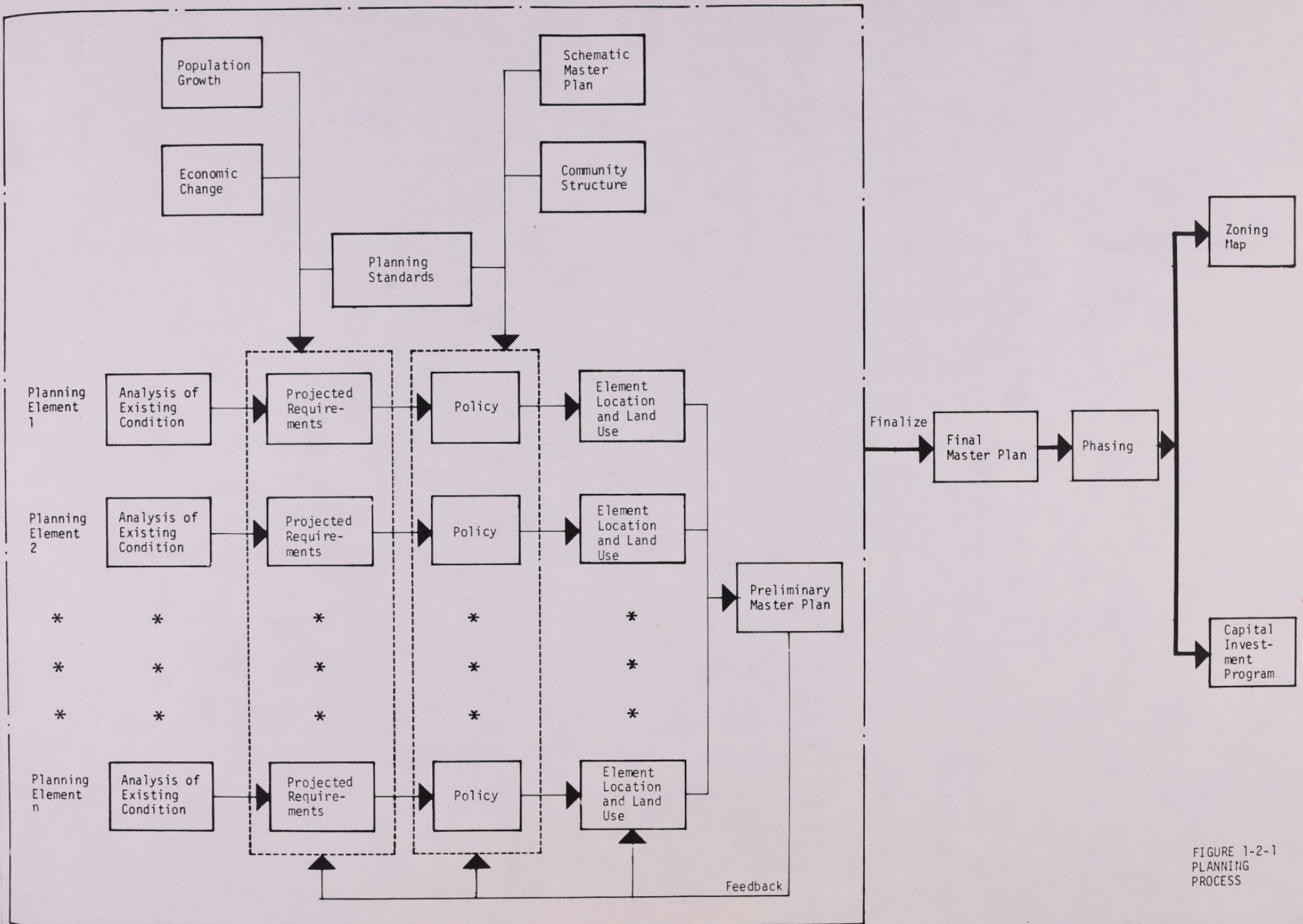


FIGURE 1-2-1
PLANNING
PROCESS

1-2-5 FEEDBACK

Throughout this entire process, constant feedback assures comprehensive and coordinated planning. Policy principles affect future requirements; the Master Plan influences the development of policy principles; and phasing, legal, and financial issues alter the Master Plan. The development plan discussed in Chapter 9 is a result of numerous studies leading from the existing conditions, to projections of requirements, to the Master Plan, and to phasing, legal, and financial considerations and back to projection of requirements. The process was repeated until all the requirements and policy principles could be satisfied in a consistent and comprehensive Master Plan.

1-2-6 FUTURE FEEDBACK

It must be very strongly emphasized that this master plan (as should be the case with any master plan) must be implemented in a way which allows a substantial amount of modification in the future should conditions change in unforeseen ways or should future planners feel that compelling reasons exist to alter certain aspects of the plan. Such adaptability is especially important when very rapid development is expected as is the case with every major area of Saudi Arabia.

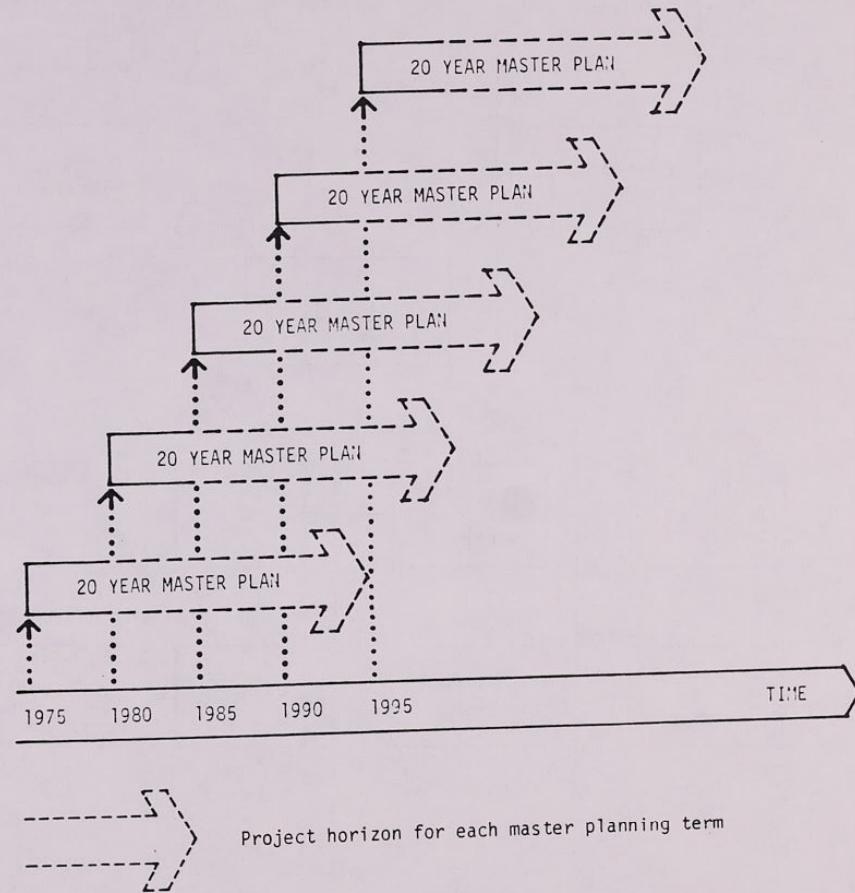
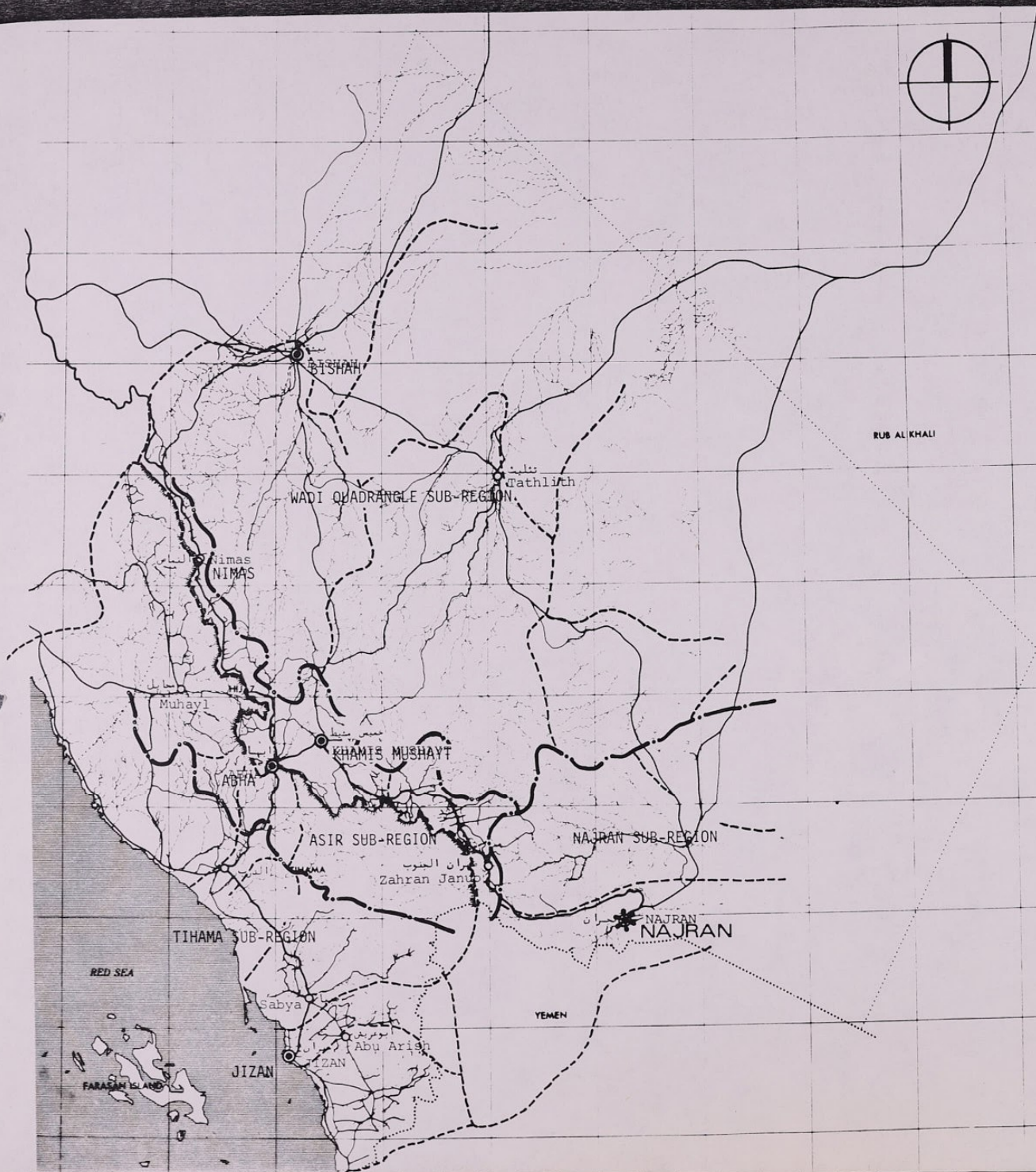


FIGURE 1-2-2
DIAGRAM OF
MASTER PLAN
OVER TIME

FIGURE 1-2-3
REGIONAL
LOCATION
scale 1:2,000,000

NOTE:
For definition of sub-regions and
wadi basins, see Southern Region,
Physical Plan, Chap.3



--- sub-region
..... wadi basin



2. summary of existing conditions

2-1 REGIONAL POLICIES AND THE CITY

The municipality of Najran consists of the old city, Suq Najran, and the new city, Al Faisaliyah, all under the administrative control of Abha and Riyadh. Khamis Mushayt serves as commercial distributor for products produced in Najran and as a source of imports for products not locally available.

Najran is located in the most fertile area of the sub-region. The majority of the 2,600 ha of irrigable land in the sub-region is in the immediate vicinity of Najran. Surprisingly, however, Najran has the smallest naturally available supply of water of the four sub-regions in the Southern Region and artificial methods for increasing the available water supply have strong economic and physical drawbacks. Improved technology in the field of irrigation and cultivation, though, can produce a substantial increase in agricultural yield and the production value per worker per hectare. For a further discussion of the agricultural potential and water resources of the city and the sub-region, see Sec. 2-2.

Because of its relative isolation from the major activity centers of the Kingdom, Najran has few locational advantages or economic resources for industrial development, with process industries based on agricultural products being the only obvious exception. The expected increase in population, however, would mean greater employment opportunities would need to be found outside the process food industries.

As the administrative and commercial center for the sub-region, Najran is a dissemination point for information, services and commodities. It is also an export market for livestock and agricultural products.

Of the total population of 122,100 estimated in the Najran sub-region [1], 35%, or 47,500 people, live in the City of Najran, as defined by the 1974 National Census. The next largest city is Al-Khab-Bash, with a population of 10,200.

Thus in terms of both economic and human resources, development goals for the sub-region as a whole must be met principally by Najran, particularly with respect to social welfare programs. Most of the villages are too small to support the intensity of services and activities suggested by the overall national goals. It is up to the city then to be able to absorb and administer these various programs throughout the sub-region.

2-2 MAIN FUNCTION OF THE CITY

2-2-1 GENERAL

The main function of the city of Najran is the administration of the Najran Province [2]. In addition, as the only urban center in the surrounding area, the city plays a variety of important roles as:

1. A commercial center serving the rural villages and the nomadic population of the Najran sub-region.
2. A base for important defense installations for the southern boundary of the Kingdom.
3. A center of agricultural production and development.
4. A center for nomads.
5. A center for the provision of educational, health, and other social services.
6. A cultural and historical center.
7. A potential center for domestic tourism.
8. A base for exploration of mineral deposits and potential extraction.

Administration, agriculture, livestock production, and mining are discussed in the following sections. Employment and industrial activity are discussed in Chap. 4. Education, social service, and commerce are discussed in Chap. 5, while recreation and tourism are discussed in Chap. 6.

2-2-2 ADMINISTRATION

Najran is a municipality, capital of the Najran Province, and seat of the Eminate of Najran. The offices of the Emir of Najran, the office of the Mayor, the branch offices of the Ministry of Municipal and Rural Affairs, and those of other Ministries are located in the city. Altogether, the various governmental institutions employ 42% of the workers living in the area surveyed by the consultant and, adjusted for population on the south side of Wadi Najran, some 31.1% of all workers in the planning area. There are also military personnel associated with various installations around the city. The government therefore is the largest employer in the local economy.

Furthermore, all social services, including education, are provided by the government, and, following the national policy of settling the nomads, the city is expected to play an important role as the regional link and service center for the over 40,000 nomads in the sub-region.






-  wadi (narrow)
-  steep slope
-  wadi (wide)
-  agricultural area
-  military area

FIGURE 2-1-1
SURROUNDING
AREA
scale 1:50,000

SOURCE:
Initial Appraisal of Existing
Conditions, Fig 2-1
Environmental Situation



2-2-3 AGRICULTURE AND WATER RESOURCES

Thus, administration and other government activities are the principal function of the city of Najran. The size and location of new government buildings will have the most significant impact on the future shape of the city.

For the present report, the Southern Region has been divided into four sub-regions. Najran sub-region is approximately equivalent to the Najran Administrative Province, with the exception of the villages of Sharorah and Al Wadyah, located outside the Southern Region Project Study area, and the villages of Al Ma Ayen and Yadama, included in the Wadi Quadrangle sub-region. Minor adjustment was due to the distribution of wadi catchment area and other physiographic factors essential to the analysis of the Southern Region [3].

The Najran sub-region has highly productive agricultural lands, although smaller in total area than cultivated lands in the other sub-regions of the Southern Region. The agriculture and water resources of the sub-region have been summarized in Table 2-2-1.

The principal obstacle to agricultural development in the Najran sub-region is the limited availability of water, the two catchment areas defined by Wadi Habawnah and Wadi Najran receive a total annual run-off of approximately 19.9 million cubic meters per year, of which some 7.6 million $m^3/yr.$ fall outside the sub-region. Together with the estimated volume of aquifers, effective rainfall, and return flow (re-use), the total water resources of the sub-region is 79.9 million $m^3/yr.$, less than 5% of the water estimated for the Southern Region as a whole [4].

Presently, Najran sub-region is using about 30.7 million $m^3/yr.$ This amount may be increased to 70.7 million $m^3/yr.$ principally through two strategies:

1. Water harvesting with sub-surface storage.
2. Artificial recharge of aquifers, which is extracted in dry periods.

Both methods attempt to store the seasonal run-off which flows in the two major wadis. A third method is to import water from other sub-regions in the Southern Region, principally from the Wadi Tashlith basin located in the Agir sub-region. This is a costly alternative, however, and there are considerations of regional priorities, since the Agir sub-region itself does not have any substantial surplus water resources.

Given the limits of the available water supply, emphasis should be placed on improving agricultural production on existing lands under cultivation, rather than on developing new agricultural lands. The Preliminary and Final Physical Plans for the Southern Region (Chap. 5) outline potential means of improving agricultural production throughout the Southern Region. Some of the methods applicable to Najran and the agricultural lands surrounding the city are:

1. Improving the system and methods of irrigation.
2. Adopting a more productive mix of crops for cultivation.
3. Joint use of the same land by different crops or vegetation.

Particular emphasis should be placed on the production of high value crops, namely fruits and vegetables. Other crops should include sorghum, wheat, dates and alfalfa. Fruits and vegetables, as well as general improvement in irrigation, will require more water per hectare of cultivated land. If the recommendations outlined in the Regional Physical Plan are put into effect on the existing agricultural lands only, the estimated agricultural demand for water in 1995 will be 58.2 million m^3 annually [5]. In addition, some 12 million $m^3/yr.$ will be required in 1995 for domestic and industrial uses [6], resulting in a total demand of over 70 million $m^3/yr.$ Comparing this figure with the estimated supply of 70.7 million m^3 obtained through an extensive improvement (Table 2-2-1), it is apparent that there is very little possibility for developing new agricultural lands in the sub-region.

Almost all of the existing irrigated lands are located in the valley near the city of Najran [7]. The valley floor contains alluvial deposits and sites close to the banks of the wadi can tap the aquifers located below the wadi bed. Thus, the most productive agricultural lands of the sub-region are concentrated near the city. These lands must be protected from conversion to urban uses, and actively encouraged to improve their productivity. Maintaining the agricultural lands in Najran in their present use is one of the most important tasks facing the government.

2-2-4 LIVESTOCK PRODUCTION

Current level of livestock production in the Najran sub-region is approximately 15,000 tons annually, of which mutton, 6,500 tons, and poultry, 5,000 tons, are the principal products [8]. An earlier study [9] has estimated that there were some 20,000 sheep and goats, 2,500 cattle, camels, and donkeys, respectively.

As in Wadi Quadrangle sub-region, existing production relies principally on open foraging on rangelands. This has led to over-grazing in some areas, while the nomadic population dependent on open grazing has been vulnerable to weather changes and to uneven growth of vegetation.

In the future, livestock development should be directed primarily toward high intensity production in specific areas, using agricultural feeds such as straws, stalks, and alfalfa. Najran should also establish the necessary plants for slaughtering and processing of meats, hides, and related products, which may be sold through the markets of Khamis Mushayt.

Although it is expected that sheep and goats will continue to forage in the rangelands, their number and movement should be managed by the appropriate authority in Najran.

2-2-5 MINING

Recent studies have revealed potential deposits of copper, nickel and sulfur iron in the Najran sub-region. Three areas, Al Massane, Wadi Qatan, and Kutam Area, have been identified for further exploration. While the exact impact of commercial mining on the city of Najran cannot be foreseen, the local economy will certainly benefit from derived demand for housing and commercial services.

2-3 HISTORICAL GROWTH AND NATURAL FEATURES

2-3-1 HISTORICAL GROWTH, AESTHETIC AND ARCHITECTURAL CHARACTERISTICS

It is difficult to determine how far back the settlement of Najran dates. It appears in Greek and Roman geographies and Ptolemy recorded it in the map of Arabia in his geography written between 150 and 160 A.D.

Throughout the Middle Ages, Najran was the largest city in the region. It lay on the caravan route from Yemen to Mecca and Wadi Najran.

The municipality of Najran was established in 1956 in the old city of Najran, referred to in the present report as Suq Najran. As the population grew, and as demand for administrative facilities increased, a new city called Al

Table 2-2-1
AGRICULTURAL LAND AND AVAILABILITY OF WATER
IN NAJRAN SUB-REGION

Total Agricultural Land (ha) ^a	14,600
Irrigated Land	2,600
Dry Farming Land	2,000
Range Land	10,000
Available Water Resources (million M ³ /yr.) ^b	79.9 ^c
Existing Use	30.7
With Moderate Improvement	58.2
With Extensive Improvement	70.7

Notes:

- a. Southern Region, Preliminary Physical Plan, Table 5-2-9.
- b. Southern Region, Preliminary Physical Plan, Table 4-3-1.
- c. Maximum theoretically available.

Faisaliyah was developed some 8 km east by north-east of Suq Najran. At the initiation of this planning project, development of Al Faisaliyah was not yet completed. The historical growth of the city took place principally in the old city of Suq Najran (fig. 2-3-1). With the construction of government buildings and many residences, however, there is a gradual shift in urban activity eastward toward Al Faisaliyah. When the recently approved plans for residential development east of Al Faisaliyah are implemented, this shift in activity is expected to accelerate. At the sub-regional level, as the implementation of the large-scale land reclamation project and agricultural development proceeds, Najran as a whole will experience further urban growth.

The traditional buildings and houses of Najran are made from sun-dried, mud brick walls. In addition to the modern concrete block buildings, the most prominent building types in the city are the tall mud-brick towers, 7 or 8 stories high, and the lower densely aggregated, mud houses of Suq Najran [10]. Although the older buildings do not always meet the modern standards for safety and comfort, they are visually and architecturally an important legacy of Najran's past. Their forms and materials stand in harmony with the surrounding environment defined by the hills, the wadi, and the vegetation.

In contrast, the modern concrete buildings often conflict visually with the natural environment. There is a need to establish standards of design which satisfy the modern building requirements, but which also complements the traditional visual qualities of the city.

2-3-2 NATURAL FEATURES

Situated near the southern border of the Kingdom, Najran is located in a valley where the foothills of the Asir Mountains meet the Rub Al Khali desert. The city and the surrounding agricultural communities depend entirely on the fertile soil on either side of the Wadi Najran, which carries the runoff from seasonal rains in the upper valleys.

Wadi Najran is the dominant topographical feature of the area, with many tributary wadis originating from the hills to the north and south. When these smaller wadis reach the flood plains, they become underflows, making it possible to establish wells directly above the flood plain deposits. The limited availability of land between the wadi and the hills has forced development of the city and farm lands into two long, narrow strips more than 18 km in length presenting extreme problems in expansion, transportation and communication.

1. Climate

The climate of Najran is semi-arid, suitable for agriculture based on irrigation. Rain seldom falls in quantities exceeding 62 mm in an average year, with 58 mm representing the estimated annual mean rainfall. The annual mean air temperature of 23.3° C ranges from 26.4° C in December to 30.7° C in July [11].

2. Geology and Soil Condition

The geological structure of the Najran area consists of various Precambrian crystalline rock formations, covered by permian wajid sandstone. There are large outcrops of granite and metamorphosed rocks along the valley, where erosion has removed the overlying sandstone. Quaternary alluvial deposits are found throughout the Najran basin. The deposits are generally coarse alluvia, consisting of sand and gravel.

There are two types of alluvial deposits in the basin: channel alluvium and flood plain alluvium. The former lies in the wadi bed, flooded by seasonal runoffs. The latter extends laterally from the wadi to the edge of the surrounding hills and consists of medium to fine sand, and sometimes silt. The flood plain alluvium when irrigated is suitable for agricultural cultivation.

Previous investigation indicates that the depth of the ground water table varies from about 3 meters below grade near the path of the seasonal flood to almost 14 meters at a distance of about 2 km from the edge of the wadi bed [12]. With the exception of certain areas subject to seasonal flooding, there is generally little constraint on construction due to the level of ground water. In particular, Al Faisaliyah and other sites proposed for future residential development are expected to be free from potential effects of ground water. However, construction within approximately 1 km of the wadi (or further in areas where tributary wadis flow into Wadi Najran) will require additional geological studies.

3. Wind

The prevailing wind direction in Najran is east by northeast, with frequent variation from north by northeast to east. The mean windspeed is approximately 8.4 km/hr., with maximum of 10.3 km/hr. [13].




-  urbanized area, 1964
-  agricultural area, 1975
-  urbanized area, 1975

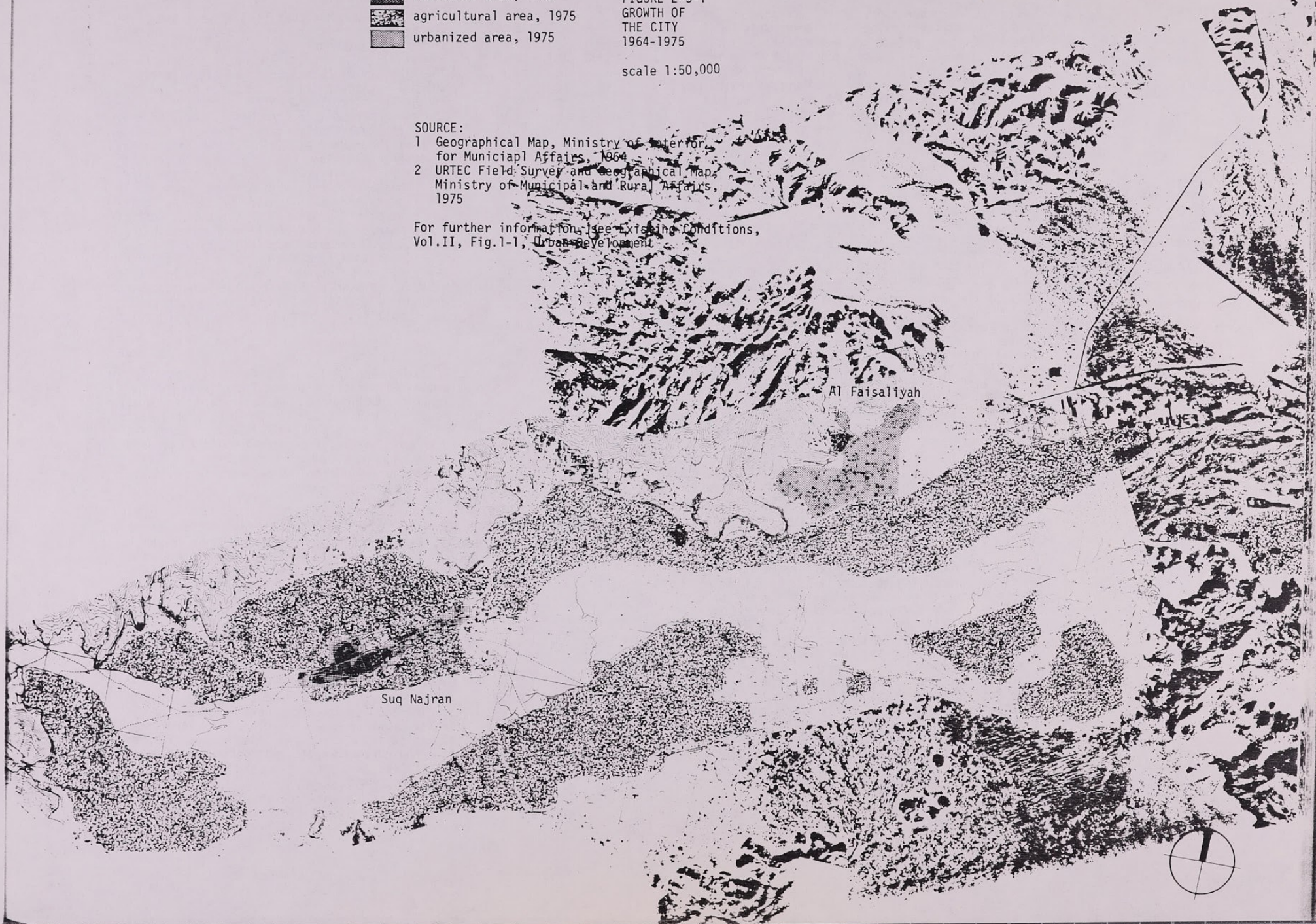
FIGURE 2-3-1
GROWTH OF
THE CITY
1964-1975

scale 1:50,000

SOURCE:

- 1 Geographical Map, Ministry of Interior,
for Municipal Affairs, 1964
- 2 URTEC Field Survey and Geographical Map,
Ministry of Municipal and Rural Affairs,
1975

For further information, see Existing Conditions,
Vol.II, Fig.1-1, Urban Development.



For planning purposes, it is important to locate industrial activities in areas which will not adversely affect the environment of residential areas. Thus, no industries which emit noxious smoke should be located northeast of Al Faisalayah. The industrial area currently proposed by the Southern Region Department of Town Planning is located at an adequate distance from all proposed sites for residential development.

2-4 STRUCTURE OF THE CITY

2-4-1 GENERAL

The spatial structure of the Najran valley is determined principally by Wadi Najran, the foothills of the mountains to the north, and the smaller hills to the south. Most of the population live in numerous villages and settlement clusters located in an elongated area measuring approximately 5 km by 20 km along the wadi. Until recently, the primary urban area had been the old city of Najran, referred to in this report as Suq Najran. The Emir's residence and offices, the municipality, the markets, and other urban functions were concentrated in Suq Najran. With the development of the new city of Al Faisalayah, however, most administrative functions have been moved to the new city, while the market in Suq Najran was expanded and modernized. Najran valley now has two central areas, with commercial functions concentrated in Suq Najran and administrative functions in Al Faisalayah.

2-4-2 EXISTING STRUCTURE

Heights and types of buildings in the Najran valley vary according to location. The predominant building type in Suq Najran is the one to two storey urban dwelling, sometimes with ground level commercial activity. The buildings in Al Faisalayah are administrative offices or new residences, both of which are constructed from concrete and concrete blocks, varying in height from one to two stories for offices and residences, to three stories for educational buildings. In the villages and settlement clusters of the surrounding agricultural area, the most visible structures are the tall, mud-brick tower houses of six to eight stories in height. Most agricultural dwellings, however, are one to two storey high court houses constructed of mud bricks.

A detailed discussion of existing building types and use is presented in a previous report sub-

2-4-3 LAND OWNERSHIP

mitted by the consultant [14]. Types and plans of residential structures are described in Chap. 6 of the same report [15].

Almost all of Najran's land is in private hands. The Ministry of Defense owns an old airstrip which bisects the triangular piece of land east of the Khamis road and north of the airport road. The remainder of this land was formerly held by The Ministry of Agriculture. Now with the exception of the former airfield, the additional land has been sub-divided and given away to private individuals. The area to the east of the airstrip has been turned into private farms, while the land to the west is used for both agricultural and other purposes. With the land in individual hands, the Municipality of Najran has essentially ruled out the possibility of reclaiming the sub-divided land and using it for roads as was previously intended. Most of the land to the west of the Khamis Mushayt road is owned by the military with the Government having purchased and subdivided the rest for residential development.

2-4-4 LAND VALUES

In assembling land parcels for development, it is sometimes necessary to acquire privately-owned land for public use. The Government is prepared to pay as much as S.R. 1,000 for a square meter of land, quite a substantial amount. Land values, as a result, are maintained at an artificially high level, which increases total expenditures for road networks and utility projects accordingly.

2-4-5 EXISTING LAND USE

Of the 340 ha of land in the central districts of Suq Najran and Al Faisalayah, 61.7 ha are built up, 84.5 ha are actively used without any structures, and 193.8 ha, or 57% of the land, is vacant. The center of gravity of Najran, however, is expected to shift eastward as Al Faisalayah and residential areas east of it experience further development. The large amount of open spaces both within and outside Najran create both opportunities and problems for future development. Agricultural lands are too valuable to be converted to urban areas. Thus either densities in the central districts must be increased thereby restricting development, or new areas developed which would invite urban sprawl. Therefore, any land use plan should strike a careful balance between the need for growth requirements and continuity of urban activities.

Within the URTEC Survey Area, approximately 2,000 ha are currently under cultivation. Dates are the main agricultural product. Oats, wheat, and other grains, as well as fruits, vegetables, and




-  governmental property
-  military
-  site for housing development plan

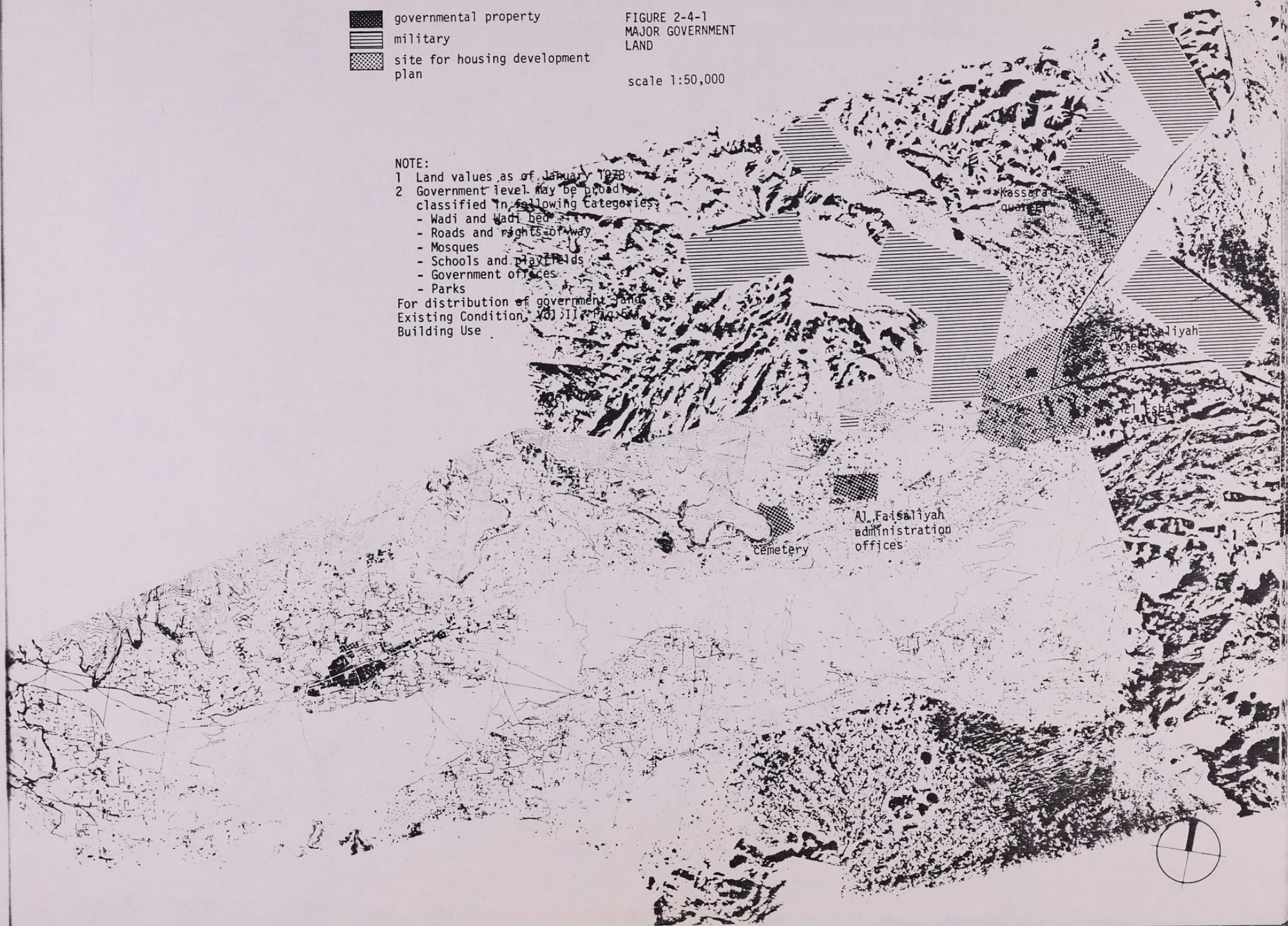
FIGURE 2-4-1
MAJOR GOVERNMENT
LAND

scale 1:50,000

NOTE:

- 1 Land values as of January 1958
- 2 Government level may be broadly classified in following categories:
 - Wadi and Wadi bed
 - Roads and rights of way
 - Mosques
 - Schools and play fields
 - Government offices
 - Parks

For distribution of government lands see
Existing Condition, Vol II, Fig. 64
Building Use



alfalfa are also produced. These activities account for 3.6% of the total land area in central Najran. Since Najran is relatively deficient in its supply of valuable natural resources, industrial activity is of relatively minor importance. There are some small-scale industries which account for 0.5% of the total land area, however.

Other land uses range from 8.8% residential to 0.4% for religious activities.

2-5 PRINCIPAL ISSUES AND PLANNING OBJECTIVES

2-5-1 PRINCIPAL PROBLEMS OF PHYSICAL PLANNING

There are general and specific problems facing the city of Najran and its surrounding areas. The general problems are:

1. Threatened loss of productive agricultural lands due to pressures for residential development.
2. Difficulty in coordinating the urban administrative and commercial functions between the old and the new cities of Najran.

Evidence of the first problem may be seen in gradual conversion of agricultural to urban uses of land located adjacent to the main road linking Al Faisaliyah to Suq Najran. The magnitude of the second problem is indicated by the volume of intra-city traffic between Suq Najran and Al Faisaliyah, more than 7,700 vehicles in a 12 hour period [16].

Specific problems of the city include:

1. Need for improved housing conditions.
2. Need for improving transportation and communication.
3. Need to provide educational facilities and other public services.
4. Need to provide an expanded system of public utilities.

Effort must be made to improve the housing conditions of those living in simple settlements at the edges of the old and the new cities. Transportation between the old and the new cities is inadequate. Many of the schools are located in small buildings without adequate play grounds and playfields. In the present report, these and other planning problems are discussed, element by element, in the appropriate chapters.

2-5-2 PLANNING OBJECTIVES

Planning objectives have been formulated according to the general categories of planning issues employed by the Second Five-Year Plan: Economic Development, Human Resources Development, and Social Development. The particular problems of Najran, as outlined in the previous section, were studied in light of the resources and opportunities in the city and the sub-region. In consultation with the Deputy Ministry for Town Planning Affairs, the following objectives have been identified for the Master Plan of Najran [17]:

1. Economic Development
 - a. Increase the productivity and the earnings of agriculture by the introduction of appropriate degrees of mechanization and of agricultural products with high economic return.
 - b. Encourage the formation of process industries based on agricultural products with high economic return.
 - c. Prepare measures for the conservation of potential resources for an eventual development of domestic tourism.
2. Human Resources Development
 - a. Increase the productivity and earning capacity of individual workers.
 - b. Prepare measures for the assimilation of Yemeni and other foreign workers into the labor force of the Kingdom.
 - c. Establish a special program for the education, settlement and assimilation of nomads.
3. Social Development
 - a. Improve the quality and extent of social welfare services to the residents of the Najran Province.
 - b. Provide suitable housing for those with limited income.
 - c. Take into consideration the special relationship between the civilians and the military population of Najran.

These measures are necessary in order to fulfill the social and cultural requirements of the citizens of Najran outlined above. The following chapters elaborate on these points and offer suggestions for implementation.

For a discussion of the relationship of the Master Plan to the detailed local plans, see Sec. 9-6.

2-6 PLANNING AREA

The project area for the master planning of Najran has been defined to include:

1. Suq Najran and Al Faisaliyah.
2. Agricultural communities surrounding Suq Najran and Al Faisaliyah, and included in the URTEC 5% Sample Socio-Economic Survey (see

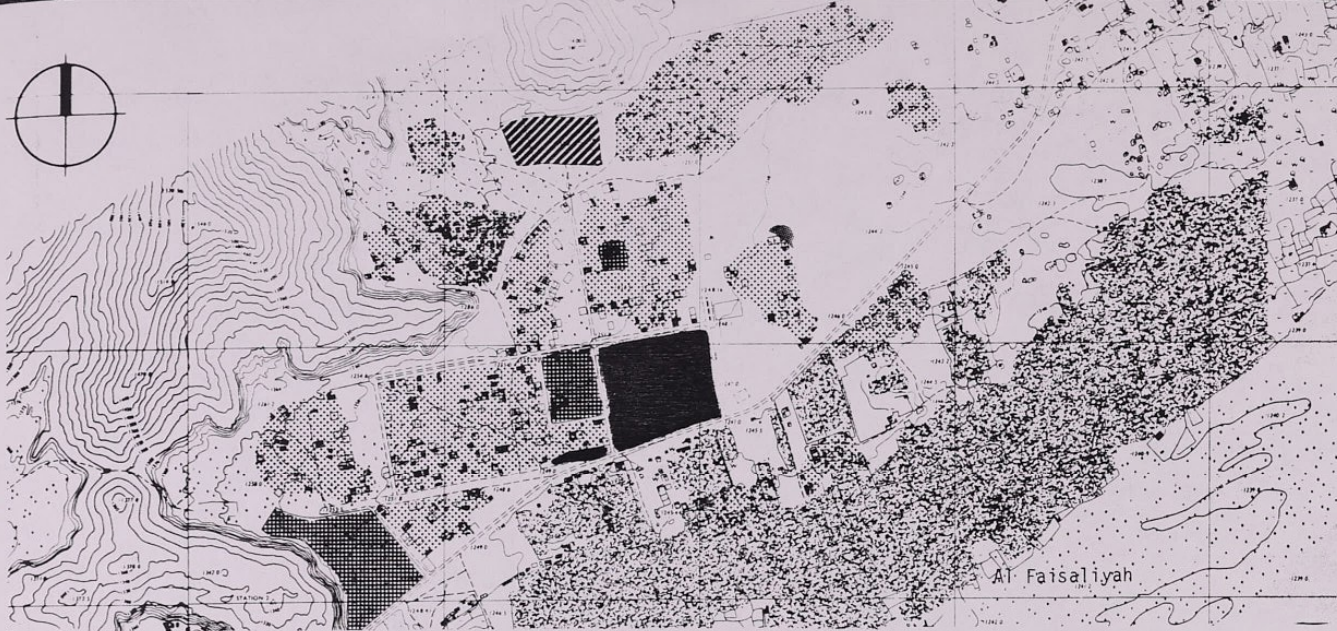


FIGURE 2-4-2
EXISTING
LAND USE
scale 1:20,000

SOURCE:
URTEC Field Survey, see Existing Conditions,
Vol.II, Fig.4-1, Land Use, and Initial
Appraisal of Existing Conditions, Fig.6-1,
Distribution of Activities



-  residential
-  agricultural
-  community service
-  business and commercial
-  production and disposal
-  military

- fig. 3-1-0).
3. Newly designated residential development areas [18]:
 - a. Al Faisalayah Extension
 - b. El Eshash
 - c. Kassarat Quarter
 4. Parts of newly subdivided agricultural lands east of the road to Khamis Mushayt, and north of the road to Najran airport.
 5. Agricultural communities south of Wadi Najran. The relationship of the planning area to the URTEC 5% Survey area is shown in fig. 3-1-0.

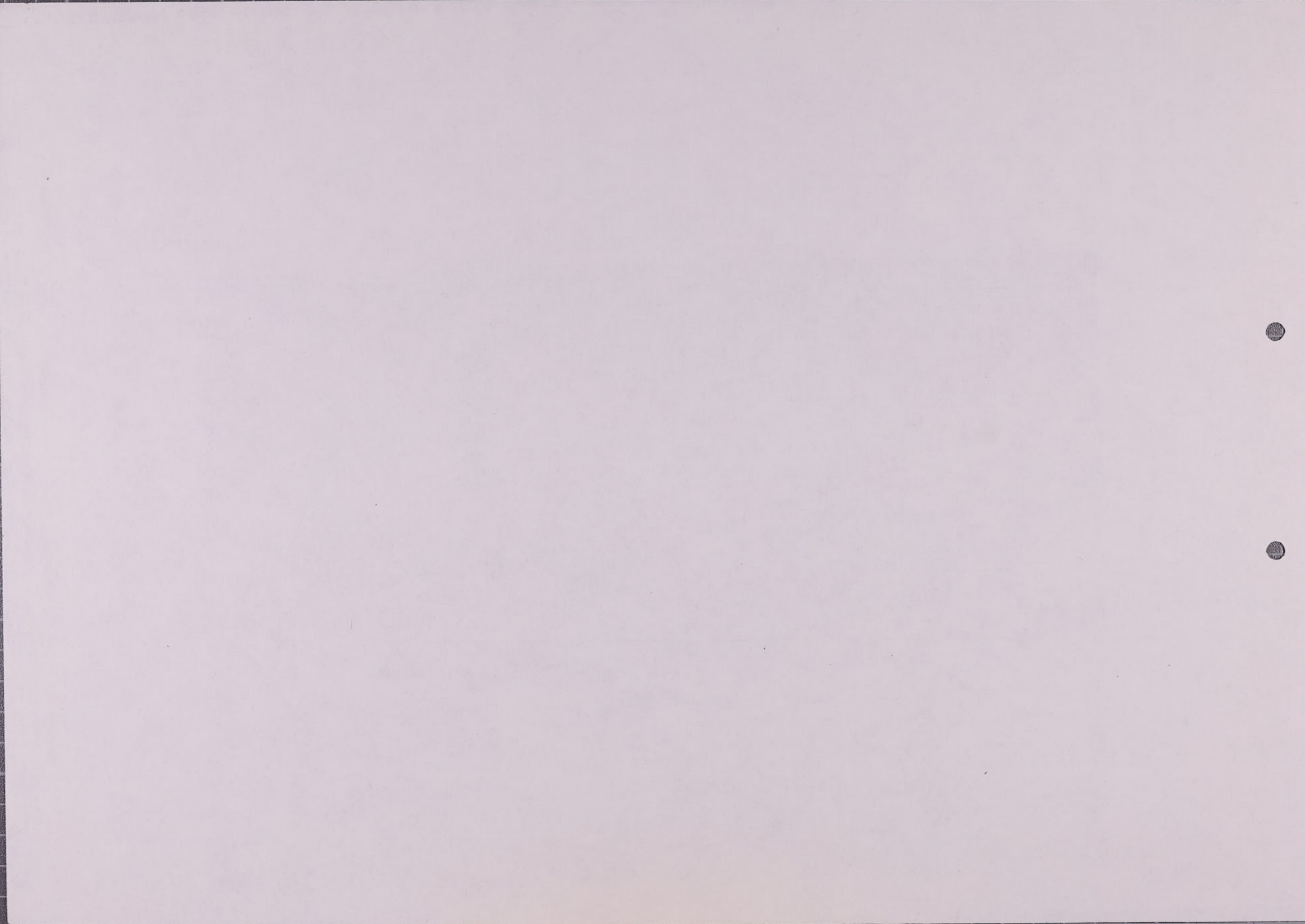
The primary focus of the Master Plan is the planning of the central districts of Suq Najran, Al Faisalayah, and some of the proposed residential sites. In these districts, land use location will be discussed in detail. In the outer districts of the planning area, a detailed program of expected requirements for public and commercial services will be developed, but the exact location of activities will be presented diagrammatically.

CHAPTER 2 NOTES:

1. 1974 National Census. See Southern Region, Preliminary Physical Plan, Table 9-1-7. Note that for purposes of this project, some villages have been included in the Wadi Quadrangle sub-region, while some are located outside the Southern Region project boundary.
2. The Najran Province is an administrative area under the jurisdiction of the Emir of Najran, identified in the 1974 National Census by a list of villages.
3. For definition of the sub-region, see Southern Region, Preliminary Physical Plan, Chap. 3.
4. See Southern Region, Preliminary Physical Plan, Sec. 4-2 and Table 4-2-1 (c).
5. Southern Region, Preliminary Physical Plan, Table 4-5-1.
6. Southern Region, Preliminary Physical Plan, Table 4-5-1.
7. Southern Region, Preliminary Physical Plan, Fig. 3-1-3.
8. Southern Region, Preliminary Physical Plan, Table 6-2-5.

9. Water and Agricultural Development Surveys for Areas II and III, ITALCONSULT, 1969.
10. For a detailed discussion of housing types in the city, see Najran, Existing Conditions, Vol. I, Sec. 6-1.
11. For more detailed climatic information, see Najran, Existing Conditions, Vol. I, Sec. 2-2.
12. Ministry of Municipal and Rural Affairs, Preliminary Report, Water Networks Extension, Sanitary Sewer System and Storm Water Works for the city of Najran, Warith Consulting Engineers, 1976. A boring taken behind the existing hospital in Suq Najran revealed water at a depth of 3 meters. The existing well at the western edge of Suq Najran has a static water level of 6.75 m below surface, while the well at Al Faisalayah has a static level of 13.75 m below surface.
13. Data from Ministry of Agriculture and Water Resources. See Najran, Existing Conditions, Vol. I, Chap. 2.
14. Najran, Existing Conditions, Vol. I, Sec. 5-2.
15. Najran, Existing Conditions, Vol. I, Chap. 6.
16. Between 7:00 am and 5:00 pm. From Kenzo Tange & URTEC traffic survey, February, 1975. See Najran, Existing Conditions, Vol. I, Figs. 7-1-4 and 7-1-5.
17. See also Najran, Alternative Strategies, Sec. 1-2.
18. Most of Al Faisalayah Extension and El Eshash areas are located within the URTEC Survey area. Kassarat Quarter falls entirely outside the survey area.





3. population and housing

3-1 POPULATION PROJECTION AND DISTRIBUTION

3-1-1 EXISTING AND PROJECTED POPULATION

The URTEC 5% Survey conducted by the consultant has estimated the population of Najran, contained within the survey area, to be 27,200 [1]. The population of the planning area outside the survey area has been estimated to be 9,400, based on 5.1 persons per hectare, which is the mean gross density of the rural sections of the survey area. The total 1975 population of the planning area of Najran, therefore, is 36,600. For a detailed breakdown of population and households by planning districts, see Fig. 3-1-4 and Table 3-1-4.

The 1974 National Census has estimated the population of Najran to be 47,500. There are, however, some difficulties in a direct comparison of the figures estimated by the URTEC 5% Survey and by the National Census. The primary difficulty is due to the unavailability of census tracts employed for the National Census. The population estimates are given for various cities and villages, but their areal definitions have not been made available at this time. Since the master planning of the city required a detailed breakdown of population and density information, it has been decided for the present report to retain the demographic and economic data obtained from the URTEC 5% Survey.

In planning for sub-regional facilities with a greater service area than the planning area, however, population estimates based on the National Census have been used.

A complete discussion of the characteristics of the population of Najran is presented in a previous report by the consultant [2]. The population was analyzed by age, nationality, and sex; birth and death rates as well as in- and out-migration rates were estimated; and characteristics of the households have been examined [3].

The population pyramid of Najran reveals that there is a significant decrease in the shares of males aged 20 to 24 and of females aged 15 to 19 (see Existing Conditions, Fig. 3-1-1). There are 1,220 males aged 15 to 19, but only 380 males aged 20 to 24. There are 1900 females aged 10 to 14, but only 840 females aged 15 to 19. On the other hand, there are 780 males aged 25 to 29 and 1,000 females aged 20 to 24 [4]. The relatively low number of males in ages 20 to 24 and of females in

Table 3-1-1
PROJECTIONS OF POPULATION

	1975	1980	1985	1995
Najran Planning Area ^a				
High	-	44,200	53,400	78,500
Low	-	43,300	51,100	70,900
Planning ^b	36,600	44,000	52,000	75,500
Najran Survey Area ^c				
High	-	33,400	41,000	61,900
Low	-	32,600	31,900	56,200
Planning ^b	27,200	33,400	40,000	59,000
Agricultural Communities South of Wadi Najran ^d				
High	-	10,800	12,400	16,600
Low	-	10,700	12,000	14,700
Planning ^b	9,400	11,000	12,000	16,000

Notes:

- Sum of projected populations in the survey area and in agricultural communities south of Wadi Najran.
- Planning population is the mean of high and low projections, rounded to the nearest 1,000.
- Area defined by URTEC 5% Survey. See Fig 3-1-0. High projection is based on annual growth rate of 4.2% per year; low projection is based on 3.7% per year.
- Existing population is based on an estimated density of 5.1 persons per hectare. Projections are based on the growth rates of the Najran sub-region as a whole. See Southern Region, Preliminary Physical Plan, Table 9-3-4.

Table 3-1-2
SUBGROUPS OF COMMUNITY HIERARCHY

Grouping Level	Name of Grouping	Typical Population
G ₀ (Level 0)	Residential Unit Group	250
G ₁ (Level 1)	Sub-Neighborhood	1000
G ₂ (Level 2)	Neighborhood	3,750 (2,500 to 5,000)
G ₃ (Level 3)	Sub-Community	15,000 (10,000 to 20,000)
G ₄ (Level 4)	Community	30,000 (20,000 to 40,000)

- planning area boundary
- || URTEC 5% sample, Socio-Economic Survey, principal survey area, and area member
- URTEC 5% sample Socio-Economic Survey, 4 survey districts, and district member

FIGURE 3-1-0
 PLANNING
 BOUNDARY AND
 SOCIO-ECONOMIC
 SURVEY AREA

scale 1:60,000

SOURCE:
 Existing Conditions, Vol. I, Fig. 3-1-3.
 See Existing Conditions, Vol. I, Fig. 3-1-4,
 for population density by survey district.
 For change in population density by district,
 see Existing Conditions, Vol. I, Fig. 3-1-1



ages 15 to 19 must be due to out-migration of these age groups.

In order to counter the out-migration of working-age males, it is necessary to establish new employment opportunities in Najran. Thus one of the objectives of the Master Plan, consistent with the goals of the National Five-Year Plan, is to diversify the economic base of the local community and to provide living standards comparable to the central urban centers of the Kingdom.

In projecting population growth, a figure of 4.2% per year can be expected to be added to the population each year, based on average birth and death rate trends. This would result in a massive population of nearly 62,000 by 1995. This figure is certainly attainable biologically, but Najran will not be economically prepared to support a population of this size by then. Therefore a moderate growth population projection was devised to reflect the slower economic growth. The actual planning projection used here is a composite average of the trend and growth projections for the period in question, with check being kept on applicability of high and low figures.

In prior studies, population projections were based essentially on Central Najran, neglecting activities outside the immediate area. This report, however, includes the population living across the wadi as well. This fact will be reflected in higher overall population figures in Table 3-1-4.

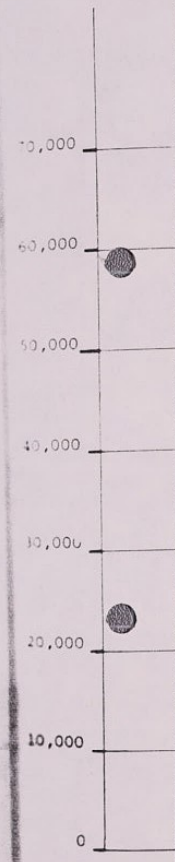
3-1-2 COMMUNITY STRUCTURE

The basis for the planning of community structure has been set forth in the planning standards section of the Regional Master Plan. These standards are based on a primary grouping of the city's population into "neighborhoods" with a population on the order of 10^3 and "communities" with a population on the order of 10^4 . Neighborhoods are considered the principal planning districts for the purpose of planning, and have been further subdivided into "sub-neighborhoods" and "residential unit groups." Communities have been further broken down into "sub-communities" consisting of two to four neighborhoods. In turn, cities are composed of one or two communities based on the population. The following list summarizes the groupings and their associated populations.

There are two additional levels as well--city and sub-region--which may be used to categorize community structure of cities and areas with relatively large populations.

Table 3-1-3
COMMUNITY STRUCTURE &
FACILITIES DISTRIBUTION

Community Level	Education Facilities	Recreation facilities	Religious facilities	Social/cultural facilities	Health facilities	Commercial facilities	Public buildings
Residential unit group	Tot-lot	Residential seating					
Sub neighborhood	Nursery Kindergarten	Play lot					
Neighborhood	Elementary schools	School playground, Neighborhood park	Small mosque	Neighborhood center	Pharmacy	Neighborhood shopping center	
Sub-community	intermediate schools	Playfield (Level 1)	Jami'a mosque		Diagnosis & treatment center		
Community	Secondary schools	Playfield (Level 2), Community park		Community center		Community shopping center	Fire station
City	Teachers schools Technical schools	City park		Civic center	General hospitals, Special hospitals, Nursing homes	City/Regional shopping center	Post office, Police station, Government
Sub-region and Region	College/university, special college		Eid mosque				Government



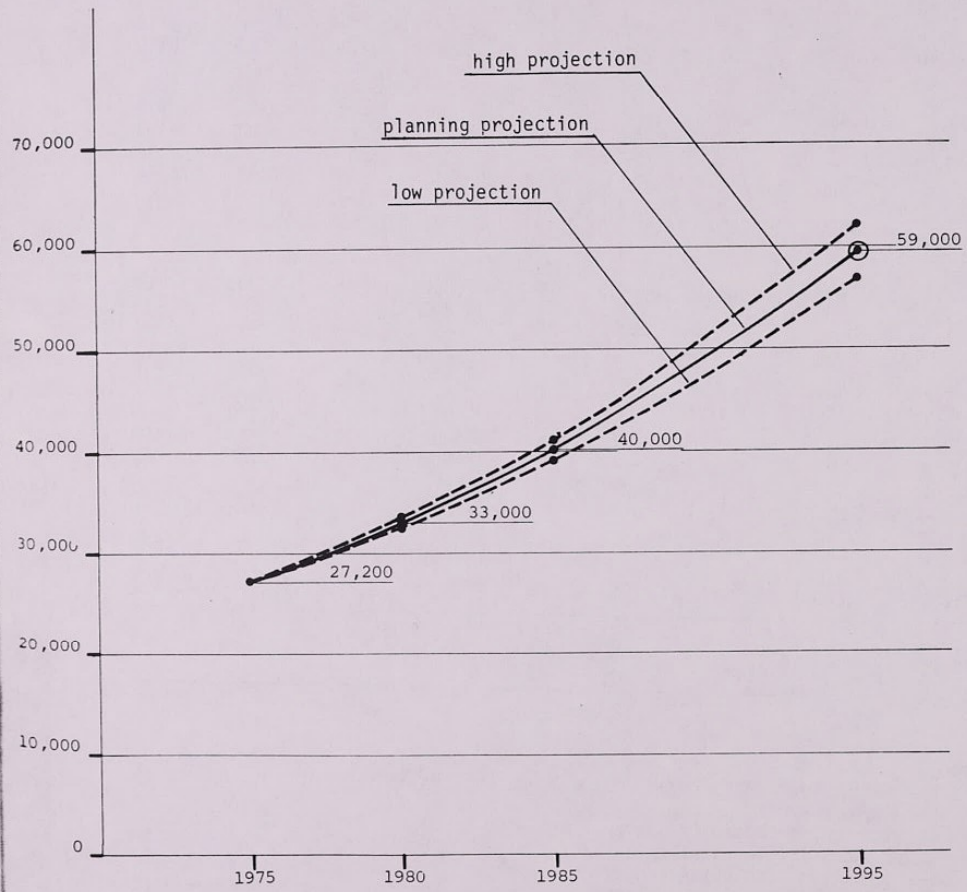
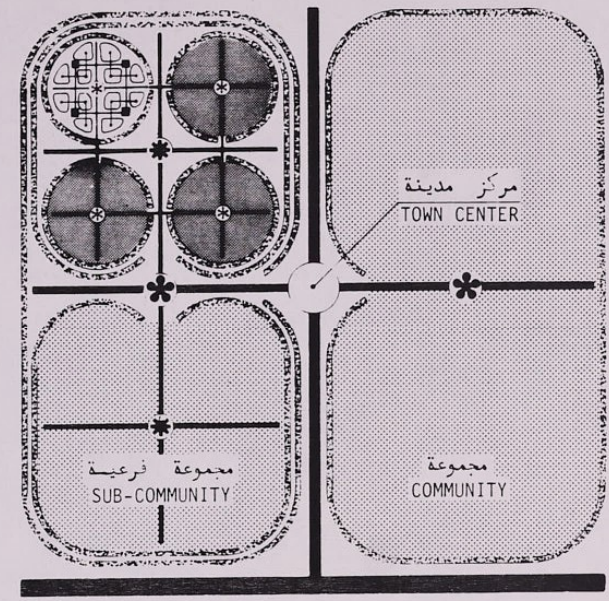


FIGURE 3-1-1
PROJECTED
GROWTH OF
POPULATION



- inter regional and regional highway
- major arterial
- minor arterial
- collector
- distributor
- local access road
- residential unit group center
- sub-neighborhood center
- neighborhood center
- sub-community center
- community center
- residential unit group
- neighborhood
- buffer zone

FIGURE 3-1-2
COMMUNITY
STRUCTURE
DIAGRAM

Table 3-1-4
PROJECTED POPULATION AND HOUSING NEEDS BY DISTRICT^a

Planning District	1975		1980		1985		1995		Planning District	1975		1980		1985		1995	
	Population ^b	Household	POP	HH	POP	HH	POP	HH		Population ^b	Household	POP	HH	POP	HH	POP	HH
1.1.1	2,300	340	2,700	460	2,900	540	3,900	800	3.1.1a	340	60	1,900	320	2,700	500	3,500	710
1.1.2	2,280	380	2,300	390	2,300	430	2,300	470	3.1.1b	110	20	100	20	100	20	100	20
1.1.3a	940	160	800	140	700	130	600	120	3.1.1c	--	--	--	--	--	--	--	--
1.1.3b	1,940	300	1,900	320	1,900	350	1,900	390	3.1.2a	--	--	--	--	--	--	2,000	410
1.1.4a	2,200	390	2,000	340	1,700	3.0	1,400	290	3.1.2b	--	--	--	--	--	--	--	--
1.1.4b	700	100	700	120	700	130	700	140	3.1.3a	250	50	1,900	320	2,700	500	3,500	710
1.1.5a	2,000	360	1,800	300	1,600	300	1,200	240	3.1.3b	700	130	700	120	700	130	700	140
1.1.5b	900	130	900	150	900	170	900	180	3.1.4	--	--	--	--	--	--	--	--
1.1	13,260	2,160	13,100	2,220	12,700	2,350	12,900	2,630	3.1.5	--	--	--	--	--	--	--	--
1.2.1	2,230	340	2,200	370	2,200	410	2,200	450	3.1.6	1,400	210	1,600	270	1,800	330	2,300	470
1.2.2a	1,400	170	1,200	200	1,100	200	900	180	3.1.7	1,800	270	2,100	360	2,300	430	3,100	630
1.2.2b	850	120	800	140	800	150	800	160	3.1	4,600	740	8,300	1,410	10,300	1,910	15,200	3,100
1.2.3a	1,500	180	1,300	220	1,200	220	900	180	3	4,600	740	8,300	1,410	10,300	1,910	15,200	3,100
1.2.3b	850	110	800	140	800	150	800	160	4.1.1	--	--	--	--	1,000	180	4,200	860
1.2.4	1,800	270	2,100	360	2,300	420	3,100	630	4.1.2	--	--	--	--	800	150	3,700	750
1.2.5	2,100	310	2,500	420	2,700	500	3,600	730	4.1.3	--	--	--	--	--	--	--	--
1.2	10,730	1,500	10,900	1,850	11,100	2,060	12,300	2,510	4.1	--	--	--	--	1,800	330	7,900	1,610
1	23,990	3,660	24,000	4,070	23,800	4,410	25,200	5,140	4.2.1	--	--	--	--	900	170	4,200	860
2.1.1	2,760	340	2,800	470	2,800	520	2,800	570	4.2.2	--	--	--	--	600	110	2,700	550
2.1.2a	330	30	1,000	170	1,500	280	2,400	490	4.2.3	--	--	--	--	500	90	2,200	450
2.1.2b	890	140	900	150	900	170	900	180	4.2	--	--	--	--	2,000	370	9,100	1,860
2.1.3a	880	110	1,700	290	2,300	430	3,000	610	4	--	--	--	--	3,800	700	17,000	3,470
2.1.3b	770	150	800	130	800	150	800	160	Total	36,600 ^c	5,680	44,000	7,460	52,000	9,630	75,000	15,310
2.1.3c	--	--	--	--	--	--	--	--	Household Size ^d	6.6		5.9		5.4		4.9	
2.1.4a	580	140	1,400	240	2,000	370	2,800	570									
2.1.4b	70	10	100	20	100	20	100	20									
2.1.5	290	60	1,000	170	1,700	310	2,800	570									
2.1.6a	400	80	400	70	400	70	400	80									
2.1.6b	1,600	220	1,600	270	1,600	300	1,600	330									
2.1	8,570	1,280	11,700	1,980	14,100	2,610	17,600	3,590									
2	8,570	1,280	11,700	1,980	14,100	2,610	17,600	3,590									

Notes:

- The projections are derived from assumed phasing of residential communities. See Table 3-4-1
- Based on URTEC 5% sample survey. Planning Districts 1.1.1, 1.2.4, 1.2.5, 3.1.6 and 3.1.7 were estimated on the basis of 5.1 persons/ha, which is the density of the outer (rural) district No. V in the URTEC survey.
- The actual sum is 37,160. There is a cumulative error leading to numerical discrepancy. See Tables 3-1-1 and 3-1-13, Najran, Existing Conditions, Vol. I.
- Household size is assumed to reduce at a decreasing rate, as a result of increased income and changing living patterns.





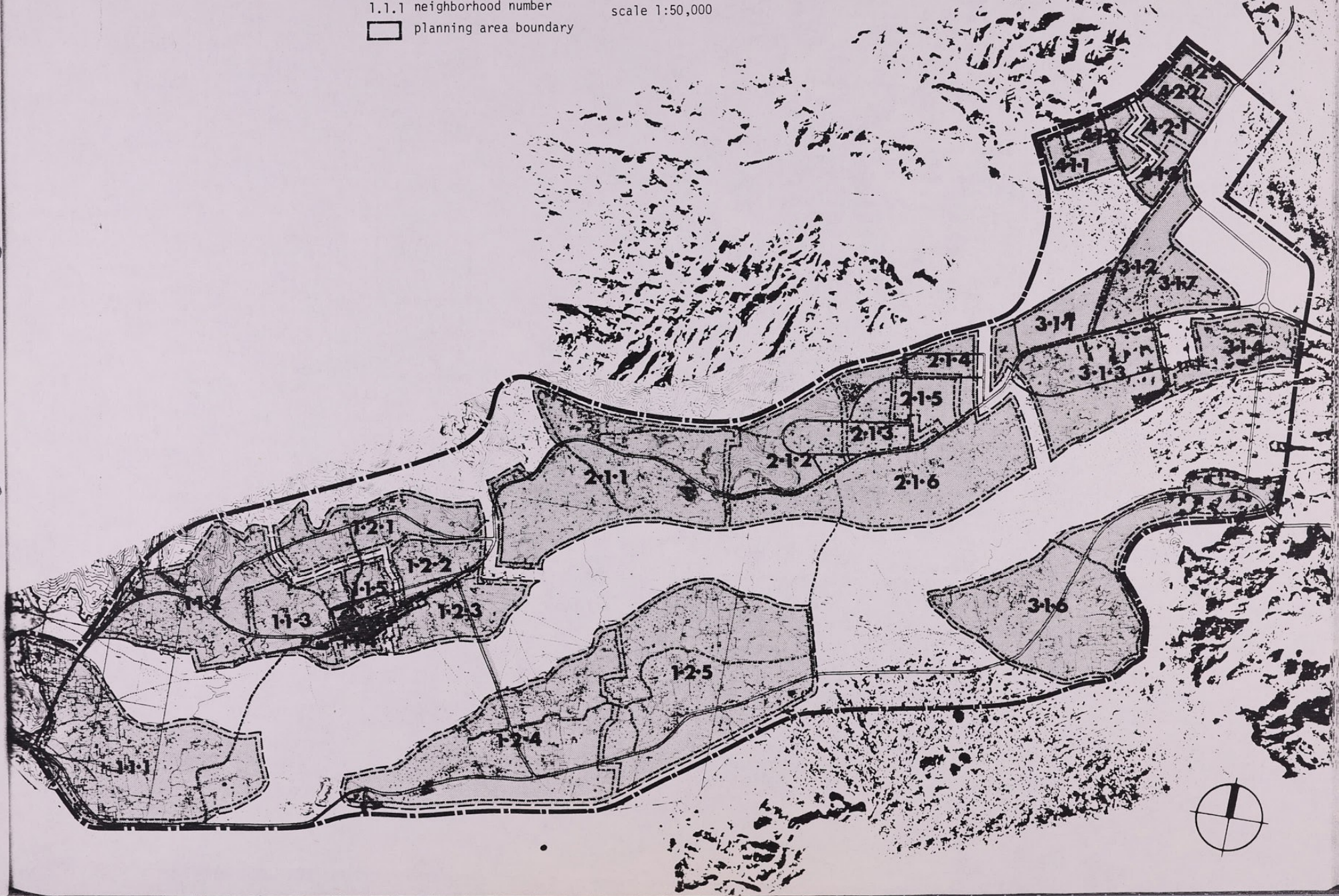
-  neighborhood
-  sub-community
-  community
- 1.1.1 neighborhood number
-  planning area boundary

FIGURE 3-1-3
1995 PROPOSED
COMMUNITY
STRUCTURE

scale 1:50,000



Associated with each of these grouping levels is a set of facilities such as schools, health facilities, mosques and recreation facilities which are hierarchy ordered to assure maximum utilization at all levels of community structure. The organization of these facilities is shown in the accompanying table and figures.

Of course, both the planning standards and the community structure set forth here must be applied in a flexible manner to account for individual differences in the physical, economic and social structure of each city. In many cases the community structure organization is affected by existing natural or man-made physical boundaries such as wadis and roads, and variations in the application of planning standards is necessary to account for and accommodate such limitations.

Application of this scheme to Najran indicates a classification into two communities, one centered around Suq Najran and one centered around Al Faisaliyah. One aspect which must be accounted for in any community structure scheme for Najran is the provision of linking devices (principally bridges) connecting communities on either side of the wadi. This can be done in such a way as to provide more direct connections between the communities and to provide a certain level of urban service functions to these communities.

At the neighborhood level, two groups emerge: an urban neighborhood including the central district and the immediately surrounding areas; and a rural neighborhood encompassing the outer districts and agricultural communities.

3-1-3 POPULATION DISTRIBUTION BY NEIGHBORHOODS.

It is estimated that some 8,040 people live in Suq Najran, as defined by the "Land Use Enumeration Block" [5]. Of the 61.2 ha included in Suq Najran, over 30% of devoted to residential use, while 2% of the land is devoted to educational uses and none for recreational use.

Thus, in comparison with the other major cities of the Southern Region, urbanized land in Suq Najran is intensively used. There is overcrowding in the sense that insufficient land is used for educational, recreational, and other public activities. At the same time, there is little possibility of increasing the urban area of Suq Najran without converting agricultural lands, an option which is specifically discouraged in this Master Plan. Therefore, serious consideration should be given to decreasing the population of Suq Najran, in order to free land for public and insitutional uses.

3-2 HOUSING NEEDS

It should be emphasized that observations made in this section on overcrowding in no way contradict the earlier observations concerning the relative lack of working age population in Najran. Suq Najran is severely restricted in accommodating further population increases, due to a shortage of non-agricultural land available for urban uses. It is therefore recommended that a fraction of the districts's existing population, along with expected increases in the overall population of the Najran planning area, be housed in Al Faisaliyah and other residential areas currently proposed for development. A balanced age structure of the population should be established for the overall planning area, but not necessarily for each planning district with unique characteristics and requirements.

In the Najran planning area there are at present 5,680 dwelling units, of which approximately 1,420 units suffer from physical deterioration of functional obsolescence [6]. The total number of housing units required in the future can be derived by the projected population and the household composition by size. The current average household size of 6.6 is expected to decline rapidly as the general income level rises and housing becomes more readily available. It is assumed that the average size of households would decline to 5.9 in 1980, 5.4 in 1985, and 4.9 in 1995. The total stock of housing units can consequently be calculated.

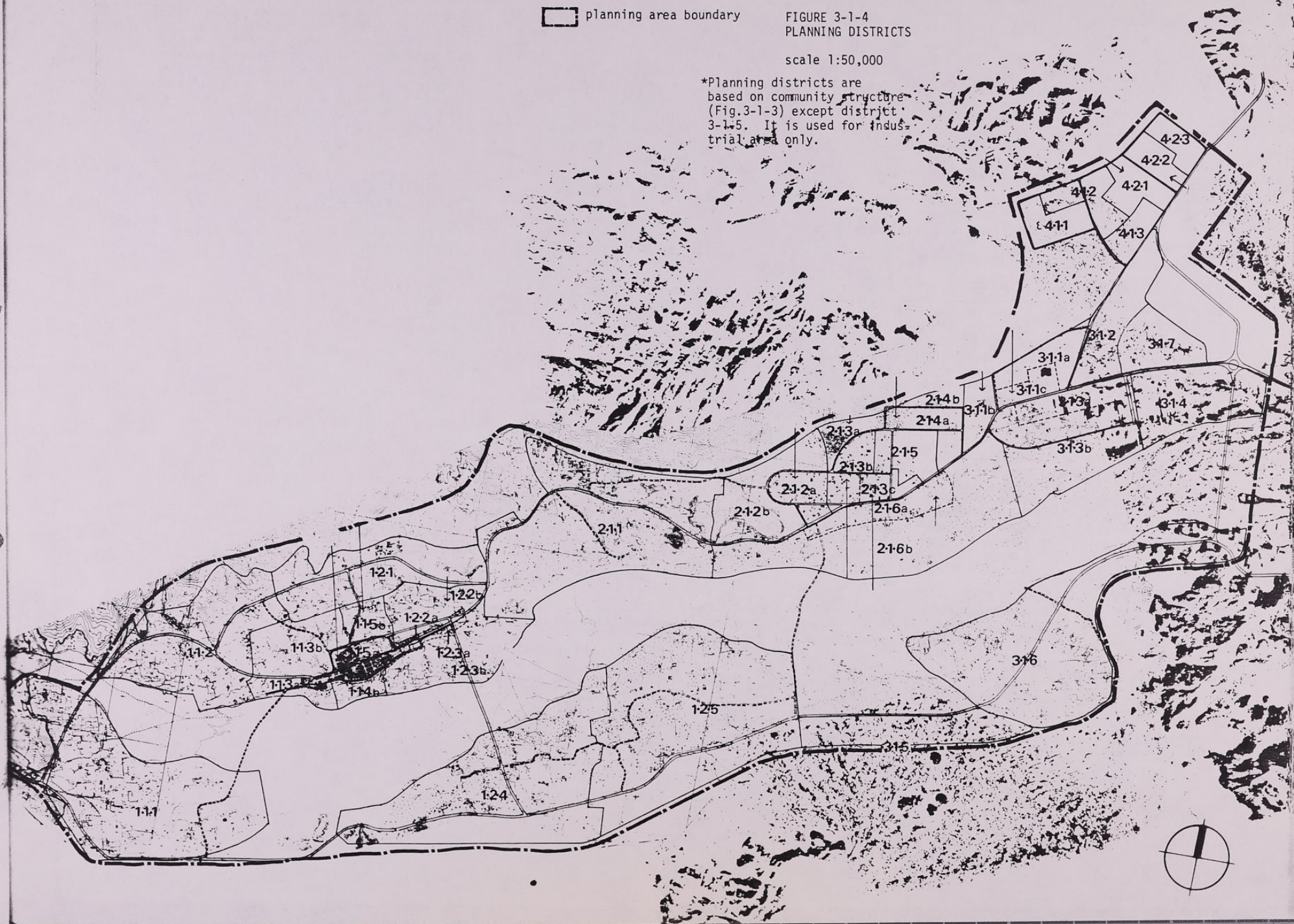
Thus, between 1975 and 1980, total housing needs will increase from 5,680 to 7,460 dwelling units. Required new housing construction between 1975 and 1980 is the difference between housing needs in 1975 and 1980, supplemented by the replacement of deteriorated and obsolete housing, or a total of 3,200 dwelling units.

□ planning area boundary

FIGURE 3-1-4
PLANNING DISTRICTS

scale 1:50,000

*Planning districts are based on community structure (Fig.3-1-3) except district 3-1-5. It is used for industrial area only.



3-3 HOUSING POLICY

3-3-1 EXISTING HOUSING

Six types of housing have been identified in the Najran area:

Type	Description
A	Tower Farm Houses
A'	Standard Farm Houses
B	Court Houses
C	Collective Court Houses
D	Simple Shelters
E	Non-indigenous Houses

The different housing types are distributed in Central Najran according to their functional uses and groupings. Mud houses are found mostly in the agricultural communities. Houses with both mud and cement blocks are located among the houses in the central district built somewhat later than the very old section of Najran. Collective Court Houses are built with mud and located in the old city of Suq Najran, and are currently suffering from neglect and deterioration. Simple shelters are found mostly in the area north of Al Faisaliyah, and are occupied by nomads who have come to Najran to settle. The non-indigenous concrete housing is the most recent form of housing in Najran and is expected to be the form of most new residential units.

3-3-2 OBSOLESCENT HOUSING AND POLICIES FOR IMPROVEMENT

Gradual deterioration due to aging and lack of maintenance (physical obsolescence) and changes in housing standards and tastes (functional obsolescence) are the two primary types of obsolescence.

Present mud structures are expected to suffer from physical obsolescence within twenty years in Central Najran and they will require rebuilding or extensive renovation. In addition, the simple shelters, constructed of twigs, small timber and zinc, are also inadequate and functionally obsolete and require replacement. A renovation/replacement program has been adopted in this report that replaces 25% of this housing stock every five years, so that they will be non-existent by 1995.

Two points will have to become central in the housing policies. The first is that housing policies should aim at providing better housing for all residents in the city through provision of bank loans and subsidies as well as Government housing construction. The second point addresses the issue of preservation of the traditional nature of housing and cityscape through declaration of historical districts.

3-3-3 RESIDENTIAL DENSITY POLICY

Planning Standards, appended to this report, indicate the relationship between net neighborhood density and net residential density. For Najran, the following relationships among gross density, net neighborhood density, and net residential density may be expected (Table 3-3-1).

Table 3-3-1
PROPOSED RESIDENTIAL DENSITY AND BUILDING TYPE

Density Classification	Gross Density Range (pph) ^a	Net Neighborhood Density ^b (pph)	Net Residential Density ^c (pph)	Building Type ^d
Low	100	75	125	Standard to Small Villa
Medium	100-200	175	400	Two to three Story Multi Family
High	200	200	550	Four Story Multi-Family

Notes:

- Units in persons per hectare (pph).
- See Planning Standards, appendix to Final Physical Plan, for definitions of net neighborhood and net residential density.
- Obtained from Planning Standards. Fig. A-2-8.
- See Ibid, Table A-2-8.

■ residential area in
the planning area boundary
▤ planning area boundary

FIGURE 3-3-1
EXISTING
RESIDENTIAL
AREAS

scale 1:50,000

SOURCE:
URTEC Field Survey, Existing Conditions,
Vol. II, Fig. 4-1, Land Use and Zoning
Appraisal of Existing Conditions, Fig. 6-1,
Distribution of Activities



3-4 HOUSING LAND USE

3-4-1 PROPOSED LAND USE

The currently proposed new residential areas will be sufficient through 1985. After this time, new residential developments should be located more centrally, nearer to Al Faisaliyah or between Suq Najran and Al Faisaliyah. Earlier sections of this report suggest difficulties in providing services to far-flung communities; furthermore, any subsequent outward shift would soon create a situation of urban sprawl.

Of the new residential areas, Al Faisaliyah is already partially occupied. An extension of this sector is planned with a proposed occupancy date of 1980. El Eshash is another new residential area under planning, and it too will be ready for occupancy in 1980. A large residential development is also planned, to be located some 18 km from Suq Najran. It is not expected to be completed until 1985.

Planning District (P.D.) 3.1.2a is a triangular area bordered by the roads to Khamis Mushayt and to the Najran airport and by the landing strip of the former Najran airport. This land is under various private ownership, and its future use is expected to be primarily residential.

Planning District 3.1.2c, located along the road to Khamis Mushayt, has been previously subdivided and distributed by the Ministry of Agriculture and Water Resources. This area may be considered as a reserve residential land. If P.D. 3.1.2a is not developed for residential use or if future population growth exceeds the expected rate, residential development should be permitted in P.D. 3.1.2c.

3-4-2 RESIDENTIAL LOCATION POLICY AND DISTRIBUTION OF POPULATION

As described in Sec. 3-1-3, the growth of population in Suq Najran has outpaced the provision of educational and other public services. It is therefore recommended that the existing gross density in Suq Najran of 131.4 persons per hectare [7] be gradually reduced to around 80 persons per hectare, in order to create sufficient space for public facilities. The resident population of Suq Najran will fall accordingly from 8,040 in 1975 to approximately 5,000 in 1995, and 3,040 people will be relocated in new residential areas. For this relocation, priority should be given to those who are currently housed in simple shelters located east and west of Suq Najran and to those living in aged and obsolescent housing in the oldest quarter of the city [8].

Table 3-4-1 (a)
DISTRIBUTION OF POPULATION BY
PHASE AND RESIDENTIAL AREA

	1975 Existing ^a	1980	1985	1995
Central Districts ^b	10,100	16,000	23,000	42,000
Sug Najran	8,040	7,100	6,300	5,000
Al Faisaliyah	2,080	5,100	7,500	11,000
Al Faisaliyah Extension	-	1,900	2,700	3,500
El Eshash	-	1,900	2,700	3,500
Kassarar Quarter	-	-	3,800	17,000
Planning District 3.1.2	-	-	-	2,000

Notes:

- From URTEC 5% Survey. See Najran, Existing Conditions, Vol I, Table 3-1-13. The boundary of Sug Najran is defined by the "Land Use Enumeration Block," Fig. 4-2-1. Populations of survey districts I and II have been adjusted in conformity with the "Land Use Enumeration Block." Similarly, the boundary of Al Faisaliyah is defined by the "Land Use Enumeration Block" in Fig. 4-2-1, and the estimated populations of survey districts III and IV have been adjusted accordingly.
- Central Districts are the existing and proposed residential areas listed in this table. See Table 3-4-1(b) for the relationship between residential areas and planning districts.

Table 3-4-1 (b)
PLANNING DISTRICTS OF
RESIDENTIAL AREAS

Residential Area	Planning Districts
Suq Najran	1.1.3a, 1.1.4a, 1.1.5a, 1.2.2a, 1.2.3a
Al Faisaliyah	2.1.2a, 2.1.3b, 2.1.3c, 2.1.4a, 2.1.5
Al Faisaliyah Extension	3.1.1a, 3.1.1c
El Eshash	3.1.3a
Kassarar Quarter	4.1.1, 4.1.2, 4.1.3, 4.2.1, 4.2.2, 4.2.3
Planning District 3.1.2	3.1.2a, 3.1.2b, 3.1.2c

■ proposed residential area
□ planning area boundary

FIGURE 3-4-1
1995 PROPOSED
RESIDENTIAL
LAND USE

scale 1:50,000

NOTE:
In outer district and south bank
residential areas of scattered
farm's cluster are not shown in
this Figure.

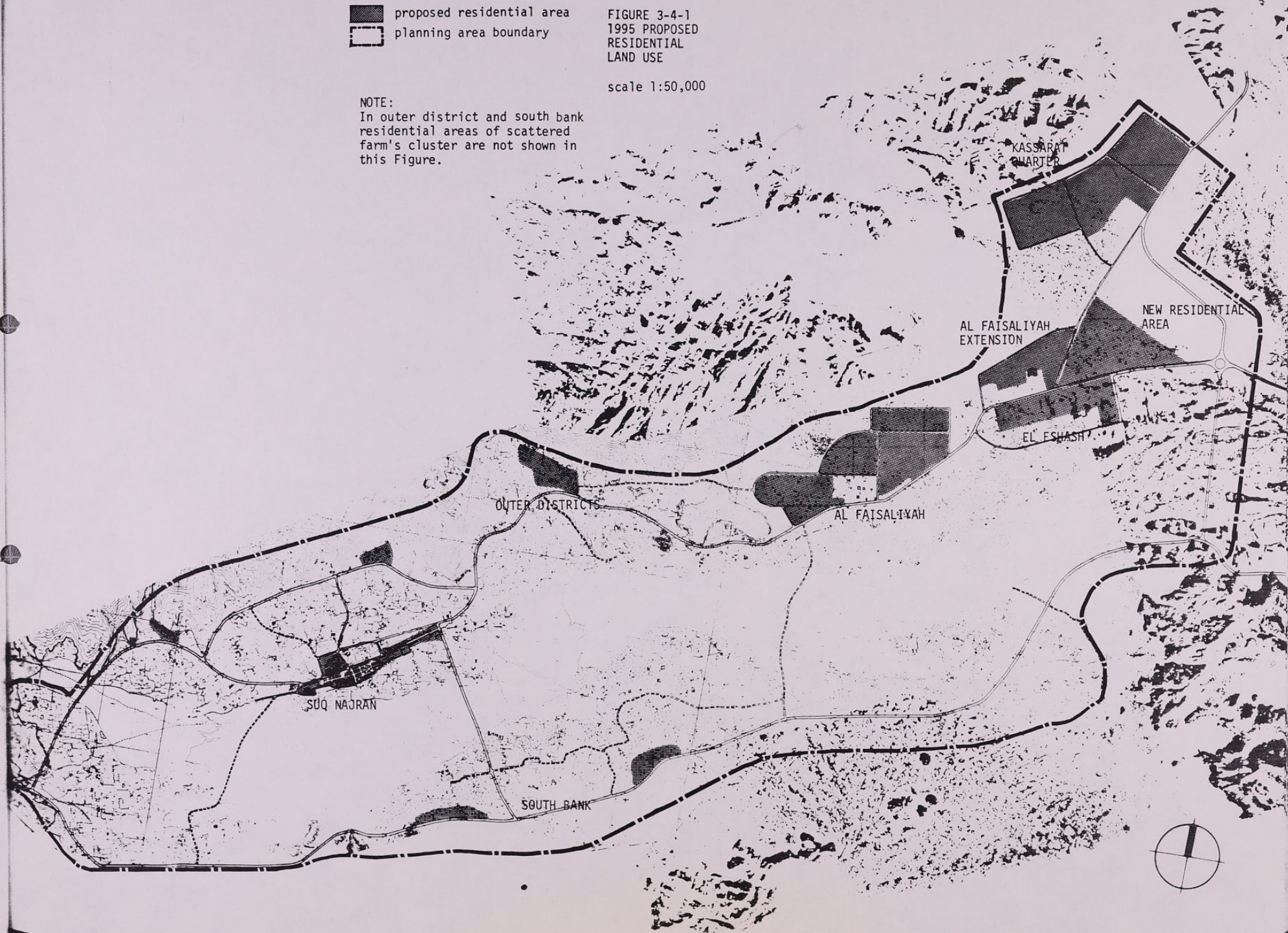


Table 3-4-2
PHASING OF NEIGHBORHOODS AND COMMUNITIES^{a, b}

Neighborhoods	1975	1980	1985	1995
	1.1.1	1.1.1	1.1.1	1.1.1
	1.1.2	1.1.2	1.1.2	1.1.2
	1.1.3	1.1.3	1.1.3	1.1.3
	1.1.4	1.1.4	1.1.4	1.1.4
	1.1.5	1.1.5	1.1.5	1.1.5
	1.2.1	1.2.1	1.2.1	1.2.1
	1.2.2	1.2.2	1.2.2	1.2.2
	1.2.3	1.2.3	1.2.3	1.2.3
	-	-	1.2.4	1.2.4
	1.2.4/5	1.2.4/5	1.2.5	1.2.5
	2.1.1	2.1.1	2.1.1	2.1.1
	-	-	2.1.2	2.1.2
	2.1.2/3	2.1.2/3	2.1.3	2.1.3
	-	-	2.1.4	2.1.4
	2.1.4/5/3.1.1/3	2.1.4/5	2.1.5	2.1.5
	2.1.6	2.1.6	2.1.6	2.1.6
	-	3.1.1	3.1.1	3.1.1
	-	-	-	3.1.2
	-	3.1.3	3.1.3	3.1.3
	3.1.6/7	3.1.6/7	3.1.6/7	3.1.6
	-	-	-	3.1.7
	-	-	4.1.1/2	4.1.1
	-	-	-	4.1.2
	-	-	-	4.2.1
	-	-	4.2.1/2/3	4.2.2
	-	-	-	4.2.3
No. of Neighborhoods	14	16	21	26

Sub-Communities				
	1.1	1.1	1.1	1.1
	1.2	1.2	1.2	1.2
	2.1/3.1	2.1	2.1	2.1
	-	3.1	3.1	3.1
	-	-	4.1/4.2	4.1
	-	-	-	4.2
No. of Sub-Communities	3	4	5	6
Communities				
	1	1	1	1
	2/3	2	2	2
	-	3	3/4	3
	-	-	-	4
No. of Communities	2	3	3	4

Notes:

- This table presents the list of community units to be established during the planning period.
- Slash indicates that the community unit established includes two or more planning districts which are separated into independent community units at a later date. For example, neighborhood 2.1.4/5/3.1.1/3 in 1975 encompasses four planning districts, 2.1.4, 2.1.5, 3.1.1 and 3.1.5, which are eventually developed into full neighborhoods during the project period, according to the expected growth of population in these districts.






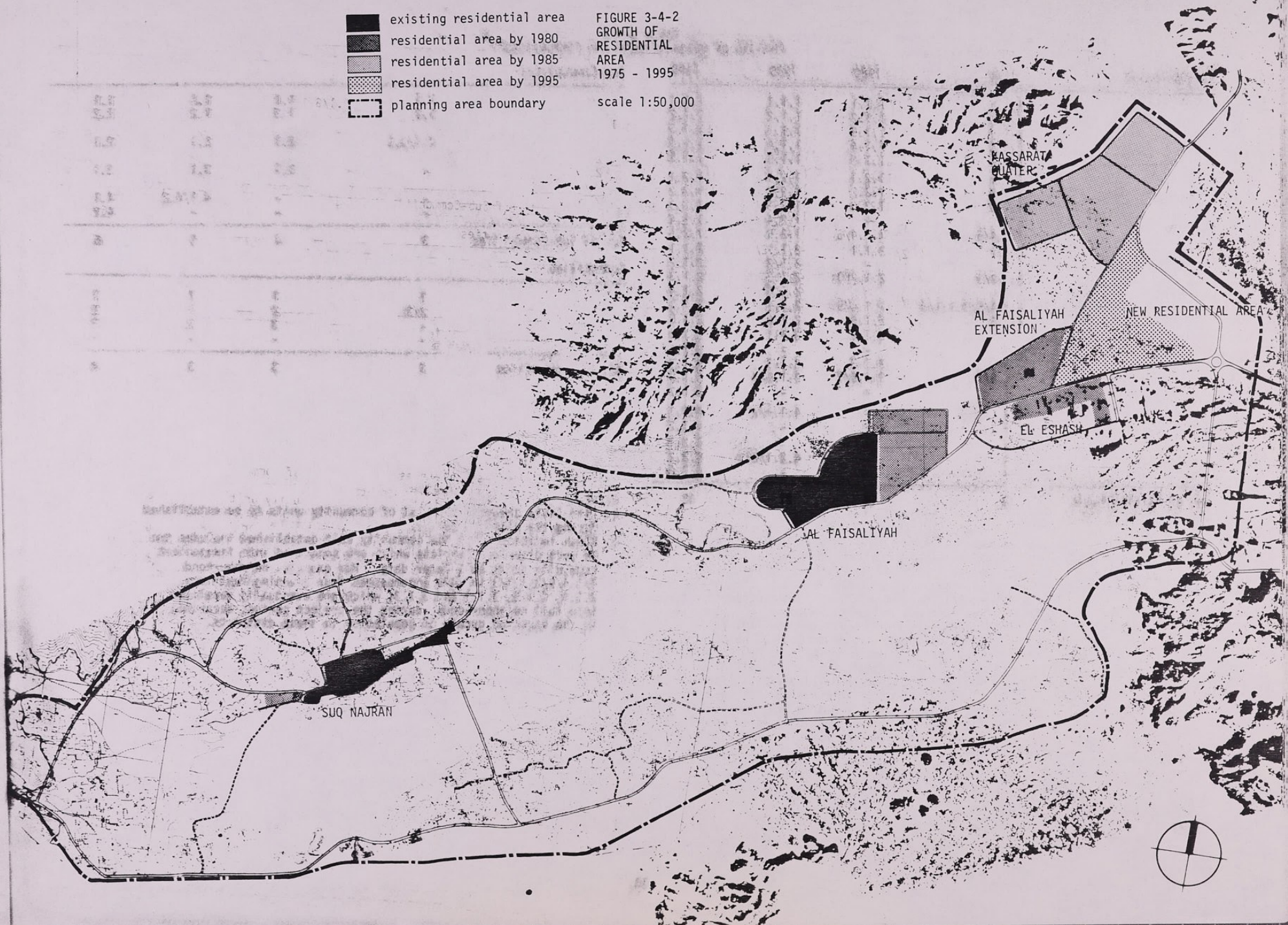
-  existing residential area
-  residential area by 1980
-  residential area by 1985
-  residential area by 1995
-  planning area boundary

FIGURE 3-4-2
GROWTH OF
RESIDENTIAL
AREA
1975 - 1995

scale 1:50,000



On the other hand, Al Faisaliyah and other new residential areas will see a rapid growth of population. The new residents will come partly from Suq Najran, partly from new households formed in the surrounding rural areas, and partly from immigration of rural and nomadic households in the larger sub-region.

For planning purposes, it is assumed that all new residential areas, including Al Faisaliyah, will achieve their planned capacity population by 1995. In Al Faishaliyah, land improvement and subdivision have already been completed. The existing population of 2,080, therefore, is expected to increase to 11,000 by 1995. Al Faisaliyah Extension and El Eshash will contain 3,500 persons each in 1995. Kassarar Quarter, the last of the presently planned areas to develop, will have approximately 17,000 persons in 1995.

CHAPTER 3 NOTES:

1. Kenzo Tange & URTEC, 5% Sample Socio-Economic Survey, 1974 - 1975, referred to in this report as the URTEC 5% Survey. Results for Najran are presented in Najran, Existing Conditions, Vol. I, Sec. 3-1.
2. Najran, Existing Conditions, Vol. I, Sec. 3-1.
3. Najran, Existing Conditions, Vol. I, Tables 3-1-1 and 3-1-1a and Fig. 3-1-1; Tables 3-1-11 and 3-1-12 and Fig. 3-1-2; among others.
4. Najran, Alternative Strategies, Table 4-1-2.
5. Najran, Existing Conditions, Vol. I, Fig. 4-2-1. Populations of survey districts I and II, tabulated in Table 3-1-13 of the same report, have been adjusted in conformity with the land use enumeration block.
6. Najran, Alternative Strategies, Fig. 7-1-2.
7. There are 8,040 residents on 61.2 ha of utilised land, as defined in "Land Use Enumeration Block," Najran, Existing Conditions, Vol. I, Fig. 4-2-1 and Table 4-2-1. Populations in survey districts I and II, as defined in Table 3-1-13, Najran, Existing Conditions, Vol. I, have been adjusted in conformity with the "Land Use Enumeration Block."
8. See Najran, Alternative Strategies, Fig. 7-1-2.

4. employment

4-1 SECTORAL COMPOSITION AND PROJECTION

4-1-1 GENERAL

Of the 27,200 people living in Central Najran, 15.2% or 4,100 people, are gainfully employed. This is relatively low when compared with the labor participation rate of 19.5% for all the urban areas of the Region. This is due in part to a large proportion of the population younger than 15 years of age, and to a very small share of foreign population usually having a relatively high participation rate.

The sectoral distribution of workers has been estimated at 8.7% in primary employment, 6.3% in secondary employment, 43% in commercial industries, and 42% in government affiliations.

4-1-2 SECTORAL DISTRIBUTION

The sectoral distribution of workers within the survey area has been estimated at 8.7% in primary employment, 6.3% in secondary employment, 43% in commercial industries, and 42% in government affiliations. A detailed analysis is contained in a previous report [1].

Since the planning area has been extended in this report (see Sec. 2-6 and Fig. 3-1-0), it is necessary to re-estimate the distribution of employment within the adjusted planning area. Based on field observations and interviews conducted subsequent to the URTEC 5% Survey, the following assumptions have been adopted:

1. The labor force participation rate of the population in the planning area outside the survey area is equal to the participation rate inside the survey area.
2. Approximately three-quarters of the employment outside the survey area are engaged in agricultural and livestock production.
3. The remaining one-quarter of the employment outside the survey area are distributed among the non-agricultural sectors in the same proportion as the employment inside the survey area.

Thus, of the 9,400 people living in the planning area outside the survey area, 15.2%, or 1,430 workers are assumed to be employed. Three-quarters plus a small adjustment, totalling 77.9%, or 1,110 workers, are assumed to be engaged in agriculture and the remaining workers distributed among the other sectors. The results are summarized in Table 4-1-0.

Table 4-1-0
ESTIMATED 1975 SECTORAL DISTRIBUTION OF EMPLOYMENT
IN THE ADJUSTED PLANNING AREA

Sectors	Inside 5% Survey Area		Outside 5% Survey Area		Adjusted Planning Area		Planning Area by Major Sector	
	No. of Workers	% ^a	No. of Workers	% ^b	No. of Workers	% ^c	No. of Workers	%
Primary								
Agriculture and Livestock Production	480	11.6	1,110	77.9	1,590	28.7	1,770	31.9
Mining	160	3.9	20	1.0	180	3.2		
Secondary								
Construction	220	5.3	20	1.3	240	4.3	280	5.1
Manufacturing	40	1.0	-	0.3	40	0.8		
Tertiary								
Trade	920	22.2	80	5.5	1,000	17.9	1,500	26.9
Finance, Insurance, Real Estate	120	2.9	10	0.7	130	2.3		
Transport and Communication	280	6.8	30	1.7	310	5.5		
Utility	40	1.0	-	0.3	40	0.8		
Services	20	0.5	-	0.1	20	0.4		
Government								
Government	1,730	42.0	150	10.5	1,880	33.9	1,880	33.9
Others	120	2.8	10	0.7	130	2.2	130	2.2
Total	4,130	100.0	1,430	100.0	5,560	100.0	5,560	100.0

Notes:

- a. Najran, Existing Conditions, Vol.I, Sec. 3-2
- b. Assume that $[\frac{.75}{.75 + (.25)} \times (.116)] \times 100 = 77.9\%$ of workers who are engaged in agriculture and livestock production. The remaining 22.1% of workers are distributed among the other sectors in the same proportions as those in the 5% Survey Area.
- c. Sum of percentage shares of these inside and outside the survey area, weighted by the proportions of the total planning population inside and outside the survey area. For example, for agricultural employment:

$$\frac{4,130}{5,560} \times 11.6 + \frac{1,430}{5,560} \times 77.9 = 28.7\%$$

and similarly for other sectors.

Table 4-1-1 (a)
PROJECTIONS OF EMPLOYMENT

	1975	1980	1985	1995
Labour Force Participation Rate (%) ^a	15.2	17.2	19.2	23.2
Population in the Survey Area ^b	27,200	33,000	40,000	59,000
Employment in the Survey Area	4,100	5,700	7,700	13,700
Population in the Adjusted Planning Area ^b	36,600	44,000	52,000	75,000
Employment in the Adjusted Planning Area	5,560	7,570	9,980	17,400

Notes:

- a. Assumed to increase 2 percentage points every five years. See text.
- b. From Table 3-1-1.
- c. Population in the planning area times the labor force participation rate.

Table 4-1-1 (b)
PROJECTED SECTORAL COMPOSITION OF EMPLOYMENT IN THE PLANNING AREA

Sector	1975 Existing ^a		1980		1985		1995	
	No. of Workers	%	No. of Workers	%	No. of Workers	%	No. of Workers	%
Total Employment	5,560	100.0	7,570	100.0	9,980	100.0	17,400	100.0
Primary Sector	1,770	31.9	2,350	31.0	2,810	28.2	3,480	20.0
Secondary Sector	280	5.1	480	6.3	750	7.6	1,740	10.0
Tertiary Sector ^c	1,500	26.9	2,190	28.9	3,090	31.0	6,090	35.0
Government	1,880	33.9	2,550	33.6	3,330	33.4	6,090	35.0
Other	130	2.2	-	-	-	-	-	-

Notes:

- a. From Table 4-1-0.
- b. For assumptions behind target shares, see text. The shares for intervening years for all sectors, exclusive of agriculture, are interpolated from existing and target shares.
- c. All commercial and service sectors exclusive of government employment.

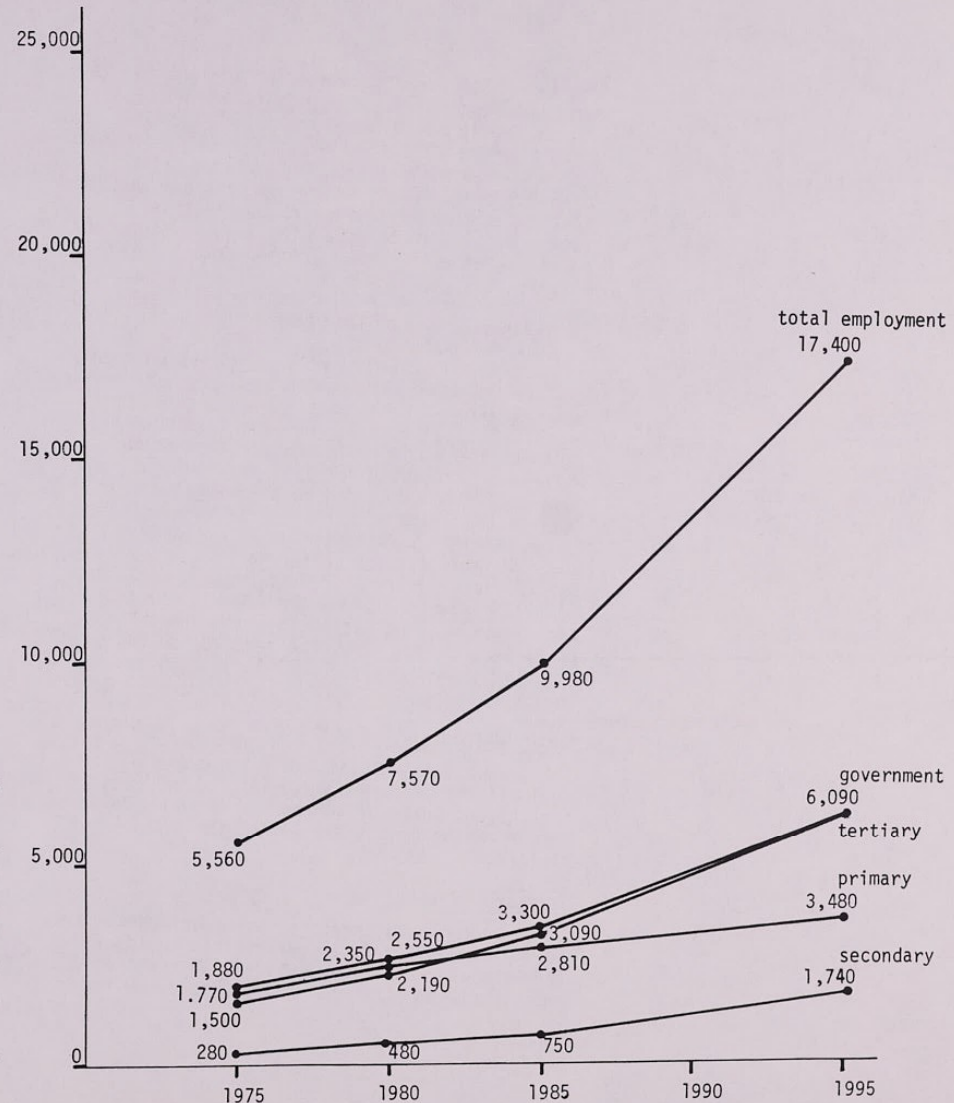


FIGURE 4-1-1
PROJECTED
GROWTH OF
EMPLOYMENT BY SECTOR

The following assumptions have been made in the projections of employment in Najran:

1. Labor Force Participation Rate.

The existing labor force participation rate has been estimated on the basis of the URTEC 5% Survey [2]. An increase of 2 percentage points every five years is assumed.

2. Primary Sector.

The estimated current demand for workers in agriculture and livestock raising in the Najran sub-region is 3,300 workers [3]. Thus slightly more than one-half of agricultural workers of the sub-region work in the Najran planning area. Over the 20-year period, this share of agricultural workers of the sub-region working in the planning area is expected to increase, due to a greater demand for workers as:

- a. Improved methods of irrigation will increase the number of man-days required for cultivation.
- b. Livestock production will rely less on open foraging over an extended area and more on agricultural feeds obtainable near the primary feed producing area, the Najran valley.

Based on the projected aggregate demand for workers in irrigated farming, dry farming, and livestock production and on the expected increase in the share of agricultural workers of the sub-region working in the planning area, the number of primary sector workers is expected to increase from 1,790 at present to 3,480 in 1995. However, since the overall growth of employment will be faster than the growth of primary sector workers, the sectoral share is expected to decrease from 31.9% in 1975 to 20% in 1995.

3. Secondary Sector.

It is expected that, if the full potential for agricultural process industries is realized, the present share of workers in the secondary sector may be doubled to 10% of the total labor force.

4. Tertiary Sector.

It is recommended that the government pursue a deliberate policy to encourage the growth of the tertiary sector, exclusive of government employment, in order to provide increased ser-

vices to a growing population and to reduce direct dependence on government employment at the same time. For example, the government may subcontract some of its service activities to private companies.

5. Government Sector.

The government sector currently employs about 33.9% of the total labor force in the planning area. This is substantially lower than the average share of government employment among the five major cities of the Southern Region, where some 60.8% of workers are employed by the government [4]. It is therefore expected that the share of government employment will remain roughly constant through the planning period at 35% of total labor force.

6. The percentage shares of the various sectors, excluding primary sector, in the intervening years between 1975 and 1995 have been interpolated from the existing and target figures. Primary sector employment is assumed to grow according to demand for primary sector workers in the sub-region, as described in paragraph (1) of this section.

For comparison, it may be noted that the sectoral shares of employment in the United States are 3.8%, 22.8%, 35.8%, 22.6% and 15% in the primary, secondary, tertiary (exclusive of government), government, and miscellaneous sectors, respectively [5]. Thus the target rates recommended for Najran are reasonable in light of the special requirements of the city.

It should be emphasized, however, that the target rates are not predictions, because they presuppose a series of government actions, for example, to improve the present systems of irrigation, to encourage the growth of the tertiary sector, and to encourage the growth of the secondary sector activities. Without the parallel under-taking of these policies, actual employment may greatly differ from the projected figures.

In order to meet the need for the expected surge in employment in the commercial and secondary sectors, thought should be given to creating more jobs in these areas.

The Development Plan has as a basic objective to diversify the economic base of the Kingdom, to reduce its dependence on imported goods, and to further the economic activity of various regional areas based on local resources. In a rural city

4-1-4 ~~4~~ EMPLOYMENT NEEDS

high income district
medium income district
low income district
planning area boundary

FIGURE 4-3-1
1975 EXISTING INCOME
DISTRIBUTION

scale 1:50,000

SOURCE:

Existing Conditions, Vol.I,
Table 3-1-15, Percentage Composition
of Households by Income and District
and Fig.3-1-6, Household Income by
District

- 1 High income district: Share of households with income of SR 2001 or more per month exceeds 15%
- 2 Medium income district: Neither high nor low income district
- 3 Low income district: Share of households with income of SR 500 or less per month exceeds 55%



such as Najran, therefore, agricultural development should receive primary attention.

4-2 DISTRIBUTION OF EMPLOYMENT CENTERS

Most of the jobs to be had are in Suq Najran and Al Faisaliyah, as they are the main local activity centers. But with the expected shift in population and employment sectors, two new centers will emerge in addition to these two: a regional commercial center and a agroindustrial center.

The Government offices complex established in the new city should remain as the administrative center of the city and for the hinterlands. This center should also absorb other provincial administrative offices which are scattered at several locations.

The civic center should be established in conjunction with the commercial center at the heart of the old city. It should contain business offices, meeting halls and other major community facilities.

4-3 INCOME DISTRIBUTION

Except for professional and technical workers and managers and officials, the medium income is substantially below S.R. 1,000 per month. In general, the self-employed are in the lower income brackets while the employers are relatively better off, reflecting the nature of the economy of Najran. Those working for the Government are relatively well-paid.

There are two distinct groups relative to income distribution: high-skilled and low-skilled. The high-skilled group comprises professional and technical workers and managers and officials; whereas farmers, service workers, and sales workers are typical elements of the latter group.

Percentage composition of households by income and district has been tabulated in a previous report [6]. Each district is then classified according to the following definitions:

1. High income district.

Share of households with income of S.R. 2,001 or more per month exceeds 15%.

2. Low income district.

Share of households with income of S.R. 500 or less per month exceeds 55%.

3. Medium income district.

Districts which cannot be classified as either

high or low income districts.

The resulting distribution of districts by income characteristics is graphically presented in Fig. 4-3-1.

High income districts are found in Suq Najran, Al Faisaliyah, or in areas immediately adjacent to these central districts. Low and medium income districts are generally found in the outlying rural districts.

4-4 INDUSTRIAL LOCATION

Although Najran does not have the necessary resources and the locational requirements to become an industrial center, the growth of population will encourage some industrial activity. The principal issue is to estimate the future land use requirements and to provide a sufficient amount of open land.

There are two principal requirements for industrial location:

1. Availability of sufficiently large parcels of land; and
2. Accessibility to resources and markets.

The Ministry has recently approved allocation of some 230 ha of land for industrial use. The site is located along the road to the Najran airport and about 14 km east of the junction of the roads to the airport and to Khamis Mushayt. The advantages of this site are:

1. Relative proximity to the airport.
2. Sufficient distance away from proposed residential areas.

The site is therefore highly suited for non-agricultural industries, such as automobile repair and concrete manufacturing. It is not appropriate for agricultural process industries, which should be located closer to the main agricultural lands of the Najran valley. A recommended distribution of activities within the proposed industrial area is presented in Fig. 4-4-1. Since the site is bordered on the east by the Petromin storage area, it is recommended that a buffer zone be created along this boundary.

For agricultural process industries, a separate industrial area south of Wadi Najran is recommended by the consultant. The advantages of this location include:

1. Proximity to agricultural lands of the Najran valley.
2. Potential impetus for the future development of the south bank of the wadi.

Approximately 100 ha have been designated for this use (see Fig. 4-4-1). Food processing, including canning, commercial livestock production, and meat packing are appropriate activities for this site.

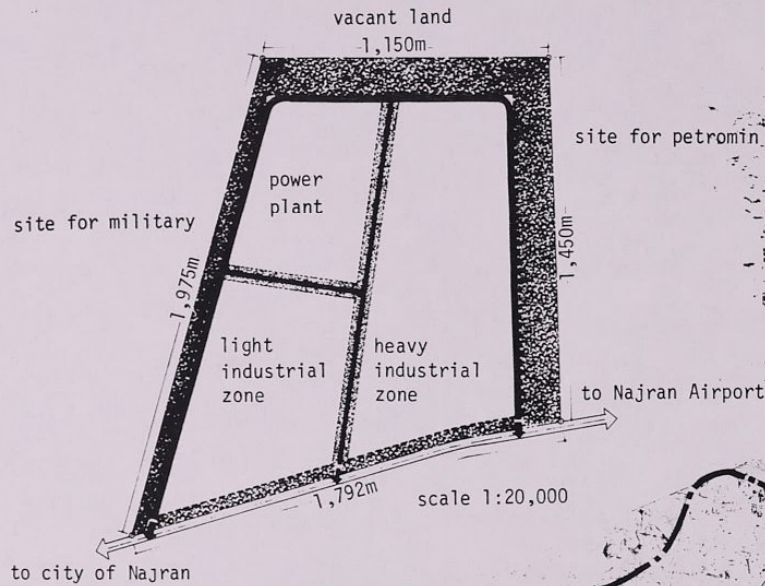
FIGURE 4-4-1
EXISTING AND
1995 PROPOSED
INDUSTRIAL AREAS

scale 1:50,000

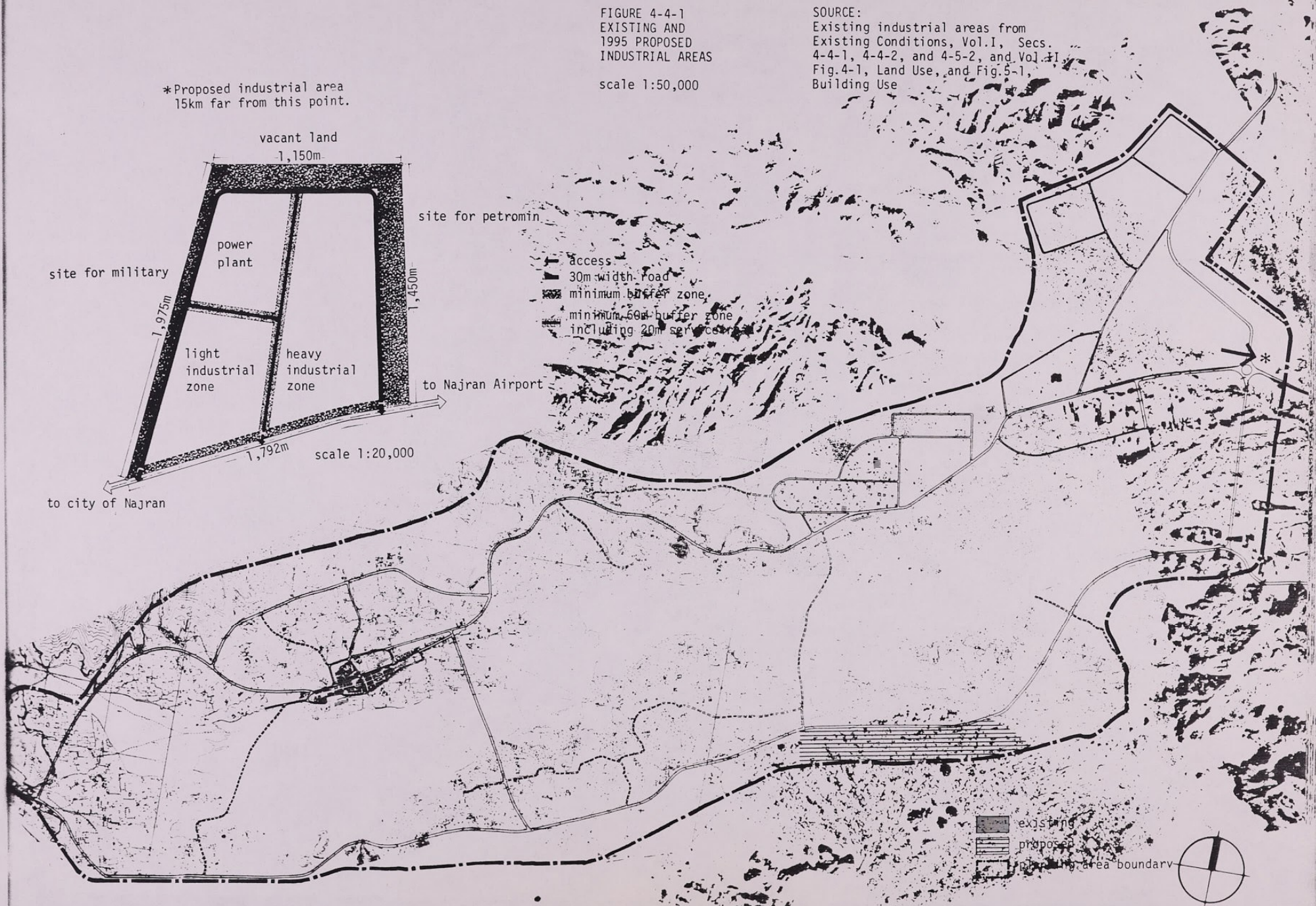
SOURCE:

Existing industrial areas from
Existing Conditions, Vol.I, Secs.
4-4-1, 4-4-2, and 4-5-2, and Vol.II,
Fig.4-1, Land Use, and Fig.5-1,
Building Use

*Proposed industrial area
15km far from this point.



scale 1:20,000



existing
proposed
proposed area boundary



CHAPTER 4 NOTES:

1. Najran, Existing Conditions, Vol. I, Sec 4-2
2. From Southern Region, Preliminary Physical Plan, Tables 5-2-16, 5-2-17, and 5-2-18
4. Southern Region, Existing Conditions, Vol. I, Table 3-2-7a.
5. Bureau of Labor Statistics, U.S. Department of Commerce, 1977
6. Najran, Existing Conditions, Vol. I, Table 3-1-15 and Fig.

5. civic, cultural, and commercial centers

5-1 GENERAL EDUCATION

5-1-1 EXISTING CONDITIONS

Suq Najran has 11 educational facilities including 8 schools, 1 religious school, 1 youth center, and 1 Boy Scout center, while Al Faisaliyah has 6 additional schools. Some facilities house more than one school and the total land area occupied is quite small relative to the size and population of the city. However, education is said to be the most important activity in the Kingdom, and is reflected in Government plans for Najran.

5-1-2 PROJECTED ENVIRONMENT AND FACILITIES

There are three components to the educational planning methodology of the present study:

1. Population projections (Chap. 4) as the principal basis for educational planning.
2. Grouping of projected populations into a hierarchical order of communities, called the Community Structure.
3. Recommended Standards for enrollment and physical facilities.

Specific, numerical guidelines are available in the Planning Standards Appendix. Following are some general comments on methodology.

From a study of the population structure of the five cities in the Southern Region, the expected number of children per hundred population has been computed for each age group. By applying the appropriate coefficients, the total numbers of school age population eligible to enroll in the primary, intermediate, and secondary schools may be determined. Recommended target enrollment rates produce the total projected enrollment at each educational level, and the size of the resident population and that of the expected enrollment determine a grouping of population into appropriate school districts for elementary, intermediate, and secondary schools. Finally the number of school districts forming the Community Structure determines the number of schools.

The total number of schools required in the future is compared with the existing number and distribution of schools. Any inadequacy in the number of schools must be corrected by conversion of existing schools or construction of new schools.

As far as possible, the boundaries of school districts have been drawn in a manner which makes maximum use of existing schools. It is recommended, however, that these boundaries be reconsidered periodically in order to better reflect the underlying structure of communities in the city.

The target rates of school enrollment for 1980 and beyond are 100% for elementary boys and girls schools, 100% for intermediate boys and girls schools, 50% for secondary boys school, and 30% for secondary girl school. Although there may be some difficulty in achieving these rates by 1980, assumption of these rates is justified by the following, temporary characteristics of existing general education in the Southern Region:

1. Currently, there are some discrepancies between the ages of some students and their grade levels in school. This is due to irregular entry ages in the past and to some instances of uneven advancement.
2. Because there are few schools outside the city, many children from the surrounding rural areas also attend the schools in the city. As schools are built in rural areas, it is expected that the children will be able to attend schools in their own neighborhoods.

Thus, each neighborhood in the planning area will have one boys elementary school and one girls elementary school. Each sub-community will have one boys and one girls intermediate school, and Najran as a whole will be equivalent to a community with one boys and one girls secondary school.

Numerical projections have been made on the basis of standards contained in Planning Standards, appendix to Southern Region, Preliminary and Final Final Physical Plans. The projections are summarized in Tables 5-1-1a, 5-1-1b, and 5-1-1c.

5-1-3 PROPOSED LAND USE

In general, schools should be located within reasonable walking distance of all households being served by those schools. In the outlying communities of Najran, however, population densities are often too low to justify the number of schools required by the walking distance criteria. Hence it is recommended that schools be constructed near the centers of the respective community units being served and that an extensive system of school buses be instituted in order to provide transportation for the students.

With Suq Najran, Al Faisaliyah, and other residential development areas, the Department of Town Planning, Southern Region, has approved or proposed most of the schools called for by the present report (see Fig. 5-1-1). However, it is still necessary to provide new schools for the children of outlying communities (i.e., outside the central districts) according to the projected requirements outlined in Tables 5-1-1 (a), 5-1-1 (b), and 5-1-1 (c).



- boys elementary school
- girls elementary school
- ▨ elementary school district
- ▲ boys intermediate school
- △ girls intermediate school
- ▭ intermediate school district
- boys secondary school
- girls secondary school
- secondary school district
- - - planning area boundary

FIGURE 5-1-1
1995 PROPOSED
SCHOOL DISTRICTS
AND GENERAL
EDUCATION
FACILITIES

scale 1:50,000

NOTE:

- 1 Elementary, intermediate, and secondary school districts correspond to neighborhood, sub-communities, and communities, respectively, as noted in Sec. 3-2-1, Community Structure and Table 3-1-3, Community Structure and Facility Distribution.
- 2 Schools with (○) are existing schools. See Existing Conditions, Vol. 1, pg. 5-1, Building Use.
- 3 Schools without accompanying symbols have been proposed and approved by the Ministry.
- 4 Schematic locations of schools (*) are proposed by the Master Plan. Exact locations must be determined by detailed studies. See text.

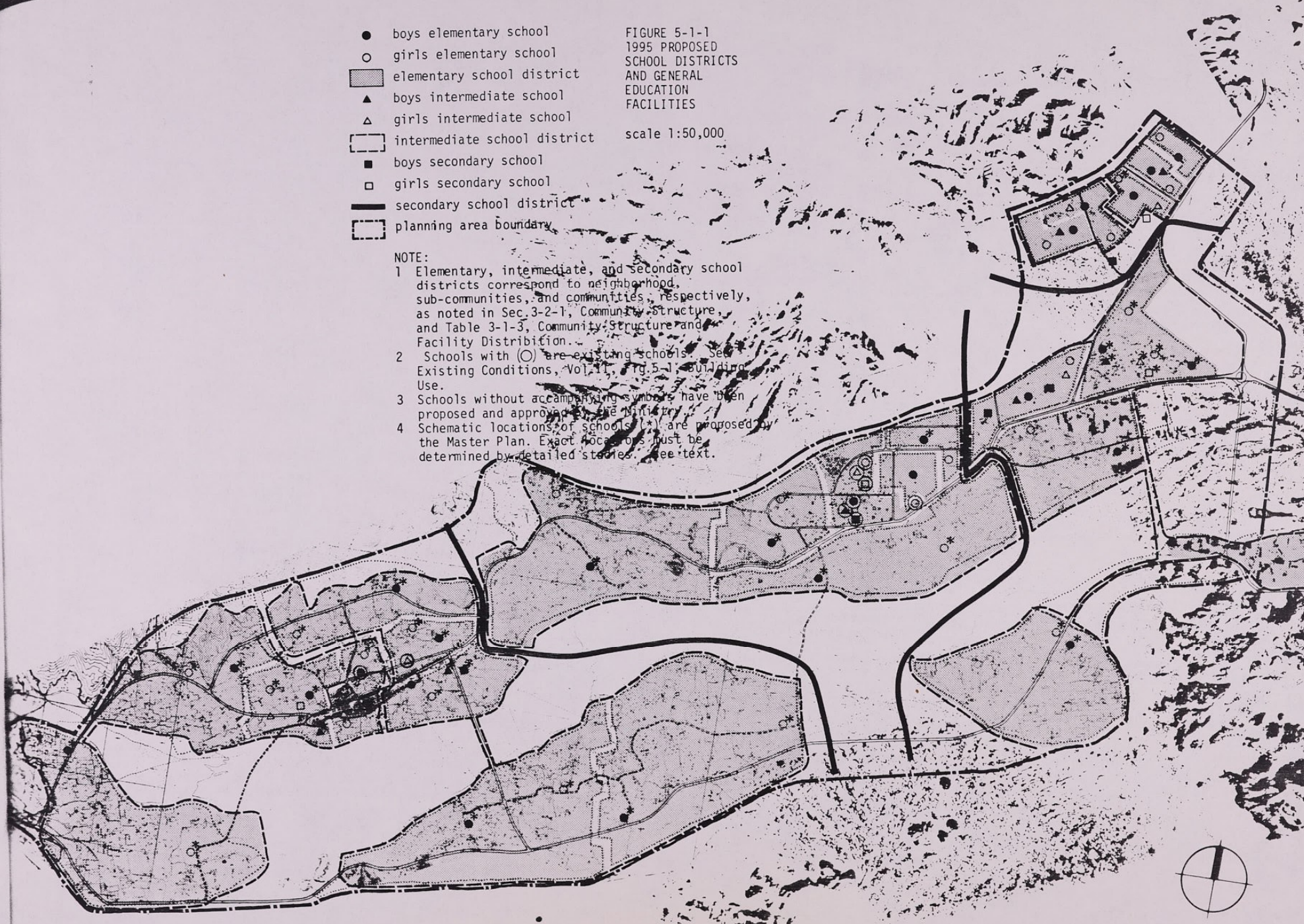


Table 5-1-1 (a)
PROJECTED GENERAL EDUCATION AREA REQUIREMENTS
ELEMENTARY SCHOOLS

	1975 Existing	1980	1985	1995
Planning Population	36,600	44,000	52,000	75,000
Boys				
No. of School Age Population ^a	3,480	4,180	4,940	7,130
No. of Students ^b	2,216 ^c	4,180	4,940	7,130
No. of Schools ^d	11(6) ^e	16	21	26
Total Floor Area (m ²) ^e	n.a.	18,800	22,200	32,100
Land Area for Buildings (ha) ^f	n.a.	5.0	5.9	8.6
Playfield (I) Area (ha) ^g	n.a.	8.4	9.9	14.3
Total Land Area (ha)	5.3	13.4	15.8	22.9
Girls				
No. of School Age Population ^a	3,480	4,180	4,940	7,130
No. of Students ^b	1,060 ^c	4,180	4,940	7,130
No. of Schools ^d	4 ^e	16	21	26
Total Floor Area (m ²) ^e	n.a.	18,800	22,200	32,100
Land Area for Building (ha) ^f	n.a.	5.0	5.9	8.6
Playfield (I) Area (ha) ^g	n.a.	8.4	9.9	14.3
Total				
No. of Schools	15(6)	32	42	52
Total Floor Area (m ²)	n.a.	37,600	44,400	64,200
Total Land Area (ha)	8.0	26.8	31.6	45.8

Population will be in primary school age groups 6 and 7. See Appendix, Planning Standards, Sec. 4-1-3.

Assume 100% enrollment for 1980, and beyond. See Appendix, Planning Standards, Sec. 4-1-3.

Education Office, Najran, 1975. See Najran, Alternative Strategies, Table 5-5-1.

The projected numbers of schools for 1980, 1985, and 1995 correspond to the phased numbers of sub-communities in those years. See Table 3-4-2.

Based on 6.5 m²/student. See Appendix, Planning Standards, Sec. A-2-1-4 and A-2-1-5.

Land area for building includes building area (building coverage), vehicular and pedestrian circulation (including parking), and minimum setbacks and landscaping, 20 m²/student is recommended.

Based on 30 m²/student. See Appendix, Planning Standards, Sec. A-2-2-6.

Based on estimated average site area per student of 25 m²/student. A total of 9.8 ha of educational land is shared by 3,907 students. See Najran, Existing Conditions, Vol. I, Fig. 4-2-1, and Alternative Strategies, Table 5-5-1. Land area cited here does not include any proposed schools.

Table 5-1-1 (b)
PROJECTED GENERAL EDUCATION AREA REQUIREMENTS
INTERMEDIATE SCHOOLS

	1975 Existing	1980	1985	1995
Planning Population	36,600	44,000	52,000	75,000
Boys				
No. of School Age Population ^a	1,370	1,650	1,950	2,810
No. of Students ^b	451 ^c	1,650	1,950	2,810
No. of Schools ^d	3	4	5	6
Total Floor Area (m ²) ^e	n.a.	10,700	12,700	18,300
Land Area for Buildings (ha) ^f	n.a.	3.3	3.9	5.6
Playfield (I) Area (ha) ^g	n.a.	5.0	5.9	8.4
Total Land Area (ha)	1.1 ^h	8.3	9.8	14.0
Girls				
No. of School Age Population ^a	1,370	1,650	1,950	2,810
No. of Students ^b	120 ^c	1,650	1,950	2,810
No. of Schools ^d	1	4	5	6
Total Floor Area (m ²) ^e	n.a.	10,700	12,700	18,300
Land Area for Building (ha) ^f	n.a.	3.3	3.9	5.6
Playfield (I) Area (ha) ^g	n.a.	5.0	5.9	8.4
Total Land Area (ha)	0.3 ^h	8.3	9.8	14.0
Total				
No. of Schools	4	8	10	12
Total Floor Area (m ²)	n.a.	21,400	25,400	36,600
Total Land Area (ha)	1.4	16.6	19.6	28.0

Notes:

- Assume 7.5% of the total population will be in the intermediate school age groups 12 to 14, divided equally between boys and girls. See Appendix, Planning Standards, Sec. 4-1-3.
- Assume 100% enrollment for 1980 and beyond. See also text.
- Education Office, Najran, 1975. See Najran, Alternative Strategies, Table 5-5-1.
- The projected numbers of schools for 1980, 1985, and 1995 correspond to the phased numbers of sub-communities in those years. See Table 3-4-2.
- Based on 6.5 m²/student. See Appendix, Planning Standards, Sec. A-2-1-4 and A-2-1-5.
- Land area for building includes building area (building coverage), vehicular and pedestrian circulation (including parking), and minimum setbacks and landscaping, 20 m²/student is recommended.
- Based on 30 m²/student. See Appendix, Planning Standards, Sec. A-2-2-6.
- Based on estimated average site area per student of 25 m²/student. A total of 9.8 ha of educational land is shared by 3,907 students. See Najran, Existing Conditions, Vol. I, Fig. 4-2-1, and Alternative Strategies, Table 5-5-1. Land area cited here does not include any proposed schools.

Table 5-1-1 (c)
PROJECTED GENERAL EDUCATION AREA REQUIREMENTS
SECONDARY SCHOOL

	1975 Existing	1980	1985	1995
Planning Population	36,600	44,000	52,000	75,000
Boys				
No. of School age Population ^a	1,370	1,650	1,950	2,810
No. of Students ^b	150 ^c	825	975	1,405
No. of Schools ^d	2(2) ^e	3	3	4
Total Floor Area (m ²) ^f	n.a.	5,800	6,800	9,800
Land Area for Buildings (ha) ^g	n.a.	2.1	2.4	3.5
Playfield (II) Area (ha) ^h	n.a.	4.1	4.9	7.0
Total Land Area (ha)	0.4 ⁱ	6.2	7.3	10.5
Girls				
No. of School Age Population ^a	1,370	1,650	1,950	2,810
No. of Students ^b	-	495	585	840
No. of Schools ^d	-	3	3	4
Total Floor Area (m ²) ^f	-	3,500	4,100	5,900
Land Area for Buildings (ha) ^g	-	1.2	1.5	2.1
Playfield (II) Area (ha) ^h	-	2.5	2.9	4.2
Total Land Area (ha)	-	3.7	4.4	6.3
Total				
No. of Schools	2(2)	6	6	8
Total Floor Area (m ²)	n.a.	9,300	10,900	15,700
Total Land Area (ha)	0.4	9.9	11.7	16.8

Notes:

- Assume 7.5% of the total population will be in secondary school age groups 15 to 17, divided equally between boys and girls. See Appendix, Planning Standards, Sec. A-1-3.
- Assume 50% enrollment for boys and 30% for girls for 1980 and beyond. See also text.
- Education Office, Najran, 1975. See Najran, Alternative Strategies, Table 5-4-1
- The projected numbers of schools for 1980, 1985, and 1995 correspond to the phased numbers of communities in those years. See Table 3-4-2.
- Figures without parentheses indicate the number of existing schools. Figures with parentheses indicate the number of currently proposed schools, approved by the Deputy Ministry for Town Planning Affairs.
- Based on 7 m²/student. See Appendix, Planning Standards, Sec. A-2-1-6 and A-2-1-7.
- Land area for building includes building area (building coverage), vehicular and pedestrian circulation (including parking), and minimum setbacks and landscaping. 25 m²/student is recommended.
- Based on 50 m²/student. See Appendix, Planning Standards, Sec. A-2-2-7.
- Based on estimated average site area per student of 25 m²/student. A total of 9.8 ha of educational land is shared by 3,907 students. See Najran, Existing Conditions, Vol. I, Fig. 4-2-1, and Alternative Strategies, Table 5-5-1. Land area cited here does not include any proposed schools.

5-2 PUBLIC AND INSTITUTIONAL FACILITIES

5-2-1 SKILLS, TRAINING, AND SPECIAL EDUCATION

Distribution of workers by occupation has been estimated by the 5% Sample Survey conducted by the consultant in 1975 and tabulated in a previous report [1]. Some 57% of all workers surveyed were engaged in sales, services, transportation, and communication, which require moderate skills and training. Craftsmen and production workers number about 4.3% of all workers, and those with the highest skills, i.e., professional, technical, managerial, and administrative personnel, number 13% of all workers. These figures, however, are somewhat biased by a number of foreign workers living in the city and engaged in occupations requiring high levels of skills.

Based on the same 5% Survey, percentage composition of population by last school attended has been computed and tabulated in 34% of all males and 9% of females surveyed have completed primary or intermediate education. 6% of males have attended secondary, higher, or night schools, while 2% of females have attended secondary or higher education. As in the case of occupational distribution, the figures are somewhat biased by the presence of foreign workers in the city.

Future social policy for the city should be directed toward improving the educational level of its residents. Since the primary economic base of the city is agricultural, particular emphasis should be placed on vocational training of workers engaged in cultivation and processing of agricultural produce. The Deputy Ministry for Town Planning Affairs has approved the location of a new vocational/technical school for boys, in which agricultural training will be emphasized. It is recommended that this technical school be linked to the agriculture department of the new university in Abha, so that the technical school may serve a broader function of disseminating information concerning agricultural practices.

For female residents of the city, a separate vocational/technical school is proposed. Nutrition, home economics, and other special programs determined by the Directorate of Girls Education will be taught.

There is at present one teacher training school. For 1980 and beyond, it is recommended that there be two such schools, one for boys and one for girls. It is also proposed that the entry level for teacher training schools be upgraded to graduates of intermediate schools.

Projected enrollments and area requirements for technical and teacher training schools are presented in Table 5-2-1.

5-2-2 MOSQUES

According to the Master Plan, each neighborhood should have a small mosque and each sub-community a Jami'a mosque.

5-2-3 HEALTH CARE

Unlike the Tihama sub-region, endemic diseases do not pose a serious problem in Najran. Malaria is virtually unknown in this sub-region, with the exception of some cases in which malaria is contacted by residents while on trips to Tihama. It has been reported, however, that cases of Bilharzia have occurred in Najran [3], due to contamination of wells used for extraction of potable water.

Health problems in Najran, including Bilharzia, are primarily related to problems in general hygiene. In particular, water supply, sewage treatment, and garbage disposal should be immediately improved.

Medical care in Najran in 1975 was provided by one general hospital with 87 beds, one hospital for tropical diseases with 21 beds, three dispensaries, 14 health points or sub-centres, and three quarantine posts [4]. The two hospitals were staffed by six general practice doctors, two specialists, and one dentist [5].

The objectives for future health care policy in Najran should follow the national objectives of the Kingdom to provide a comprehensive system of preventive health services. In particular, health care policy in Najran should strive:

1. To increase the number of modern hospital beds so that by 1980 the standard of 2.5 beds per 100 population will be met.
2. To increase the number of clinics, dispensaries, and other subordinate facilities so that such services are convenient to all sectors of the population.
3. To increase the number of supportive facilities so that it is not necessary for patients to be hospitalized unless there is a real need.
4. To strengthen the system of on-going primary health care and preventive services.
5. To reduce infant mortality to less than 10% by a system specifically directed toward pre- and post-natal care.
6. To establish a program of nutritional education with governmental provision of supplements as necessary.
7. To improve public health supportive systems, such as sanitation, inoculation, and other

means of disease control.

8. To increase the number of physicians to a ratio of 1 per 2,000 population by 1980
9. To establish health education programs.
10. To establish a health administration system with primary responsibility at the local level.

Currently, the Ministry of Health is planning a new general hospital in Bishah, one hospital for obstetrics and gynecology, and one hospital for accidents [6]. Of the three, a site for the new general hospital has already been recommended by the Department of Town Planning, Southern Region.

The following are some of the issues to be considered in the siting and distribution of new health facilities:

1. Najran provides medical services to the entire Najran sub-region. Hence a new facility should be located in an area easily accessible from the various rural communities of the sub-region as well as those in the Najran planning area. Thus the proposed location of the new general hospital east of El Eshash residential area (Fig. 5-2-1) is highly appropriate.
2. According to the Director General of the Ministry of Health, Southern Region, one accident hospital and one gynecology and obstetrics hospital are planned for Najran, in addition to the new general hospital. It is recommended that the three hospitals be located close to one another, forming a single health facilities complex. Advantages of a unified complex include:
 - a. Sharing of personnel, grounds, and facilities.
 - b. Avoiding unnecessary duplication.
 - c. Most efficient use of available resources.

It is recommended that land adjacent to the currently proposed site for the new general hospital be acquired for the new health facilities complex. This area is close to the junction of roads leading to the Najran airport and to Khamis Mushayt. It, in addition a bridge across the wadi is constructed, this site will be highly accessible from all the communities which the hospital must serve.

3. The existing general hospital in Suq Najran should be converted to an out-patient clinic, after the new general hospital is completed. The present site is appropriate for out-patient services, since:
 - a. It is located in Suq Najran and accessible to the large segment of Najran's population living in the western portion of the valley and further inland.

- ◆ higher and special education
- mosque (⊕ existing)
- ▨ hospital
- ▲ pharmacy
- public administration
- * cemetery
- historic conservation
- ⋯ planning area boundary

FIGURE 5-2-1
1995 PROPOSED
PUBLIC, CULTURAL
AND INSTITUTIONAL
LAND USE

scale 1:50,000

- *1 museum
- *2 ruins of UKHQUB

NOTE:

Proposed new small mosques, pharmacies, diagnosis and treatment centers are tabulated in Table 3-1-3, Community Structure and Facility Distribution, and schematically shown in Fig. 3-1-1.



- b. It is located at the edge of the town, away from the commercial areas of Suq Najran.

Table 5-2-1
EDUCATIONAL INSTITUTIONS OTHER THAN GENERAL BOYS AND GIRLS SCHOOLS

	1975 ^a	1980	1985	1995
Boys Teacher Training School				
No. of Students ^b	205	250	290	420
No. of Schools ^c	1	1	1	1
Total Floor Area (m ²) ^d	1,600	2,000	2,300	3,400
Total Land Area (ha) ^e	0.6	0.8	0.9	1.3
Girls Teacher Training School				
No. of Students ^b	140	165	195	280
No. of Schools ^c	1	1	1	1
Total Floor Area (m ²) ^d	1,100	1,300	1,600	2,200
Total Land Area (ha) ^e	0.4	0.5	0.6	0.8
Boys Technical School^f				
No. of Students ^b	205	250	290	420
No. of Schools ^c	1	1	1	1
Total Floor Area (m ²) ^d	1,600	2,000	2,300	3,400
Total Land Area (ha) ^e	0.6	0.8	0.9	1.3
Girls Technical School				
No. of Students ^b	140	165	195	280
No. of Schools ^c	1	1	1	1
Total Floor Area (m ²) ^d	1,100	1,300	1,600	2,200
Total Land Area (ha) ^e	0.4	0.5	0.6	0.8
Total				
No. of Schools	2	2	2	2
Total Floor Area (m ²)	5,400	6,600	7,800	11,200
Total Land Area (ha)	2.0	2.6	3.0	4.2

Notes:

- Figures for 1975 indicate the required number and size of schools, if the recommended standards are to be satisfied.
- Number of students enrolled in teacher training schools is assumed to be equivalent to 15% of boys aged 15 to 17 and 10% of girls aged 14 to 17. Same standards are used for technical schools. Unlike the students in secondary schools, who are assumed to be residents of Najran, students in teacher training and technical schools will come from a wider area within the Najran sub-region.
- Due to small expected enrollment in these schools, it is recommended that a single building be constructed for joint use by the boys teacher training and boys technical programs; a separate building should be constructed for use by girls teacher training and technical schools.
- Based on 8 m²/student. See Appendix, Planning Standards, Sec. A-2-1-8 and A-2-1-9.
- Based on 30 m²/student. These areas do not include grounds for athletic activities. The playfields of secondary schools should be shared with the students of teacher training and technical schools.
- Same as agricultural/vocational school, proposed by the Ministry of Education, to be located at the present site of the livestock market east of Suq Najran.

Table 5-2-2 (a)
PROJECTED HEALTH CARE FACILITIES AREA REQUIREMENTS
NEIGHBORHOOD AND SUB-COMMUNITY FACILITIES

Neighborhood Pharmacy	1975 Existing or Approved Proposal	1980	1985	1995
No. of Facilities	2	16	21	26
Total Gross Floor Area (m ²)	n.a.	2,200	2,600	3,800
Total Land Area (ha)	n.a.	1.6	2.1	2.6

Sub-Community No.	1975 Existing or Approved Proposal	1980	1985	1995
1.1 Gross Floor Area (m ²)	n.a.	130	130	130
Land Area (ha)	0.5 ^a	0.4	0.4	0.4
1.2 Gross Floor Area (m ²)	n.a.	110	110	120
Land Area (ha)	1.5 ^b	0.3	0.3	0.4
2.1 Gross Floor Area (m ²)	n.a.	120	140	180
Land Area (ha)	0.2 ^c	0.4	0.4	0.5
3.1 Gross Floor Area (m ²)	n.a.	80	100	150
Land Area (ha)	0.6 ^d	0.2	0.3	0.4
4.1 Gross Floor Area (m ²)	n.a.	--	--	80
Land Area (ha)	0.2 ^e	--	--	0.2
4.2 Gross Floor Area (m ²)	n.a.	--	--	90
Land Area (ha)	0.1 ^f	--	--	0.2

Notes:

- a. Red Crescent and Clinic proposed in P.D. 1.1.3b by the Deputy Ministry.
- b. The existing General Hospital should be maintained for community and sub-community health care services.
- c. Located in Al Faisaliyah, P.D. 2.1.3.c.
- d. Approximately 0.3 ha to be located in Al Faisaliyah Extension and 0.3 ha to be located in the El Eshash Area. If possible these two facilities should be combined into one for greater efficiency.
- e. Red Crescent office to be located in P.D. 4.1.3.
- f. Clinic to be located in P.D. 4.2.3.

Table 5-2-2 (b)
PROJECTED HEALTH CARE FACILITIES AREA REQUIREMENTS
GENERAL AND SPECIAL HOSPITALS

	1975	1980	1985	1995
Extended Service Area Planning Population	47,500	59,000	73,000	107,000
Recommended Size of Community General Hospital No. of Beds ^b	170	210	260	370
Recommended Size of Special Hospital No. of Beds	140	180	220	320
Existing General Hospital No. of Beds	87	87	-d	-d
Land Area (ha)	1.0	1.0	1.0	1.0
Existing Hospital For Tropical Diseases No. of Beds	21	21	-d	-d
Land Area (ha)	0.5	0.5	0.5	0.5
Proposed New General Hospital No. of Beds ^e	-	-	200-500	200-500
Land Area ^f	-	-	12.6	12.6
Proposed Obstetrics and Gynecological Hospital No. of Beds ^e	-	-	-	100-200
Land Area ^g	-	-	-	5.4
Proposed Hospital for Accidents No. of Beds ^e	-	-	-	100
Land Area (ha) ^g	-	-	-	3.6
Total Land Area for Existing and Proposed Facilities (ha)	1.5	1.5	14.1	32.1

Notes:

- a. Population of Najran according to the 1974 National Census. The projected populations for 1980 and beyond are computed by the following methods:
 - (1) Population of the Najran planning area is assumed to grow as indicated in Table 3-1-1.
 - (2) Population of the extended service area outside of the Najran planning area is assumed to grow at the same rate as the rural population of the Najran sub-region. See Southern Region, Preliminary Physical Plan, Table 9-3-4.
 - (3) Population of the extended service area is the sum of (1) and (2).

(continue to next page)

Table 5-2-2 (b) NOTES:
(continued)

- b. Recommended standard is 3.5 beds/1,000 inhabitants. See Appendix, Planning Standards, Sec. A-2-5-3.
- c. Recommended standard is 3 beds/1,000 inhabitants. See Appendix, Planning Standards, Sec. A-2-5-4.
- d. It is assumed that, at the completion of the new general hospital, the existing hospitals will be converted into community out-patient clinics without facilities for hospitalization.
- e. Information on proposed hospitals obtained from Ministry of Health, Southern Region, and Health Office, Abha.
- f. A 335 m x 375 m site has been considered in studies by the Ministry of Health.
- g. Computed at 3.6 ha/bed, approximately equal to the proposed new general hospital.

Table 5-2-3
PROJECTED PUBLIC ADMINISTRATION AREA REQUIREMENTS

	1975 Existing or Approved Proposal	1980	1985	1995
Employment in Government Sector	1,880	2,550	3,330	6,090
Employment in Public Administration	900	1,300	1,700	3,000
Floor Area (m ²) ^a	n.a.	19,500	25,500	45,000
Land Area	19.2 ^b	8.9 ^c	10.4 ^c	18.0 ^c
Parking ^d	-	260	340	600

Notes:

- a. Assuming 15m²/employee. See Appendix, Planning Standards, Sec. A-2-7-4.
- b. Currently planned by the Deputy Ministry in the following areas:

Al Faisaliyah	14.2
Al Faisaliyah Extension	2.0
Kassarar Quarter	3.0
Total	19.2

- c. Assuming FAR = 4.0
- d. Assuming 1 space per 5 employees.

5-2-4 PUBLIC
ADMINISTRATION

Although some ministry branches are located in Najran, it is the regional commercial rather than the administrative center. Al Faisaliyah has a very large administrative sector. The city's municipal administration facilities are generally located near the central district, but are scattered and not unified in a coherent manner. The existing area, however, is deemed sufficient through 1995.

5-3 CULTURAL
FACILITIES

5-3-1 HISTORIC & CULTURAL
CONSERVATION

Historic conservation should be designated and protected from the encroachment of new development. This includes obsolescent and decaying houses in the center city as well as some of the beautiful traditional housing clusters in the old agricultural settlement adjacent to the city along the wadis. The former might become museums and the latter tourist sites in future parks.

5-4 COMMERCIAL
FACILITIES

5-4-1 EXISTING COMMERCIAL
AREAS

The commercial activities of Najran are distributed along the airport road with a concentration towards the eastern end at the intersection of the north-south road.

5-4-2 PROPOSED DISTRIBUTION OF MAJOR COMMERCIAL ACTIVITIES

Presently the flow of products into the city is rather unsophisticated. Trucks bring goods directly to retail shops, causing a great deal of congestion and confusion. The Plan proposes to establish a distribution center at the edge of the city. The distribution center will receive large amounts of goods, store them, and slowly circulate them into the city, thereby increasing efficiency.

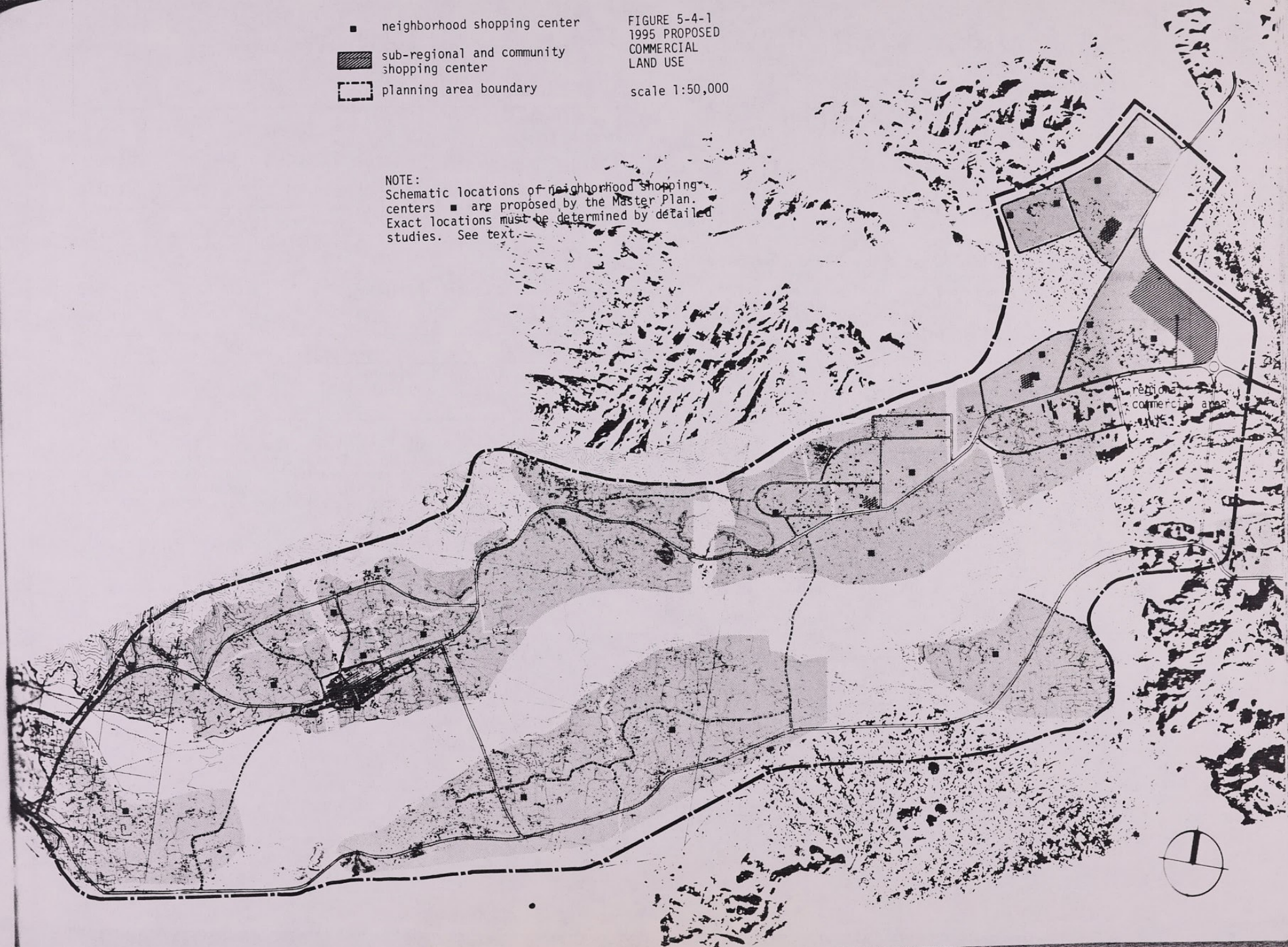
Major regional and citywide commercial activities will be concentrated between the juncture of the Khamis Mushayt and Airport Roads. As the population of the urban area increases, so will the floor space devoted to regional commercial activities. Goods such as clothes, furniture and household equipment will be found in the regional center at the intersection of the two roads, while a smaller and less diverse community commercial area will be located in Suq Najran. A civic center will be situated between the two along the main road south of the wadi.

- neighborhood shopping center
- ▨ sub-regional and community shopping center
- ⋯ planning area boundary

FIGURE 5-4-1
1995 PROPOSED
COMMERCIAL
LAND USE

scale 1:50,000

NOTE:
Schematic locations of neighborhood shopping centers ■ are proposed by the Master Plan. Exact locations must be determined by detailed studies. See text.



5-4-3 PROJECTED DISTRIBUTION OF NEIGHBORHOOD COMMERCIAL ACTIVITY

Each neighborhood will have a shopping center. Neighborhood centers should be within five to ten minutes walking distance, integrated with other facilities and along a local distribution road connecting the center of the neighborhood to the sub-community. The neighborhood centers should house a food market, drug store, barber shop, laundry, dry cleaning facility, restaurant, etc.

5-5 NEIGHBORHOOD AND COMMUNITY CENTRAL AREAS

Each hierarchical unit within the four communities should have its central area, including the neighborhood whose focal point would be the school. These centers will dispense public services and amenities to the residential areas surrounding them.

South of the Wadi, the Deputy Ministry for Town Planning Affairs has planned a new development district (1.2.5) with elementary schools for boys and girls. This development is expected to serve as a central area for both neighborhoods 1.2.4 and 1.2.5 until 1985.

All the neighborhoods in community 4 as well as 3.1.1 contain areas of community services which can act as neighborhood and community central areas.

5-5-2 DISTRIBUTION OF COMMUNITY CENTERS

In keeping with the above policy, each community, sub-community, and neighborhood will have at least one facility for education, recreation, religion, health, commercial activities, social or cultural affairs, and some open space. Needless to say, the emphasis of the particular facilities will vary depending on the unit discussed. For instance, although every community has its own secondary schools, mosque, park, commercial area, community center and health facility, the focus of the community is around the shopping area and cultural facilities such as museums and libraries. In the sub-communities, the focal point is the Jami'a mosque, around which the diagnostic treatment centers will also be located, while in the neighborhood the school and shopping area provides the nexus.

The community centers are situated to provide easy access and service each community's needs, to be integrated with the commercial and public facilities.

Table 5-4-1
PROJECTED COMMERCIAL AREA REQUIREMENTS

	1975 Existing	1980	1985	1995
Neighborhood Commercial				
No. of Neighborhood Commercial Areas	4	16	21	26
Total Sales Floor Area (m ²)	4,800 ^a	16,500	19,500	28,100
Total Land Area (ha)	6.2 ^b	13.2	15.6	22.5
Community Commercial				
No. of Community Commercial Areas	1	3	3	4
Total Sales Floor Area (m ²)	2,100 ^c	6,600	7,800	11,200
Total Land Area	2.6 ^c	3.3	3.9	5.6
Regional Commercial				
Total Sales Floor Area (m ²)	-	-	-	11,200
Total Land Area	-	-	-	5.6

Notes:

- In Suq Najran, there are 5,070 m² of permanent shops and 1,220 m² of temporary shops. See Fig. 6-2 Najran, Initial Appraisal of Existing Conditions. It is assumed that there are one-tenth as much commercial space in Al Faisaliyah as there are in Suq Najran. It is also assumed that 70% of all the commercial facilities may be classified as neighborhood commercial.
- 70% of total of commercial lands in Suq Najran and Al Faisaliyah. See Table 4-2-1, Najran, Existing Conditions.
- It is assumed that 30% of existing facilities may be classified as community commercial.

- * neighborhood center
- planning area boundary
- * community/civic center

FIGURE 5-5-1
1995 PROPOSED
NEIGHBORHOOD
AND COMMUNITY
CENTRAL AREAS

scale 1:50,000

NOTE:
This is a schematic representation
of central areas proposed by the
Master Plan. Exact locations must
be determined by detailed studies.
See text.



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ties sector of each area and to be of sufficient scale that they become magnets capable of attracting a city-wide population.

Several criteria have been used to determine the location of the sub-community centers: space, direct access and therefore proximity to major distributor roads, as well as a spatial centrality to a growing population. In some cases it has been possible to satisfy the above requirements and have the community center for one area double as the sub-community center for another, thereby maximizing land use.

Neighborhood centers should be central to the population, near the local mosque, park, and shopping area, providing a meeting place for residential activity as well as facilities for adult education, small libraries, and entertainment.

CHAPTER 5 NOTES:

1. Najran, Existing Conditions, Vol. I, Table 3-2-4.
2. Najran, Existing Conditions, Vol. I, Tables 3-2-6 and 3-2-7
3. From interviews with Dr. Bashir Haqi, Director General, Ministry of Health, Southern Region, and Dr. Al Sayed Hilali, Director of Health Office, Abha.
4. Ministry of Health. See Southern Region, Existing Conditions, Vol. 0, Tables 8-2-12 and 8-2-13.
5. Ministry of Planning, 1971, and Ministry of Health, 1975. See Southern Region, Existing Conditions, Vol. I, Table 8-2-14.
6. Ministry of Health, Southern Region, and Health Office, Abha.

6. recreation and conservation

6-1 RECREATION

6-1-1 EXISTING RECREATION AREAS

Currently in Najran, there are no organized sports or recreation facilities. Such activities are important for many reasons, including:

1. Provision of outdoor physical activities for children and adults, particularly those whose work does not allow sufficient exercise for good health and for children in school.
2. Provision of an amenity to make the Southern Region a more attractive place to live and to stem the flow of out-migration
3. Making the urbanized area more aesthetically pleasant.

6-1-2 POLICY AND REQUIREMENTS FOR RECREATIONAL DEVELOPMENT

Reference is made in the Planning Standards to land area requirements for recreational purposes. These range from specifying a .05 ha "tot lot" for roughly every 250 residents, to a 12+ ha community park for a city of 30,000 population. These are arranged in a hierarchical fashion of increasing size and number of people served. Again, the tot lot is the lowest, followed by the playground, two types of sports fields, and the neighborhood and city parks which allow for many types of activities. The standard specifies the distribution of recreational land via type of facility.

It might seem that recreation would be a low priority development need in comparison with commercial or industrial development; but it is an important sector of the overall growth process. It can improve living conditions significantly if properly handled, but if ignored the opportunity may be permanently lost. Thus implementation of the recreation elements of the plan should take place concurrently with the others.

6-1-3 RECREATIONAL LAND USE

Recreational land use requirements have been computed on the basis of projected population of the Najran planning area and recreational planning standards contained in the appendix to the Preliminary and Final Physical Plan of the Southern Region. The resulting land areas are tabulated in Table 6-1-1.

Three general types of recreational land use are proposed:

1. Neighborhood recreation, consisting of a range of open space activities from tot lots to neighborhood parks.

With the exception of playgrounds for elemen-

tary schools, discussed below, it is recommended that the various neighborhood level recreational spaces be planned in such a way as to form a linear network of pedestrian paths linking the various social and commercial facilities which serve the neighborhood. The elementary school, the mosque, the neighborhood commercial center should all be accessible by such a pedestrian way. Thus, the neighborhood park is not a single, large area but an elongated, linear park. See Fig. 6-1-1. for suggested plan of this neighborhood recreation space.

2. Community and City Parks
These parks provide passive recreation for the residents of the communities and the city. The parks should also act as linear connectors of community and city level cultural and religious facilities.
3. Playgrounds and playfields associated with elementary, intermediate and secondary schools. Strictly speaking, these areas are acquired and maintained by the Ministry of Education or by the Directorate of Girls Schools. As such, these sites cannot be included in the city's parks and recreation program. From a more general point of view, however, the playgrounds and playfields are recreational uses of the land. Furthermore, it is recommended that, during non-school hours, the grounds be made available to members of the community at large.

6-2 TOURISM

On a regional and national scale, there is a potential for tourism in Najran. There are a number of archeological sites and ruins in the area. One example is the noted historical ruins of Ukhud. At present, however, no one is permitted to enter the ruins of Ukhud until survey and conservation efforts can be completed.

There are also plans to maintain the old mud castle as a tourist attraction. Proposals include establishing a museum inside, which could attract tourists to Najran.

The nearby desert Rub al Khali, as well as the surrounding mountains and valley, could also become tourist sites.

If the above sites succeed in bringing visitors to Najran new lodgings and eating facilities will be needed. Hotels should be built in the Regional Commercial Center as well as in Suq Najran.








-  community/city park
-  playfield (level 1)
-  playfield (level 2)
-  school playground
-  neighborhood park
-  park open space network
-  planning area boundary

FIGURE 6-1-1
1995 PROPOSED
RECREATIONAL
LAND USE

scale 1:50,000



Table 6-1-1
PROJECTED RECREATIONAL AREA REQUIREMENTS

	1975 ^a	1980	1985	1995
Planning Population	36,600	44,000	52,000	75,000
Neighborhood Recreation				
No. of Tot Lots ^b	146	176	208	300
Total Land Area (ha) ^c	7.3	8.8	10.4	15.0
No. of Nursery/Kindergarten Play Lots ^d	37	44	52	75
Total Land Area (ha) ^e	7.4	8.8	10.4	15.0
No. of Neighborhood Parks ^f	14	16	21	26
Total Land Area	18.3	22.0	26.0	37.5
No. of Playgrounds ^h	28	32	42	52
Total Land Area (ha) ^j	14.0	16.8	19.8	28.6
Total Neighborhood Recreational Area (ha)	47.0	56.4	66.6	96.1
Sub-Community Recreation				
No. of Playfields ^k	6	8	10	12
Total Land Area (ha) ^l	8.2	10.0	11.8	16.8
Community Recreation				
No. of Playfields II ^m	4	4	6	8
Total Land Area (ha) ⁿ	5.5	6.5	7.8	11.2
No. of Community Parks ^p	2	3	3	4
Total Land Area (ha) ^q	14.6	17.6	20.8	30.0
Total Community Recreational Areas (ha)	20.1	24.2	28.6	41.2
City Recreation				
Total City Park Land Area (ha) ^r	14.6	17.6	20.8	30.8
Total Recreational Land Use Area (ha)	89.9	108.2	127.8	184.1
Total Recreational Area Less School Associated Playgrounds and Playfields (ha) ^s	62.2	74.8	88.4	127.5

Table 6-1-1

Notes:

- a. Figures for 1975 indicate the number and size of facility, if the recommended standards are to be satisfied.
- b. Estimated on the basis of service population of 250 per tot lot. Planning Standards, Sec. A-2-2-1.
- c. 500 m²/tot lot.
- d. Service population of 1,000 per play lot. Planning Standards, Sec. A-2-2-2.
- e. 2,000 m²/play lot.
- f. One park per neighborhood. Planning Standards, Sec. A-2-2-3.
- g. 5 m²/inhabitant.
- h. One playground per elementary school. It is necessary to allocate separate playgrounds to boys and girls schools.
- i. In terms of acquisition, service, and maintenance, playgrounds and playfields I and II, should included in the area requirements for elementary, intermediate, and secondary schools, respectively, since the major user of these grounds is the school athletic program. They are included here solely to illustrate the overall recreational land use of the city.
- j. 20 m²/elementary school student. See Table 5-1-1a.
- k. One playfield I per intermediate school. It is necessary to allocate separate playfields to boys and girls schools. Students from teacher training and technical schools should also have access to these fields.
- k. One playfield I per intermediate school. It is necessary to allocate separate playfields to boys and girls schools.
- l. 30 m²/intermediate school student. See Table 5-1-1b.
- m. One playfield II per secondary school. It is necessary to allocate separate playfields to boys and girls schools. Students from teacher training and technical schools should also have access to these fields.
- n. 50 m²/secondary school student, see Table 5-1-1c.
- p. One park per community. Planning Standards, Sec. A-2-2-5.
- q. 4 m²/inhabitant.
- r. One large park for use by all the residents of the Najran planning area. 4 m²/inhabitant. Planning Standards, Sec. A-2-2-8.
- s. Total recreational area excluding playgrounds and playfields I and II. This area is the proper component of the city's parks and recreation program.

6-3 OPEN SPACE AND
COASTAL CONSERVATION

As mentioned in an earlier chapter, availability of open space is not an issue in Najran. To maintain its desirability for development, however, it will be necessary to adopt guidelines to curb tendencies toward urban sprawl or overdevelopment which could potentially lead to crowded conditions.

It has already been suggested that no development occur on prime agricultural lands or on the wadis bed. An additional stipulation might consider prohibiting any building within a certain distance of the wadi in order not to further constrain crossing or to create discontinuity of the cityscape by allowing development to march right up to the banks of the wadi and then abruptly stop, only to be continued again on the distant bank.



7. primary communication and transport

7-1 GENERAL

7-1-1 CITY LOCATION

Located in the Southern portion of the Southern Region bordering Yemen, the City of Najran has been considered traditionally an agricultural village as well as the administrative and commercial center for the more than 300 villagers surrounding it. Bounded by mountains to the North and West, it has good water availability and fertile soil, but is isolated from other parts of the country. Khamis Mushayt, some 300 kilometers to the Northwest, receives vegetables and other agricultural commodities from Najran, while administrative functions depend totally on Abha and Riyadh, some 300 and 1,300 kilometers to the North respectively. Besides agriculture, Najran functions as a potential center for tourism, with many historical Hymyaritic ruins located there, and most importantly, as a strategic defense stronghold for the Kingdom, due to its proximity to Yemen.

7-1-2 URBAN DEVELOPMENT

Expansion of Najran has been Eastward and Southward away from the major farmlands along a narrow belt by a wadi containing the only major highway in the City. Urban development has begun with the establishment of the "New City" Najran, or "Al Faisaleyah", some 10 kilometers East of the "Old City" Najran or "Suq Najran". Al Faisaleyah will function as the New City centre of activity, commercial, governmental, etc. Although Suq Najran will decrease significantly in population and commercial importance, it will still carry on, but to a lesser degree, as an activity centre. Due to the development of trend, and physical restriction of the transportation network, generated traffic has to be accommodated on only a few major arterials resulting in high traffic flows through the cities. Traffic volume in the Old City is anticipated to grow two-fold, and in the New City nearly nine-fold by 1995. This projected population growth has to be carefully incorporated in the planning of a safe and efficient transportation system.

7-2 LAND USE/TRANSPORTATION STUDY

7-2-1 OBJECTIVES

The principal objectives of this study are:

1. To satisfy the long-term travel demands of the city of Najran through the establishment of an effective transportation system, and

2. To provide a practical basis for the phasing of construction relative to the expanding needs of the city of Najran.

7-2-2 TRANSPORTATION PROCEDURE

The transportation planning procedure is based on the extension of present travel habits relative to known trends in national prosperity and vehicle ownership to project and predict future travel demands. Existing travel characteristics for the city of Najran were derived from the analysis of data obtained from home interviews and roadside traffic surveys carried out in 1975 and basic information on land use, population and employment obtained from planning surveys. Based on the available data described above, the predicted total number of trips generated and attracted to each traffic zone of the city is distributed and assigned to the road network. Thus, future highway requirements are determined and future demands for parking and terminal facilities are derived.

7-2-3 TRAFFIC PLANNING METHODOLOGY

Although a very detailed account of the traffic survey methodology would take far too much space to be presented here, a detailed and comprehensive survey was conducted which is outlined below:

1. Information gathering - the following classes of data were collected:

A. Socio Economic Survey. This information was gathered as a comprehensive 5% sample survey, as called for in the agreement, and provided valuable background material applicable to both qualitative and quantitative interfacing with actual traffic data gathered in specific traffic surveys. In the course of the URTEC 5% survey conducted by this consultant certain numbers of the population of the city were interviewed in their homes, and were asked questions such as how many and what type of vehicles were owned or used by them, and for what purposes. Based on the 5% survey, the number and type of vehicles in the city at the time of the survey has been estimated as follows:

Sedans	- 200
Station Wagons	- 80
Pick-up Trucks	- 120
Jeeps	- 380
Large Trucks	- 660
Total	-1440

B. Manual Traffic Volume Counts. These data are of various types. Straightforward volume counts conducted at locations iden-

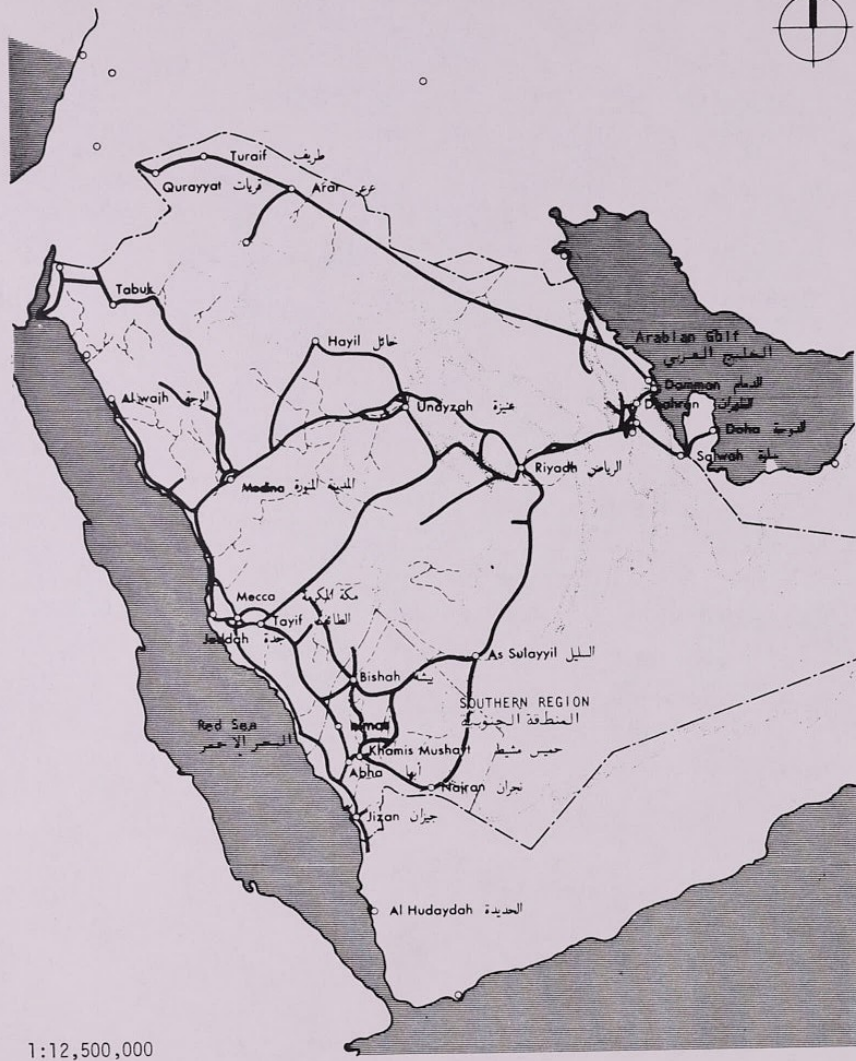


FIGURE 7-1-1
NATIONAL
ROAD NETWORK



FIGURE 7-1-2
REGIONAL
ROAD NETWORK

tified in the Existing Conditions report (Volume II), and subsequent additional counts done to account for traffic patterns established by the recent completion of new roadways. Such counts were conducted at strategic locations within the city to determine both basic volume and turning movements of intra-city traffic, and were conducted at all arterial highways leading from the city to determine inter-city traffic movements. On the basis of these manual counts an accurate idea of straight line volume turning movements, intra- and inter-city volumes for the existing situation was determined.

C. Manual Mode Counts. These counts were done independently of the 5% survey, to establish an accurate idea of actual mode use on the roads and to act as a general check of proportional information gathered in the household survey. Table 7-2-1 indicates traffic volume by type or mode as counted at three points (TO1, TO2, TO3, as identified in the Existing Conditions report, Volume II, figure 7-1).

D. Commodity Flow Survey. During field traffic counts, interviews were conducted with drivers to determine commodity flow. This was done primarily to determine such flow between cities since intra-city commodity flow is not considered as important at this level of planning, and to some extent can be indirectly inferred from intra-city origin - destination analysis. Refer to the Southern Region Existing Conditions, FIGURE 7-1-3 for a graphic representation of commodity flow between cities of the Southern Region.

E. Origin Destination Survey. Comprehensive origin-destination surveys were conducted by traffic engineering consultants to determine both locational and purpose parameters for trips. To show a complete set of locational origin-destination elements here would be overly complicated for the general level of this report. However, in Najran the city was divided into 16 districts for planning purposes.

population, traffic generators and traffic routes were determined within and between these districts so that desire lines for 1995 traffic could be established. A percentage breakdown of trip purpose elements is shown in Table 7-2-2.

Table 7-2-1
TRAFFIC VOLUME BY TYPE (MODE)
(VEHICLE/WEEK)

	Motor Cycle	Sedan	Wagon	Taxi	Jeep	Bus	Pickup	Truck	Military	Total
TO 1 from	94	371	222	673	498	42	1,467	397	181	3,945
to	73	459	112	769	449	32	1,523	311	180	3,905
TO 2 from	96	497	166	874	612	41	2,448	348	503	5,585
to	96	468	127	940	680	31	2,824	336	530	6,032
TO 3 from	190	868	388	1,547	1,110	83	3,915	745		9,530
to	166	927	239	1,709	1,129	63	4,347	647		9,937
G.Total	356	1,795	627	3,256	2,239	146	8,262	1,392	1,394	19,467

Table 7-2-2
ORIGIN DESTINATION COMPOSITION BY PURPOSE (PROPORTIONAL)

	Going to Work	Busi- ness	Shop- ping	Re- crea- tion	Home	Receiv- ing and Loading	Delivery and Un- loading	Others	Total
Origin	0.148	-	0.133	0.090	0.050	0.182	0.164	0.232	1.000
Destination	0.184	-	0.534	0.020	0.060	0.029	0.070	0.104	1.000
Total	0.170	-	0.379	0.047	0.056	0.088	0.106	0.153	1.000

Source: URTEC O.D. Survey 1974 - 1975

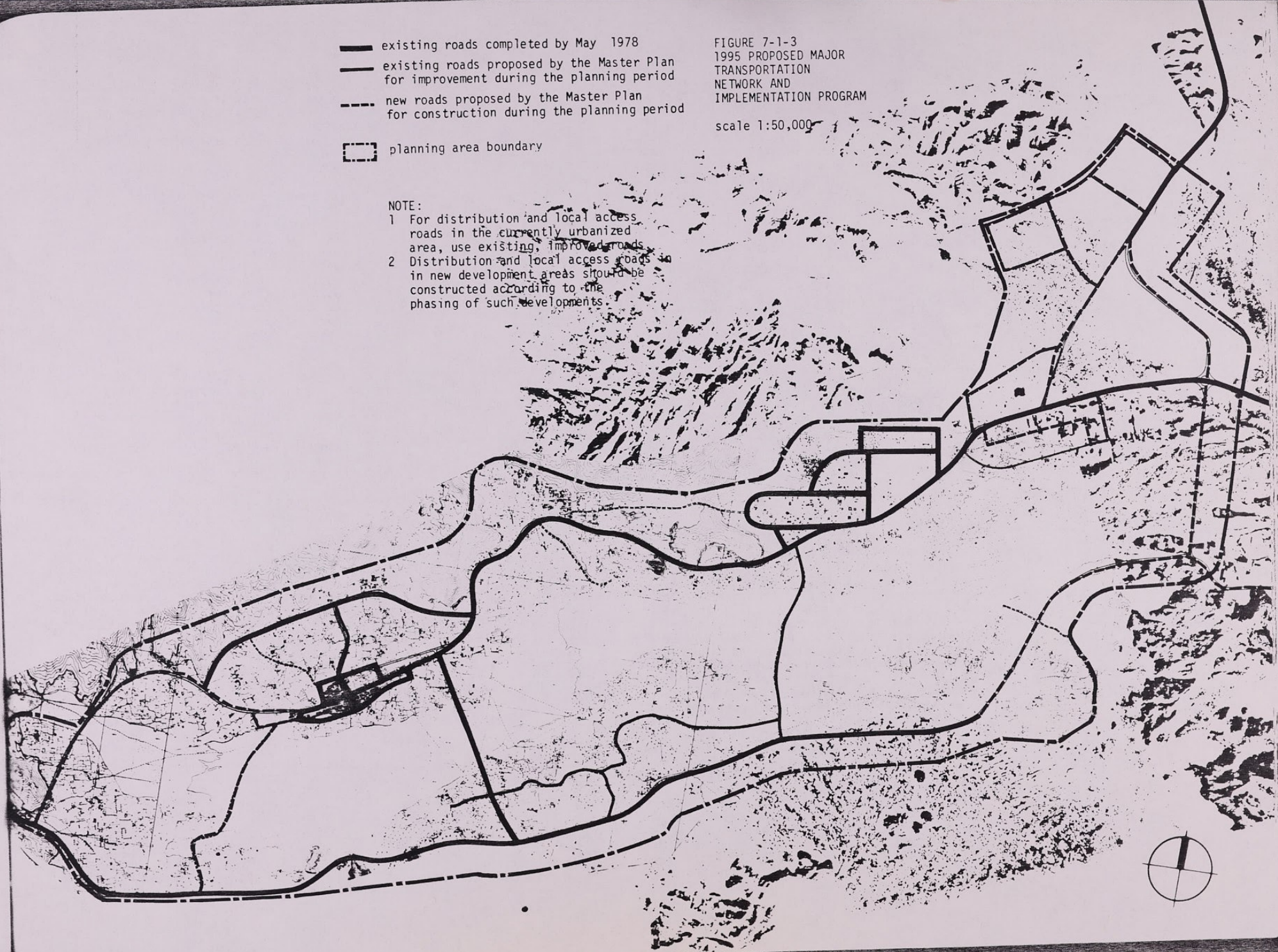
- existing roads completed by May 1978
- existing roads proposed by the Master Plan for improvement during the planning period
- - - new roads proposed by the Master Plan for construction during the planning period
- planning area boundary

FIGURE 7-1-3
1995 PROPOSED MAJOR
TRANSPORTATION
NETWORK AND
IMPLEMENTATION PROGRAM

scale 1:50,000

NOTE:

- 1 For distribution and local access roads in the currently urbanized area, use existing, improved roads.
- 2 Distribution and local access roads in new development areas should be constructed according to the phasing of such developments.



The trips were distributed using the gravity method and transportation planning techniques. This method uses distance as an inverse function of trip volume. Distance is stated in terms of travel time which is raised to exponential power to account for its restraining effect. The model can be stated as follows:

$$T_{ij} = \frac{T_i S_j / D_j^n}{(S_x / D_{ix}^n)}$$

Where S_j = "attraction" factor at j .
 S_x = "attraction" factor at any zone x .
 D_{ij} = distance or travel time from i to j .
 D_{ix} = distance or travel time from i to any zone x .
 n = friction exponent or restraining influence.

The "attraction" factor may be expressed in any meaningful way. For example, the logical measure of attraction for work trips would be the number of jobs in the zone.

When the number of trips between pairs of zones have been calculated they were assigned to routes of the appropriate transportation network using minimum friction path method. Resistance to travel was measured in units of time.

A computer evaluation based on iterative procedures was conducted with certain established parameters held constant. Based upon this iterative computer program, the traffic volume assignment was made (see FIGURE 7-2-1). For Najran (and the process was essentially the same for the other cities in this study) existing land use and future land use based upon this plan were known. Vehicle occupancy and type were determined by traffic field surveys, and future occupancy and composition were assumed based on established trends and conventional guidelines. From these data and assumptions, a modal split was established (for conservative planning due to the extreme uncertainty of the rapidly developing situation, the pedestrian mode was purposely excluded here), trips per person and trips per zone were established and consequently persons per vehicle. Once the programmatic development of a satisfactory figure for trips per person was achieved, this number was held constant and applied to all future years (a standard procedure). From this information and the planned road network, a modal split assignment was made, road capacities determined and road widths were established. For further information regarding

existing traffic and the initial traffic survey, refer to the Najran Existing Conditions report, Chapter 7. Much additional information on existing conditions of traffic is included in Chapter 5 of the Initial Appraisal report, including:

1. Road Hierarchy
2. Road Width
3. Road Section
4. Implementation of Road Pavement
5. Traffic Volume and Capacity
6. Traffic Generation
7. Daily Traffic Flow Variation
8. Parking Space
9. Sidewalk Network
10. Distance from the Center
11. Time from the Center
12. Land and Road System
13. Land and Road Width
14. Land and Traffic Capacity

7-2-4 LAND USE/ TRANSPORTATION STUDY--SUMMARY OF CHANGING DEMANDS

A primary objective is to ensure high standards in the developing areas throughout the city of Najran in the course of creating an efficient transportation system. A policy therefore is founded on three important considerations:

1. To establish an integrated land/use transportation plan.
2. To establish an attractive public transportation system.
3. To establish an efficient commodity distribution network.

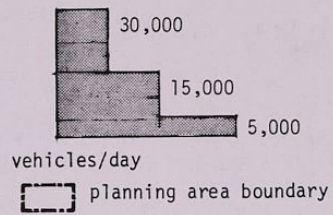
The urban area of the City of Najran is divided by a wadi. A major part of the population is concentrated on the Northern river bank with the agricultural land located to the South. Only two major roads will serve the entire urban area with long bridges spanning over the river. The city is unique in the sense that no major road will continue further West except to serve local agricultural land. All long haul and medium haul traffic will be approaching the city from the East on the road from Khamis Mushayt.

Table 7-2-3
SUMMARY OF TRANSPORTATION DATA

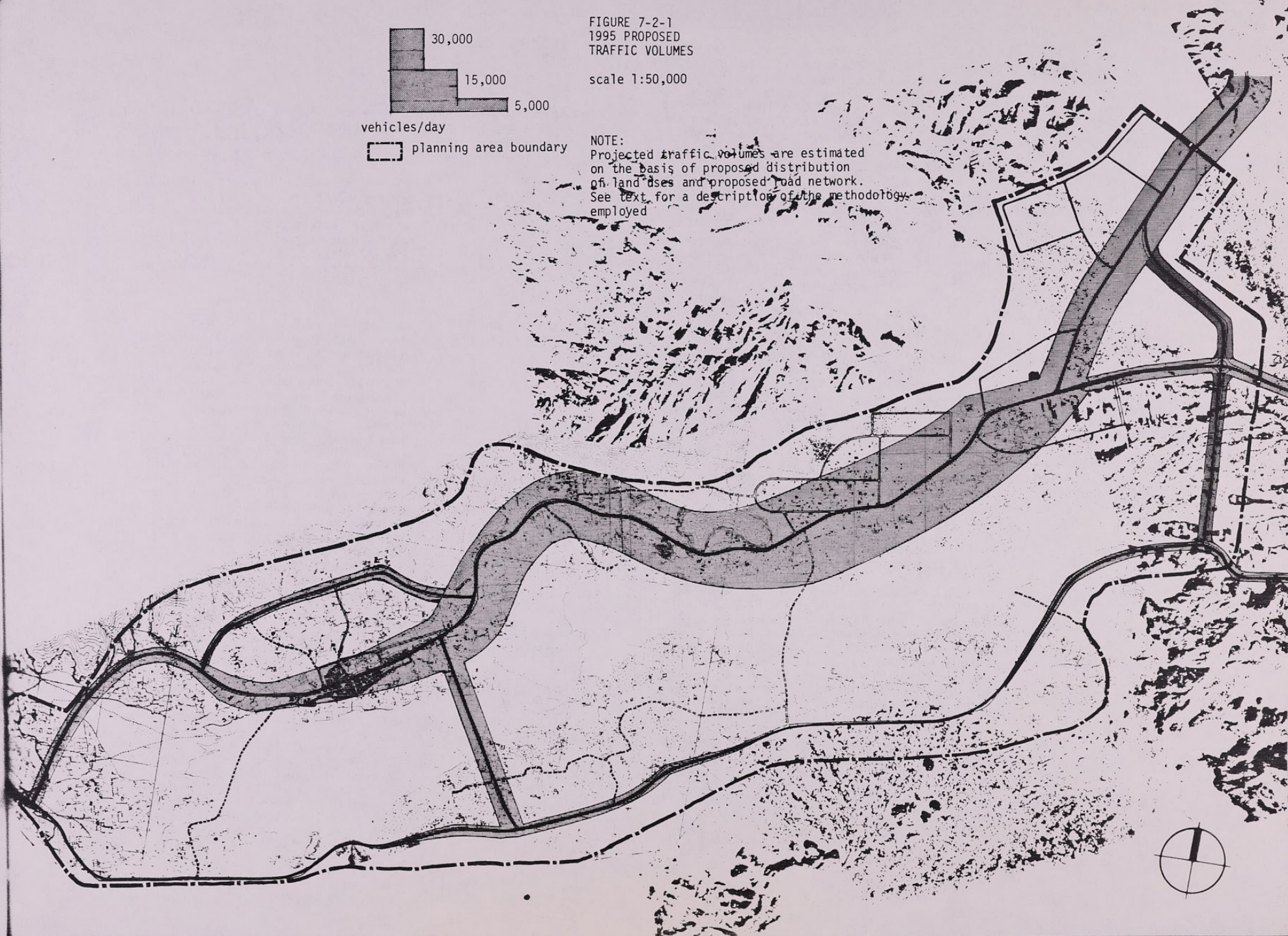
Planning Parameters	1975	1995
Planning Population	27,760	55,000
Jobs	4,200	12,800
Households	4,280	11,200
Vehicle Ownership (per thousand persons)	52.9	185.2

FIGURE 7-2-1
1995 PROPOSED
TRAFFIC VOLUMES

scale 1:50,000



NOTE:
Projected traffic volumes are estimated
on the basis of proposed distribution
of land uses and proposed road network.
See text for a description of the methodology
employed



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7-2-5 LOCAL
SCHEMATIC AND DE-
TAILED DESIGN OF GENER-

The Najran Airport is located approximately 30 kilometers from the Old City of Najran. Vehicular transfer between the airport and the city is made along one road that enters from the Northeast and eventually merges with the main highway from Khamis Mushayt. An estimated 220,000 passengers annually can be expected to enplane and deplane at Najran Airport by 1995, generating traffic to be accommodated along this route.

Two other main traffic generators in Najran are the "New City", Al Faisaliyah, located at the Eastern end of the urban area, and "Old City", Suq Najran, located 10 kilometers further West.

Suq Najran is currently the central commercial district of the Najran Valley. It is to be redeveloped into a commercial center for the Western Najran Valley serving approximately 30,000 people.

Al Faisaliyah is presently being developed as the new government center containing the provincial administrative functions employing approximately 2,000 people. The new government center will be surrounded by a number of medium density residential areas with a total 1,600 households. Just slightly further East of this center will be the residential area of Al Faisaliyah extension containing several hundred additional households.

At the junction of the airport road and the main highway of Khamis Mushayt a new wholesale and distribution industrial park will be located. Located just North of the industrial park a large residential area for 12,000 residents will be developed.

Although the list of commercial, governmental and residential generators seems quite extensive, the major portion of Najran is composed of agricultural land. Because of the physical restraints present to the North and West of the City, the bulk of this agricultural land is located to the South of the city across the wadi. Access to the city is provided by three bridges; one at the extreme West end of the city; another at the extreme East end; and one immediately adjacent to Suq Najran. The agricultural area located directly North of Suq Najran will generate nearly 5,000 vehicular trips along the access road leading to the city.

The general expansion of Najran along the primary highway can be attributed to preservation of agricultural land and to the physical constraints of the mountains bounding the city to the North and West. Because of this linear form of growth, the proposed grid road network in high density urban centers provides an excellent means of linking the main traffic generators as well as a simple means of phasing highway construction.

7-3 PRINCIPAL ROAD NETWORK

7-3-1 ROADWAY CLASSIFICATIONS AND DESIGN CRITERIA

Achievement of good traffic flow continues to depend upon the proper integration of urban and rural roadway networks throughout the vicinities of the city of Najran and throughout the country.

The urban roadway network for the city of Najran will maintain the three principle classification categories already described in the Regional Master Plan, namely primary, secondary and local roads. However, the functional classification of the urban system for the city can be defined in terms of major and minor arterials, collector roads and access roads.

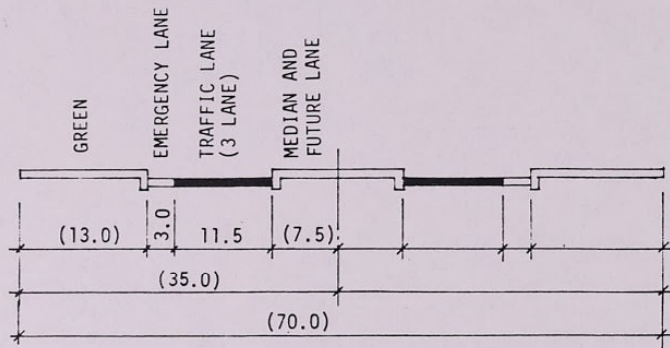
7-3-2 PRIMARY ROAD SYSTEM (V1, V2)

The primary road system will consist of major arterials designed for fairly high speeds with controlled access wherever possible and maximum comfort. Provided no major land use constraints exist along the major arterials, a wide right-of-way should be maintained. This wide right-of-way can be utilized to accommodate possible additional traffic or transit lanes in the future. Design speeds should be established at 80 km/hour in urban areas, increasing to 120 km/hour in rural areas. Horizontal and vertical alignments should correspond to these design speeds. The roadway section will be of two or four lanes with a minimum 3.65 meter lane width. Unlike the primary system described in the Regional Master Plan, the urban primary system will consist mainly of signalized or unsignalized intersections depending on traffic conditions. Grade separations are preferred wherever the physical and economic conditions will allow it.

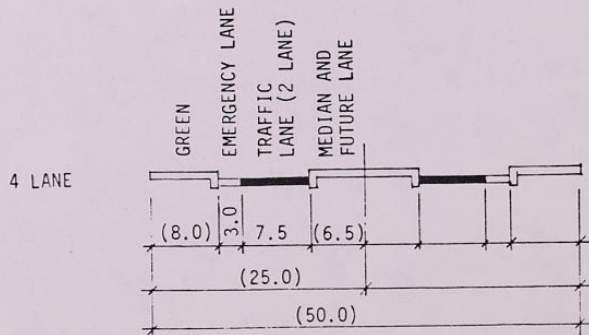
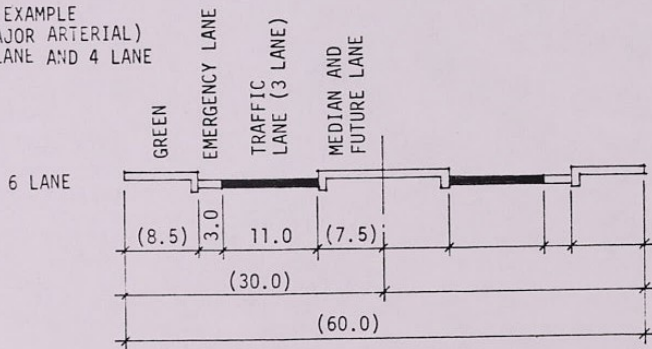
7-3-3 SECONDARY ROAD SYSTEM (V2, V3)

The secondary road system consists of minor arterials and perhaps some collectors designed for traffic volumes and equal or lower speeds than the primary system. These minor arterials should be designed to accommodate the traffic coming into the city from many surrounding agricultural villages. The secondary road system will require less right-of-way than the primary system, but it should be wide enough to accommodate necessary traffic lanes, shoulders and a minimum buffer to protect adjacent areas from air and noise pollution. Horizontal and vertical alignments should correspond to a design speed of 100 km/hour in rural areas and 80 km/hour in urban areas. The roadway section should have two or four lanes with a minimum width of 3.65 meters per lane. Intersections will be signalized or unsignalized depending on traffic conditions.

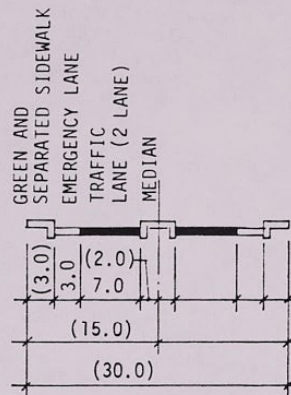
V₁ EXAMPLE
(REGIONAL HIGHWAY)
6 LANE



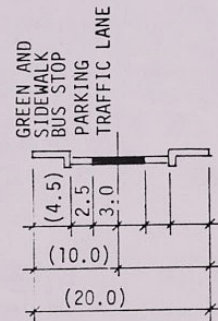
V₂ EXAMPLE
(MAJOR ARTERIAL)
6 LANE AND 4 LANE



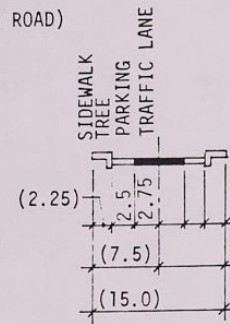
V₃ EXAMPLE
(ARTERIAL)
4 LANE



V₅ EXAMPLE
(DISTRIBUTOR)
2 LANE



V₆ EXAMPLE
(LOCAL ACCESS ROAD)
2 LANE



NOTE: (.) Dimensions can vary depending on the local condition and detail design, sometimes median strip and green zone can even be eliminated where elimination is justified by the detail planning.

FIGURE 7-3-1
ROAD SECTIONS BY
CLASSIFICATION
(EXAMPLE)

7-3-4 LOCAL ROAD SYSTEM (V4, V6, V7)

The local road system consists of mostly local collector and access roads. These local collectors will require minimum right-of-way to allow maximum land utilization. The low design speeds of 60 km/hour maximum is suggested to be compatible with pedestrian traffic and other urban activities.

7-4 PUBLIC TRANSPORT

7-4-1 URBAN BUS TRANSIT SYSTEM

Presently, analysis of the characteristics of trips in Najran show a relatively high percentage of taxi and buses (35%), implying that acceptance of public transportation is already developing. With regard to public transportation there are three major areas of concern, the airport, "New City" Najran and "Old City" Najran. Taxi traffic, even presently is quite heavy between the New and Old City. While airport traffic is low it will increase considerably as development continues.

The concentration of activities in the New and Old City centers and the restriction of traffic to one primary arterial connecting these centers warrants the establishment of an efficient urban bus transit system. Success of attracting potential users depends on a combination of important factors; the size of bus, riding comfort, operating schedules, station locations and transfer points and terminal locations.

7-4-2 SYSTEM LOCATION

The main hub of this public transit system will be located in the center of "New City", Najran (Al Faisaliyah) and stretches out Eastward serving the airport, and Westward serving the "Old City" along the primary roadway. Reservation of a "public transit corridor" along this primary route should be planned for in the acquisition of right-of-way for the eventual implementation of a more sophisticated rapid transit system in the future. Flexible interchange at these main terminal points allowing the efficient transfer between all modes, is essential. Also vital for the success of this transit system is the careful integration of this urban transit system with the regional public transit system discussed in the Regional Master Plan.

Adequate parking facilities at terminal locations are another important factor in the planning of a public transit system and will be discussed in the paragraphs to follow.

7-4-3 OTHER MODES

7-5 TRAFFIC CONTROL POLICY

7-5-1 ROADWAY HIERARCHY

Because of the close proximity of the residential areas to the main city activities, a more localized or "courtesy bus" type transit system should be considered. This system, serving specific residential areas on a regularly scheduled basis, would reduce the number of vehicular shopping trips made to the city center and, consequently, also reduces demand for parking.

Achievement of the fundamental transportation planning and environmental management objectives set forth in the Master Plan necessitates, in the establishment of a clearly defined hierarchy of roads the strict control of important design parameters and the establishment of a well planned training program directed to extending and maintaining the transportation systems. Satisfying these goals will ultimately encourage drivers to make their journeys along the most appropriate roads.

The hierarchy of the road network has been defined previously. Control of certain design parameters is established below.

7-5-2 THE PRIMARY AND SECONDARY SYSTEM

The primary arterial roadway runs East to West connecting the agricultural areas West of Suq Najran with the New City Najran, Al Faisaliyah, and ultimately the airport and the road to Khamis Mushayt. Access to frontage properties and parking on or along this roadway should be restricted and prohibited respectively. In high volume areas, such as the activity centers already discussed, certain vehicles such as motorcycles, donkey carts, etc., should be prohibited.

Interchange spacings should be held to a minimum of 500 meters where possible and the utility services beneath the roadway should be prohibited. Various types of interchanges are possible in each particular situation, however certain types are recommended in the Appendix, Planning Standards, FIGURE A-2-9(c) and A-2-9 (d). In general a right-of-way reservation of 70 meters is recommended.






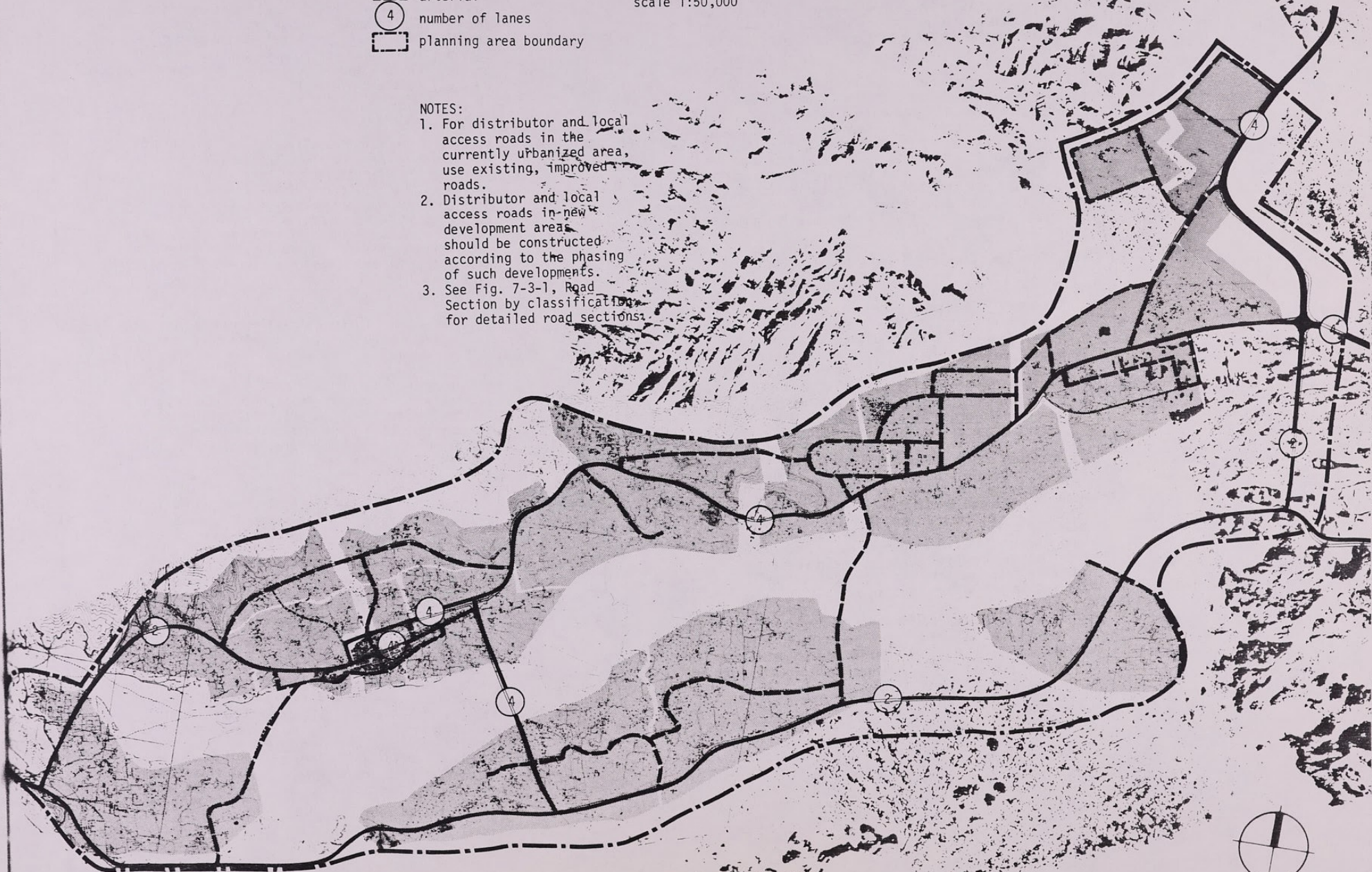
-  regional highway
-  major arterial
-  arterial
-  number of lanes
-  planning area boundary

FIGURE 7-5-1
1995 PROPOSED ROADWAY
NETWORK CLASSIFICATION

scale 1:50,000

NOTES:

1. For distributor and local access roads in the currently urbanized area, use existing, improved roads.
2. Distributor and local access roads in new development areas should be constructed according to the phasing of such developments.
3. See Fig. 7-3-1, Road Section by classification for detailed road sections.



The function of the collector roads is to provide a link between the primary roads and the local residential, industrial, business, agricultural and commercial areas. As redevelopment takes place, an increasing degree of restrictions should be placed on frontage access and street parking where warranted.

In Najran, one major collector is located across the Wadi to the south of the city. It connects the many agricultural areas to the main city centers via three bridges; one at the extreme western end of the city, another directly south of Suq Najran and still another at the extreme eastern end of the city. Projected volumes on this road are low, yet the route is a vital link for Najran's agricultural community. This road also serves a secondary role as a by-pass route for those who wish to avoid center city traffic.

This southern road with its bridges creates, in effect, a large ring road which connects the village in the valley and the city areas to the north of the wadi. Because there is currently no traffic generators or demand on the southern road, projected volumes are low as mentioned before. However the road is a crucial and necessary route. Therefore as a matter of policy activities, facilities and housing should be located south of the wadi in order to attempt to even out the distribution of traffic throughout the valley.

A second major collector links the agricultural areas immediately north of Suq Najran. This section intersects the primary arterial several kilometers northwest and immediately east of the old city providing a by-pass around the city center.

Secondary or minor collectors must be planned for the many residential areas located north, east and northeast of the city center. These roads should facilitate the safe and free movement of traffic within the districts they serve.

For these collector roads, junction spacings should be at a minimum of 200 meters where possible and either signalized or unsignalized depending on volume demands.

7-5-4 LOCAL AND ACCESS ROADS

These roads will provide a link between smaller access roads and the collector system. By design these roads should attract only local traffic for immediate access to residences, shops or offices and should discourage through traffic. Appropriate restrictions should be set with regard to access and street parking to meet particular needs. Utility services should be located in easements adjacent to the travel way.

7-5-5 SAFETY CONSIDERATIONS

To ensure the safe and efficient use of the proposed road system, careful consideration must be given to specific design parameters such as turning movements, visibility requirements and pedestrian movements for each roadway type. Restricting the number of junctions along major roads will increase safety by decreasing possible vehicles and pedestrian conflicts. Where junctions exist, the use of traffic and pedestrian signals is an effective method of traffic control and is strongly recommended.

Mandatory speed limits, strictly enforced by traffic police, is by far the most effective means of safety control.

Perhaps the most important factor in the planning of a safe efficient and environmentally compatible transportation system is the establishment of an adequate training program for the maintenance and operation of the existing or planned transportation systems.

7-5-6 PEDESTRIAN MOVEMENT

The use of pedestrian crossings, both signalized and unsignalized, or grade separation crossings are essential in the segregation of pedestrian and vehicular activities. Restriction of vehicle penetration within the central area, or "pedestrianization" of main shopping streets, not only increases safety but improves the environment as well.

It would be quite impractical to recommend the precise locations of pedestrian crossings that may be needed in the future. The selection of such locations should be based on up-to-date surveys of pedestrian movements within the city and detailed studies of short term developments which might make alternative crossing points more attractive. Pedestrian routes which cross primary roads must be given careful attention, and the construction of pedestrian bridges or subways must be given detailed consideration.




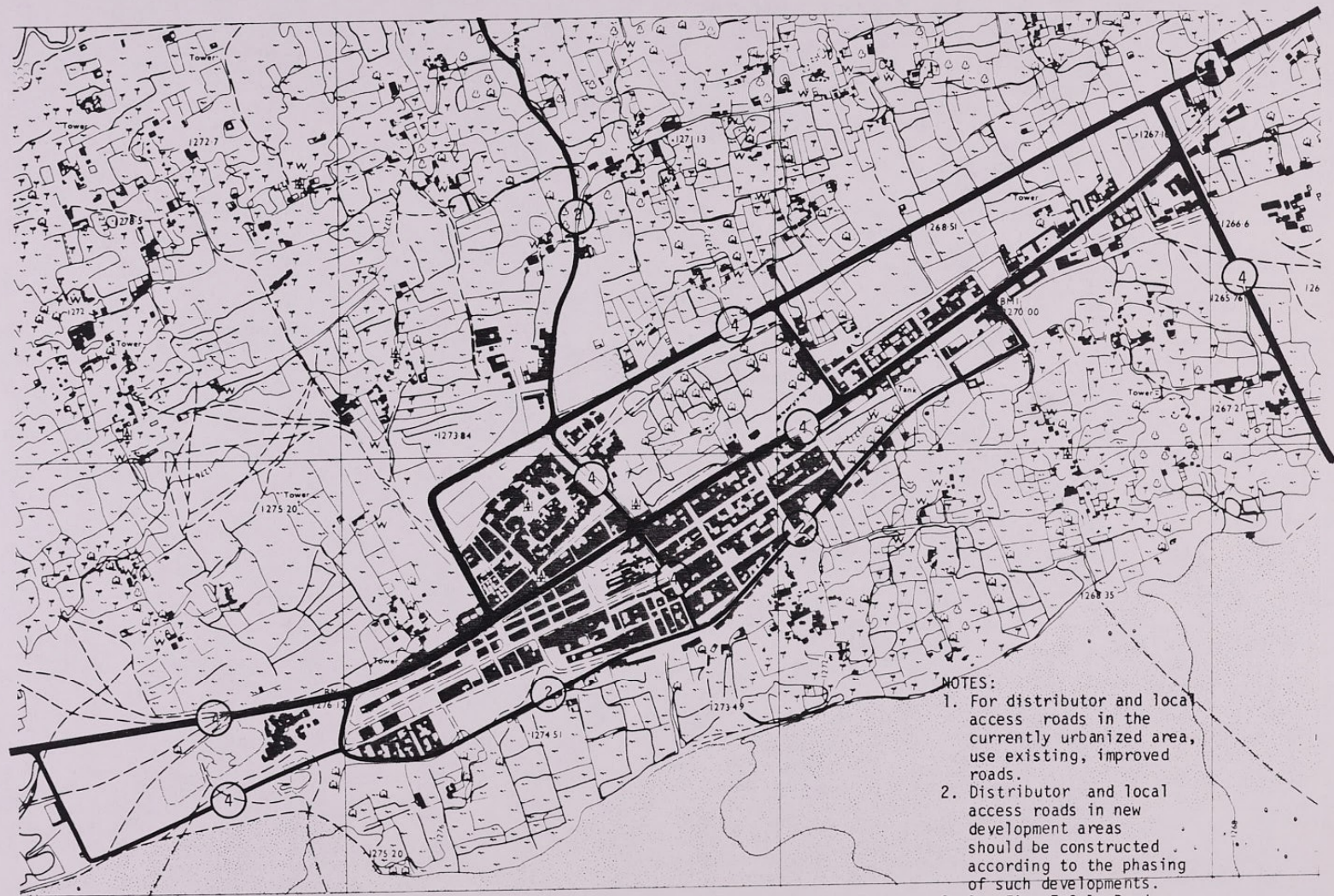
-  major arterial
-  arterial
-  number of lanes

FIGURE 7-5-2
1995 PROPOSED ROADWAY
NETWORK CLASSIFICATION
SUQ NAJRAN

scale 1:10,000



NOTES:

1. For distributor and local access roads in the currently urbanized area, use existing, improved roads.
2. Distributor and local access roads in new development areas should be constructed according to the phasing of such developments.
3. See Fig. 7-3-1, Road Section by classification, for detailed road sections.

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7-6 CAR PARKING POLICY

7-6-1 GENERAL

Increased prosperity will increase vehicle ownership quite substantially by 1995, resulting in increased pressures to control the use of road space and increased conflicts between moving and stationary vehicles. Concentration of commercial and business activities in the city centers will, consequently, be of major concern. Therefore, the main car parking policy for the village cluster must attempt to provide a reasonable balance between the capacities of the car parks and the road system planned for the central area.

7-6-2 GENERAL PARKING DEMANDS

To accommodate the dominant types of trips made by vehicle users, two categories of parking demands exist, namely long and short term parking. Long term parking is attributed to workers employed in the City Center. These long term facilities can be located on peripheral sites providing reasonable access to the work center with walking distances less than 400 or 500 meters. Short term parking attributed to shopping and business trips comprises some 43% of the parking demand. This trend can be expected to continue indicating that priority should be given to accommodating these demands conveniently within or close to the central business district. General locational policies, however, for both types of facility must consider specific proposals for access from the primary feeder road system and, most importantly, the competing demands for land in the central business area, which may highlight the advantages of multi-story car parks.

Present parking data indicate that a continuous parking time of greater than two hours is rare and that two peak periods exist.

Suq Najram, which is currently the central commercial district occupying some eight hectares, will eventually be converted to a secondary commercial area. It is anticipated that this area will still attract approximately 10,000 private vehicles. The new city, on the other hand, will attract a total of nearly 40,000 private vehicles to its commercial and government centers, of which nearly 30,000 will be employees or long-term parking. Provision, then, should be made to meet these 1995 demands through a policy of progressive development from surface to multi-story car parks.

Additional general policies for parking planning, design and location are as follows:

1. Off street parking should be encouraged wherever possible, especially at busy intersections.
2. All parking facilities, whether on-grade or multi-story, should have painted parking stall lines. See Figure A-2-9 (f) for appropriate dimensioning for such stalls.
3. On-grade parking facilities should utilize landscaped islands to subdivide large paved areas.
4. Wherever large scale development of any kind is planned (such as a civic center, central suq, etc.) parking should be included as an integral part.
5. Public parking areas should be created at all main commercial centers. These should be off-street facilities, planned in such a way as to avoid congestion at street intersections.
6. Where possible and economically feasible, multi-level parking structures should be used. See the Appendix, Planning Standards, Figure A-2-9 (e) for examples of multi-level parking structures.
7. Although each parking facility, whether independent or associated with a major development, should be individually examined and planned according to the specific needs of each development, the following guidelines may be used for an initial determination of number of parking spaces.
 - A. Housing - 1 space per household.
 - B. Office - 1 space per 30 m² floor area.
 - C. Commercial - 1-4 spaces per 40 m² sales area (see the planning standards section A-2-6 for more detail).
 - D. Industrial - 1 space per 5 employees.
 - E. Hotel - 1 space per guest room.
 - F. Entertainment - 1 space per 10 seats.
 - G. Hospital - 1 space per bed.

7-6-3 VEHICULAR PENETRATION

Another consideration in the establishment of a good car parking policy is vehicular penetration within the commercial center. A policy restricting vehicular traffic to commercial vehicles delivering goods and private vehicles associated with families residing in the center would provide a safe environment for shopping and business activities.

Where commercial areas exist directly along major roads vehicular penetration and access should be established to reduce possible congestion. Parking should be provided at the rear of such commercial areas, and community access should be limited and strictly controlled. Loading and unloading should not occur directly from the street, but at loading areas at the sides or back of commercial establishments. Such frontage control is especially important at major intersections where undesirable congestion would otherwise certainly occur.

7-7 ENVIRONMENTAL MANAGEMENT POLICY

7-7-1 THE FACTORS AND IMPACT

Design of any transportation links or terminals should be done concurrently with environmental impact assessments to minimize adverse consequences to surrounding areas. In addition to the usual factors taken into consideration such as right-of-way acquisition, type of construction and traffic volumes it is necessary to evaluate the impact on air quality, noise levels and aesthetics of the facility.

Since noise and air quality are the most critical items in an environmental assessment, an effective Environmental Policy and National Standards must be established and enforced. As an example, the United States Environmental Standards are shown below.

After these standards are established, design parameters such as number of lanes, median widths, shoulder widths, maximum grades and roadway curvatures and design speed limits should be reviewed and modified if necessary. Governmental and administrative policies can be set as to the allowable automobile pollutant emissions to be accepted. Land use or urban activity must be controlled in the vicinity of any transportation facility.

7-7-2 METHODS AND CONTROL

The surrounding area of the city of Najran is presently fortunate to have a clear, clean and quiet environment. It will be the responsibility of the Administrators and Planners not to permit conditions to deteriorate, but to improve them instead.

In populated areas along the most heavily travelled arteries, vegetative, earth or man-made barriers can be used aesthetically to control objectionable noises produced by traffic. Many materials and

Table 7-7-1
1977 UNITED STATES FEDERAL EXHAUST EMISSION
STANDARDS AND CONTROL LEVELS

Type of Vehicle	Emissions Expressed in Grams per Kilometer		
	HC	CO	NO _x
Light-duty Gasoline Passenger Car	0.94	9.4	1.25
Light-duty Diesel Passenger Car	0.94	9.4	1.25
Light-duty Gasoline Truck	1.25	12.5	1.9
Light-duty Diesel Truck	1.25	12.5	1.9

techniques are available for the construction of these noise barriers and at a relatively low cost. The right-of-way at intersections where congestion tends to build up should be ample in size and access should be partially or fully controlled to provide a separation between traffic flow and surrounding developments which could result in reduction of noise and air pollution.

Grade separated interchanges not only increases capacity and safety, but reduces congestion, shortens travel time and efficiently transfers traffic from one roadway to another. One location of major concern, where grade separations may be considered is the intersection of the road to Khamis Mushayt and the access road to the airport. It is estimated that by 1995 traffic volumes will be such that grade separations may be warranted at this location.

Aesthetics should always be kept in mind when choosing the final design of grade separations, roadway intersections or traffic control devices in general. Landscaping and provision of wide open right-of-ways contribute greatly to safe and comfortable transportation .

7-7-3 POLICY SUMMARY

Therefore, the environmental management policy must extend to the design of various interacting facilities other than just the road types and their junctions. Careful consideration must also go into the location and design of car parking areas, pedestrian routes, general traffic control devices and most importantly an attractive public transportation system with adequate terminal and transfer facilities.

7-8 PHASING AND COST OF RECOMMENDED IMPROVEMENTS- INVESTMENT NEEDS FOR 5, 10 AND 20 YEAR

Recommended construction of the road network must be related to the urban growth projections prepared for the city of Najran.

In order to ensure adequate right-of-ways for the future transportation corridors, it is recommended that rights-of-way be established and purchased as soon as possible. The early purchase of rights-of-way will minimize costs and also will establish minimum building setbacks for future developments.

It is estimated that approximately 60 kilometers of a four-lane roadway and 34 kilometers of two-lane roadway have to be built by the year 1995 to establish a basic road network. The total construction cost of the proposed improvements is estimated to be 102.6 million S.R. Since the bulk of this construction should be completed in the first 10 years, it is recommended that 33.8 million S.R. be expended in the first 5 years, another 33% in the next 5 years, and remaining 33% in the final 20 years of the planning period.

All costs cited are estimated in order of magnitude. Costs based on hypothetical road alignments with an average cost per kilometer based on 1977 costs excluding cost of right-of-way.

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8. public utilities

8-1 ELECTRICITY

There is a 2,400 kw electric generating plant located between Suq Najran and Al Faisaliyah, but its operating capacity is already insufficient. The quality of the road between Riyadh and Najran is critical in the transportation of fossil fuels required for operating the power plant. (Oil used in generating power is shipped by truck from the eastern region of the Kingdom.) Najran would consequently benefit greatly by the completion of a paved arterial road to Riyadh.

The distribution network for electric power within the central district is already under construction. Service to the outer district of agricultural communities, however, should be initiated as soon as possible. While underground cables are desirable in the built-up areas, the agricultural communities are adequately served by overhead lines.

Buta-gas is supplied by merchants on an individual basis. There are six gas shops in Najran, and each shop sends a truck to Dammam to obtain a week's supply. Since gas is a relatively clean and efficient fuel, its use for domestic consumption should be encouraged. However, an underground network of domestic gas pipes should be considered, particularly because buta-gas cylinders could be a serious fire hazard in a densely populated area. A unified and controlled system of supplies would be more economical as well as safer than the present system.

8-2 WATER

Underground water, pumped up and distributed through a supply system presently under construction, is Najran's primary water source. Future water supply schemes do not encompass the entire Najran-Al Faisaliyah area, nor are any purification facilities under discussion. With a projected population of 61,900 in 1995 and a domestic water consumption rate of 150 litres/person/day, it becomes immediately apparent that a broader approach to water supply planning is imperative.

8-3 SEWARAGE

There are no unified sanitary sewage facilities in Najran at present, and the population depends largely upon cesspools, privies, and septic tanks. As the more intense urban form of land use continues, however, such facilities will no longer serve. Insufficient or unsatisfactory treatment of sanitary sewage can produce severe health problems. There is, however, a new system in the planning stage [1].

- existing network
- - - - - proposed extension
- ⊙ power station
- 500 1995 domestic demand by neighborhood unit (kw/day)
- planning area boundary

FIGURE 8-1-1
1995 PROPOSED ELECTRIC
POWER SUPPLY NETWORK
AND DOMESTIC DEMAND

NOTE:
1 For distribution of neighborhoods,
see Fig. 3-1-3.
2 For domestic demand, by neighborhood,
see Table 8-1-1.

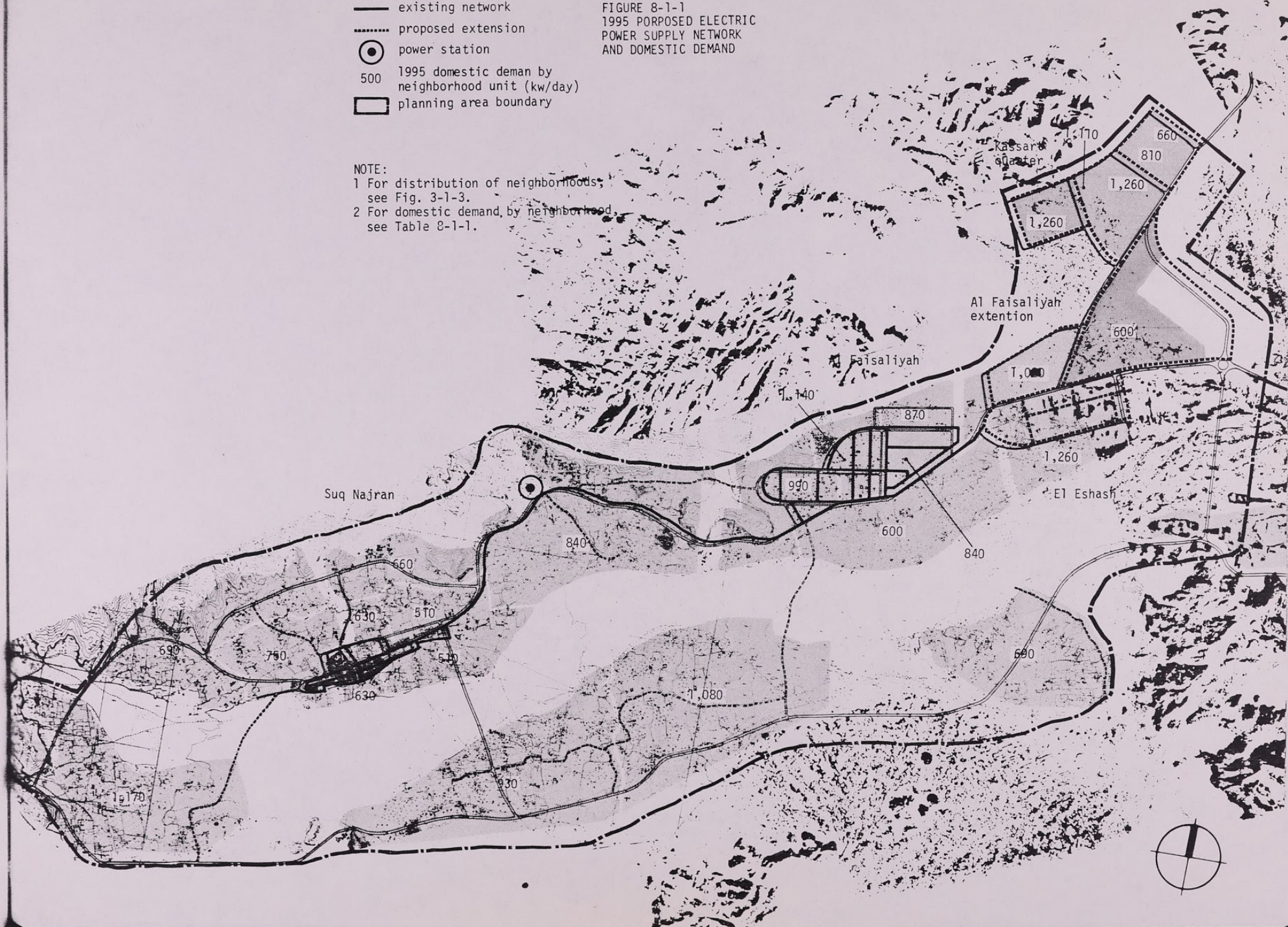







Table 8-1-1
1995 PROJECTED DEMAND FOR PUBLIC UTILITIES SERVICES

A. DOMESTIC DEMAND BY DISTRICT

Planning District	Population 1975	Electricity 0.3 kw/Person (kw)	Gas 0.5 kg/Day/Person (ton/day)	Fuel 2.31/Day/Person (k1/day)	Water 150 l/Day/Person (m ² /day)	Refuse 0.5 kg/Day/Person (ton/day)
1.1.1	3,900	1,170	1.95	8.97	585	1.95
1.1.2	2,300	690	1.15	5.29	345	1.15
1.1.3	2,500	750	1.25	5.75	375	1.25
1.1.4	2,100	630	1.05	4.83	315	1.05
1.1.5	2,100	630	1.05	4.83	315	1.05
1.2.1	2,200	660	1.10	5.06	330	1.10
1.2.2	1,700	510	0.85	3.91	255	0.85
1.2.3	1,700	510	0.85	3.91	255	0.85
1.2.4	3,100	930	1.55	7.13	465	1.55
1.2.5	3,600	1,080	1.80	8.28	540	1.80
2.1.1	2,800	840	1.40	6.44	420	1.40
2.1.2	2,300	690	1.15	5.29	345	1.15
2.1.3	3,800	1,140	1.90	8.74	570	1.90
2.1.4	2,900	870	1.45	6.67	435	1.45
2.1.5	2,800	840	1.40	6.44	420	1.40
2.1.5	2,000	600	1.00	4.60	300	1.00
3.1.1	3,600	1,080	1.80	8.28	540	1.80
3.1.2	2,000	600	1.00	4.60	300	1.00
3.1.3	4,200	1,260	2.10	9.66	630	2.10
3.1.4	-	-	-	-	-	-
3.1.5	-	-	-	-	-	-
3.1.6	2,300	690	1.15	5.29	345	1.15
3.1.7	3,100	930	1.55	7.13	465	1.55
4.1.1	4,200	1,260	2.10	9.66	630	2.10
4.1.2	3,700	1,110	1.85	8.51	555	1.85
4.1.3	-	-	-	-	-	-
4.2.1	4,200	1,260	2.10	9.66	630	2.10
4.2.2	2,700	810	1.35	6.21	405	1.35
4.2.3	2,200	660	1.10	5.06	330	1.10
Total	75,000	22,500	37.50	172.50	11,250	37.50
B. NON-DOMESTIC DEMAND						
All facilities	75,000	26,250	60.00	292.50	14,100	60.00
C. CITY TOTAL DEMAND						
Total	41,250	41,250	97.5	465.00	25,350	97.50

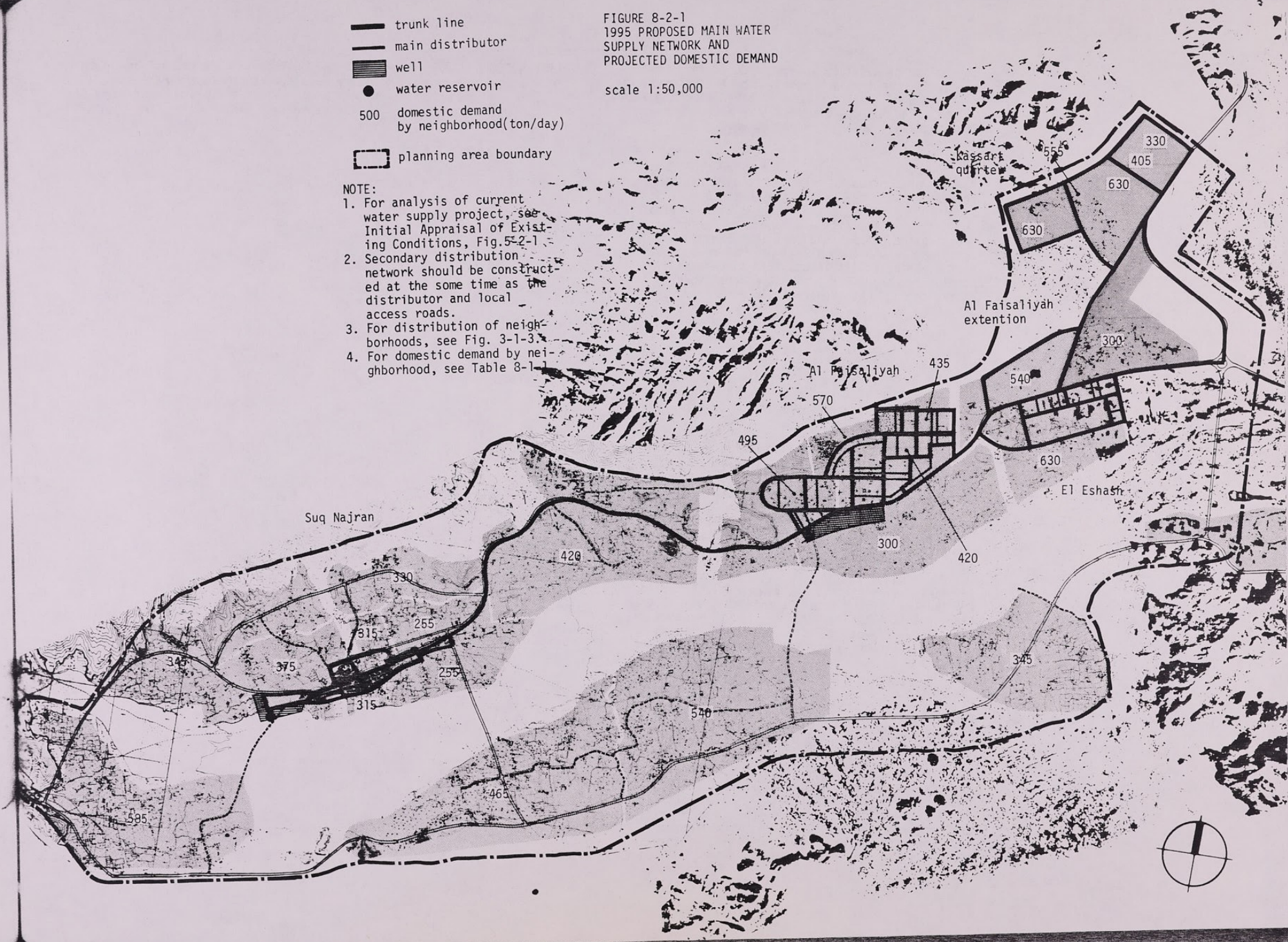
FIGURE 8-2-1
 1995 PROPOSED MAIN WATER
 SUPPLY NETWORK AND
 PROJECTED DOMESTIC DEMAND

scale 1:50,000

-  trunk line
-  main distributor
-  well
-  water reservoir
- 500 domestic demand by neighborhood (ton/day)
-  planning area boundary

NOTE:

1. For analysis of current water supply project, see Initial Appraisal of Existing Conditions, Fig. 5-2-1
2. Secondary distribution network should be constructed at the same time as the distributor and local access roads.
3. For distribution of neighborhoods, see Fig. 3-1-3.
4. For domestic demand by neighborhood, see Table 8-1-1



The volume of sanitary sewage produced in a community is essentially a function of the volume of water used. Since domestic water consumption is estimated to increase more than four times by 1995, sanitary sewage generation will increase accordingly.

The sewage system consists of two functions: removal and disposal. Removal is a fairly simple process whereby sewage is transported by gravity flow through pipes to the disposal area. Disposal in the new facility will consist, first, of treating the effluent so that it is not dangerous or offensive and then allowing it to be degraded by the elements. It is possible to recover a portion of the effluent to use a fertilizer if it is treated so that dangerous microorganisms are destroyed.

For the new treatment plant in Al Uraissah, care must be taken to insure that contamination of the ground water does not occur. Particular attention should be given to possibilities for leakage. Before the effluent is discharged, secondary and tertiary treatments, as well as the primary treatment, should be made.

8-4 STORMWATER DRAINAGE

Rainfall data is one of the governing factors in the choice of the use of a combined or a separate sewage system, i.e. whether to collect the runoff from rainfall in the sewers or convey this runoff in separate stormwater drains. In addition, the design intensities of rainfall directly determine the required diameters and slopes of sewers or storm drains required to convey the expected runoff.

In Najran and environs, all sewers will be above the level of ground water, eliminating any filtration of this water into the sewers. The storm water runoff will be collected separately into a separate drainage system for direct disposal into the valley.

8-5 SOLID REFUSE COLLECTION AND DISPOSAL

Garbage collection services are provided on a limited basis by the Najran municipality. Apparently, such service is not adequate as evidenced by the widespread practice of disposing of litter in the streets. A public awareness program should be launched to acquaint the citizens with the drawbacks of littering and to instill an appreciation for a clean environment. The image a clean city could create would do much toward providing a pleasant setting for normal activities of the residents and creating a positive urban impression for tourists.

CHAPTER 8 NOTES:

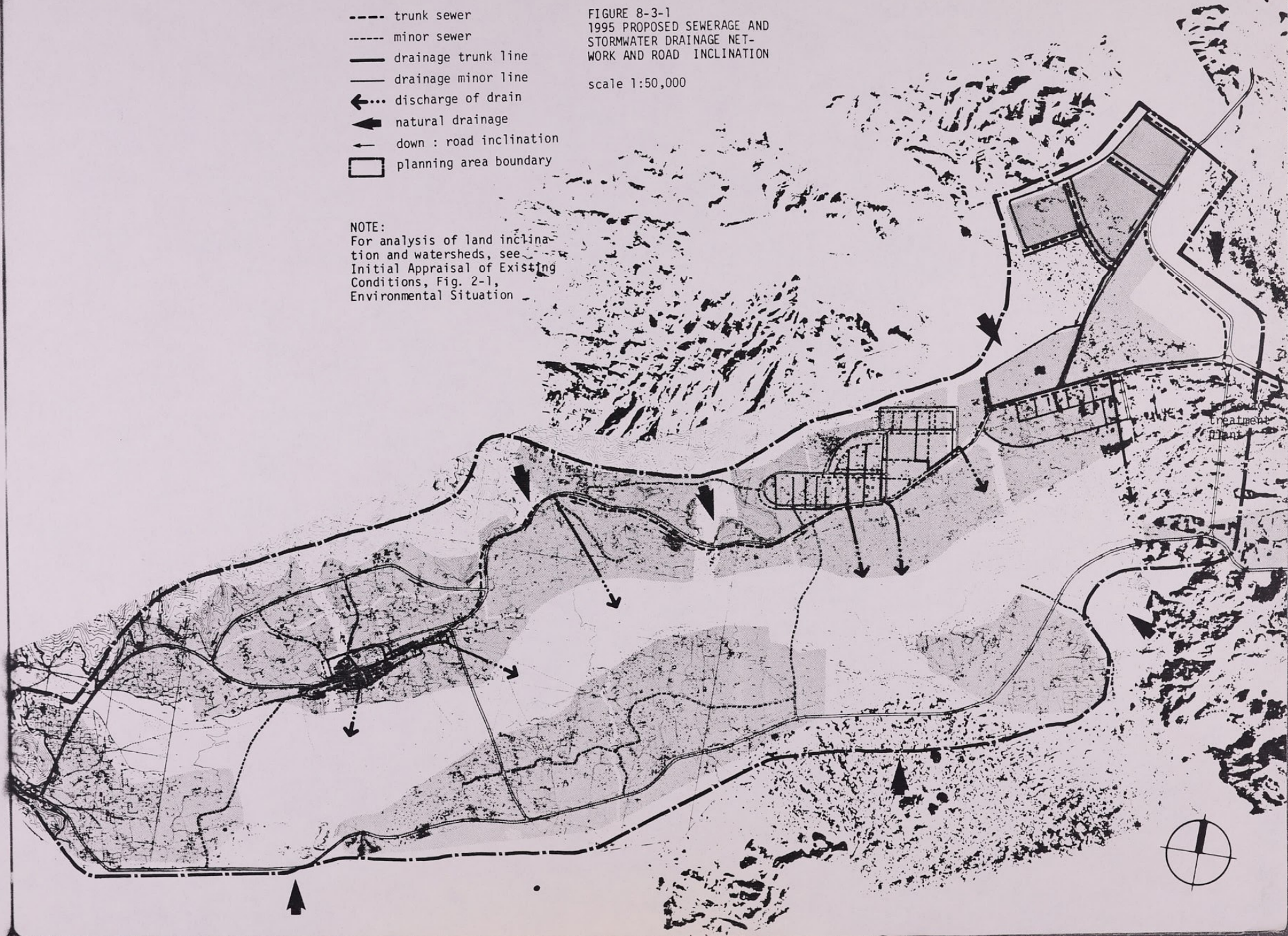
Ministry of Municipal and Rural Affairs, Preliminary Report, Water Networks Extension, Sanitary Sewer System and Storm Water Works for the city of Najran, Warith Consulting Engineers, 1976.

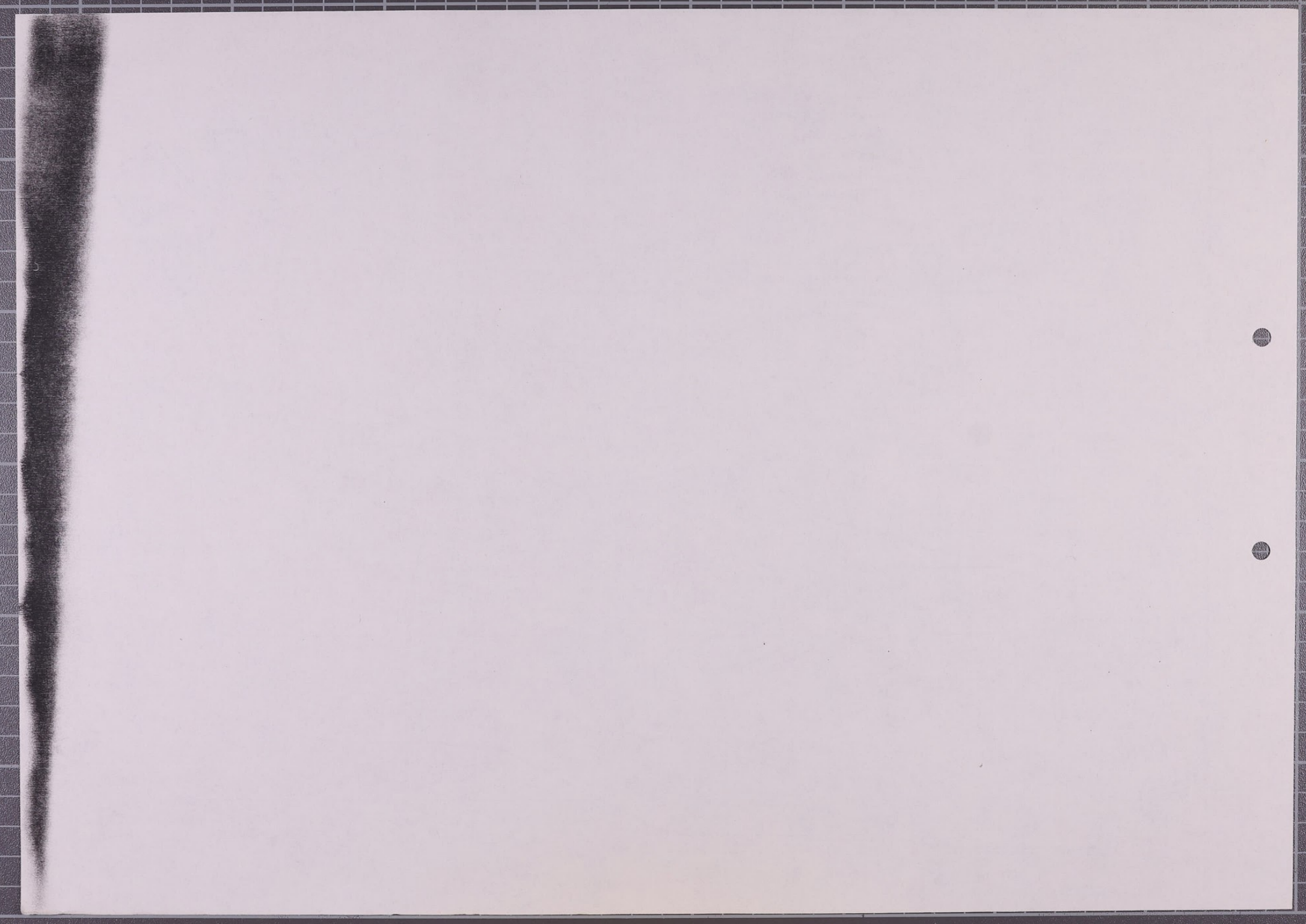
- trunk sewer
- minor sewer
- drainage trunk line
- drainage minor line
- ←···· discharge of drain
- ▲ natural drainage
- ↑ down : road inclination
- planning area boundary

FIGURE 8-3-1
1995 PROPOSED SEWERAGE AND
STORMWATER DRAINAGE NET-
WORK AND ROAD INCLINATION

scale 1:50,000

NOTE:
For analysis of land inclina-
tion and watersheds, see
Initial Appraisal of Existing
Conditions, Fig. 2-1,
Environmental Situation





9. land use

9-1 EXISTING AND PROJECTED LAND USE

Land use is the kind and intensity of human activities taking place on the land as a function of space. Land use is usually represented as the distribution of facilities. For example, the area where many commercial facilities are concentrated is called the commercial area, and the area where many houses are concentrated is called the housing area, etc.

Suq Najran occupies approximately 70 ha, 45% of which (31.4 ha) is built-up. This percentage is relatively large and indicates that the stage of development of Suq Najran is nearly at an end. The remaining open space excluding the major road network is 29.8 ha, or 42.6% of the total land area.

The largest portion of the built-up area is comprised of residential units to the extent of 60% of the built-up area. Commercial activities also occupy a great deal of land area in Suq Najran. The other areas of social maintenance, industry, and education are very small.

9-2 SUMMARY OF LAND USE POLICIES

1. Attempts should be made to link Suq Najran with the new communities planned along the main road north of the Wadi including Al Faisaliyah, its extension, the regional commercial center at the intersection, and the Kassarat Quarter.
2. Outlying communities scattered north and south of the Wadi beyond the central district should be provided with rural service centers, including health and educational facilities.
3. All agricultural land should be conserved. Future growth in the agro-industries is expected to be great and thus all prime agricultural land should be reserved for the purposes of future development.
4. Cultivation of new agricultural land should also be encouraged for reasons stated above.
5. Any new housing construction should take place away from agricultural lands, perhaps towards the foothills.
6. A new agro-industrial center should be built in the area south of Wadi Najran.
7. Warehousing facilities should be created to serve all communities of the Najran Valley with regional collection and distribution capabilities.

9-2-1 LINKAGE OF OLD AND NEW NAJRAN

The present isolation of the old and new communities from each other should be checked. Planning policy should try to link all communities with an infrastructure trunkline, a rapid transit network, and an interconnecting system of residential housing that effectively forms a kind of urban corri-

9-2-2 RESIDENTIAL AREA EAST OF KASSARAT QUARTER

dor. It is in this way that the cultural, educational, and conservation activities of Suq Najran can be linked to the administrative center of Al Faisaliyah, which in turn can be connected to the commercial facilities of the regional center and the sports and recreation activities of the Kassarat Quarter.

Some community and city-wide facilities, especially those related to agricultural development, should be located along the road between Suq Najran and Al Faisaliyah. Such facilities should include: agricultural cooperatives, agricultural bank, community park with picnic facilities, and neighborhood health facilities. These facilities should form the spine of the urban corridor between the old and the new Najran.

A large tract of land east of the road to Khamis Mushayt and northeast of the old Najran airport has been subdivided by the Ministry of Agriculture and Water Resources to be developed as agricultural land. Subsequently, it was found that there was insufficient water for cultivation. Therefore, urban uses of the land must be considered.

The Master Plan proposes a new residential development in a triangular area near the junction of the roads to Khamis Mushayt and to the Najran airport (planning district 3.1.2a). This land is privately controlled, however, and its future land use is subject to private market forces. In case residential land cannot take place in planning district 3.1.2a, therefore, it is recommended that district 3.1.2c, formerly owned and subdivided by the Ministry of Agriculture and Water Resources, be considered for residential development.

The site of the former Najran airport (planning district 3.1.2b), on the other hand, is still wholly government-owned and is more amenable to detailed master planning. It is therefore recommended that regional commercial facilities, distribution center, and city park - functions which serve the population of the entire Najran planning area - be located in district 3.1.2b, forming an urban center for all the new residential developments east of Al Faisaliyah and for the Najran valley.

FIGURE 1995 MASTER PLAN

scale

FIGURE 1995 MASTER PLAN SUQ NAJRAN

scale

NOTES

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- *2 F
- *3 F

Facilities structure and unit service hence conce other Plann

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hese facilities
corridor bet-

road to Khamis
ajran airport
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must be consid-

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FIGURE 9-2-1
1995 PROPOSED
MASTER PLAN

scale 1:50,000




- *1 
- *2 
- *3 

FIGURE 9-2-1 (b)
1995 PROPOSED
MASTER PLAN
SUQ. NAJRAN

scale 1:10,000

NOTES:

- *1 Existing facilities.
- *2 Facilities proposed and approved by the Military of Municipal and Rural Affairs as of April 1978.
- *3 Facilities newly proposed by the Master Plan in addition to those identified in *1 and *2.

Facilities are distributed according to the community structure established in accordance with Planning Standards. Facilities for neighborhoods, sub-communities, communities, and the city have been shown, but these for residential unit groups have been included as part of the general service requirements of the residential neighborhoods, hence are not shown in this plan. For further details concerning the service population, function, area, and other requirements for various facilities, see Appendix, Planning Standards.

elementary school and playground for boys	EB
elementary school and playground for girls	EG
intermediate school and playfield-level 1 for boys	IB
intermediate school and playfield-level 1 for girls	IG
secondary school and playfield-level 2 for boys	SB
secondary school and playfield-level 2 for girls	SG
teachers' school for boys	TB
teachers' school for girls	TG
technical school for boys	VB
technical school for girls	VG
colleges	U
special college	SU
neighborhood park	NP
community park or small city park	CP
city park	P
mosque	SM
jami'a mosque	JM
eid mosque	M
neighborhood center	NC
community center	CC
civic center	C
pharmacy	PH
sub-community diagnosis and treatment center	DT
community/general hospital	H
special hospitals and nursing home	SH
neighborhood shopping center	NS
community shopping center	CS
sub-regional shopping center	S
fire station	FS
post offices	PO
police station	PS
government offices	G

Al Faisaliyah development	1
Al Faisaliyah expansion	2
Al Kantoub development	3
El Eshash development	4
Al Kassarat development	5
technical-vocational school	6
boys educational center	7
girls educational center	8
boy scout and educational storage	9
sports stadium	10
museum	11
ruins of Ukbud conservation	12
new general hospital	13
existing general hospital and expansion	14
industrial park and power plant, 15km east from Al Faisaliyah	15
sewage treatment plant 5km east from Al Faisaliyah	16
processing industry based on agricultural products	17
well area for water supply	18
regional commodity center and related commercial center for tourism	19

permitted uses
 uses requiring special permits
 prohibited

	ARR		BMPP		SSSS	
	1	2	1	2	1	2
cultivated farm and home storage sheds and animal barns	■					
occupation quarters						
family dwellings - detached	●	■				
family dwellings - attached	●	■				
family dwellings - grouped	●	■				
apartment houses						
hotels						
rooming and boarding houses						
nursing homes						
caretakers' quarters						
professional offices						
business and merchandise stores						
service establishments						
business and professional offices						
banks and exchange offices						
other financial institutions						
retail and service shops						
food markets, restaurants, and others						
gas stations						
petroleum service stations						
small workshops						
contractor's yards						
warehousing and storage services						
construction materials yards						
hardware and equipment services						
freight and shipping services						
machinery rental and services						
automotive repairs						

NOTES TO SUMMARY OF PERMITTED USES

- NOTES:
- The Summary of Permitted Uses indicates the detailed land uses which are permitted as a matter of right, permitted after obtaining special permits, or prohibited for each zoning classification and special district. For example, business and professional offices are permitted as a matter of right in zone B, permitted after review and obtaining special permit of type P1, and prohibited in others.
 - For a detailed discussion of zoning classification and requirements, see Section 13-3, Legislation and Requirements, Final Physical Plan, for the Metropolitan Region.

garbage dump yards
 electricity power plant yards
 water supply yards
 sewage treatment plant yards
 manufacturing of finished products
 bottling and canning plants
 printing houses
 food products factory
 confectionary products
 ice manufacturing
 rolling mills
 brick oven yard
 agricultural processing plants
 fat and fertilizer manufacturing
 slaughterhouse and stock yards

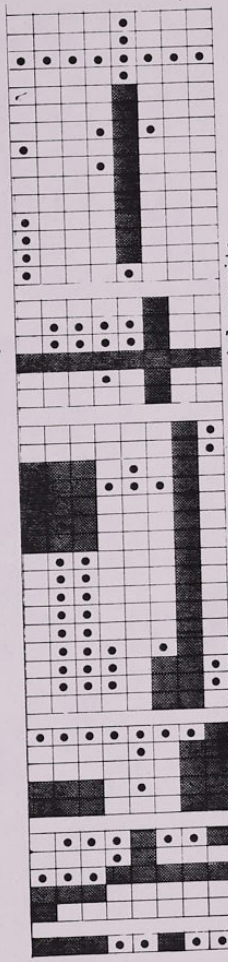
governmental offices
 police and fire stations
 post, telephone and telegraph offices
 mosque
 other religious offices
 civic and community center

general hospital
 special hospitals and nursing homes
 diagnosis and treatment center
 first aid and ambulance
 nursery and kindergartens
 elementary schools
 intermediate schools
 secondary schools
 teacher's training schools
 other special schools
 colleges and universities
 other educational institutions
 religious schools and institutions
 museums
 libraries
 prisons

park and recreational areas
 athletic fields
 club houses
 playfields and playgrounds
 playlots and totlots








bus and taxicab service yards
 bus and taxicab garages
 public parking or garages
 private parking or garages
 off-street parking

cemetery







Certain open space uses permitted with special permits
 Land exclusively under the jurisdiction of the Ministry of Defence
 Special permit required for all future developments

Zoning Classification Principal Land Use

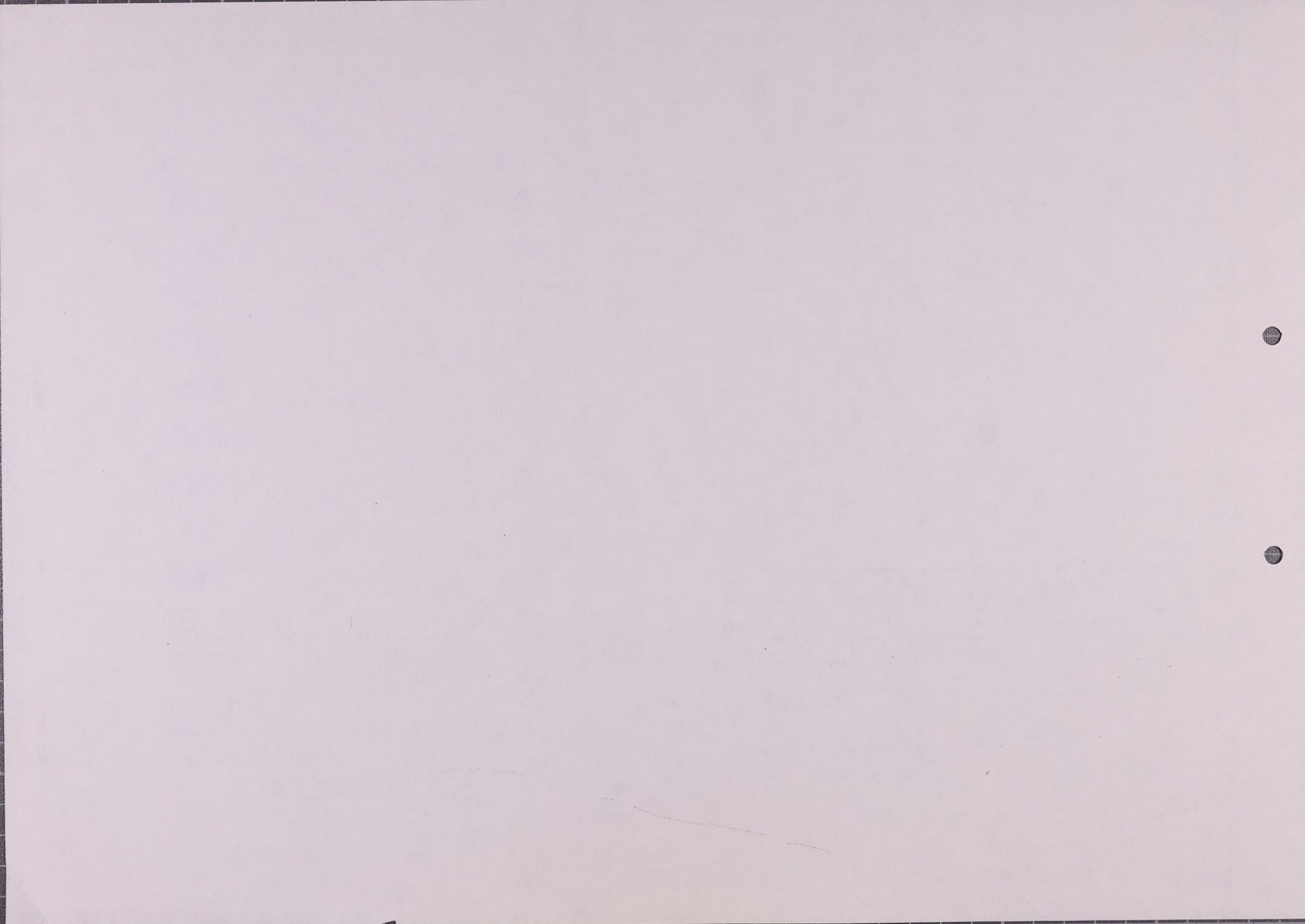
A	Agricultural	
R₁	Low density residential	
R₂	Medium density residential	
B	Business and commercial	
M	Industrial and warehousing	
P₁	Government and civic	
P₂	Institutional	

Special District Classification Principal Land Use

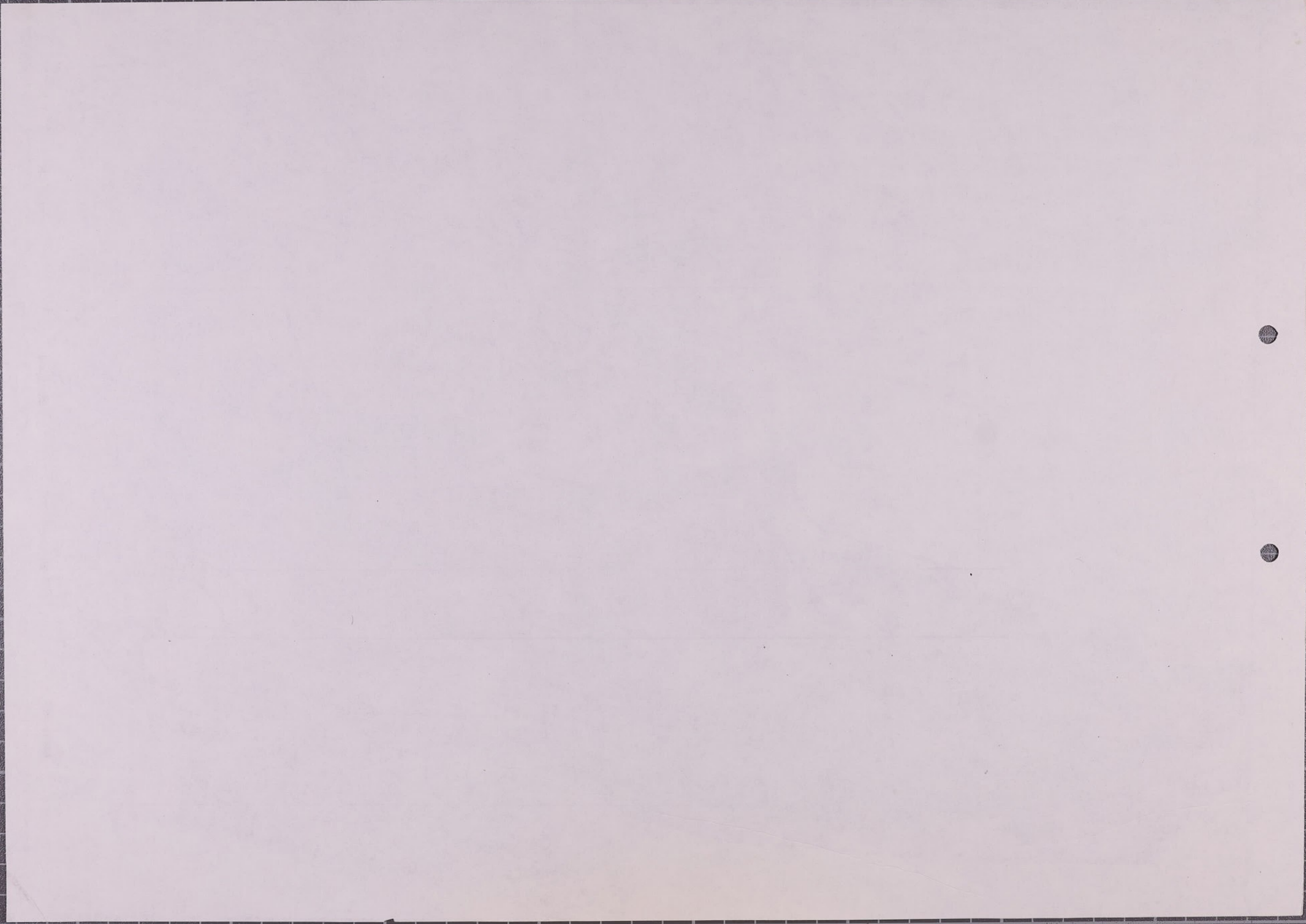
S₁	Recreational	
S₂	Non-agricultural conservation	
S₃	Military	
S₄	Restricted Development	

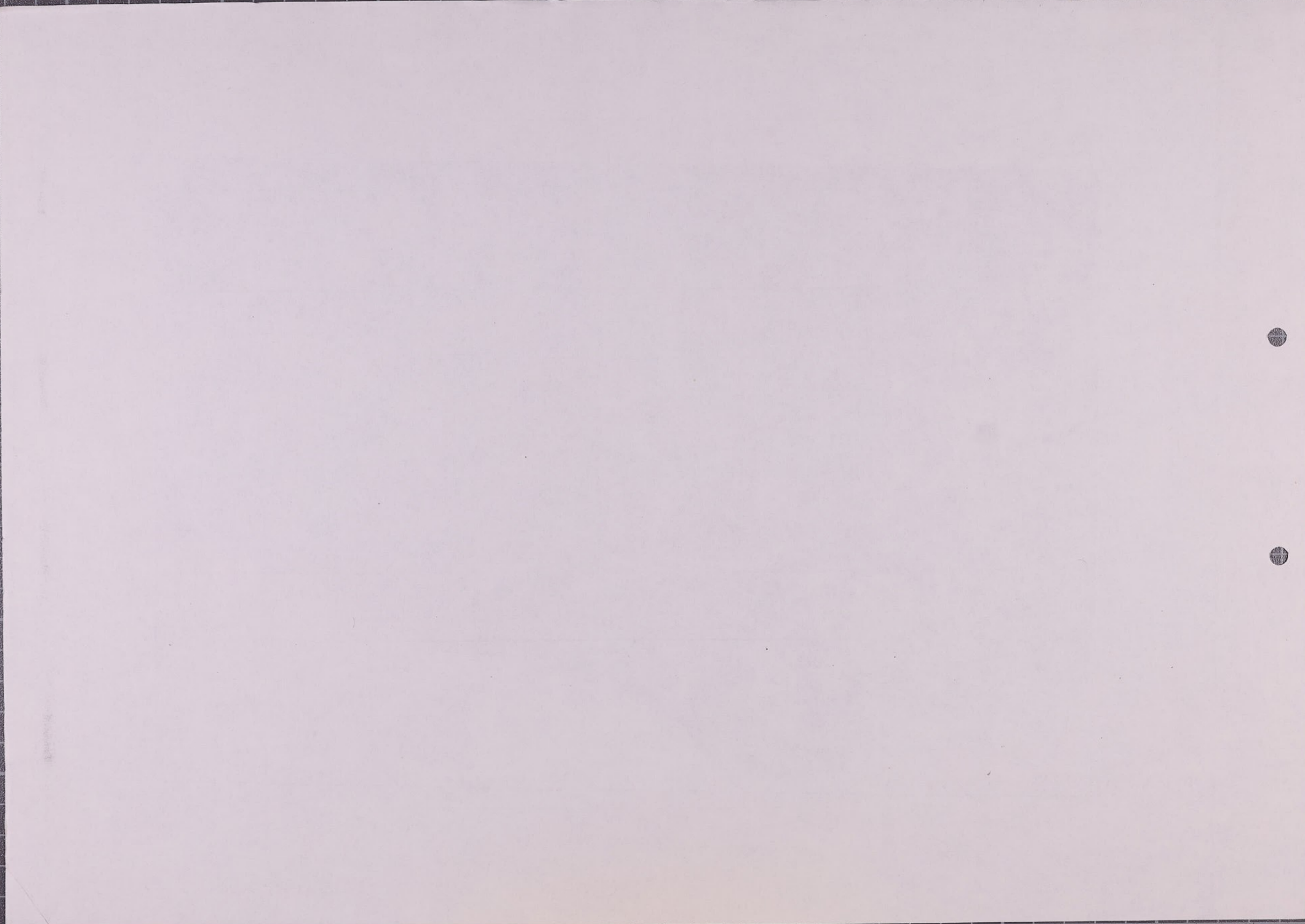
NOTES:

1. For a detailed discussion of zoning classification and requirements, see Southern Region, Final Physical Plan, Sec. 13-3, Legislation and Regulations.
2. Principal land use is the predominant land use activity associated with each zoning classification. See Summary of Permitted uses for classes of detailed land uses permitted for each zoning classification.
3. Non-agricultural conservation includes recreation, scenic, and, in Jizan; coastal conservation area.
4. Restricted development area is land unsuitable for development due to unfavorable topographic or geological conditions, land reserved for traffic and industrial buffer areas or land specially reserved for future use.









9-3 DEVELOPMENT PLAN

9-3-1 DEVELOPMENT STRATEGY

The Development Plan is to be implemented in a three-phase process as follows:

Phase I:
1980

While the new sub-divisions are being built, attention should be paid to existing areas in Suq Najran and in the rural communities of the outlying districts. Also during this phase studies on an appropriate agro-industrial site should commence.

Phase II:
1985

Completion of infrastructure and service improvements should occur during this phase, as well as the beginning implementation stages of the agro-industrial center.

Phase III:
1995

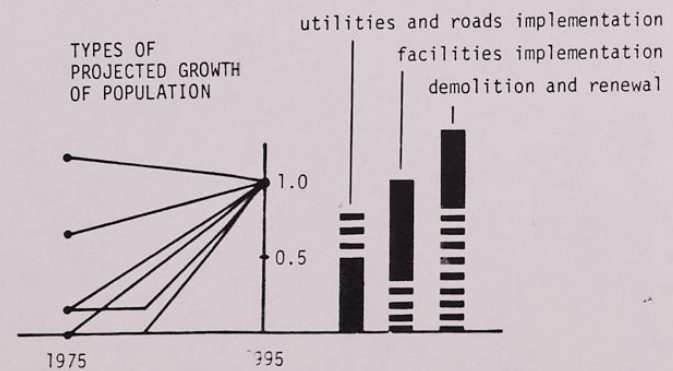
Development along the south bank of Wadi Najran should be encouraged. By this time, wadi crossings shall have been completed and the beginnings of a ring road can be viewed.

9-3-2 PHASE I

Phase I projects under construction or nearing completion by 1980 include most construction in Al Faisaliyah and the start of El Eshash and the Al Faisaliyah Extension. Rehabilitation and replacement of housing units and other structures in Suq Najran are also on-going projects during this phase. Another important feature of this phase is the creation of the new neighborhood center south of Wadi Najran and starting the new regional commercial center at the intersection of the roads to Khamis Mushayt and the airport.

A key link in this phase is the improvement and extension of the existing road network. A connector road between the existing road and Suq Najran is proposed, along with a bridge and another extension south of the wadi. At this point, the beginnings of a ring road can be seen.

* Implementation in residential area is mainly specified according to the population ratio to 1995 population as follows:



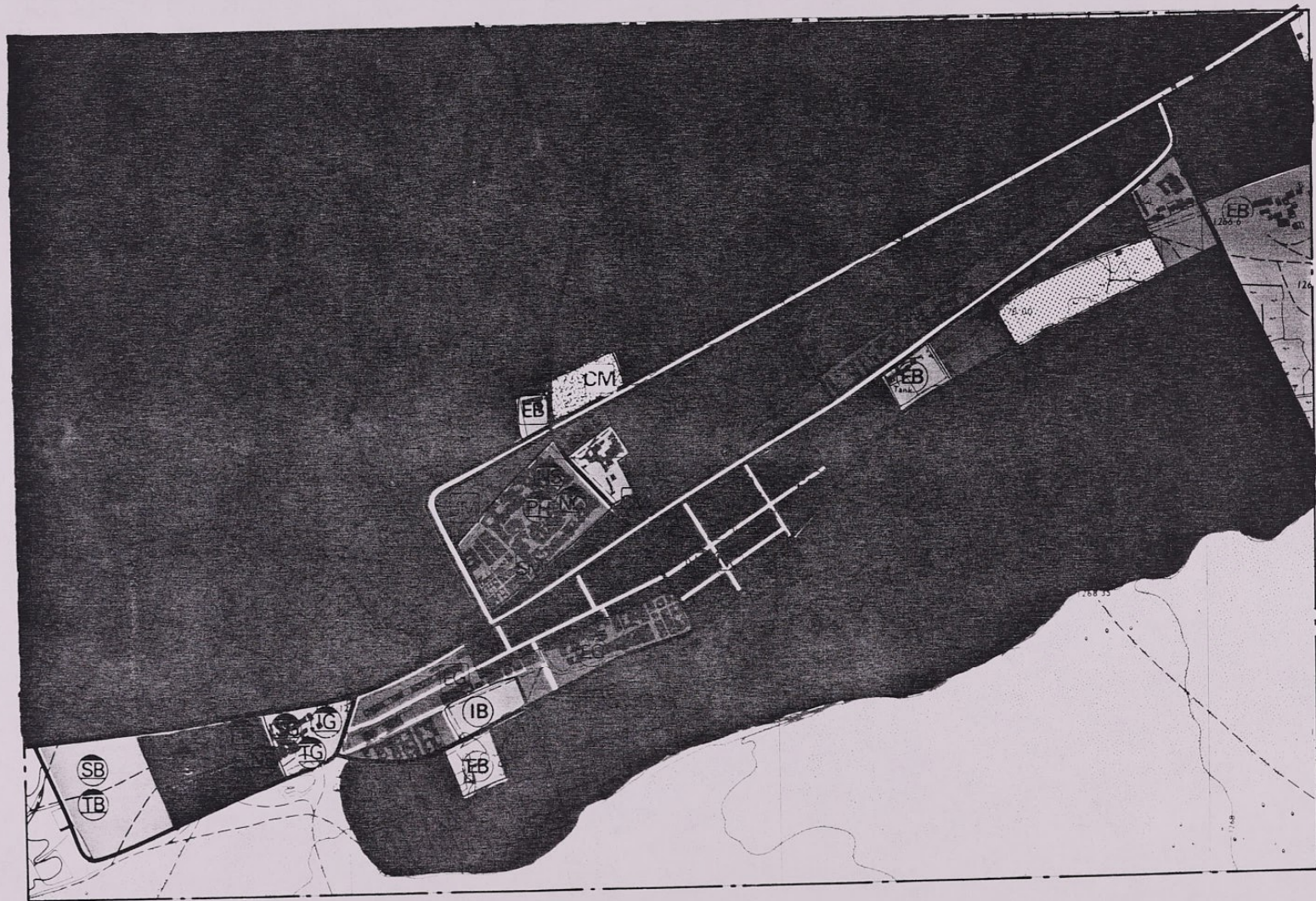
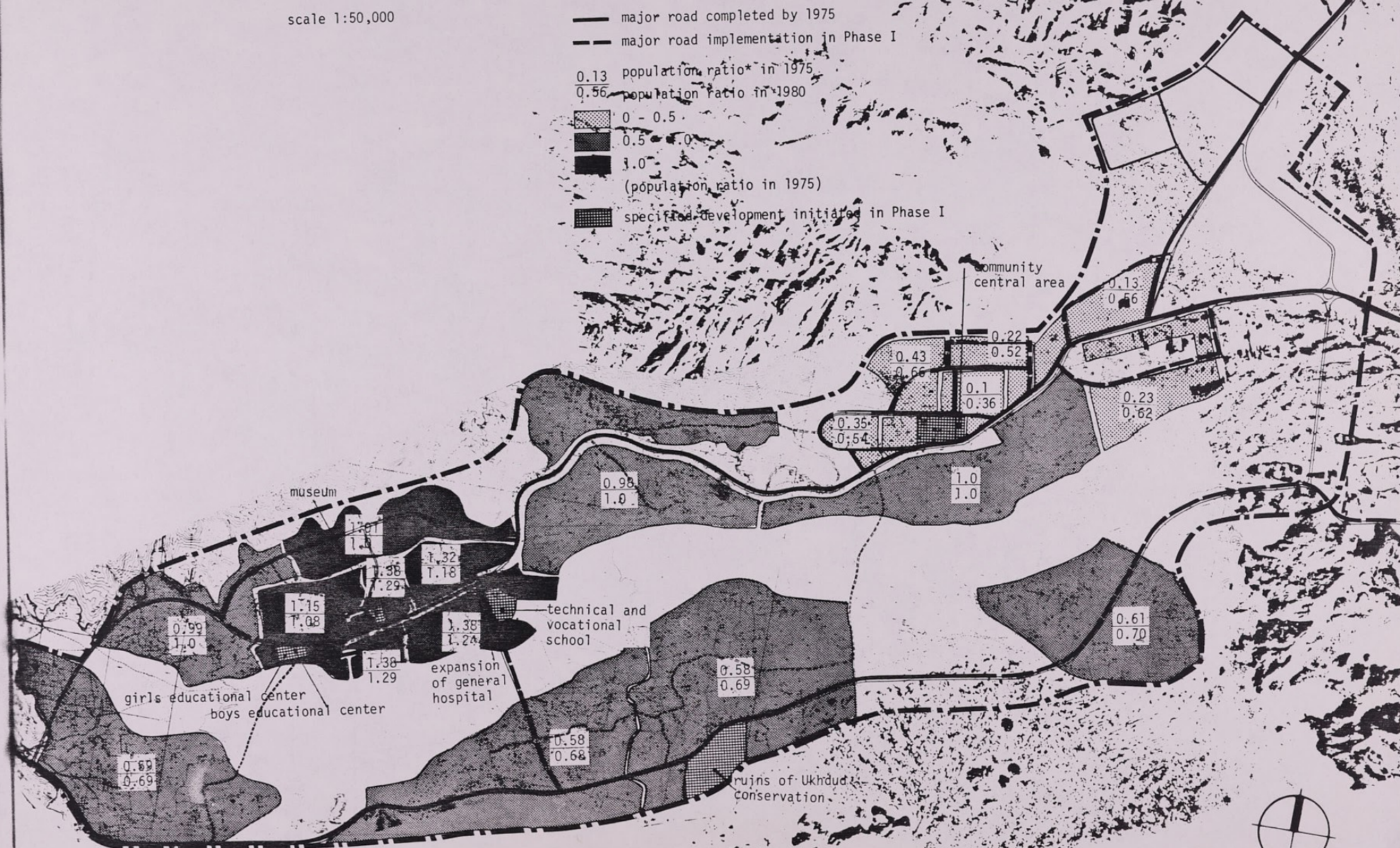


FIGURE 9-3-1
 PHASE I
 (1975-1980)

scale 1:50,000

- major road completed by 1975
- - - major road implementation in Phase I
- 0.13 population ratio* in 1975
- 0.56 population ratio in 1980
- 0 - 0.5
- 0.5 - 1.0
- 1.0
- (population ratio in 1975)
- specified development initiated in Phase I



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9-3-3 PHASE II

The agro-industrial center will have been begun by 1985, along with further road extensions to serve the new centers and two additional wadi crossings. The ring road concept has been completed at this stage. The three wadi crossings provide enhanced access to the new activity centers south of Wadi Najran. It also provides direct access to the airport and to the new warehousing facilities under construction.

* Implementation in residential area is mainly specified according to the population ratio to 1995 population as follows:

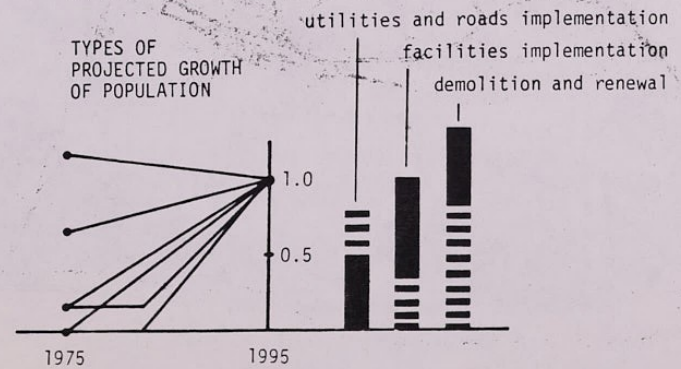


FIGURE 9-3-2
 PHASE II
 (1980-1985)

scale 1:50,000

- major road completed by 1980
- - - major road implementation in Phase II

$\frac{0.56}{0.78}$ population ratio* in 1980
 population ratio in 1985

0 - 0.5

0.5 - 1.0

1.0 -

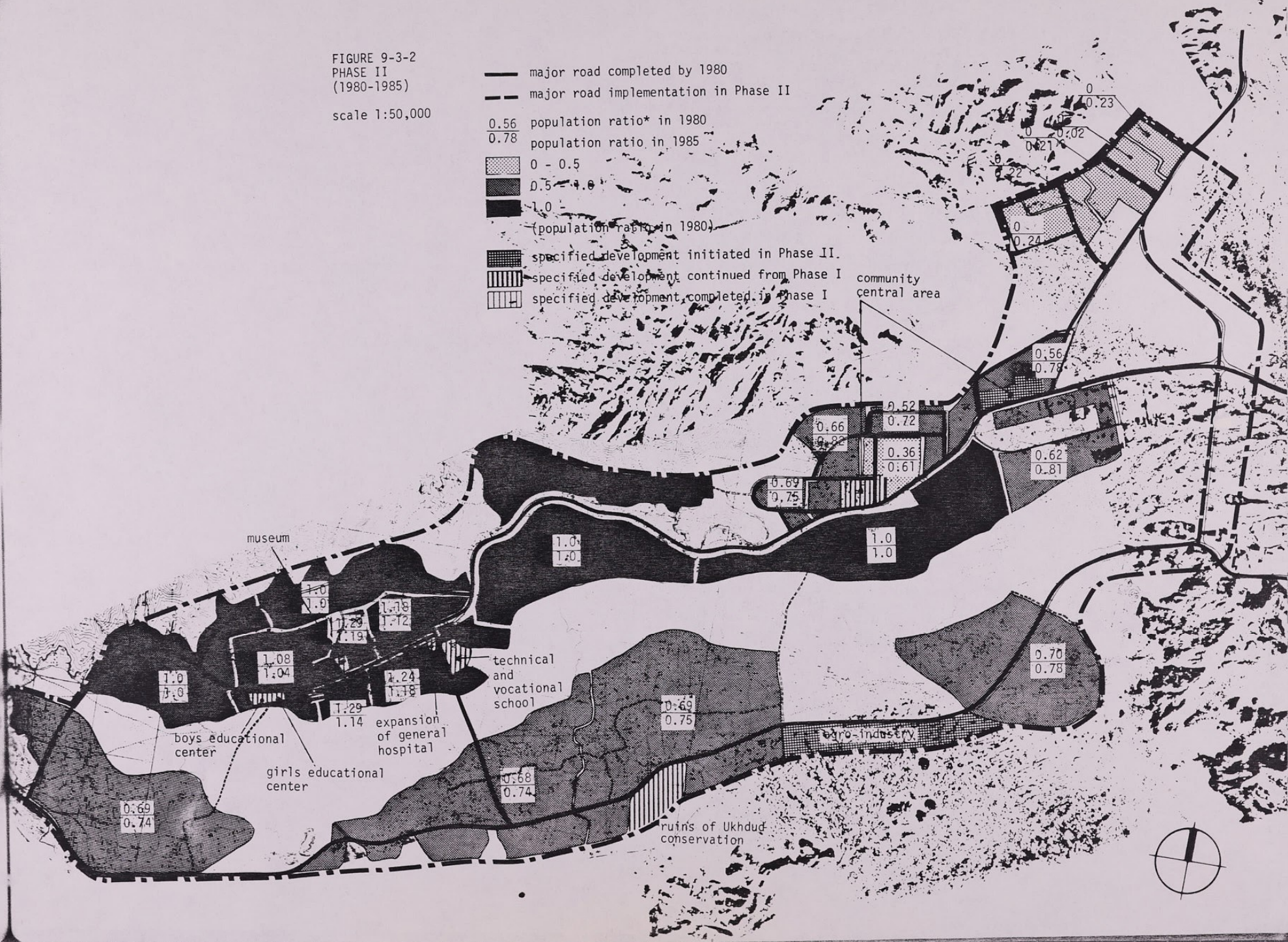
(population ratio in 1980)

▨ specified development initiated in Phase II.

▨ specified development continued from Phase I

▨ specified development completed in Phase I

community
 central area



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9-3-4 PHASE III

Phase III encompasses the ten-year period 1985-1995 and is the final phase of development. Not much takes place during this phase, with most of the intensive development having gone before in Phases I and II. West of the regional commercial center, new medium-density housing will be developed to fill in the areas left vacant by the uneven parceling of land area.

9-4 CITY CENTER

It is proposed that Planning District 3.1.2 become a Regional Commercial Center. This concentration of urban activities should be designed to relieve congestion, integrate city-wide facilities, improve accessibility to the commercial sector and the surrounding residential areas, and to provide adequate housing for a growing population.

The problem always exists of making infrastructure improvements in an urban area. Such projects are often highly disruptive and can further complicate congestion problems.

More specifically, general rebuilding and rehabilitation is called for in Suq Najran, while at the same time conserving the old section of town. This will also generate an increased service requirement. This need should be accommodated as it is created so as not to inconvenience or hinder growth.

With regard to transportation and vehicle movements in Suq Najran, it has been suggested that cars be removed entirely from the city streets and to provide access and parking at the periphery. These remote parking facilities should somehow be coupled with transit services. Such a no-parking policy would be difficult to enforce and could potentially conflict with other traffic control objectives. For example, if the goal is to improve vehicle flow through the city center by restricting or eliminating on-street parking without an additional provision for constructing new parking facilities, a high volume of recirculating traffic can be expected as motorists search for parking spaces, and thus the original purpose is defeated. Such potentially conflicting policy objectives should be closely monitored to minimize any cancelling effects.

By closing certain streets to vehicles, one should look for possible disruption of transit operations, service deliveries, mail deliveries, and garbage collection. When possible, separate facilities should be provided for these.

* Implementation in residential area is mainly specified according to the population ratio to 1995 population as follows:

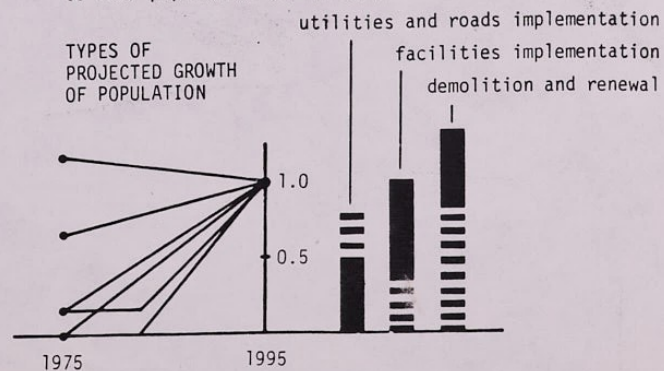


FIGURE 9-3-3
 PHASE III
 (1985-1995)

scale 1:50,000

- major road completed by 1985
- - - major road implementation in Phase III

0.78 population ratio* in 1985
 1.0 population ratio in 1995

0 - 0.5

0.5 - 1.0

1.0 -

(population ratio in 1985)

▒ specified development initiated in Phase III

▨ specified development continued from Phase II

▧ specified development completed in Phase II



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 implementation
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In Al Faisaliyah, it is recommended that residential units be removed from zone 2.1.3, and that the remaining area be used solely as an administrative and commercial center. This would provide continuity of land use throughout the area.

9-5 PROPOSED ACTION
AREAS

Based on the detailed element-by-element analysis and planning, the following action areas have been identified for further studies leading to implementation of the Master Plan:

1. Rehabilitation of Suq Najran
2. Conversion of planning district 2.1.3c into an administrative/commercial complex.
3. A Regional commercial center in planning district 3.1.2b
4. An agro-industrial center in planning district 3.1.5.

Most of these items have been discussed, but a few additional comments are warranted.

There are many problems that must be attacked in the city center to insure its proper development. But government loans or subsidies for housing are equally important here as elsewhere to ensure that the urban design guidelines are adhered to and are suitable for the kind of environment desired for a modern city.

9-6 RELATIONSHIP OF THE
MASTER PLAN TO THE
DETAILED LOCAL PLANS

The Master Plan has been coordinated with all the detailed local plans under consideration for Najran by the Deputy Ministry for Town Planning Affairs. The Master Plan has incorporated the General Plans for Suq Najran and Al Faisaliyah, prepared by Ministry, and the residential development plans of Al Faisaliyah Extension, El Eshash, and the Kassarat Quarter, prepared and approved by the Ministry [1].

The Master Plan has been coordinated with the preliminary recommendations for construction of sewerage system for Suq Najran and Al Faisaliyah [2]. The Master Plan has also incorporated the proposed locations for new facilities to be provided by the government, including educational, health, and administrative facilities.

CHAPTER 9 NOTES:

1. See Najran, Existing Conditions, Vol. I, Fig. 8-2-1.
2. Ministry of Municipal and Rural Affairs, Preliminary Report, water Net works, Extension, Sanitary Sewer System and Storm Water works for the city of Najran, Warith Consulting Engineers, 1976.

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10. administration and management

10-1 TOWN PLANNING LEGISLATION AND ADMINISTRATION

10-1-1 EXISTING LEGISLATION AND ADMINISTRATION

The main responsibility for urban and regional planning lies with the Deputy Ministry for Town Planning Affairs. The office for the Southern Region is the Department of Town Planning in Abha, which coordinates regional planning activities. However, the responsibility of the Abha office is somewhat attenuated and it cannot plan new facilities without the approval of the Deputy Ministry in Riyadh. It is believed that the responsibilities and decision makings of the department of town planning in Abha should be increased, that is to enable the department to avoid delays and to meet the local needs and requirements of the Southern Region.

10-1-2 PROPOSED MANAGEMENT FRAMEWORK

It is suggested first that the Master Plan be read into existing law to eliminate some of these problems. Second, it is proposed that the planning process be decentralized by making the Deputy Ministry in Riyadh responsible only for long-range planning. Offices on the local, regional, and municipal levels should then be allowed to interpret and execute the Plan without further consulting Riyadh. The delegation of authority should make the process more efficient, more responsive to local needs, and less cumbersome. Third, a comprehensive management framework requires enacting a general zoning act, tailoring each city's Master Plan to it and thereby creating a zoning map for each city.

Finally, the Deputy Ministry for Town Planning should have an annual budget, with only very general guidelines given as to the allocation of funds and the specifics left to the municipal office in question. Presently, there must be an item-by-item approval from Riyadh to the point where if a new fence is built in Khamis Mushayt, it cannot be done without prior approval from the Deputy Ministry. Clearly the Deputy Ministry must still continue to have some control over the trade-off of funds from sector to sector.

10-2 DEVELOPMENT AND IMPLEMENTATION PROGRAM

10-2-1 PRIORITIES AND PHASING

Development priorities can be indicated by the phasing of investment and the share of public investment in the total investment requirements. The following general rule is assumed in preparing a public investment schedule: that the standards of facilities in all sectors will be raised by 1985. Furthermore, public investment will by that time be attempting to achieve two objectives simultaneously: raising the standards of existing facilities and providing additional facilities to an increased population. Therefore, public investment seeks to provide a growing population with adequate facilities, while replacing old stock.

In Najran, public investment should follow two criteria: (a) the recommendations that have been suggested in the development strategy and indicated for each phase of the plan; (b) the priorities which have been established in the sections on Proposed Action Areas (9-5) and the City Center (9-4).

New parts of the city will be developed over time as indicated in the various phases. Investment should obviously follow the overall phasing, going first to the city center, then to the areas directly to the south, then to the newly developed areas across Wadi Najran, etc. Simultaneously, however, certain problems will need immediate attention. Some of them--especially land acquisition and roads-- will demand heavy public investment.

10-2-2 CAPITAL INVESTMENT PROGRAM

Public investment will be greatest in the first two phases, dropping off slightly in the last. In all phases the heaviest public investment expenditure will be in housing, although it is expected to decrease by almost half in the third phase of the Plan. The next heaviest sector across all years is in education. Social and religious facilities, public utilities, and recreation will require smaller expenditures, with only half as much devoted to commerce, public facilities, and industries during all phases from 1975-95. After 1980, investment in recreation, commerce, industry and health should level off.

10-3 ZONING REGULATIONS
AND ADMINISTRATIVE
MEASURES

The purpose of zoning regulations is to safeguard the health, safety and welfare of the community as well as to insure that land is available for the purposes designated in the Plan. With growth and development, legal issues will arise as to land use. If this is decided on a case-by-case basis, development will be slow and regulatory measures may be undermined.

Zoning is essentially a legal instrument for the implementation of land use aspects of the Master Plan. A zoning ordinance divides the land area within the municipal boundaries into zones; designates the classes of industry, trade, commerce, business, residence, and other purposes for which structures are to be used in each district; and imposes varying standards of development such as set-backs, height, bulk, and other requirements for buildings and other structures to be constructed, rehabilitated, altered, or repaired.

Zoning regulations should be ratified as a legal document and administered by the Building Departments in various municipalities, assisted as necessary by the police and the courts. Applicants for building permits would have to submit the necessary documentation, including plans and specifications to the Building Department and no permit would be granted for work not in conformity to standards.

Districts should be zoned as Agricultural, Residential (high, medium and low density), Business and Commercial, Light and Heavy Industry, Public Land, and Special Districts such as areas to be conserved. Industrial areas, power stations, and sewage plants must all be zoned as special areas and appropriately screened from surrounding properties. The wadi beds, open areas surrounding them, park space within the city, and land to be conserved should also be zoned to ensure that development does not encroach upon them and destroy the environment. To further foster the conservation of open spaces, existing agricultural land should be zoned "Agricultural" and any other development prohibited without an additional permit.

10-4 CONTROL OF DEVELOPMENT
IN OUTSKIRTS

As the population of Najran increases, there will be pressures for the landowners near the old city to convert their land to urban uses. The current general plan and the proposed residential development areas are designed to relieve these pressures and direct the demand for housing into planned residential areas. Nevertheless, some farm lands will have a high potential for development because they are near the existing center of act-

ivities in Suq Najran and are relatively desirable. This is particularly true for the agricultural lands between Suq Najran and Al Faisaliyah.

Such pressures, however, should be strongly resisted for the following reasons:

1. The existing date farms and other agricultural lands are the primary economic resources of the city. These lands have been cultivated because they are close to the wadi and the ground water supplied by the seasonal flow of the river. Converting such lands to urban uses, which do not require large quantities of water, will deprive the city of some of its most productive lands.
2. The greenery of date palms and other produce benefits the city environmentally as well as visually, by providing moisture and shade. Without such plants, the city will be hotter and more arid during the summer.
3. Any sizable development of the agricultural land will deflect demand for housing in the new development areas, jeopardizing the possibility of these areas to develop into viable communities.

Thus all intensive, urban use of the agricultural lands along the wadi should be prohibited. Some of the instruments available to the government to enforce this policy are:

1. Zoning of all such lands for agricultural use. This will enable the city to legally control the future use of the agricultural land.
2. Limiting public utility services, including water, sewage, and electricity, only for those uses allowed under agricultural zoning or under special permit.
3. Withholding approval for development of any intensive, urban activity on agricultural land.
4. Outright purchase of the land and conservation for the common benefit of the city.

The importance of preserving agricultural lands in Najran cannot be overemphasized. Management of future pressures for the development of these outlying areas is one of the critical tasks facing the government.

Table 10-2-1
IMPLEMENTATION PROGRAM, NAJRANA

	1975			1975 - 1980			1980 - 1985			1985 - 1995		
	NUMBER	TOTAL FLOOR AREA (m ²)	TOTAL LAND AREA (ha)	PHASE I			PHASE II			PHASE III		
				NUMBER	TOTAL FLOOR AREA (m ²)	TOTAL LAND AREA (ha)	NUMBER	TOTAL FLOOR AREA (m ²)	TOTAL LAND AREA (ha)	NUMBER	TOTAL FLOOR AREA (m ²)	TOTAL LAND AREA (ha)
BOYS ELEMENTARY ^b	14	15,647	11.2	2	4,153	3.4	5	3,600	2.4	5	10,800	7.6
BOYS INTERMEDIATE ^b	3	8,925	6.9	1	3,163	1.4	1	1,300	4.0	1	5,200	4.0
BOYS SECONDARY ^b	2	1,806	4.7	1	364	0.2	0	900	0.8	1	2,800	2.6
BOYS HIGHER EDUCATION ^c	1	3,200	1.2	0	800	0.4	0	600	0.2	0	2,200	0.8
GIRLS ELEMENTARY ^b	14	15,647	11.2	2	4,153	3.1	5	3,600	2.4	5	10,800	7.6
GIRLS INTERMEDIATE ^b	3	8,925	6.9	3	3,163	1.4	1	1,300	4.0	1	5,200	4.0
GIRLS SECONDARY ^d	2	1,078	4.4	1	225	0.1	0	700	0.6	1	1,400	2.0
GIRLS HIGHER EDUCATION ^c	1	2,200	0.8	0	400	0.2	0	600	0.2	0	1,200	0.4
TOT-LOT	146		7.3	30		1.5	32		1.6	92		4.8
PLAY-LOT (KINDERGARTEN)	37		7.4	7		1.6	8		1.6	23		4.6
NEIGHBORHOOD PARK	14		18.3	2		3.7	5		3.0	5		8.8
COMMUNITY PARK	2		14.6	1		3.0	0		3.2	1		9.2
CITY PARK	1		14.6	0		3.0	0		3.2	0		9.2
SMALL MOSQUE	14	10,500	3.5	2	2,100	0.5	5	2,300	1.25	5	6,600	1.25
JAMI'A MOSQUE	2	3,600	1.4	1	1,800	0.7	0	0	0	2	3,600	1.4
NEIGHBORHOOD CENTER	14	1,830	4.2	2	370	0.6	5	400	1.5	5	1,150	1.5
COMMUNITY CENTER	2	360	1.2	1	74	0.6	0	80	0	1	230	0.6
CIVIC CULTURAL CENTER	0		0	0		0	1		3.75	0		0
PHARMACY	14	1,830	1.4	2	370	0.2	5	400	0.5	5	1,200	0.5
DIAGNOSIS/TREATMENT	3	1,830	1.1	1	370	0.2	1	400	0.2	1	1,200	0.7
COMMUNITY/GENERAL HOSPITAL	128	3,840	2.75	26	780	0.6	30	900	0.6	80	2,400	1.7
SPECIAL HOSPITALS				500	16,200	11.4	500	16,200	11.4	210	7,000	5.1
				beds			beds					
ADMINISTRATION		18,300	0.9		4,200	0.2		3,700	0.2	18,800	18,000	1.0
POPULATION/HOUSEHOLDS		36,600/5,680			7,400/1,780			8,000/2,170			23,000/5,680	

Table 10-2-1 NOTES:

- a. This table represents the facilities implementation programme for each phase of the master plan based on the application of the Planning Standards (detailed in the Appendix) to the projected populations.

For 1975 this means that the figures shown represent the proposals of this master plan rather than the existing conditions. TPO planners may compare these figures with the existing conditions to determine shortfalls in existing facilities. This method was chosen for 1975 because the very rapid pace of development implementation would have made the presentation of a comparison of existing facilities to facilities currently required by the planning standards immediately obsolete.

The figures for Phases I, II and III represent the increments of facilities to be added to those of the previous phases in order to meet the requirements of the planning standards.

To use boys elementary schools as an example, in 1975 there should be 8 schools with a total floor area of 12,600 m² and a total land area of 9.0 ha. By the end of Phase I there should be an additional 2 schools with 4,050 m² of floor area and 2.8 ha of land. Therefore by 1980 there should be 10 elementary schools (8+2) with a total land area of 16,650 m² (12,600 + 4,050) and a total land area of 11.8 ha (9.0 + 2.8). This method is carried out for each phase, with only the increments being shown and not the totals, and is intended to facilitate implementation and cost planning for each phase.

It was decided in discussions with the TPO and its U.N. advisors that it would be undesirable to give monetary figures for this implementation program because the instability of construction costs and rapid and uncertain inflation would soon render such figures meaningless. It is felt to be a much better policy to give only numbers and areas of proposed facilities and have the expert financial planners of the Ministry prepare financial analyses as they become needed. In this way the implementation program of this master plan can be kept constantly up-to-date and meaningful.

- b. Land area for boys and girls elementary, intermediate and secondary schools includes appropriate associated recreation areas. See Chap. 5, Sec. 5-1 for details.
- c. Higher education facilities for boys and girls includes teachers and technical schools, but not colleges and universities. See Table 5-1-1.



appendix: community planning standards

A-0 INTRODUCTION

Planning standards and community facility design criteria are studied and summarized in this chapter. They are given here as a set of guidelines for facility planning and community grouping strategy. Obviously planning standards should vary from one locality to another reflecting different local needs and conditions. Standards should also vary from one state to the next in the development process reflecting the different constraints of each stage of development. Meanwhile standards applicable to relatively wide ranges of situations are also needed before a locally specific set of standards is created. The general standards are needed to determine or reflect policies for the region or areas covering more than one city. The study here was intended to create a set of standards with ranges wide enough to reflect all of the five cities' situations yet narrow enough to function as a guideline for the relatively detailed community planning. The standards provide recommended rigid target figures as well as their acceptable ranges providing strong guidelines whenever needed, as well as flexibility to adapt to local conditions. The standards are based on our understanding of the planning area and our general knowledge and philosophy gained through experience in other projects.

The standards for most items (such as service radius, population served and required land) depend on residential density and overall population size. In the first section of this appendix, the characteristics of population and its density are summarized for the five cities for both existing and future situations, providing the basic background reasons for the range of standards and the population grouping described in the later sections. In the second section, planning standards are described for each type of facility. They contain, as mentioned above, the recommended target numbers and their acceptable ranges. The third section presents a hypothetical example of a city of 60,000 and the distribution of land uses required.

A-1 DEMOGRAPHIC AND DENSITY FRAME FOR STANDARDS

A-1-1 OVERALL POPULATION SIZE

Table A-1-1 shows population of five cities in 1975 and 1995. In 1995 each of five cities has population of somewhere between 30,000 to 70,000. The planning standards to be described

should reflect this fact. The standard is to be applied not to the large city of population over 100,000 nor is to be applied to the small rural village of population less than 10,000. The standard here, therefore, should cover mainly the population group scale of normally called "Neighborhood" scale (population of order of 10^3) and normally called "Community" scale (population of order of 10^4). The population group scale normally called "Region" (population of order of 10^5) should also be discussed but the former two scales should be given more emphasis.

It should also be noted that the expected population increase for each city is over 100% in average and some city like Bishah is expected to grow over 200%. In this kind of rapid growth usually the protection of group privacy becomes seriously difficult due to the fact that, for example, the once quiet residential neighborhood is bisected by the traffic which should belong to much higher level of grouping order than neighborhood or it is exposed to the regional traffic with unacceptable proximity without any buffer. The standard should cover the problem related to this matter i.e. standards for buffer zone, street hierarchy and group privacy dealing with the rapid growth of the cities.

Table A-1-1
SURVEY POPULATION^a 1975 and 1995

	1975 ^b	1995 ^c	Increase
Abha	21,900	66,000	200%
Khamis Mushayt	29,300	85,000	190%
Najran	27,200	59,000	120%
Jizan	22,200	41,000	80%
Bishah	7,900	23,000	190%
Nimas Village Cluster	7,100	11,640	164%

- Notes: a. Population for KTU survey area only (not necessarily represent "city population")
 b. Southern Region Project Study, Existing Conditions many Master Plans.
 c. Southern Region Project Study, KTU estimate, in the area inside of KTU socio economic survey area.

A-1-2 POPULATION DENSITY

Table A-1-2 (a) summarizes the 1975 and 1995 population densities for the five cities. The Table indicates that density is low in overall city area in 1975 and therefore, in the next twenty years "in-fill" type of development is possible and recommended rather than "sprawl" type of development. The planning standards should reflect this fact. Unnecessarily low density developments in the central area should be discouraged or prohibited through these standards.

From Table A-1-2(a), following approximations are made:

1. Each city as a whole has a density of 10 pph (person per hectare) to 40 pph in 1975, and estimated density in 1995 is somewhere between 20 and 120 pph.
2. Each city's central district (approximately 100 to 200 ha area) has a density of 50 to 150 pph.
3. Each city's highest density zone (approximately 10 to 40 ha area) has a density of 100 to 200 pph.

It is also assumed that the central district density will increase from 50 to 75% and the density of a city's highest density zone may increase up to 200 pph due to the limited availability of land and of the peripheral area. If no renewal is done, no density increase is expected in the central zone. The standards should be written with a wide enough range to enable planning within the density ranges listed.

Table A-1-2(b) summarizes the density range used for the determination of planning standards.

A-1-3 SCHOOL AGE GROUP DISTRIBUTION

Table A-1-3(a) shows the per cent share per age of children in the total population. The numbers are based on the results of the 1975 5% Sample Survey. From this table it is apparent that there are 3 to 4 (3.01 to 4.20, to be exact) children per age per 100 population for the age group 0 to 9, and there are 2 to 2.5 (1.95 to 2.69, to be exact) children per age per 100 population for the age group 10 to 19. An analysis of the existing conditions indicates that the population pyramids in the cities of the Southern Region do not have normal, stabilized characteristics due to a lack of working age population. In a normal and growing population, approximately 3% and 2.5% of the total population are estimated for the age group of 0 to 9 and 10 to 19, respectively.

Presently larger numbers of children exist in

Table A-1-2(a)
POPULATION DENSITY 1975 and 1995 (pph)^a

	CITY AVERAGE		CENTRAL DISTRICT		HIGHEST DENSITY ZONE	
	1975	1995	1975	1995	1975	1995
Abha	20 (1100 HA)	60	50 (150 HA)	150	150 (10 HA)	200+
Khamis Mushayt	40 (720 HA)	120	100 (230 HA)	150	200 (10 HA)	200+
Najran	10 (3400 HA)	20	100 (70 HA)	150	100 (40 HA)	200+
Jizan	40 (500 HA)	80	150 (100 HA)	150	200 (10 HA)	200+
Bishah	20 (470 HA)	60	50 (100 HA)	150	100 (20 HA)	200+

Note: a. From Southern Region Study, Existing Conditions. The nearest multiple of 10 and 50 in "City Average" column and other columns respectively. City areas are defined as the 5% sample survey areas.

Table A-1-2(b)
APPLICABLE DENSITY RANGE FOR PLANNING STANDARDS

	DENSITY RANGE (pph)	EXAMPLE
Low Density	Up to 50	1975 City Average
Low-Medium Density	50 to 100	1975 Central District 1995 City Average
Medium Density	100 to 200	1975 Highest Density Zone 1995 Central District
High Density	200 and up	1995 Highest Density Zone

these five cities than in normal cities. In the future, this deviation may be reduced by regaining working age populations back to these cities. Table A-1-3(b) indicates the range of children population taken into consideration in the determination of the standards.

Analysis of the existing distribution of the numbers of boys and girls indicates that boys and girls number basically the same for each age group, and the standards do not need to differentiate between the two, although ratio of school enrollment may differ between the sexes.

Table A-1-3(a)
POPULATION OF AGE GROUP 0 TO 19 IN THE FIVE CITIES^a
NUMBER OF CHILDREN PER AGE OUT OF 100 POPULATION
EXISTING CONDITIONS IN THE FIVE CITIES

AGE GROUP	ABHA	BISHAH	JIZAN	KHAMIS MUSHAYT	NAJRAN	AVERAGE	CASE
0 TO 9	3.5	3.9	3.0	3.9	4.0	3.7	3.0
10 TO 19	2.3	2.5	2.7	2.0	2.1	2.5	2.5

NOTE: a. Southern Region Project Study, Existing Conditions

Table A-1-3(b)
APPLICABLE RANGE OF CHILDREN POPULATION FOR PLANNING STANDARDS

AGE GROUP	NUMBER OF CHILDREN OUT OF 100 POPULATION
0 TO 9	3 TO 4 Children/age
10 TO 19	2 TO 3 Children/age

Based on the Table A-1-3(b), Nursery-Kindergarten enrollment is desired as following:
If Nursery-Kindergarten (ages 3 to 5) enrollment is 25 or 50% of the total population of that age group, the enrollment may be calculated to be between 2.25% and 6.0% of the total population as shown below:

	25% ENROLLMENT	50% ENROLLMENT
3% per age x 3 ages = 9%	9% x 25% = 2.25%	9% x 50% = 4.5%
4% per age x 3 ages = 12%	12% x 25% = 3.0%	12% x 50% = 6.0%

Also based on the Table A-1-3(b), Elementary School enrollment is derived as following:
Elementary School age group is 6 through 11 and the enrollment rate should be very close to 100% for both boys and girls. Therefore 16% to 22% of the total population may be estimated for elementary school enrollment (total of boys and girls) as shown in the following calculation:

$$3\%/Age \times 4 \text{ ages (6,7,8 and 9)} + 2\%/Age \times 2 \text{ ages (10,11)} = 16\%$$

$$4\%/Age \times 4 \text{ ages (6,7,8 and 9)} + 3\%/Age \times 2 \text{ ages (10,11)} = 22\%$$

Intermediate School age group is 12 through 14, and close to 100% of the age group population should be enrolled. Intermediate School enrollment thus is estimated to be somewhere between 6% and 9% (total of boys and girls) of the total population (See below):

$$2\%/Age \times 3 \text{ ages (12,13 and 14)} = 6\%$$

$$3\%/Age \times 3 \text{ ages (12,13 and 14)} = 9\%$$

For secondary schools, enrollment in 1995 is assumed to be somewhere around 37.5% of the age group population (15,16 and 17). Secondary school enrollment is expected to be somewhere between 2.25% and 3.38% of the total population.

$$2\%/Age \times 3 \text{ ages (15,16 and 17)} \times 37.5\% = 2.25\%$$

$$3\%/Age \times 3 \text{ ages (15,16 and 17)} \times 37.5\% = 3.38\%$$

A-1-4 SUMMARY OF DEMOGRAPHIC AND DENSITY FRAMEWORKS

The key elements to be taken into consideration of planning standards which have been discussed individually, are analyzed in a combined way. Table A-1-4 shows potential population grouping on the left hand side, density and enrollment ranges across the top, and the combined implications on the contents of the table. The combined implications are in terms of land area requirements for each population group, service radii, and school enrollments.

Table A-1-4
SUMMARY OF POPULATION GROUP, DENSITY, AND ENROLLMENT

POPULATION GROUP RANGE	DENSITY RANGE		RANGE OF ENROLLMENT												
	50pph	100pph	200pph	NURSERY KINDERGARTEN	ELEMENTARY SCHOOL	INTERMEDIATE SCHOOL	SECONDARY SCHOOL	2.25%	6.0%	16.0%	22.0%	6.0%	9.0%	2.25%	3.38%
	10 ^a	5	2.5												
500	(178) ^b	(126)	(89)	12 ^c	30	80	110	30	45	11	17				
10 ³ =1000	20	10	5												
	(252)	(178)	(126)	23	60	160	220	60	90	23	34				
5000	100	50	25												
	(564)	(399)	(282)	115	300	800	1100	300	450	112	169				
10 ⁴ =10000	200	100	50												
	(798)	(564)	(399)	230	600	1600	2200	600	900	225	338				
50000	1000	500	250												
	(1784)	(1261)	(892)	1150	3000	8000	11000	3000	4500	1125	1690				
10 ⁵ =100000	2000	1000	500												
	(2523)	(1784)	(1261)	2300	6000	16000	22000	6000	9000	2250	3380				

Notes: a. Land Area for Group Population in Hectares.
b. Service Radius in m.
c. School Enrollment

The table indicates that a population of 10^{3a} (i.e. an a-multiple of population group 10³) provides a normally acceptable range of elementary school enrollment per school when the value of a is between 2.5 and 5, and the resulting elementary school enrollment (160a to 220a) is 400 to 1100. In this case the service area (20a to 5a) is 100 ha to 12.5 ha, and its radius from the center to the edge is 600m to 200m (for densities between 50 pph and 200 pph) which is equivalent to 10 to 3 minute walking distance. If one elementary school (if boys' and girls' schools are counted separately, then two schools) is located in this territory then both the number of enrollment per school and the walking distance to the school are acceptable to the standards recommended.

The table also indicates that a population of 10^{4b} (i.e. a b-multiple of population group 10⁴) provides a normally acceptable range of intermediate school students per school when the

value of b is between 1 and 2, and the resulting intermediate school enrollment (600b to 900b) is 600 to 1800. In this case the service area (200b to 50b) is 400 ha to 50 ha, and its service radius is 1200m to 400m (for the densities between 50 pph and 200 pph) which is equivalent to 20 minute to 6 minute walking distance. If one set of boys' and girls' intermediate schools is located in this territory then both the number of enrollment per school and the walking distance to the school are within the acceptable range of the standards recommended.

The table also shows that a population of 10^{4b} (i.e. a c-multiple of population group 10⁴) provides a normally acceptable range of secondary school enrollment per school when the value of c is between 2 to 4, and the resulting enrollment (225c to 338c) is 450 to 1352. In this case, the service area (200c to 50c) is 800 ha to 100 ha and the service radius is 1600m to 560m (for the densities between 50 pph to 200 pph) which is equivalent to 25 to 8 minute walking distance. If one set of boys' and girls' secondary school is located in this territory then both the number of enrollment per school and the distance to the school are acceptable to the standards recommended.

From these findings, the following observations may be made for the densities and population characteristics of the cities in the region:

1. Elementary School oriented territory includes a population of 2,500 to 5,000 (3,750 represents the range as typical).
2. Intermediate School oriented territory includes a population of 10,000 to 20,000 (15,000 represents the range as typical).
3. Secondary School oriented territory includes a population of 20,000 to 40,000 (30,000 represents the range as typical).

Obviously the standards recommended are not so restrictive as to exclude possibilities other than those listed above. However, the range definition is justifiable not only because of the acceptability of the key standard elements normally used by the consultant but also because of the convenience in establishing a hierarchical order of population grouping. As mentioned in A-1-1 of this section, the grouping of population with order of 10³ is conventionally called "Neighborhood" and the grouping of population with order of 10⁴ is called "Community". The elementary school oriented territory defined above corresponds to a "Neighborhood" and the intermediate and secondary school oriented territories correspond to a "Community". Taking

these traditional names and the hierarchical, structural character of the grouping into consideration, the following pattern and names are used:

Table A-1-5
SUMMARY TABLE OF POPULATION GROUPING

GROUPING LEVEL	NAME OF GROUPING	TYPICAL POPULATION
G ₀ (Level 0)	Residential Unit Group	250
G ₁ (Level 1)	Sub-Neighborhood	937 (Say 1000)
G ₂ (Level 2)	Neighborhood	3,750 (2,500 to 5,000)
G ₃ (Level 3)	Sub-Community	15,000 (10,000 to 20,000)
G ₄ (Level 4)	Community	30,000 (20,000 to 40,000)

G₀ and G₁ represent sub-areas of a neighborhood to function as the smallest units of territories for intimate social activities.

A "Residential Unit Group", as the smallest grouping, provides at its center a tot-lot and seating areas for the approximately 250 residents who live in the vicinity. The service radius and scale are so small and intimate that these shared outdoor spaces are conceived almost as extensions of living room activities.

A "Sub-Neighborhood" provides nursery-kindergarten and other facilities whose immediate accessibility from the residential area and whose sense of spatial intimacy is crucial. Using Table A-1-4, it is estimated that each G₀ group has a territory of 5 ha to 1.25 ha with a radius of 120m to 60m (2 to 1 minute walking distance); each G₁ group has a territory of 20 ha to 5 ha with a radius of 250m to 125m (i.e. 4 to 2 minute walking distance), and 23 to 60 nursery-kindergarten enrollment.

The following sections assume these basic grouping ideas as guidelines. The ideas in this section, in turn, were influenced by a study of each set of standards summarized in the next section.

A-2 PLANNING STANDARDS FOR EACH FACILITY

A-2-1 PLANNING STANDARDS FOR EDUCATIONAL FACILITIES

A-2-1-1 NURSERY-KINDERGARTEN

Age of Children:	3 through 5
Enrollment:	25% to 50% of age group population is enrolled. 9% to 12% of the total population is in this age group. Therefore, 2.25% to 6% of the total population is enrolled.
Population Served:	Approximately 1000 with an acceptable range of 500 to 1,500.
Size of Facility:	40 pupils/school with an acceptable range of 20 to 80.
Radius of Area Served:	Maximum 200m (3 minute walking distance) is recommended. 600m (10 minute walking distance) is also acceptable if density is less than 50 pph.
Sub-Unit:	20 pupils/class (3 year old); 25 pupils/class (4 year old); 30 pupils/class (5 year old). 1 nurse and 1 assistant for each class are recommended.
Land Area Requirement:	5m ² /pupil is recommended (3m ² to 7m ² /pupil is acceptable) for building area and service area. For play area (see next section, "Nursery-Kindergarten Playlot".)
Floor Area:	3m ² /pupil is recommended (2m ² to 4m ² /pupil is accepted).
Location:	It shall be closely located to the center of gravity of residential sub-neighborhood and away from major traffic. Play lot is either a part of or closely located to it.
Other Requirement:	3 and 4 year old children could be separated from the 5 year old children if there is room. (Although ages are close, there is a substantial difference of activity between the two groups.) Mixed for boys and girls.

A-2-1-2 ELEMENTARY SCHOOL FOR BOYS

Age of Children:	6 through 11 (8% or 11% of total population) Boys only
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NOTE

Enrollment: Close to 100% of age group population is enrolled. 8% to 11% of the total population is enrolled (boys' school). Ministry of Education Standards (M. E. Standards) indicates that 10% of the total population is equal to the expected enrollment for boys' elementary school.

Population Served: 3,750, say 4,000, is recommended. 2,500 to 5,000 is acceptable. (Even a further deviation may be acceptable with good planning reasons.)

Size of Facility: 375 enrollment (boys only) is recommended. 200 to 550 is acceptable. (M. E. Standards indicate 450 pupils/school = 30 pupils/classroom x 15 classrooms.)

Radius of Area Served: Maximum of 300m (i.e. 5 minute walking distance). 600m (10 minute) is also acceptable. If density is less than 50 pph, and a school bus system is developed, then further expansion of the radius is also acceptable.

Sub-Unit: 30 pupils/class is recommended. 20 - 40 pupil/class is also acceptable. (M. E. Standards indicate 30 pupils/class and 15 classes/school.)

Land Area Requirement: 12m²/student is recommended for building and site area.* (12m²/student x 375 student = 0.5 ha) plus 400m² for play area for lower grades exterior activity is recommended. Playground for upper grade athletic program is located either in, or close to, the school site. Playground standard is given later. Minimum width of site is 80m. But less than 80m is also acceptable if accompanied by an acceptable layout plan. (M. E. Standards recommend 100m x 100m site; 80m x 95m as minimum.)

Floor Area: 4.5m²/student, i.e. 1700m²/375 student is recommended. 3m² to 6m²/student is also acceptable depending on the degree of programs for non-classroom facilities such as library, special purpose rooms and indoor athletic play facilities.

Location: It should be situated in the center of grouping Level 2, i.e. "Neighborhood". It should be accessible by footpath from residential areas not interrupted by major auto traffic, even by the distributor roads. It should be separated from the girls' school.

NOTE: * School "building and site" area is the area within which school buildings, access drive-way, drop-off, parking areas, court and gardens, landscaped areas and other ancillary facilities are located. Athletic play ground (or play field) and formal paved play area are excluded from the "building and site" area.

Other Requirement: Playground should be a part of or close to the school. Elementary schools should be integrated with neighborhood shopping and neighborhood cultural facilities to create a multi-activity "Neighborhood center". Play area of the school should be fenced from the street.

A-2-1-3 ELEMENTARY SCHOOL FOR GIRLS

Age of population, population served, radius of area served and sub-units are the same as boys' schools. Locational requirements are similar to those of boys' elementary school. Site area for girls' elementary school is slightly small at present (M. E. Standards indicate a minimum site of 80m x 70m) and the rate of enrollment is also smaller than the rate for boys. The consultant, however, hesitates to recommend any smaller or lesser standards to girls' schools than boys' schools because of the urgent and strong necessity for girls' education in the kingdom.

A-2-1-4 INTERMEDIATE SCHOOL FOR BOYS

Age of Student: 12 through 14 (3.0 to 4.5% of total population; boys only)

Enrollment: Close to 100% of age group population is enrolled, therefore 3.0% to 4.5% of the total population is enrolled (boys). Although M. E. Standards indicate that 5% of the total population is to be enrolled for boys intermediate schools.

Population Served: 15,000 is recommended. 10,000 to 20,000 is also accepted. (Even wider range is accepted if good planning reasons exist.)

Size of Facility: 600 enrollment per school (boys) is recommended. 300 to 900 enrollment per school is also acceptable. (M. E. Standards indicate 30 students/class x 15 classes/school = 450 student/school.)

Radius of Area Served: Maximum 1200m (20 minute walking distance) is recommended. Larger radius is also accepted if density is less than 50 pph. In this case the acceptability standard should be provided on a case by case basis.

Sub-Unit: 25 to 30 students/class or homeroom (M. E. Standards recommend 30 students/classroom and 15 classrooms/school.)

Land Area Requirement: 20m²/student is recommended for the building and ground area. (20m²/student x 600 students = 1.2 ha) plus playfield which is either inside

of the school site or closely located to it.
(See "Standards for Playfield" - Level 1.)
Minimum width of site is 80m with an acceptable
building layout plan. (M. E. Standards recom-
mend 100m x 100m but not less than 80m x 95m.)

Area Require-
ment: 6.5m²/student, i.e. 3900m²/600 students, is
recommended. 5m²/student to 8m²/student is al-
so acceptable depending on the degree of non-
classroom facility (library, indoor sports) pro-
grams.

Location: It should be situated in the center of grouping
Level 3, i.e., "Sub-Community". It should be
accessible either by footpath, lanes, alleys (V₇),
local access street (V₆) or distributor road (V₅)
with sidewalks (See definition of V₇ through V₅
in the "Road Standard" section) It should be
separated from girls' school.

Other Requirements: Playfield - Level 1 should be a part of or close
to the school; it shall be used for intermediate
school curriculum and also by the neighboring
population for weekend and off-working-hour
sports activities.

A-2-1-6 INTERMEDIATE SCHOOL FOR GIRLS

Age of population, population served, radius of
area served, and sub-unit standards are the
same as intermediate school for boys. Although
the standards for girls' school are inferior at
the moment, it is recommended that 100% enroll-
ment up to intermediate school be mandatory not
only for boys but also for girls. From this
view point the standards for girls' school
should be basically identical.

A-2-1-7 SECONDARY SCHOOL FOR BOYS

Age of Student: 15 through 17 (3 to 4.5% of total population;
boys only).

Enrollment Assump-
tions: 37.5% of the age group served is assumed to be
enrolled (boys enrollment is assumed 50%, girls'
enrollment is assumed 30%). Therefore, 1.50 to
2.25% of total population is assumed to be en-
rolled for boys' secondary schools. M. E. Stan-
dards estimate that 2.5% of total population is
enrolled for boys' secondary schools.

Population Served: 30,000 is recommended. 20,000 to 40,000 is al-
so acceptable. (Even wider range is acceptable
if good reasons exist.)

Size of Facility: 600 enrollment per school (300 to 900) is rec-
ommended within the enrollment assumptions de-
scribed above. (M. E. Standards indicate 30
students/classroom x 18 classrooms/school = 480
students/school.)

Radius of Area
Served: Maximum 1600m (25 minute walking distance) is
recommended. Larger radius is also acceptable
if density is less than 50 pph. In this case
the acceptability standard should be provided
on a case by case basis.

Sub-Unit: 25 to 30 student/class (M. E. Standards recom-
mend 30 students/class and 18 classes/school.)

Land Area Require-
ment: 25m²/student is recommended for building and
ground area (25m²/student x 600 student =
1.5 ha). In addition to the building, the play-
field should be provided next to or close to the
school. (See "Standards for Playfield" - Level
2.) Minimum width of site is 95m, but it could
be less than that if acceptable building layout
plans are provided. (M. E. Standards recommend
100m x 100m but not less than 95m x 110m.)

Floor Area Require-
ment: 7m²/student, i.e. 4200m²/600 students is recom-
mended. 6m²/student to 8m²/student is also ac-
ceptable depending on the degree of provision of
non-classroom facility (such as indoor athletic
facilities) programs.

Location: It should be situated in the center of grouping
Level 4, i.e. "Community". It should be acces-
sible by either footpath, lanes, alleys (V₇), local
access street (V₆), distributor road (V₅) or minor
collector road (V₃). It should not be directly
accessible from the residential area through arte-
rial road (V₂ or V₁).
(See section on "Road Standard" for the definition
of V₇ through V₁) It should be separated from
secondary schools for girls.

Other Requirements: Playfield - Level 2 should be a part of or close
to the school. It shall be used by secondary
school curriculum by the neighboring population
of "Community" for weekend and off-working hour
sports activities.

A-2-1-7 SECONDARY SCHOOL FOR GIRLS

Age of population, population served, radius of
area served and sub-unit standards are the same
as those of secondary school for boys. Enroll-
ment assumptions should be lower than the case
for boys. The enrollment of girl students
should in the future go higher and eventually as
high as the boys. For the present planning pur-
poses, it is assumed that 30% of the girls' will

be enrolled in the secondary school (instead of 50% for boys). 30% of age group means 0.9% to 3.16% of the total population is enrolled in a girls' secondary school.

A-2-1-8 TEACHERS' SCHOOL

Age of Student: Varies

Enrollment and Size of Facility: M. E. Standards recommend 30 students/class x 24 classrooms/school = 720 students/school.

Population Served/Radius of Area Served: One Teachers' School for each city with population over 20,000.

Sub-Unit: 25 to 30 students/class.

Land Area Requirement: 30m²/student (2.1ha/720 students)(M.E. Standards require 100m x 100m for building and site area)

Floor Area Requirement: 8m²/student

Location: Directly accessible from the town center or from an arterial road leading to the town center.

Other Requirement: When college is established, the Teachers' School can be absorbed into it. Athletic field should be easily accessible.

A-2-1-9 TECHNICAL SCHOOL

Age of Student: Varies but over 15.

Enrollment and Size of Facility: M. E. Standards recommend 30 students/class x 24 classes/school = 720 students/school.

Population Served/Radius of Area Served: One technical school for each city with population of 20,000 or more.

Sub-Units: 25 to 30 students/class.

Land Area Requirement: 30m²/student (2.1ha/720 students.)

Floor Area Requirement: 8m²/student. (M. E. Standards require 100m x 110m for building and site area)

Location: Directly accessible to the town center or accessible from an arterial road leading to the town center.

A-2-1-10 TECHNICAL SCHOOL FOR GIRLS INCLUDING SEWING LEARNING PROGRAM

Age of Student: Varies but over 15.

Population Served/Radius of Area Served: One female technical school for each city with population of 20,000 or more.

Land Area Requirement: 1 ha recommended. Minimum 80m x 70m.

Floor Area Requirement: 7m²/student.

Location: Accessible from the city center or from an arterial road leading to the center.

A-2-1-11 COLLEGES

Age of Student: 18 to 21 or 18 to 19.

Population Served: The first college at Abha by 1980. By 1995, Jizan, Khamis Mushayt and Najran will also have one college each.

Size of Facility: Average size of 1,000 students.

Land Area Requirement: 100m²/student to 50m²/student.

Floor Area Requirement: 15m²/student excluding dormitory facilities. (If dormitory is needed then 25m²/dormitory resident is additionally needed.)

Location: Accessible from the city center through arterial road. Locate as closely as possible to the city's central cultural area so that cultural-educational facility of the college is shared by the community.

A-2-1-12 SPECIAL COLLEGE

Age of Student: 18 to 21 or 18 to 19.

Population Served: The first special college (for medicine, agriculture and engineering) at Abha by 1995 serving the regional population.

Size of Facility: Average size of 600.

Land Area Requirement: 100m²/student excluding dormitory facilities.

Location: Located on regional arterial road or major arterial road connecting to and situated close to the city center.

A-2-2 PLANNING STANDARDS FOR RECREATIONAL AND ATHLETIC FACILITIES

A-2-2-1 TOT-LOT

Main Population: Pre-school children 2 years old to 5 years old and their supervising adults (mothers).

Main Function: Infants' exterior play, supervising adults' seating, conversation, and evening stroll.

Size of Population Served: Approximately 250. 12 to 16% of the total population, i.e. 30 to 40 is in ages 2 through 5.

Radius of Area Served: Maximum 120m (2 minute walking distance) is recommended. If density is less than 50 pph, 300m (5 minute walking distance) is acceptable.

Land Area Requirement: 500m²/lot is recommended. 300m² to 1000m²/lot is also acceptable.

Location: Situated in the center of each residential group unit (or grouping level of G₀ as defined in A-1-4) directly accessible from each unit without crossing any street or preferably even group parking spaces or access lane. It should be bordered by residential units or pedestrian activities but not by parking or streets.

Other Requirement: Infant play area and seating area should be arranged in such a way as to enable adult surveillance over the infants at play. Enough planting and shaded area should be provided. Play area should be visible from as many dwelling units as possible for the adults in house to survey their children at play in the tot-lot. Connected to the nearest nursery-kindergarten playlot by footpath through narrow but well controlled exit point.

A-2-2-2 NURSERY-KINDERGARTEN PLAYLOT

Main Population Served: 3 to 5 year old children enrolled in nursery-kindergarten. It also serves surrounding infants, accompanied by adults, and lower grade

elementary school children during off-school hours.

Main Function: For nursery-kindergarten outdoor play or for organized group play for pre-school children.

Size of Population Served: Approximately 1,000 inhabitants. 2.25% to 6% of the total population is enrolled in the nursery-kindergarten (See "Standards for Nursery-Kindergarten" in the previous section).

Radius of Area Served: Maximum 200m (3 minute walking distance) is recommended. 600m (10 minute walking distance) is also acceptable if density is less than 50 pph.

Land Area Requirement: 2000m² is recommended. 1000m² to 3000m² is also acceptable.

Location: Situated in the center of "Sub-Neighborhood" (See "Nursery-Kindergarten Standards".)

Other Requirement: Integral part of kindergarten design. Footpath connection to surrounding small scale tot-lots should be provided. Should not be bordered by major traffic. If bordered by any auto traffic, fences should be provided. Play pool for children may be included.

A-2-2-3 NEIGHBORHOOD PARK

Population Served: All inhabitants in the "Neighborhood", all age groups.

Main Function: General recreation. Preservation of natural environment in the neighborhood. Common garden for neighborhood residents.

Size of Population Served: 3,750, say 4,000, is recommended. 2,500 to 5,000 is accepted.

Radius of Area Served: Maximum 300m (i.e. 5 minute walking distance) is recommended. 600m (10 minute) is also acceptable. If density is less than 50 pph and access path to the park is designed over a long distance and properly separated from auto traffic, then radius may be extended.

Land Area Requirement: 5m²/inhabitant is recommended; 2m² to 10m²/inhabitant is also acceptable.

Location: Situated in the center of "Neighborhood" (grouping Level G₂). Should not be surrounded or bordered by major traffic (street classification of "collector road" or higher).

Other Requirement: Connected to major neighborhood level facilities (such as elementary school, neighborhood shopping, small mosque, etc.) by footpath without crossing major traffic. Park itself could be stretched along such a path to create a linear park along which neighborhood facilities can be clustered. Trees, green areas, seating areas with benches and paved paths should be provided. Recreational adult swimming pool with ancillary facilities may be provided.

A-2-2-4 PLAYGROUND

Main Population Served: Primarily elementary school children at school time. Secondly other inhabitants at off-school-hours and weekends.

Main Function: Active play and game for elementary school athletic programs.

Size of Population Served: 3,750, say 4,000, is recommended. 2,500 to 5,000 is acceptable. 750 children (400 to 1,100 in range) per playground are expected, of which half are boys. Boys' and girls' playground are separated and each should be located in or close to the school.

Radius of Area Served: Maximum of 300m (i.e. 5 minute walking distance) is recommended. 600m (10 minute walking distance) is also acceptable. When density is less than 50 pph, longer service radius is acceptable if safe and pleasant access to the playground is provided.

Land Area Requirement: 20m²/elementary school student is recommended. 10m² to 30m²/elem. school student is acceptable.

Location: Situated at the center of the "Neighborhood" (See "Elementary School Standards"). Situated in convenient proximity to both boys' and girls' elementary schools.

Other Requirement: Designed as an integral part of an elementary school. Connected to the elementary school and residential zone on footpath crossing no major traffic. Off-school time usage by the adult population is recommended and elementary school utilities such as water-drinking and toilet should be available for those adults. Enough pavement space should be provided for medium size sports activities such as basketball, tennis, etc. Childrens' pool, fenced and equipped with locker room and shower can be provided as a part of the playground program or a part of school program.

A-2-2-5 COMMUNITY PARK OR SMALL CITY PARK

Population Served: All residents of the "Community" whose population range is 20,000 to 40,000 (30,000 as average).

Main Function: Passive recreation on a weekly to monthly participation basis (not daily use) to be integrated with cultural, religious facilities. It also functions as a linear connector of "Community" level facilities.

Size of Population Served: 30,000 is recommended. 20,000 to 40,000 is acceptable.

Radius of Area Served: Maximum 1000m (15 minute walking distance) is recommended. 1600m (20 minute) is also acceptable. When density is less than 50 pph, longer service radius may be acceptable if the park penetrates into the residential zones as a linear park to provide safe and pleasant footpath to the center of the park.

Land Area Requirement: 4m²/inhabitant is recommended. 2m² to 6m²/inhabitant is acceptable.

Location: Situated in the center of a "Community" whose population range is 20,000 to 40,000. It should be located between two sub-community centers in order to connect them and to create a park-open space spine in the middle of which the "Community" center is located.

Other Requirement: Fruit trees or agricultural land use could be used as a part of community park function since a part of the function is as visual relief or visual buffer between two adjacent subcommunities. Where community park comes in contact with community commercial (or shopping) area, the park design should reflect an "urban park" where extensive pavement and landscaping are concentrated in a limited area.

A-2-2-6 PLAYFIELD - LEVEL 1

Main Population Served: Primarily for intermediate school students at school hour; secondarily, for other inhabitants in the "Sub-Community" at off-school-hours or weekends.

Main Function: For athletic curriculum activities of intermediate schools (boys and girls). Practice field for "Sub-Community" sports club or sports team activity.

Size of Population Served: 15,000 is recommended. 10,000 to 20,000 is acceptable. 600 to 1800 intermediate school enrollment (boys plus girls) is assumed in the service area.

Radius of Area Served: Maximum 1200m (20 minute walking distance) is recommended. When density is less than 50 pph, longer radius is acceptable if bus service is provided the areas beyond the recommended walking distance.

Land Area Requirement: 30m²/intermediate school student is recommended. 20m² to 40m²/student is accepted.

Location: Situated at the center of a "Sub-Community", whose population range is 10,000 to 20,000, and in close proximity to or in integrated part of both boys' and girls' intermediate schools.

Other Requirement: Parking space should be provided for the adult field users (10 to 20 spaces). Official pavement sizes for game courts should be provided for sports requiring smaller spaces, such as tennis and basketball, but not necessarily full size official dimensions for the field and track. Boys' and girls' fields should be separated with enough distance. Swimming pool(s) can be provided with shower rooms and locker rooms.

A-2-2-7 PLAYFIELD - LEVEL 2

Main Population Served: Primarily for secondary school students at school hour; secondarily for the other residents in the "Community" off-school-hours or weekends.

Main Function: For athletic curriculum activity of secondary schools (boys and girls separately). Practice and competition or game for the community sports teams and clubs.

Size of Population Served: 30,000 is recommended. 20,000 to 40,000 is acceptable. 900 (450 to 1350) students per playfield are expected, 70% of whom are boys.

Radius of Area Served: Maximum 1000m (15 minute walking distance) is recommended; 1600m (20 minute) is also acceptable. When density is less than 50 pph, longer service radius may be acceptable if bus system and pleasant pedestrian path are provided to cover the "Community" and if ample parking space is provided.

Land Area Requirement: 50m²/secondary school student. 40m² to 60m²/student is also acceptable. Minimum land area is 4ha/playfield.

Location: Situated at the center of a "Community" whose population range is 20,000 to 40,000 and in close proximity to both boys' and girls' secondary schools.

Other Requirement: Parking space should be provided for the adult field users and game spectators. Full size official dimensions for courts, track and fields. Simplified spectator seating area, either by stands or by banking should be provided. Boys' and girls' playfields should be separated with enough distance. Swimming pool with full official size can be provided with full ancillary activities (indoor and outdoor).

A-2-2-8 CITY PARK

Population Served: All residents and non-resident workers of a city with a population of 60,000 or more.

Main Function: Weekend family recreation for residents. Lunch time recreation for downtown workers. Park as an integral part of city's cultural and recreational center.

Size of Population Served: 40,000 or more. In 1995 all five cities with the exception of Bishah and Najran should have a "city park". Bishah and Najran will have a "Community Park" functioning as a "small scale city park".

Radius of Area Served: Entire city. Radius varies.

Land Area Requirement: 4m²/inhabitant is recommended. 2m² to 6m²/inhabitant is acceptable.

Location: Situated at the center of city with main cultural, community, and educational functions clustered around it.

Other Requirement: Historical district and architecture are to be integrated into the network of a city park. The park is conceived as a combination of a central park and its extended network to which the lower hierarchical park network is connected. Arena (enabling indoor sports, exhibition, theater, musical festival and other multi-purpose uses) should be integrated in the city park site.

L-2-3 PLANNING STANDARDS FOR
RELIGIOUS FACILITIES

L-2-3-1 SMALL MOSQUE

Population Served:	75% to 100% of the adult male in the age group 15 and above (i.e. approximately 20% to 25% of the total population potentially attends one of the mosques in the city.
Size of Population Served:	One neighborhood mosque (small mosque) for every 3,750 inhabitants (potential attendance 800 to 1000 persons) is recommended. 2500 to 5000 inhabitants (500 to 1250 prayers) is acceptable.
Radius of Area Served:	Maximum 200m (i.e. 3 minute walking distance) is recommended. 600m (10 minute walking distance) is also acceptable.
Land Area Requirement:	0.2 to 0.3 ha/mosque.
Floor Area Requirement:	$1.2m^2$ /person, i.e. $600m^2$ to $1500m^2$.
Location:	Situated at the center of a "Neighborhood" with population of approximately 2500 to 5000.
Other Requirement:	Elementary school and neighborhood cultural facilities should be closely linked to the mosque to foster an integration of religious and educational functions.

A-2-3-2 JAMI'A MOSQUE

Population Served:	10% of the inhabitants of the service area.
Size of Population Served:	One Jami'a Mosque for each 15,000 inhabitants (i.e. approximately 1500 prayers) is recommended. 10,000 to 20,000 inhabitant range is also accepted (i.e. 1000 to 2000 prayers).
Radius of Area Served:	Maximum 1200m (20 minute walking distance) is recommended. Larger radius may be acceptable if density is less than 50 pph. In this case standards should be provided on a case by case basis.
Land Area Requirement:	0.6 to 0.8ha/mosque.
Floor Area Requirement:	$1.2m^2$ /prayer (i.e. 1200 to $2400m^2$ /mosque) is recommended.

Location: Situated at the center of a "Sub-Community" with a population of 10,000 to 20,000.

Other Requirement: Intermediate schools should be close to the mosque in order to foster an integration of religious and educational functions.

A-2-3-3 EID MOSQUE

Population Served:	1 to 2% of the population in the served area; 20 to 25% of the total population should be included for the determination of land area.
Size of Population Served:	One for every 100,000 to 300,000 population. Therefore none of the cities in the southern region can justify an Eid Mosque due to a lack of population. Abha and Khamis Mushayt's combined population in 1995 is estimated to be 151,000 and will together require one Eid Mosque.
Radius of Area Served:	Not specified.
Land Area Requirement:	$0.6m^2$ /prayer, i.e. 1.2 ha to 3.6ha/unit is recommended.
Other Requirement:	The mosque is a fenced open area; it is provided with a guard room and a storage.

A-2-4 PLANNING STANDARDS FOR
SOCIAL AND CULTURAL
ACTIVITIES

A-2-4-1 NEIGHBORHOOD CENTER

Size of Population Served:	3,750 (say 4,000) is recommended. 2,500 to 5,000 is acceptable.
Main Function:	General social interactions (meetings, elementary school PTA, games). Offices for a neighborhood association to program activities, maintenance, and utilization of parks and facilities. Supervision and coordination of sub-neighborhood activity and facilities. Adult education associated with elementary school facilities and small mosque activities (including a neighborhood library).
Radius of Area Served:	Maximum 300m (i.e. 5 minute walking distance) is recommended. 600m (10 minute) is also acceptable.

If density is less than 50 pph, maximum radius may be increased depending on the local condition.

- Land Area: 0.1 to 0.5ha/center. If the center abutts a neighborhood park and the park is directly accessible from the center, less than 0.1 ha is acceptable.
- Floor Area Requirement: 0.05m²/inhabitant (i.e. 125m² to 250m²) is recommended. 0.03 to 0.1m²/inhabitant is also acceptable.
- Location: Situated at the center of a "Neighborhood" whose population is in the range of 2,500 to 5,000. Close to the neighborhood park, playground, small mosque, and neighborhood shopping area.
- Other Requirement: Courtyards and other small scale exterior spaces for seating and visual relief should be provided. Footpath access from surrounding residential area without crossing any major traffic.

A-2-4-2 COMMUNITY CENTER

- Size of Population Served: 30,000 is recommended. 20,000 to 40,000 is acceptable; even wider range is acceptable if good reasons exist.
- Main Function: General social interactions for residents in the "Community" (meetings, adult education, social ceremonies, entertainment, cultural activity programs, PTA for intermediate and secondary schools). Offices for a community association to program activities for maintenance and utilization of community parks, community facilities, intermediate and high school facilities and playfields.
- Radius of Area Served: Maximum 1600m (25 minute walking distance) is recommended. Even larger radius is accepted if density is less than 50 pph, depending on the situation.
- Land Area Requirement: 0.2 to 1.0ha/center is recommended. If the center abuts a community park and direct access to it is available, less than 0.2 ha is also acceptable. In any case 0.1 ha is the minimum.
- Floor Area Requirement: 0.01m²/inhabitant (i.e. 200m² to 400m²) is recommended. 0.005m² to 0.02m²/inhabitant is also acceptable.
- Location: Situated at the center of a "Community" whose population range is 20,000 to 40,000. Close to

the community park, community shopping center, Jami'a Mosque, secondary school community museum, library, youth center (these could be a part of the community center) and playfield, Level 2.

- Other Requirement: Additional standards for potential components of community center:
- a. Community library: One for each 30,000 inhabitants (20,000 to 40,000). Land area 0.1m²/inhabitant if library is in an independent building and not a part of community building. If the library is located in the community center, the land area is increased by 0.05m²/inhabitant from the community center building land requirement. Floor area is 0.01m²/inhabitant.
- b. Community museum: Standard is identical to that of community library with the exception of museums located in a renovated old structure. In such a case, standards should be created on a case by case basis.

A-2-4-3 CIVIC CENTER

- Size of Population Served: 60,000 and over. One center for every city.
- Main Function: Cultural and social center for the city. Art gallery, exhibition hall, small arena, museum and auditorium are included.
- Radius of Area Served: Entire city and its vicinity. Radius varies.
- Land Area Requirement: 0.5m²/inhabitant (i.e. 3ha/60,000 inhabitants) or more. If the Civic Center is designed as an integral part of other downtown activities such as commerical areas, the land area requirement can be reduced to 0.25m²/inhabitant.
- Floor Area Requirement: 0.05m²/inhabitant (i.e. 300m²/60,000 inhabitants) is recommended, including art gallery, exhibition hall, arena-auditorium (these facilities can be put in one structure or in separate buildings) and other general and multi-purpose rooms.
- Location: Situated at the center of city with a population of 60,000 or over. Closely located to the administration-commercial center of the city and city park system.
- Other Requirement: Pedestrian zone should be clearly defined, eliminating auto traffic and providing in the city a pedestrian island of which the Civic Center is a core. Downtown historical artifacts should be preserved and maintained as a part of a Civic

Center-city park complex.

A-2-5 PLANNING STANDARDS FOR HEALTH FACILITIES

A-2-5-1 PHARMACY

Size of Population Served: One general practitioner and/or pharmacy for every neighborhood of population size 2,500 to 5,000.

Main Function: Outdoor treatment, diagnosis, and general treatment. Providing hospital information to the residents. Providing patient information to the community clinic and higher level hospitals.

Radius of Area Served: Maximum 300m (i.e. 5 minutes walking distance) is recommended. 600m (10 minute) is also acceptable.

Land Area Requirement: 0.1ha/unit approximately.

Floor Area Requirement: 0.05m²/inhabitant or more.

Location: Situated at the center of a "Neighborhood". Access by footpath without crossing major traffic.

A-2-5-2 SUB-COMMUNITY DIAGNOSIS AND TREATMENT CENTER (INCLUDING RED CRESENT BUILDING)

Size of Population Served: One for 15,000 (10,000 to 20,000 more or less) inhabitants.

Main Function: Public health centers for general treatment and diagnosis and for red crescent program.

Radius of Area Served: Maximum 1200m (20 minute walking distance) is recommended. Larger radius may be acceptable when density is less than 50 pph.

Land Area Requirement: 0.3m²/inhabitant (i.e. 0.3ha to 0.6ha/center) is recommended.

Floor Area Requirement: 0.05m²/inhabitant (i.e. 500m² to 1000m²/center) or more is recommended.

Location: Situated at the center of a "Sub'Community" with a population of 10,000 to 20,000.

A-2-5-3 COMMUNITY/GENERAL HOSPITAL

Size of Population Served: One for each city with a population over 30,000 more or less.

Main Function: General hospital for normal treatment clinics, diagnosis and treatment, long term care, public health, nursing units, and emergency and firstaid.

Radius of Area Served: Varies. The hospital serves not only the city population but also the surrounding suburban population.

Land Area Requirement: 0.5m² to 1.0m²/inhabitant is recommended (i.e. 2.5 ha to 5ha/hospital for a city with 50,000 inhabitants).

Floor Area Requirement: 3 to 4 beds/1,000 inhabitants is recommended. 20 to 40m²/bed is recommended. (i.e. 3000m² to 8000m²/hospital for a city with 50,000 inhabitants.) 200 to 500 beds/hospital is generally recommended.

Location: Close to the center of the city yet easily accessible from the main arterial and regional road for easy emergency access and easy access for the suburban population. Psychological, visual, and acoustical relief should be secured by not locating in the middle of the built-up areas.

A-2-5-4 SPECIAL HOSPITALS AND NURSING HOME

Size of Population Served: One mental hospital for each 50,000 inhabitants or more. One special long term hospital for each 50,000 inhabitants or more. One nursing home for each 50,000 inhabitants or more.

Land Area Requirement: 0.1ha/1000 inhabitants for mental hospital or long term hospital. 0.02ha/1000 inhabitants for nursing home.

Floor Area Requirement: 5 beds/1000 inhabitants, and 20m² to 45m²/bed (mental hospital). 3beds/1000 inhabitants, and 20m² to 45m²/bed (special long term hospital). 1 to 2beds/1000 inhabitants, and 20m² to 45m²/bed (nursing home).

Table A-2-1
SPECIAL HOSPITAL REQUIREMENT IN SOUTHERN REGION
(PRESENTLY IDENTIFIED BY THE MINISTRY OF HEALTH)

	ASIR	JIZAN	BISHAH	NAJRAN	TIHAMA
CHEST DISEASE	1*	0	0	0	0
OBSTETRICS AND GYNECOLOGY	2	1	1	1	2
OPHTHALMOLOGY & OTOLARYNGOLOGY	1	0	0	0	0
HOSPITAL FOR ACCIDENT	2	1	1	1	1
FEVER (COMMUNICABLE)	1*	1	0	0	0
PSYCHIATRY	1	0	0	0	0
LEPROSY	0	1	0	0	0
TOTAL	8	4	2	2	4

NOTE: * Existing Al-Asan Hospital is for both chest disease and other communicable (fever) diseases. In future, the fever hospital will be separated to the new location.

Table A-2-2
DOCTOR REQUIREMENT

1 General doctor	for 40-50 patients
1 Special doctor	for 10-15 patients
1 nurse	for 4-6 patients

A-2-6 PLANNING STANDARDS FOR
COMMERCIAL FACILITIES

A-2-6-1 NEIGHBORHOOD SHOP-
PING CENTER

Size of Population Served:	4,000 inhabitants more or less. (2,500 to 5,000.)
Main Functions:	Food market, drugstore, bakery, barber shop, laundry and dry cleaning, hardware, stationery, restaurant, etc.
Radius of Area Served:	Maximum of 300m (i.e. 5 minute walking distance) is recommended. 600m (10 minute) is also acceptable. If density is less than 50 pph, a larger radius may be acceptable depending on the situation.
Land Area Requirement:	2 to 4m ² /inhabitant, i.e. 0.8 ha to 1.6ha/4000 inhabitants.
Floor Area Requirement (Sales Area):	0.25 to 0.5m ² /inhabitant (i.e. 1000m ² to 2000m ² /4000 inhabitants) is recommended.
Location:	Situated at the center of neighborhood with population size of 2,500 to 5,000 or along the local distributor road connecting the center of the neighborhood to the "Sub-Community" with a population of 10,000 to 20,000. Closely located to or integrated with neighborhood center, neighborhood park and other neighborhood facilities.
Other Requirement:	If a shopping center for a higher hierarchical group order exists in the vicinity, the neighborhood shopping center is incorporated into the larger shopping center. A portion of neighborhood shopping center could be substituted by the corner stores in the neighborhood. 1:1 parking (i.e. parking area : sales area = 1:1) is recommended. Less than 1:1 is acceptable if density is more than 100 pph.

A-2-6-2 COMMUNITY SHOPPING
CENTER

Size of Population Served:	30,000 inhabitants more or less.
Main Function:	Basic retail service to the "Community" population. Shops whose financial viability requires larger population than neighborhood population are located in the community shopping center (such as florist, shoe shops, giftshops, candy, lingerie, book stores, toys, childrens' wear,

radio and TV repairs, etc). "Second Floor Office" could be included.

Radius of Area Served:

Maximum 1200m (20 minute walking distance) is recommended. Larger radius is also acceptable if density is less than 50 pph and ample parking space is provided.

Land Area Requirement:

0.5m² to 1.0m²/inhabitant is recommended. (i.e. 1.5 ha to 3ha/30,000 inhabitants.)

Floor Area Requirement (Sales Area):

0.1m² to 0.2m²/inhabitant (i.e. 3000m² to 6000m²/30,000 inhabitants) is recommended.

Location:

Situated at the center of community with population size of 20,000 to 40,000 or along the arterial road connecting community center to city center. Close to or integrated with community center, park and other community facilities.

Other Requirement:

When a regional shopping center or a downtown shopping center is in the vicinity, the community shopping center may be incorporated into the larger shopping center. 2:1 parking (i.e. parking area : sales area = 2:1). Less than 2:1 is acceptable if density is more than 100 pph.

A-2-6-3 SUB-REGIONAL SHOPPING CENTER

Size of Population Served:

100,000 inhabitants or more.

Main Function:

Downtown shopping center to serve the regional population. This could also be located along a major arterial extending from the city center. It will provide, in addition to the stores normally found in the neighborhood and community shopping centers, fashion goods, furniture, household equipment, women's apparel, etc.

Radius of Area Served:

City and its neighboring communities. Regional population beyond city and its surroundings also uses on a less frequent basis.

Land Area Requirement:

0.5m² to 1.0m²/inhabitant (i.e. 5 ha to 10ha/100,000 inhabitants) is recommended.

Floor Area Requirement (Sales Area):

0.1m² to 0.2m²/inhabitant (i.e. 10,000m² to 20,000m²/100,000 inhabitants) is recommended.

The following table indicates per capita sales areas for different sizes of the city popula-

tion (including neighborhood, community and regional shopping centers):

Table A-2-6-1
SALES AREA PER CAPITA

CITY POPULATION	COMPONENTS(m ² /inh.)	TOTAL(m ² /inh.)
4,000	0.25 to 0.5	0.25 to 0.5
30,000	0.25 to 0.5 plus 0.1 to 0.2	0.35 to 0.7
100,000	0.25 to 0.5 plus 0.1 to 0.2 plus 0.1 to 0.2	0.45 to 0.9

Building area is about 1.5 times the floor area.

Location:

Situated in the downtown area of major cities or along the regional arterials leading to the major city centers.

Other Requirement:

4:1 parking is recommended. 2:1 is also acceptable if located in the middle of downtown.

A-2-7 PLANNING STANDARDS FOR PUBLIC BUILDINGS

A-2-7-1 FIRE STATION

Population Served:

One for each community of population of 20,000 to 40,000 inhabitants.

Radius of Area Served:

In a high value district:
a. Maximum 1.5 km for engine companies.
b. Maximum 2.0 km for ladder companies.
In a normal residential district:
a. Maximum 3.0 km for engine companies.
b. Maximum 5.0 km for ladder companies.
In a high density residential district:
a. Maximum 2.5 km for engine companies.
b. Maximum 3.5 km for ladder companies.

Land Area Requirement:

Approximately 10m²/1000 inhabitants is recommended.

Floor Area Requirement:

3m²/1000 inhabitants is recommended.

Location:

In residential district, station should be located to the center. Additional stations

should be near extensive industrial or business districts and near districts where there is a high life hazard. An intersection of roads is a preferred station location.

Other Requirement: Water supply system with adequate pressure should be developed. Reserve capacity: 5-day reserve with maximum daily rate.

A-2-7-2 POST OFFICES

Population Served: One post office for each city. One branch post office for each neighborhood with a population of 2,500 to 5,000.

Radius of Area Served: Maximum 300m (5 minute walking distance) is recommended for branch office. 600m (10 minute) is also acceptable if density is less than 50 pph. A larger radius is acceptable depending on the situation.

Land Area Requirement: 0.2 ha to 0.4ha/city post office.

Floor Area Requirement: $2m^2/1000$ (i.e. $100m^2/50,000$ city). City post office should be located at city center. Branch post office should be located at the center of center of neighborhood with population range of 2,500 to 5,000. It can be located inside of the neighborhood center.

A-2-7-3 POLICE STATION

Population Served: One for each city with population over 50,000, i.e. at minimum a city of 50,000 inhabitants should have one police district with approximately 10 police. (1.5 to 2.0 police/1000 inhabitants.)

Radius of Area Served: 1000ha/district (1.8 km radius) or more at a density of 50 pph or less. At lower densities, service radius may be extended. Mobile unit is needed in any case.

Land Area Requirement: 0.2 to 0.4ha/district station.

Floor Area Requirement: $2m^2/1000$ inhabitants (i.e. $100m^2/50,000$ inhabitants).

Location: Situated in the center of town with comparable distances to different parts of its service population. Corner site is preferred for the convenience of the mobile unit.

A-2-7-4 GOVERNMENT OFFICES

Population Served: One for each city. The percentage of government employment to total population is in a range from 6% to 14% (at present the 5 city average is approximately 10%) of which it is assumed 3% to 7% (half) are in administrative sectors (excluding teachers, police, firemen, etc., who have normal place of work rather than offices), i.e. 2,500 to 3,750 are located in the administrative offices (for the case of a 50,000 city).

Floor Area Requirement: Assuming 80% gross efficiency and proper use of net areas, there should be $10m^2$ to $20m^2$ /employee (i.e., $25,000m^2$ to $75,000m^2$ for city of 50,000). If FAR = 2, then land area is approximately 2.5 ha.

Location: Situated and concentrated in the center of town.

A-2-8 PLANNING STANDARDS FOR HOUSING AND DENSITY

Table A-2-8 shows the approximate ideas on the relationship between residential building types and residential densities. "Net residential density" defined as the ratio of the number of inhabitants to the total area inside the property boundary lines excluding street areas in the residential district. "Net neighborhood density" is ratio of the number of inhabitants to the net neighborhood area including amenities, schools, residential streets, and neighborhood services but excluding non-used reserve areas or areas devoted to facilities which serve community structure at a higher level than neighborhood. As shown in the right hand side of the Table, gross density for a neighborhood area varies from 15 pers./ha (for single family villa) to 252 pers./ha (for average equivalent of 10 story apartments). In reality, there is little possibility of having only single family villas or 10 story apartments in one neighborhood, exclusive of other types. It is estimated that actual, net neighborhood density in many cases is somewhere between 50 pers./ha to 200 pers./ha depending on the mixture of unit types.

As far as net residential density is concerned, it is estimated that the most probable case is in the vicinity of 150 to 200 pers./ha. For example, the combination of 10% standard villa (say $750 m^2$ site/unit, 5 persons/unit) 60% smaller villa (say $250 m^2$ site/unit, 5 persons/unit) and 30% multi-family units (say $100 m^2$ site/unit, 5 persons/unit) results in approximately 150 to 200 pers./ha of net density.

A-2-9 PLANNING STANDARDS FOR ROAD AND STREET NETWORK

Table A-2-9(a) shows the classification and standards for roads and streets. Clear recognition of the hierarchical order of the street network system is crucial to achieve group privacy in an automobile oriented society. The street network hierarchy should be integrated into the hierarchical order of facility distribution and territorial sequence to maximize the access convenience yet to minimize the potential hazard and nuisance caused by auto traffic in the residential area.

Diagram A-2-9(b) indicates typical sections for each type of road classified in Table A-2-9(a).

Diagrams A-2-9(c) and A-2-9(d) indicate general outlines for road intersections.

A-3 APPLICATION OF PLANNING STANDARDS

A-3-1 A HYPOTHETICAL EXAMPLE

Table A-3-1(a) shows an example of land area distribution based on the standards developed in the previous sections. In order to reflect the situation in the Southern Region in 1995, a hypothetical city of 60,000 inhabitants is analyzed. It is found that such a city will require approximately 1,140 ha, 750 ha or 550 ha with net residential densities of 100 pph, 200 pph, or 400 pph, respectively. (These densities correspond to net densities of "villa"; mixture of "villa" and "one family semi-detached"; and low-rise "multi-family", respectively, see Table A-2-8 column C).

Table A-3-1 (b) is based on the result of computation on Table A-3-1 (a). It shows the land distribution for each use in the hypothetical residential city of 60,000 inhabitants. It is assumed that such a city will have two "Communities" of 30,000 residents, each of which will have two "Sub-Communities of 15,000 residents, each of

which, in turn, will have four "Neighborhoods" of 3,750 residents. Since this model does not take into consideration non-used or reserved area of the city, the percentages for the listed use per total "actual" city area should be less than those listed. The table, therefore, is a preliminary guide to the allocation of "used-land" to different uses.

A-3-2 HIERARCHICAL ORDER OF GROUPING

Figure A-3-1 shows an example layout of prototypical city in which the recommended standards are expressed as a diagram. This is merely one of many acceptable interpretations of the standards. It is not the consultants' intent to impose a fixed solution to the planning. Rather, this is just a demonstration of one example against which the planning concepts for each city may be evolved.

Table A-2-8
RESIDENTIAL TYPES OF HOUSES AND DENSITIES

	A	B	C	D	E	F	G
	LAND AREA PER FAMILY m ²	NET DWELLING DENSITY Fam./ha	NET DENSITY* Pers./ha	RATIO OF NET RESIDENTIAL DENSITY TO NET NEIGHBORHOOD DENSITY**	NET NEIGHBORHOOD DWELLING DENSITY Fam./ha	NET NEIGHBORHOOD DENSITY Pers./ha	APPROXIMATE AVERAGE NET NEIGHBORHOOD DENSITY Pers/ha
(1) LARGE VILLA	4,000 2,000	2.5 5.0	12.5 25.0	80.9% 78.6%	2.0 3.9	10.1 19.7] 15
(2) STANDARD VILLA	1,000 500	10.0 20.0	50.0 100.0	74.4% 67.2%	7.4 13.4	37.2 67.2	
(3) FAMILY SEMI-DETACHED OR SMALLER VILLA	300 200	33.3 50.0	166.5 250.0	59.5% 52.1%	19.8 26.1	99.1 130.3] 115
(4) MULTI-FAMILY LOW-RISE (2 STORY)	150 125	66.7 80.0	333.5 400.0	46.3% 42.5%	30.9 34.0	154.4 170.0] 162
(5) MULTI-FAMILY MID-RISE (3-5 STORY)	100 75	100.0 133.3	400.0 533.2	42.5% 36.6%	42.5 48.8	170.0 195.1] 183
(6) MULTI-FAMILY HIGH-RISE (6-10 STORY)	50 25	200.0 400.0	800.0 1600.0	28.5% 17.2%	57.0 68.8	228.0 275.2] 252

NOTE: * 5 Pers./Fam. is assumed for building types (1) through (4);
4 Pers./Fam. is assumed for building types (5) and (6).

** -Net residential area:
Net area is the area within residential property lines. The area for streets and area for neighborhood facilities are excluded from the net residential area. The population (or number of residential units) divided by this area is called "net residential population (or dwelling) density."

-Net neighborhood area:
Net residential area defined above plus the area for streets (streets at the neighborhood scale) and area for neighborhood facilities is called net neighborhood area. The area for neighborhood buffer zone, area for facilities to serve higher levels of community hierarchy (such as, community shopping center and intermediate and high schools) and the areas for non-neighborhood scale streets (such as regional highways) are excluded from this "net neighborhood area". The population (or the number of dwelling units) divided by the "net neighborhood area" is called "net neighborhood population (or dwelling unit) density".

-Computation of column "D" is based on the following formula:

$$y = \frac{P}{(P+ax) \cdot (1+c)}$$

where:

y = ratio of net neighborhood density to net residential density

x = net residential density

P = typical population of neighborhood.

P = 3750 is assumed.

a = neighborhood facility area excluding circulation space (8.1 ha in table A-3-1 (a) as a total of (1) through (7); plus contingency of 10%, i.e., 8.1 x 1.1 = 9 ha).

a = 9 ha is assumed.

c = ratio of circulation space to net neighborhood area minus neighborhood circulation space.

c = 0.2 is assumed.

This formula is calculated in the following process:

$$x = \frac{P}{R} \text{ (where, R = net Residential Area)}$$

$$y = \frac{P/N}{P/R} = \frac{R}{N} \text{ (where, N = net Neighborhood Area)}$$

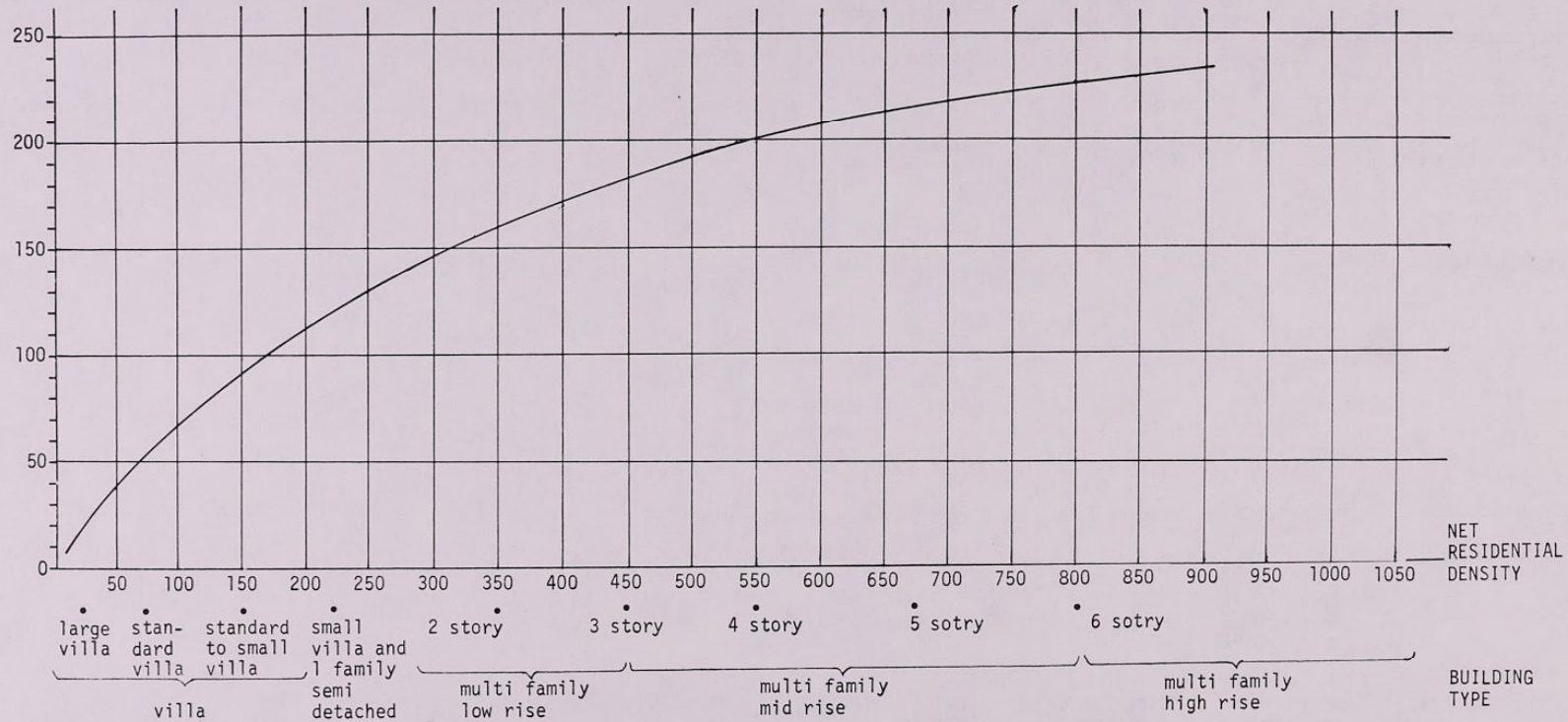
$$N = (R + a) \cdot (1+c)$$

from above,

$$y = \frac{R}{(R+a) \cdot (1+c)} = \frac{P/x}{(P/x+a) \cdot (1+c)} = \frac{P}{(P+ax) \cdot (1+c)}$$

FIGURE A-2-8
 RELATIONSHIP BETWEEN NET
 RESIDENTIAL DENSITY AND
 NET NEIGHBORHOOD DENSITY
 AND
 RELATIONSHIP BETWEEN NET
 DENSITY AND BUILDING TYPE

NET NEIGHBORHOOD
 DENSITY
 (pers./ha)

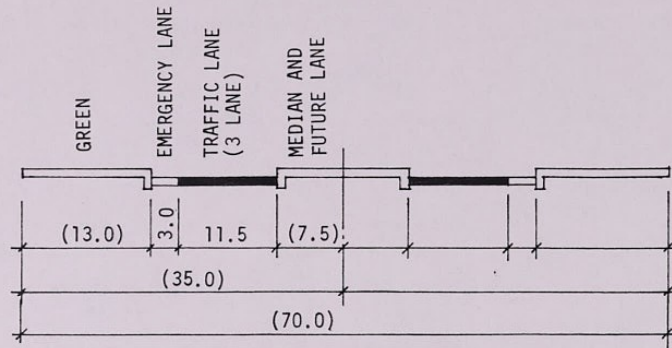


- NOTE: 1. The relation between net neighborhood density and net residential density shown here is based on the discussion developed in the Section A-2-8 and Table A-2-8. It shows one "example case" and not necessarily always true. Actual relationship is depending on detail planning and design of the neighborhood. The figure is shown here for the purpose of providing "approximate example idea" of the relationship between the two densities.
2. Actual relation between net residential density and building type is depending upon the dwelling unit size, family size and many other conditions.

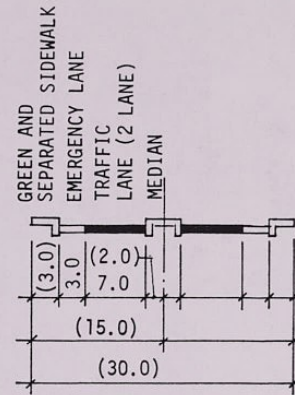
Table A-2-9(a)
CHARACTERISTICS AND HIERARCHY OF ROADS AND STREETS (RECOMMENDATION ONLY)

SYSTEM CLASSIFICATION	PRIMARY ROAD SYSTEM		SECONDARY ROAD SYSTEM				LOCAL ROAD SYSTEM
	V ₁ REGIONAL HIGHWAY	V ₂ MAJOR ARTERIAL	V ₃ ARTERIAL	V ₄ COLLECTOR	V ₅ DISTRIBUTOR	V ₆ LOCAL ACCESS ROAD	V ₇ SERVICE ROAD
FUNCTIONAL CLASSIFICATION	LONG TRIPS: NATIONAL AND REGIONAL TRIP	MEDIUM TRIPS: INTER-SETTLEMENT TRAVEL	MEDIUM TRIPS: INTER TO INTRA-SETTLEMENT TRAVEL	MEDIUM TO SHORT TRIPS: INTRA-SETTLEMENT TRAVEL	SHORT TRIPS: INTRA-SETTLEMENT TRAVEL ONLY	VERY SHORT TRIPS: INTRA-SETTLEMENT TRAVEL ONLY	SERVICE ACCESS TO PROPERTIES
ACCESS CONTROL	FULL CONTROL	CONTROL	PARTIAL	PARTIAL	NONE	NONE	NONE
DESIGN SPEED (km/h)	120	100-80	90-80	80-70	60-50	50	30
OPERATING SPEED (km/h)	100-80	80-70	70-60	60-50	50-30	50-30	30-20
MAXIMUM GRADE: UP (%) DOWN (%)	6 7	7 8	7 8	7 8	8	10	12
MINIMUM HORIZONTAL RADIUS OF CURVATURE (m)	500	300	250	200	150	75	30
HOURLY CAPACITY/LAND (VEHICLE/HOUR)	1500-800	1000-800	900-700	900-600	600-300	400-200	-
RIGHT OF WAY (m)	70	50	30	25	20	15	5
LANE WIDTH (m)	3.75 MINIMUM	3.75	3.5	3.5	3.0	2.75	2.5
DIVIDED FLOW	ALWAYS	USUALLY	FREQUENTLY	SOMETIMES	NOT USUALLY	NEVER	-
PARKING	PROHIBITED	PROHIBITED	PROHIBITED	INTERIM ONLY	PERMITTED OR INTERIM	PERMITTED	PROHIBITED
RELATED ELEMENTS	EMERGENCY LANES (SHOULDER), NO SIDEWALKS, NO SMALL MOTORCYCLES	EMERGENCY LANES, NO SIDEWALK, NO BICYCLE	EMERGENCY LANES NO SIDEWALK USUALLY, SEPARATED SIDEWALK MAY BE ALLOWED, NO BICYCLE	SIDEWALKS SEPARATED FROM PAVEMENT USUALLY	SIDEWALKS	SIDEWALKS	OPTIONAL
INTERSECTION TYPE	GRADE SEPARATED ALWAYS	GRADE SEPARATED IN GENERAL	GRADE SEPARATION OPTIONAL	SIGNALIZED	SIGNALIZED OR STOP SIGNS	STOP SIGN OR UNCONTROLLED	STOP SIGN OR UNCONTROLLED
DISTANCE BETWEEN INTERSECTIONS (m)	1,000 MINIMUM	400 MINIMUM	250 MINIMUM	200 MINIMUM	200 MINIMUM WHEN POSSIBLE	-	-
NORMAL NUMBER OF LANES	6-4 USUALLY	4 MINIMUM	4-2	4-2	2	2	1 or 2

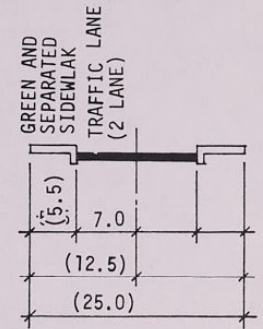
V₁ EXAMPLE
(REGIONAL HIGHWAY)
6 LANE



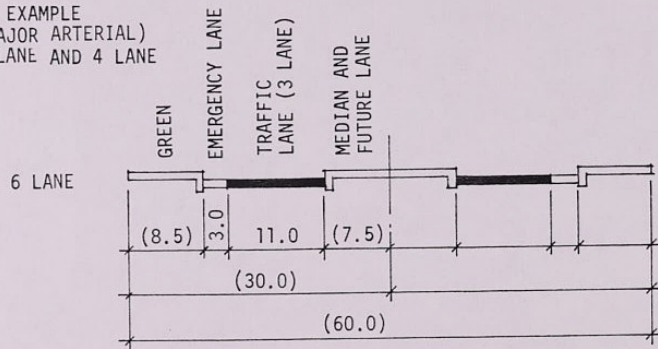
V₃ EXAMPLE
(ARTERIAL)
4 LANE



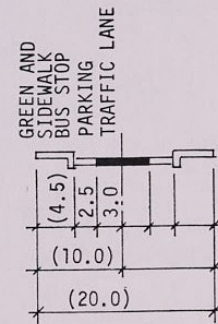
V₄ EXAMPLE
(COLLECTOR)
4 LANE



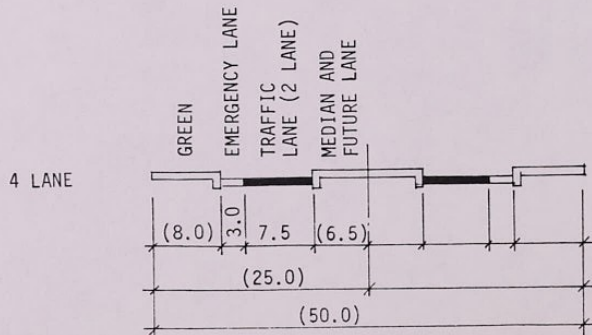
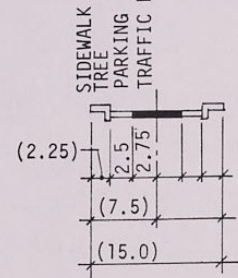
V₂ EXAMPLE
(MAJOR ARTERIAL)
6 LANE AND 4 LANE



V₅ EXAMPLE
(DISTRIBUTOR)
2 LANE



V₆ EXAMPLE
(LOCAL ACCESS ROAD)
2 LANE



NOTE: () Dimensions can vary depending on the local condition and detail design, sometimes median strip and green zone can even be eliminated where elimination is justified by the detail planning.

FIGURE A-2-9 (b)
ROAD SECTIONS BY
CLASSIFICATION
(EXAMPLE)

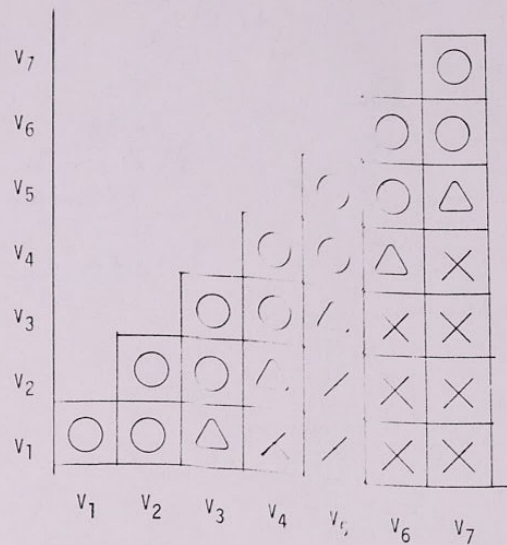
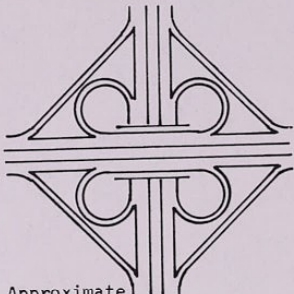
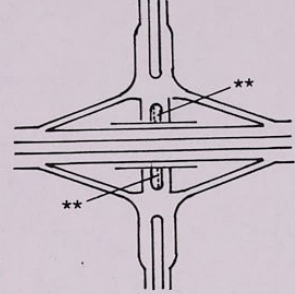
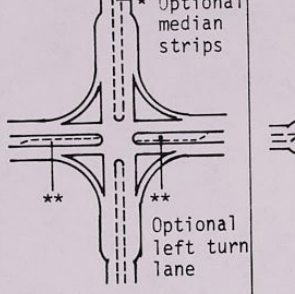
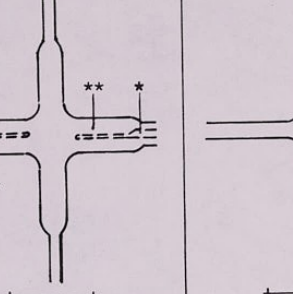
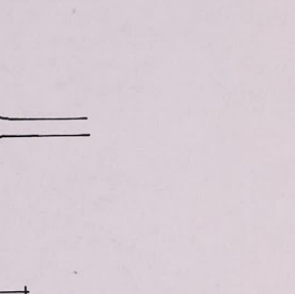
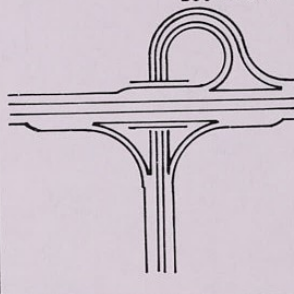
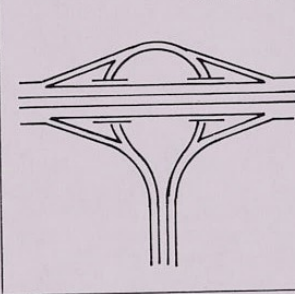
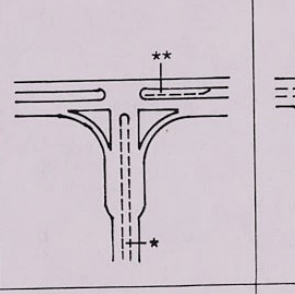
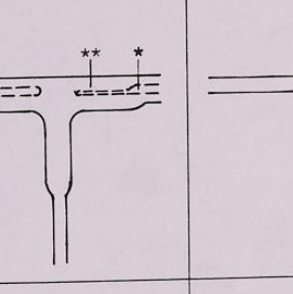
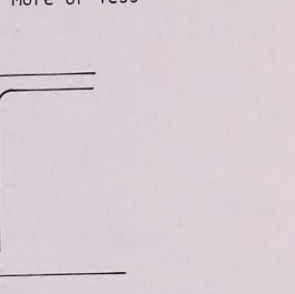


FIGURE A-2-9 (c)
ALLOWABLE ROAD
INTERCHANGES

NOTE: When two roads (with classification V_m and V_n) intersect, then interchange (V_m/V_n) is:

Allowed when (○) $|m-n| = 0$ or 1
 Not allowed when (△) $|m-n| = 3$
 Allowed but not recommended when (X) $|m-n| = 2$

	Cloverleaf	Diamond	Channelized	Flaired	Common
Four leg Cross intersection	 <p>Approximate scale: 200-400 M</p>	 <p>100-200 M</p>	 <p>50-100 M</p>	 <p>50-100 M</p>	 <p>50 M More or less</p>
Three leg "Tee" intersection					
Basic characteristics of intersection	Vertical separation Flow separation Ramps Speed control	Vertical separation Flow control Ramps Speed control Signal/sign control	Flow control Traffic channels Signal control	Flow control Traffic channels Signal/sign control	Sign control or Uncontrolled
Types of roads intersecting	V_1 / V_1 (V_1 intersecting V_1) V_1 / V_2 V_2 / V_2 V_2 / V_3	V_2 / V_2 V_2 / V_3 V_3 / V_3 V_3 / V_4	V_3 / V_3 V_3 / V_4 V_4 / V_4 V_4 / V_5	V_4 / V_4 V_4 / V_5 V_5 / V_5 V_5 / V_6	V_5 / V_5 V_5 / V_6 V_6 / V_6 V_6 / V_7

Note:
Intersections shown above are "examples" only.
Actual design should be based on detailed analysis
of each case in each location.

* Median strips may be eliminated, then
roadway width can be decreased accordingly

** Left turn lane may be provided
for safer turn (optional)

FIGURE A-2-9(d)
INTERSECTION
EXAMPLES

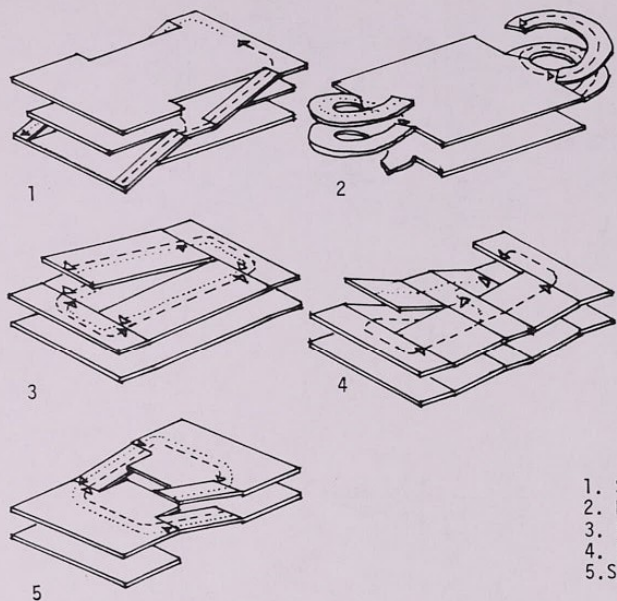


FIGURE A-2-9 (e)
STRUCTURE PARKING
(EXAMPLES)

1. Straight Ramp
2. Helical Ramp
3. Ramped Floor
4. Double Ramped Floor
5. Split-level Floor

Recommended Size

Minimum capacity	200 cars
Maximum capacity	500 cars
Maximum No. of Levels (for garage)	6

Unit Parking Dimensions

45° one-way	14.5 to 16.5 m.
60° one-way	17.0 to 19.0 m.
90° two-way	18.5 to 19.5 m.

Entrance and Exit

Number	At least one with multiple lanes, minimum 15 m from street intersection.
Width of lanes	3.5 m for one-way
Radius of Curb (inside)	Minimum 3.5 m.

Ramps and Driveways

Slope	15 per cent maximum.
Width	
Straight	Minimum 3.0 m.
Curved, inside lane	Minimum 3.5 m.
Curved, outside lane	Minimum 3.0 m.
Curvature	4 m. diameter to inside.

Parking Stalls

Length	5.5 m.
Width	2.5 m.

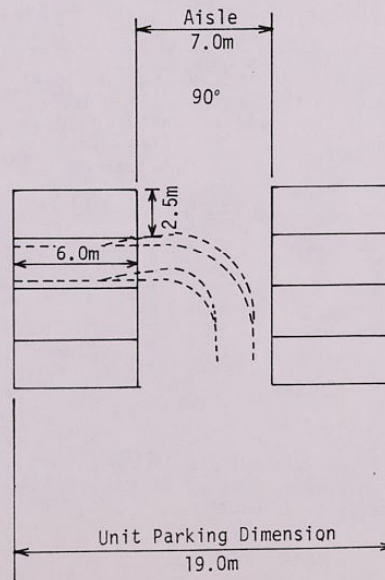
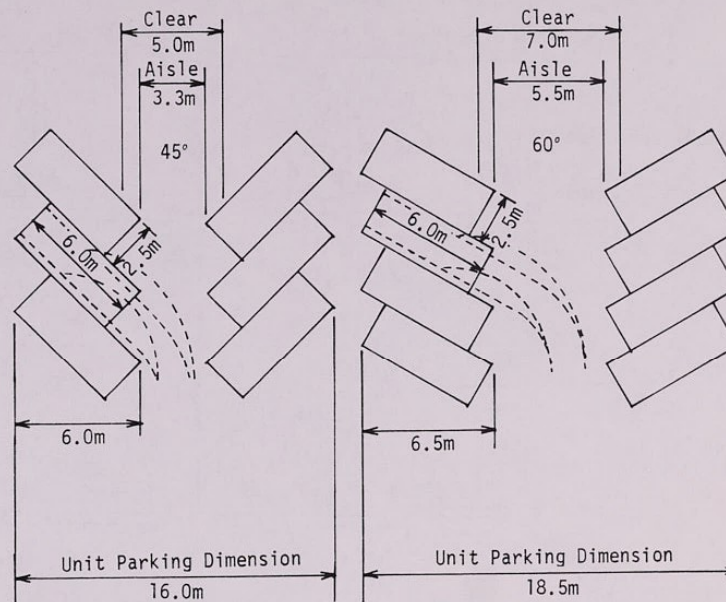


FIGURE A-2-9-(f)
UNIT PARKING
DIMENSION (EXAMPLES)

Table A-3-1(a)
LAND AREA DISTRIBUTION FOR A PROTOTYPICAL CITY OF 60,000 INHABITANTS (in ha)

	NEIGHBORHOOD (3750 Inh)	SUB-COMM. (15,000 Inh)	COMMUNITY (30,000 Inh)	CITY TOTAL (60,000 Inh)
(1) EDUCATIONAL FACILITIES				
NURSERY-KINDERGARTEN	0.02x4=0.1	x4= 0.4	x2= 0.8	x2= 1.6
ELEMENTARY SCHOOL(BOYS)	0.5	x4= 2.0	x2= 4.0	x2= 8.0
ELEMENTARY SCHOOL(GIRLS)	0.5	x4= 2.0	x2= 4.0	x2= 8.0
INTERMEDIATE SCHOOL(BOYS)		1.2	x2= 2.4	x2= 4.8
INTERMEDIATE SCHOOL(GIRLS)		1.2	x2= 2.4	x2= 4.8
SECONDARY SCHOOL(BOYS)			1.5	x2= 3.0
SECONDARY SCHOOL(GIRLS)			0.9	x2= 1.8
TEACHERS SCHOOL				2.1
TECHNICAL SCHOOL(BOYS)				2.1
TECHNICAL SCHOOL(GIRLS)				1.0
COLLEGE WITH ATHLETIC FACILITIES				10.0
TOTAL (1)	1.1	6.8	15.6	46.7
(2) RECREATIONAL/ATHLETIC FACILITIES (to be cont.)				
TOT-LOT	0.5x16=0.8	x4=3.2	x2= 6.4	x2=12.8
NURSERY-KINDERGARTEN PLAY LOT	0.2x4=0.8	x4=3.2	x2= 6.4	x2=12.8
NEIGHBORHOOD PARK	2.0	x4=8.0	x2=16.0	x2=32.0
PLAYGROUND	1.5*	x4=6.0	x2=12.0	x2=24.0
PLAYFIELD LEVEL 1		3.6**	x2= 7.2	x2=14.4

NOTE: * 0.75 ha for boy; 0.74 ha for girl
 ** 1.8 ha for boys; 1.8 ha for girls
 *** 2.0 ha for boy; 1.0 ha for girl

	NEIGHBORHOOD (3750 Inh)	SUB-COMM. (15,000 Inh)	COMMUNITY (30,000 Inh)	CITY TOTAL (60,000 Inh)
RECREATIONAL/ATHLETIC FACILITIES (CONT.)				
COMMUNITY PARK	-	-	12.0	x2=24.0
PLAYFIELD LEVEL 2	-	-	3.0***	x2= 6.0
CITY PARK	-	-	-	24.0
TOTAL (2)	5.1	24.0	63.0	150.0
(3) CULTURAL FACILITIES-RELIGIOUS, SOCIAL AND CULTURAL FACILITIES				
SMALL MOSQUE	0.25	x4= 1.0	x2= 2.0	x2= 4.0
NEIGHBORHOOD CENTER	0.3	x4= 1.2	x2= 2.4	x2= 4.8
JAMI'A MOSQUE	-	0.7	x2= 1.4	x2= 2.8
COMMUNITY CENTER	-	-	0.6	x2= 1.2
CIVIC CENTER	-	-	-	3.0
TOTAL (3)	0.6	2.9	6.4	16.1
(4) HEALTH FACILITIES				
PHARMACY	0.1	x4= 0.4	x2= 0.8	x2= 1.6
DIAGNOSIS/TREATMENT CENTER	-	0.5	x2= 1.0	x2= 2.0
GENERAL HOSPITAL	-	-	-	4.5
TOTAL (4)	0.1	0.9	1.8	8.1
(5) COMMERCIAL FACILITIES				
NEIGHBORHOOD SHOPPING CENTER	1.2	x4= 4.8	x2= 9.6	x2= 19.2
COMMUNITY SHOPPING CENTER	-	-	1.1	x2= 2.2
DOWNTOWN SHOPPING	-	-	-	4.5
TOTAL (5)	1.2	4.8	10.7	25.9

Table A-3-1 (a) continued

		NEIGHBORHOOD (3750 Inh)	SUB-COMM. (15,000 Inh)	COMMUNITY (30,000 Inh)	CITY TOTAL (60,000 Inh)
(6) PUBLIC FACILITIES	GOVERNMENT OFFICE	-			2.6
	POST OFFICE	-		0.1	x2= 0.2
	POLICE STATION	-		0.1	x2= 0.2
	FIRE STATION	-		0.1	x2= 0.2
	WATER SUPPLY STATION	-	0.5	x2= 1.0	x2= 2.0
	SEWAGE TREATMENT	-	1.0	x2= 2.0	x2= 4.0
	POWER STATION	-	1.0	x2= 2.0	x2= 4.0
	GARBAGE DISPOSAL	-	1.0	x2= 2.0	x2= 4.0
	MUNICIPAL LIBRARY OR MUSEUM	-	0.2	x2= 0.4	x2= 0.8
	TOTAL (6)	-	3.7	7.7	18.0
(7) INDUSTRIAL	FACTORY, WAREHOUSE DISTRIBUTION CENTER	-	10.0	x2=20.0	x2=40.0
TOTAL (7)		10.0	20.0	40.0	
TOTAL of (1) through (7)		8.1	53.1	125.2	304.5
(8) RESIDENTIAL	CASE 1 100 pph NET DENSITY	37.5	x4= 150.0	x2= 300.0	x2= 600.0
	CASE 2 200 pph NET DENSITY	18.8	x4= 75.0	x2= 150.0	x2= 300.0
	CASE 3 400 pph NET DENSITY	9.4	x4= 37.5	x2= 75.0	x2= 150.0

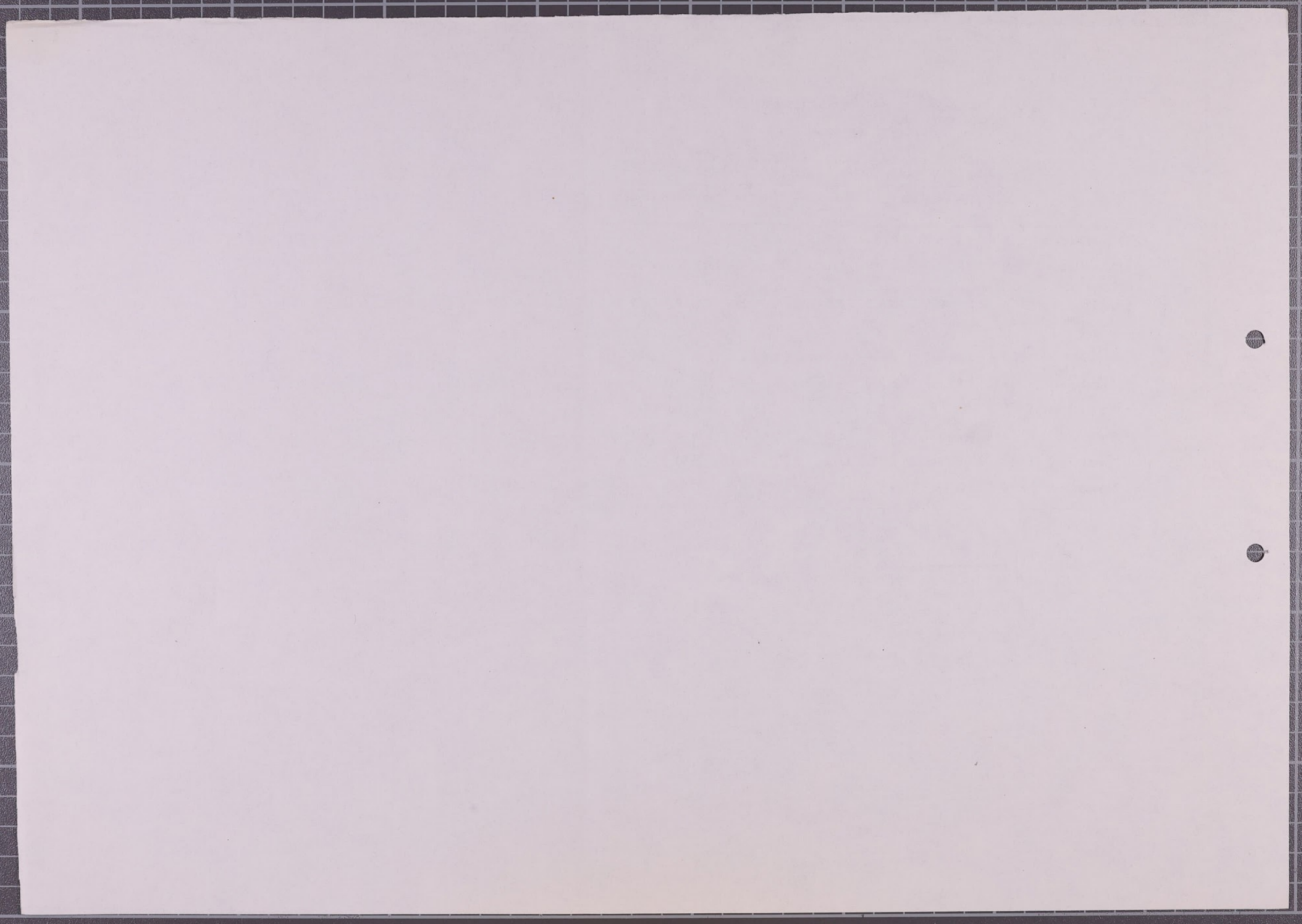
		NEIGHBORHOOD (3750 INH)	SUB-COMM. (15,000 INH)	COMMUNITY (30,000 INH)	CITY TOTAL (60,000 INH)
TOTAL of (1) THROUGH (8)	CASE 1	45.6	203.1	425.2	904.5
	CASE 2	26.7	128.1	275.2	604.5
	CASE 3	12.5	90.6	200.2	454.5
(9) TRANSPORTATION	STREET/SIDE-WALK* CASE 1	9.1	x4=36.4	x2=72.8	x2=145.6
	CASE 2	5.3	x4=21.2	x2=42.4	x2= 84.8
	CASE 3	3.5	x4=14.0	x2=28.0	x2= 56.0
	ARTERIES**				
	CASE 1	-	20.3	42.5	90.4
	CASE 2	-	12.8	27.5	60.4
	CASE 3	-	9.1	20.0	45.4
TOTAL (9)	CASE 1	9.1	56.7	115.3	236.0
	CASE 2	5.3	34.0	69.9	145.2
	CASE 3	3.5	23.1	48.0	101.4
GRAND TOTAL of (1) THROUGH (9)					
	CASE 1	54.7	259.8	540.5	1140.5
	CASE 2	32.0	162.1	345.1	749.7
	CASE 3	21.0	113.7	248.2	555.9

NOTES: * Assumption: 20% of total of (1) through (8) for small streets related "inside" of neighborhood
 ** Assumption: 10% of total of (1) through (8) for arteries outside of neighborhood

Table A-3-1(b)
 GENERAL STANDARDS FOR URBAN LAND DISTRIBUTION^a
 (% OF TOTAL AREA WITHOUT RESERVE
 LAND, NON USED OR BUFFER AREAS)

	NEIGHBORHOOD (3750 INH.)			SUB-COMMUNITY (15,000 INH.)			COMMUNITY (30,000 INH.)			CITY (60,000 INH.)		
	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
(1)Educational*	2.0	3.4	5.2	2.6	4.2	6.0	2.9	4.5	6.3	4.1	6.2	8.4
(2)Recreational/ Athletic	9.3	15.9	24.3	9.2	14.8	21.1	11.7	18.3	25.4	13.2	20.0	27.0
(3)Cultural/ Religion and Social	1.1	1.9	2.9	1.1	1.8	2.6	1.2	1.9	2.6	1.4	2.1	2.9
(4)Health	0.2	0.3	0.5	0.3	0.6	0.8	0.3	0.5	0.7	0.7	1.1	1.5
(5)Commercial*	2.2	3.8	5.7	1.8	3.0	4.2	2.0	3.1	4.3	2.3	3.5	4.7
(6)Public Facility	-	-	-	1.4	2.3	3.3	1.4	2.2	3.1	1.6	2.4	3.2
(7)Industrial	-	-	-	3.8	6.2	8.8	3.7	5.8	8.1	3.5	5.3	7.2
(8)Residential	68.6	58.8	44.8	57.7	46.3	33.0	55.5	43.5	30.2	52.6	40.0	27.0
(9)Transportation	16.6	16.6	16.7	21.8	21.0	20.3	21.3	20.3	19.3	20.7	19.4	18.2

Note: a. Parking is included in each use category.
 b. Case 1: 100 pph, NET RESIDENTIAL DENSITY
 c. Case 2: 200 pph, NET RESIDENTIAL DENSITY
 d. Case 3: 400 pph, NET RESIDENTIAL DENSITY
 * School athletic ie. palyground/playfield is excluded from this
 category in this computation.





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