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SOCIO-ECONOMIC IMPACTS OF TRANSPORTATION  
AND PLANNING DESIGN FOR SAUDI ARABIAN CITIES

CASE STUDY: THE CENTRAL CORE AREA OF ALGASSIM REGION

AHMED HAMAD O. ABALKHAIL

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## ABSTRACT

The purpose of this study was to consider the socio-economic impacts of the development of modern transportation in Saudi Arabian urban areas, and thereby to derive guidelines for future planning to minimise damaging impacts.

In order to achieve the purpose, a series of studies were undertaken. A theoretical background was constructed from international sources relevant to the socio-economic impacts of transportation. The growth of transportation in Saudi Arabia in general and in particular in the Central Core Area of Alqassim Region (The Study Area) was then examined, followed by an explanation of the management of transportation.

A survey questionnaire, interviews with government officials and with community leaders, and a traffic count survey, were conducted to obtain information and attitudes regarding the socio-economic impacts of transportation in the study area. From the analysis of the surveys, an evaluation of the strategies was then made and alternative ways of developing a balanced transportation strategy for the study area were considered. A land use transportation plan was produced to demonstrate the relationship between the preferred transportation strategy and the land use activities, and based on the research principles, a land use/transportation concept was formulated.

In the light of the conclusions made for the study area, a planning design for Saudi Arabian cities was then recommended as part of more sensitive appreciation of the socio-economic impact of modern transportation developments.

Finally, the thesis briefly emphasises the importance of planning co-ordination and of sensitive guidelines for Saudi planners. It also recommended further studies to be carried out.

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## INTRODUCTION

0.01 On March 3, 1938, oil was discovered in Saudi Arabia in commercial quantities at what later became known as Dammam Well No. 7. The initial flow was 1585 barrels of oil per day and by March 22, it was flowing at 3810 barrels per day. On that day, a major source of income came into being for the Kingdom of Saudi Arabia.

0.02 There is no doubt that the discovery of oil was the beginning of the modernisation of the Kingdom. The impact of modernisation varies widely from one society to another, depending on culture, politics, customs and other natural and environmental factors. One of the most important factors of modernisation was the construction of a modern network of highways which connected all the major populated areas of the country. As a result, the patterns of urban structure of the Kingdom's cities were altered. Among the changes, residential areas shifted and neighbourhoods changed and commercial areas were relocated.

0.03 Saudi Arabian society is considered to be conservative. However, the activities in which people are engaged are more controlled by their residential settings than by other factors. These controls are determined by the social environment, the physical environment and the extent of the modernisation of the people themselves.

0.04 The increase in revenue from oil has provided the financial resources for the Kingdom to implement plans that could never have been envisaged in earlier years. In fact, these development plans are of such vast dimensions that they have never been attempted in any country of comparable population. These fortunate circumstances offered the Kingdom an opportunity to improve its security, health and education as well as its system of transportation without destroying its traditional values. Furthermore, it was not building only for this generation but also for the generations to come.

#### STUDY APPROACH

0.05 The vast revenues flowing into the coffers of the Kingdom during the mid-seventies as a result of the very high crude oil prices afforded the government of Saudi Arabia the opportunity to begin its development plans. The transportation sector, including the construction of a nation-wide highway network, was given high priority.

0.06 This thesis examines planning issues associated with transportation in a moderately populated metropolitan area of Saudi Arabia which was centrally located and whose urban patterns were drastically changed as a result of the development of a transportation network.

0.07 The Central Core Area in the Alqassim Region which is located in the Central Region of Saudi Arabia was



therefore chosen to be the case study for this research (see Figure 0.01).

### STUDY ORGANISATION

0.08 There is a brief introduction outlining how the discovery of oil in Saudi Arabia assisted development. This is followed by a description of the study approach, organisation and a statement of objectives.

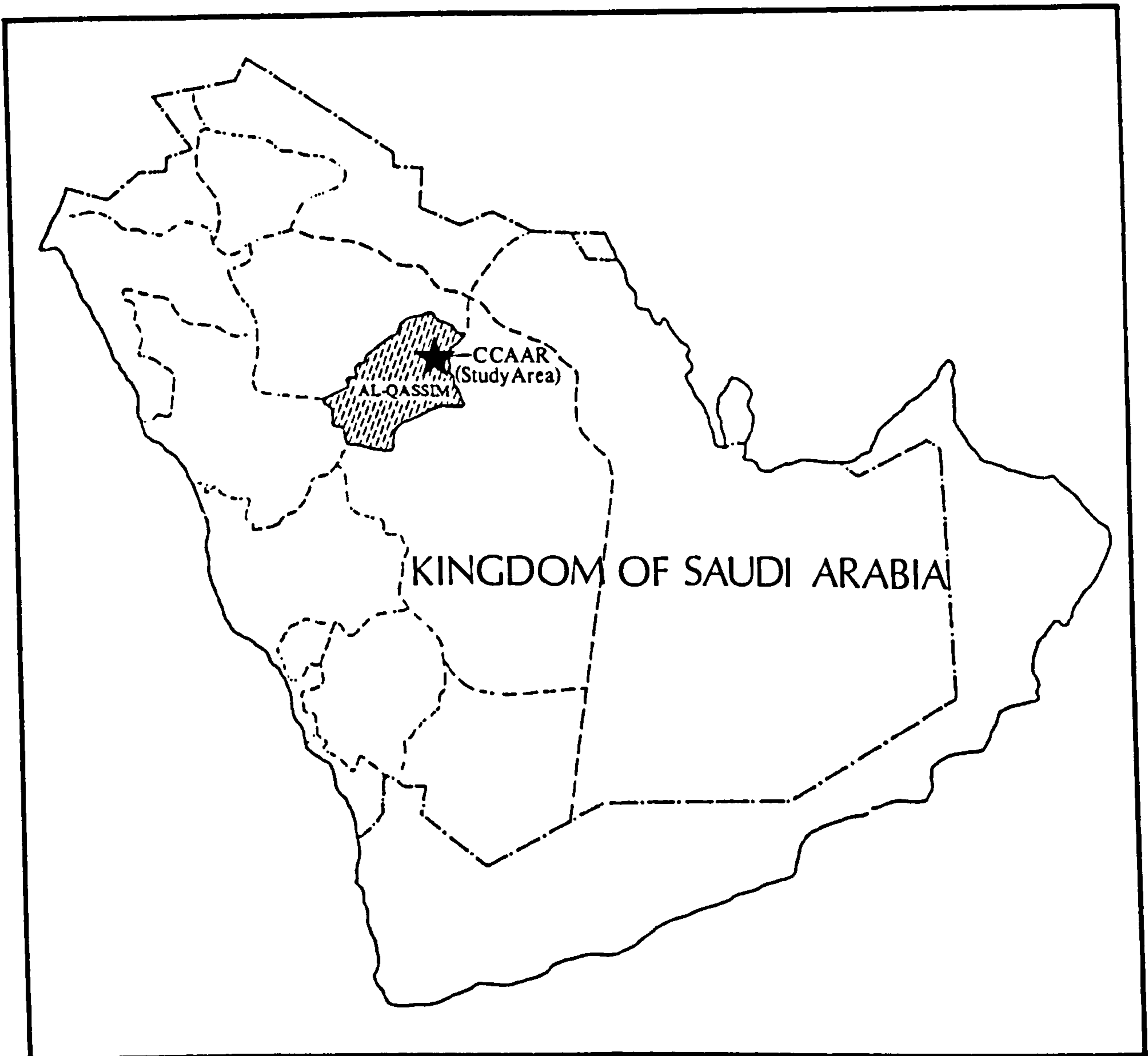
0.09 Chapter One will provide the reader with general information and background on Saudi Arabia. This chapter will also include a discussion of the rate of urbanisation, approaches to transportation planning in the past, and a description of the structuring of urbanising regions and how growth is managed by the government.

0.10 Chapter Two will review existing literature and related materials on the subject matter.

0.11 Chapter Three will discuss the methods of assessing the impacts of transportation developments and their relevance to Saudi Arabia.

0.12 Chapter Four will focus on the growth of transportation in Saudi Arabia, both past and present, as well as on how the Islamic environment affects this growth. Mass transportation and how the government is managing the growth in transportation will also be dealt with.

**Figure 0.01 LOCATION OF THE RESEARCH STUDY AREA  
WITHIN THE ALGASSIM REGION AND THE  
KINGDOM**



**Source: MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, ALGASSIM REGION  
COMPREHENSIVE DEVELOPMENT PLAN, REPORT 1, 1983, p.xxi. AND,  
NORCONSULT A.S., ALGASSIM REGION COMPREHENSIVE DEVELOPMENT  
PLAN, 1984, REPORT 5, p.27.**

0.13 The economic structure and the location of activities in the Central Core area, as well as the future growth of urban areas in Saudi Arabia, will be presented in Chapter Five.

0.14 Chapter Six will discuss planning and management of transportation in the Central Core Area, while Chapter Seven will deal with methodology and survey design. Chapters Eight, Nine and Ten will comprise an analysis of the data collected, recommended planning and transportation strategies for the study area, and a planning design and principles for Saudi Arabian cities, respectively.

#### STATEMENT OF OBJECTIVES

0.15 The road network in Saudi Arabia has made a great contribution to the development of the country through the direct benefits it has brought to the growth of agriculture, industry and commerce. It was constructed to stimulate and facilitate economic and social progress.

0.15 In this thesis, the focus will be on the growth of transportation and the growth of urban regions in Saudi Arabia. There will also be an investigation of transportation planning and management in urbanising regions in the Kingdom. A review of existing traffic surveys, socio-economic studies, interviews and other materials will be presented. It is hoped that this will provide the information required to assess the selection of the



preferred transportation strategy for urbanisation in Saudi Arabia which is the primary concern of this thesis.

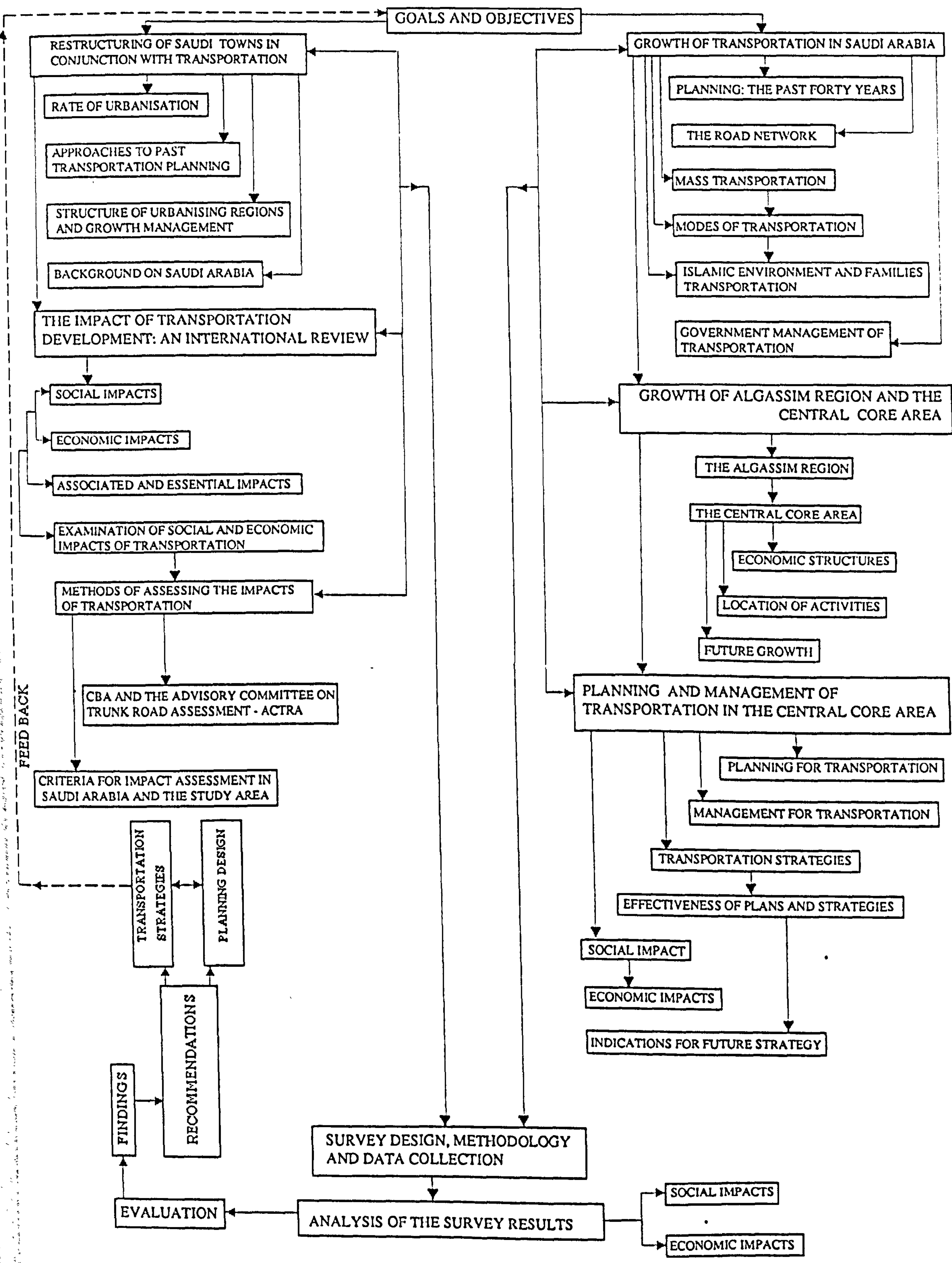
0.17 However, the overall objective of this research (see Figure 0.02) is to arrive at principles for transportation strategy for urbanisation in Saudi Arabia by selecting the Central Core Area of Alqassim Region as the case study. And by reviewing previous transportation strategies for Saudi Arabian cities in regard to their social and economic development, employing the CCAAR as a case study, will lead to the establishment of planning guidelines to be utilised on other areas of the Kingdom. But first, a discussion of the rate of urbanisation in Saudi Arabia and some aspects of the Kingdom's background will be presented in the first chapter.

#### ORIGINAL CONTRIBUTION OF THE THESIS

0.18 The original contribution of the thesis is made through the investigation of the social and economic impacts of transportation in the context of Saudi Arabia. That is, the study of the impacts of the transportation system on social relationships among family members, the destruction of neighbourhood unity, the change of citizens' lifestyles, the relocation of residential areas, the movement of people around the area, and the change from a traditional to a modern society. Also, through the investigation of the economic impacts of the network on the relocation of businesses and industries, damage to small businesses, the



Figure 0.02 THE FLOW DIAGRAM OF THE RESEARCH PROCESS



attraction of government, public and private facilities, the promotion of economic activities, the values of land, and the range of sources of supply of goods to be consumed locally.

0.19 The thesis makes an original contribution by assessing the case study area based on its social and economic needs. These needs are reflected in the thesis according to the findings of the impacts, and according to specific criteria.

0.20 Past transportation planning in Saudi Arabia has been conducted according to techniques developed in Western countries, and particularly in the United States. In the future, planning will be increasingly undertaken by Saudi professionals, and the thesis aims to make an original contribution to understanding of the impacts of transportation upon a country whose social context is very different to that from which past transportation policy was derived.

0.21 It is noteworthy here to indicate that there has never been a study of the socio-economic impact of transportation similar to that which this thesis is attempting to investigate. Nevertheless, a number of studies concerning the field of transportation have been conducted by various ministries and consultants.

0.22 One of the early transportation studies was accomplished by SCET International in 1975 for the Central Region of the Kingdom. The consultant was assigned by the Central Planning Organization (now known as the Ministry of Planning), to study the entire central region of the Kingdom transport sector which also involved post and telecommunications, based on supply and demand and recommendation for future supply of transport.

0.23 Doxiadis International of Greece executed a Master Plan for the Central Region of the Kingdom in 1973. Their master plan which was requested by the Ministry of the Interior covered all cities in the region and included the twin cities of Buraydah and Unayzah.

0.24 Other studies of transportation came under the overall studies of comprehensive plans of regions and cities of the Kingdom. For example, Norconsult did a study in 1984 for the Ministry of Municipal and Rural Affairs, and that too contained proposals for transportation infrastructures. Moreover, the International Road Federation completed several reports on the progress of the road network, in addition to the involvement of the Ministry of Communications and the Ministry of Municipal and Rural Affairs in the transport sector and their research and studies in the field of transportation.



## CHAPTER ONE:     RESTRUCTURING SAUDI TOWNS IN CONJUNCTION WITH TRANSPORTATION

This chapter will discuss the rate of urbanisation in Saudi Arabia and how the past planning of transportation was approached. Furthermore, some aspects of Saudi Arabia, namely the society and the economy, will also be illustrated to provide some brief background about the country.

### RATE OF URBANISATION

1.01     In 1921, prior to the completion of the unification of the Kingdom, King Abdulaziz, founder of the Kingdom and father of the present monarch, King Fahd, began the implementation of his social, economic and physical policies. One of the goals of these policies was the settlement of the nomadic population of the country. These settlements were located near water wells and springs. Furthermore, to ensure that the nomads remained settled in these areas, the King ordered the residents to sell their camels to minimise migration (Hazem, 1979).

1.02     In the process of unifying the Kingdom, Riyadh, a city which dates back to pre-Islamic times, was made the capital of the new political configuration, and once unification had been secured, security and stability were thereafter guaranteed. The walls surrounding the two major cities of the Kingdom, Jeddah and Riyadh, were demolished in 1947 and 1950 respectively, enabling them to expand further. The absence of walls provided space for growth and develop-



ment and new planning patterns were introduced into urban areas. However, archaeologists and historians consider the demolition of the city walls an irreplaceable loss (Hazem, 1979).

1.03 In furthering growth and development, a number of roads were constructed throughout the Kingdom. These roads connected the cities and towns of the Kingdom with the various settlements. Then, in the 1950s, the first railway was constructed to connect the Eastern Region with the capital. At about the same time, air transportation began to develop, further advancing the speed of communications between the vast areas of the Kingdom.

1.04 Before the discovery of oil, the Eastern Region of Saudi Arabia consisted of a number of fishing villages scattered along the coast of the Arabian Gulf along with some agricultural villages located in the Al-Ahsa Oasis where the city of Al-Hofuf is located. At that time, the Eastern Region was not comparable to the relatively developed urban areas of the Central and Western Regions of the Kingdom.

1.05 With the discovery of oil in 1938, the Eastern Region began to gain economic importance in the Kingdom. As industrial projects, oil refineries, pumping stations, gas purification plants, oil reservoirs and pipelines came into existence, residential settlements were established along

with the relevant public utility projects which are required by urban areas, including a network of roads, airports, harbours and other infrastructural projects. This development has led many citizens to move to the Eastern Region where there is employment to be had and the results of migration to this region have completely altered its demographic patterns. For instance, by 1974, the population of Dammam, the largest of the cities in the Eastern Region, had grown from 40,00 to 127,000 (Hazem, 1979).

1.06 The job opportunities which came into being as a result of the discovery of oil led to the creation of a metropolitan area which now covers the urban complex of Dammam/Dhahran/Al-Khobar. The establishment and growth of this area has largely been due to the migration of people from other areas of the Kingdom who came in search of work. In addition, the structure of the pre-oil population centres of the Eastern Region has been subjected to changes as a result of the steady migration to the new urban areas.

1.07 As a result of expansion of the petroleum industry in the Eastern Region, many entirely new settlements have appeared. Among them are the cities of Arar, Turaif, Al-Qaisumah and Rafha which have grown to service the oil pipeline running from Dhahran and are now important cities in the Northern Region. In addition, two large sea ports have been constructed in the Eastern Region: Ras Tannura which is entirely devoted to the export of oil by sea and



the Commercial Port of Dammam which is a major importing centre for the entire Kingdom. These sea ports and the road network which connects the Eastern Region to the other parts of the Kingdom have greatly contributed to the striking changes which the region has experienced in recent decades.

1.08 Saudi Arabian economic growth, as a result of the oil boom of the mid-1970s, has speeded up the development of urban and rural areas. These have now been provided with all the necessary public services and utilities as well as cultural facilities. Cities such as Riyadh, Jeddah, Dammam, Al-Khobar, Makkah and Al-Medina have doubled or even tripled in both size and population. Small towns such as Yanbu on the Red Sea and Jubail on the Arabian Gulf have become industrial complexes of great importance as a result of the establishment of the Royal Commission for Jubail and Yanbu and the Saudi Basic Industry Corporation (SABIC) which has set up large chemical plants in once small fishing villages. In addition, there is a vast complex of modern highways which connect all the inhabited areas of the Kingdom.

1.09 All this has been possible because of the availability of financial resources which has allowed the government to provide and expand essential facilities for the entire nation and especially for the Holy Cities of Makkah and Al-Medina.

## APPROACHES TO PAST TRANSPORTATION PLANNING

1.10 Before the discovery of oil in Saudi Arabia (March 1938) the most common means of transportation was the camel which was used for carrying goods and people alike and providing a link between small settlements and towns. For centuries, the camel and camel caravans have used time-honoured trade routes which criss-cross South Arabia. These routes originate in what is now called North and South Yemen, pass through what is now Saudi Arabia and then continue northwards to Palestine, Syria and Mesopotamia (MOC, Highway and Planning Development, 1988).

1.11 The most famous of all the caravan routes crossing the Arabian Peninsula was the "Darb Zubayda". It was commissioned by one of the wives of the great Abbasid Caliph, Harun Al-Rashid, whose name was Zubayda, and it functioned principally as a pilgrim highway leading to the holy city of Makkah. Originating in the city of Kufa in Iraq, it was built during the Abbasid period as a pilgrim route and it allowed the pilgrims, either camel-borne or on foot, to make the 1140-kilometre journey in relative ease and comfort. Along the way, at regular intervals, there were rest stops where water was available as well as supplies and for the entire length of the road, there were milestones marking the way. It was among the most impressive engineering achievements in the ancient Islamic world, rivalling the great roads of the Roman Empire (MOC, Highway and Planning Development, 1988).



1.12 In the early part of this century, motor car transportation was still unknown in the Arabian Peninsula. Camels, horses and donkeys were the only means available to move people and transport their goods and commodities. Motor vehicles were not brought to this part of the world until the 1930s when they were imported to assist Aramco (Arabian American Oil Company) in their oil explorations.

1.13 In 1900, the government of the Ottoman Empire undertook the construction of a railway from Damascus to Al-Medina and Makkah. Its principal purpose was to facilitate the pilgrimage. Funded by public subscription in the entire Islamic world, it took eight years to reach Al-Medina where construction ended (Daghistani, 1983).

1.14 After World War II, as the economic growth of Saudi Arabia began accelerating as a result of oil production, so the need to transport equipment and consumer goods from the Eastern Region to the Central Region accelerated. Consequently, in 1947, construction began on a railway from Damman to Riyadh. This railway now serves these two regions of the Kingdom, covering a distance of 562 kilometres (MOC, Transport and Communications Progress, 1986).

#### STRUCTURE OF URBANISING REGIONS AND GROWTH MANAGEMENT

1.15 Based on the natural and physical characteristics of the country, the Kingdom is divided into five principal regions: the Central, Western, Eastern, Northern and South-

western Regions (see Figure 1.01). These regions are further divided into fourteen emirates and each emirate is divided into sub-emirates.

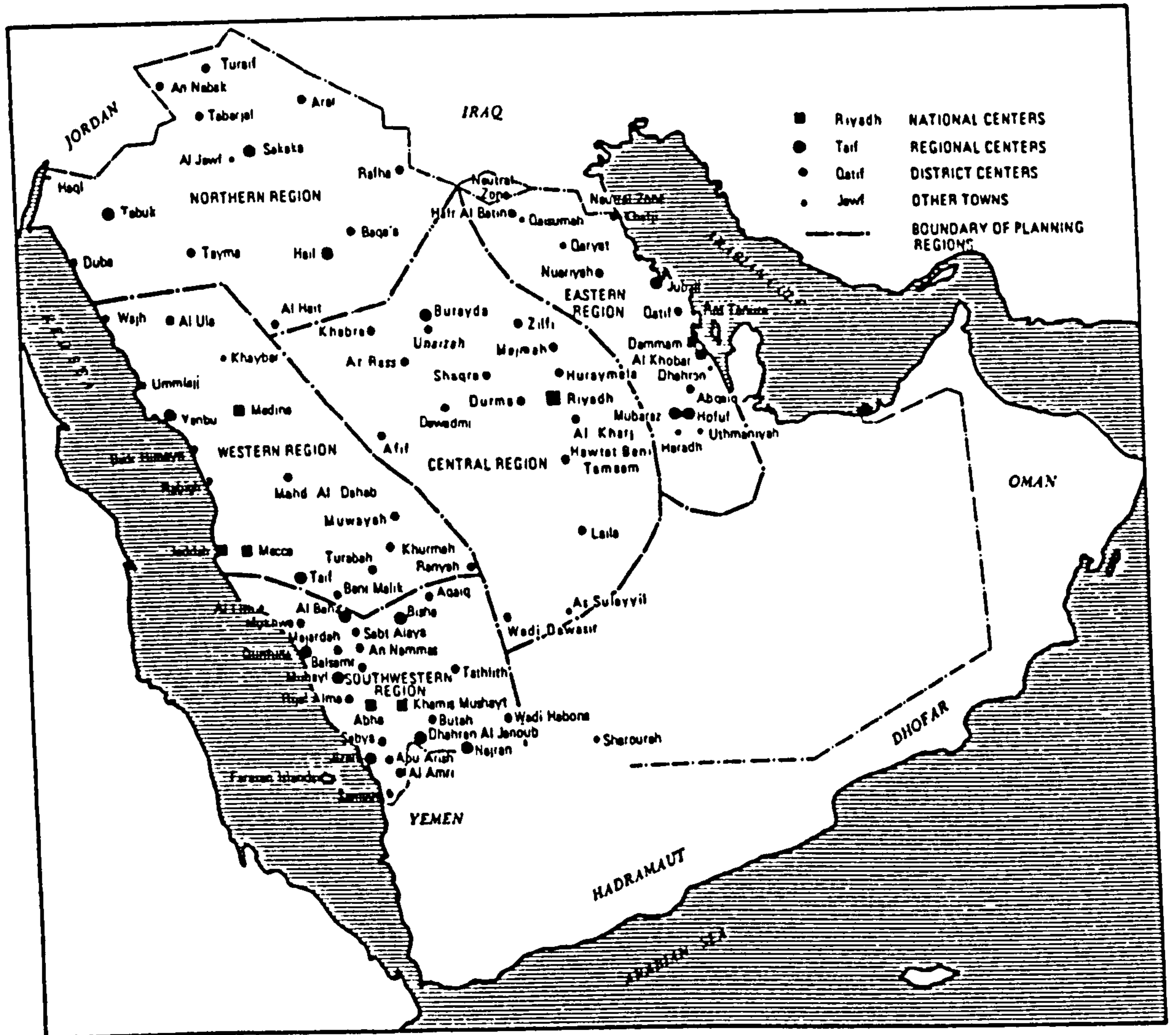
1.16 The Ministry of Planning (MOP) carried out socio-economic studies during the First and Second Five-year Development Plans (1970-75 and 1975-80). These studies showed significant population shifts within the Kingdom. The Northern and Southwestern Regions showed the most decline in population and the Central and Western Regions showed the highest population gains. By far the greatest population gains were registered in the cities of Riyadh and Jeddah.

1.17 During the Third Five-year Development Plan (1980-85), each of the major regions experienced population increases but at different rates. This was due to the fact that there were more municipal and social facilities available plus the increase in employment prospects. Now that the nation-wide balance and level of education, health, municipal and telecommunications systems are levelling off, the migration to and from regions is decreasing.

1.18 The central government of the Kingdom of Saudi Arabia is located in the capital city of Riyadh, the principal city of the Central Region. The central government consists primarily of ministries, each of which bears responsibility for a specific task or tasks and the names of



**Figure 1.01 THE PRINCIPAL REGIONS OF SAUDI ARABIA**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF PLANNING,  
THIRD DEVELOPMENT PLAN: 1400-1405 A.H. (1980-85), p. xxxv

the ministries are self explanatory, i.e. the Ministry of Municipal and Rural Affairs, the Ministry of Communications (Transportation), the Ministry of Planning and the Ministry of Finance and National Economy. Our principal concern in this thesis will be with the activities of the Ministry of Municipal and Rural Affairs, the Ministry of Communications (Transportation) (MOC) and the Ministry of Planning (MOP), as it related to the research matter.

1.19 In order to control and maintain the balance of development and growth of all the five main regions of the Kingdom, the ministries established branches in each region in an effort to keep a firm hand on the direction of development. In this way they have been remarkably successful, for example the Ministry of Communications (MOC) and the Ministry of Municipal and Rural Affairs (MOMRA) have constructed the nation's road network, including the expressways, main roads, agricultural roads and all the small roads which link the smallest villages of the Kingdom. This considerable achievement has been the result of many studies and programmes which were undertaken in co-ordination with many ministries and government agencies according to the perceived needs of the specific area for roads, the principal overall objective being to connect all human settlements in the Kingdom with the principal urban areas, thereby opening up channels through which the entire population can be provided with the many services offered by the government.



1.20 The MOC maintains thirteen road directorates (road district departments) in the Kingdom. These departments maintain a full complement of staff and it is they who receive requests from the public for the construction of feeder and agricultural roads. After study and evaluation of these requests from social, economic and physical standpoints, the construction of the road is undertaken if there are sufficient funds allocated in the specific region. The decision to construct main roads is taken at the ministerial level.

1.21 In brief, the Ministry of Communications is responsible for the construction of the entire network of highways in the Kingdom, including all agricultural and feeder roads. A major factor in determining the construction of roads is the expected nature of future growth in the regions.

1.22 The system of five-year national development plans was introduced in 1970 to cope with increasing problems of the economic growth resulting from the oil boom. These plans are built around comprehensive urban, regional and national plans.

1.23 The Ministry of Municipal and Rural Affairs (MOMRA) bears the sole responsibility for the preparation and execution of the Kingdom's development projects. There are five major municipalities which comprise this ministry:

Riyadh, Jeddah, Makkah (Mecca), Al-Medina and Dammam. There are also ninety eight (98) smaller municipalities and forty three (43) village clusters (Jazwant, 1988).

1.24 The present municipal infrastructure of the Kingdom was formulated during the First Five-year Development Plan (1970-75) and it placed emphasis on the provision of water and sewage systems in urban areas. At the same time, MOMRA initiated its plan for the major cities such as Riyadh, Jeddah, Dammam, Taif and Abha, as well as introducing the village cluster programme on the emirate level, the aim of which was to provide municipal-type services to a cluster of villages from a central location (Fourth Plan, 1985-90).

1.25 By the end of the Second Five-year Development Plan (1975-80), the Kingdom had been comprehensively surveyed and master plans were in place in the major cities. The concept of development centres as the co-ordinating agencies for services on the national, regional and local levels was adopted during the Third Five-year Plan (1980-85) to provide for the equitable distribution of socio-economic opportunities. In addition, economic and physical master plans on the emirate level were also instituted (Fourth Plan, 1985-90).

1.26 There were sixteen functioning village cluster programmes in 1400 A.H. (1980 A.D.), increasing to 43 by 1404 A.H. (1984 A.D.). Twenty six more cluster programmes

were approved. Furthermore, MOP undertook a study of each of the fourteen emirates in an effort to analyse existing conditions and evaluate the potentials of the various locations, hoping thereby to suggest ways of understanding and realising balanced regional development (Fourth Plan, 1985-90).

1.27 It was MOMRA which prepared the master plans for the cities and towns of the Kingdom as well as the action master plans which include detailed socio-economic, traffic and physical studies. MOMRA also provides a variety of services to the cities of the Kingdom such as asphaltting, and street lighting. They are also responsible for forecasting the growth of the regions. It is through the agency of its municipalities that all services are provided to the population.

## BACKGROUND INFORMATION ON THE KINGDOM OF SAUDI ARABIA

### UNIFICATION OF THE LAND

1.28 King Abdulaziz was the leader of a small band of forty men which made the historic march from Kuwait to Riyadh in 1901 which ended in the capture of the City of Riyadh. This marked the beginning of what is now known as the Kingdom of Saudi Arabia. Until the advent of Abdulaziz, much of the Arabian Peninsula was a land without a leader and there was no stability or peace. Tribes were in constant conflict and they were a law unto themselves in the absence of any recognised system of justice. They alone



were responsible for protecting their people and property, and justice was haphazardly administered according to the variations of tribal law. With the coming of Abdulaziz, he set about unifying the tribes and applying the universal law of Islam. His objective was to establish security, peace and stability in the entire Arabian Peninsula. In this he was successful and when he had consolidated his rule, the threat to personal security was removed and the fear of loss of freedom became something of the past. Consequently, Saudi Arabia became and still remains one of the safest countries in the world (Daghistani, 1983).

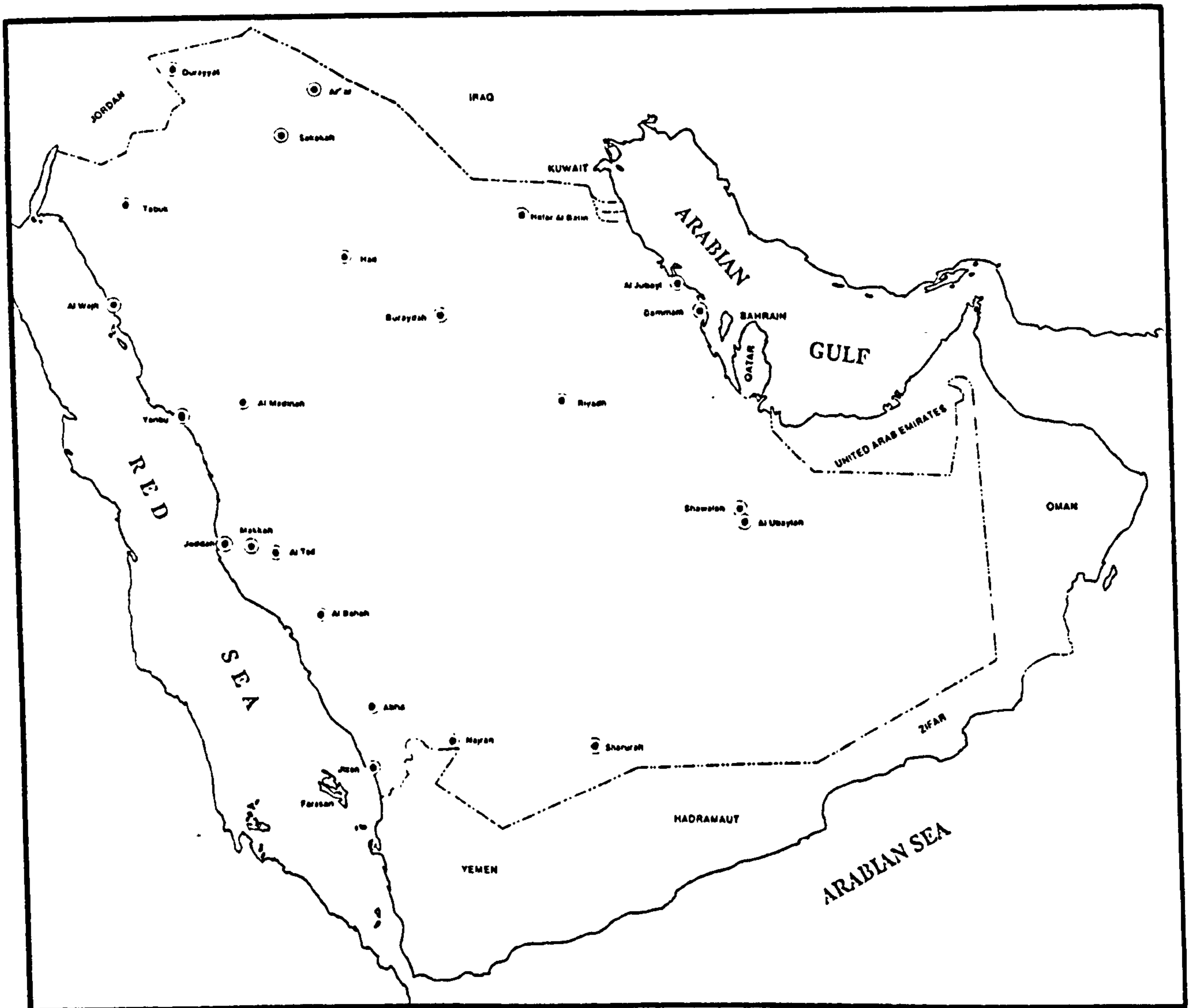
#### LOCATION AND POPULATION

1.29 Saudi Arabia is bounded on the north by Jordan, Iraq and Kuwait; on the south by North and South Yemen; on the east by Oman, Qatar, the United Arab Emirates and the Arabian Gulf; and on the west by the Red Sea (see Figure 1.02).

1.30 A population estimate for Saudi Arabia was undertaken by Dixiades Associates in 1972. They compared their own findings with government-sponsored studies and came up with a total population figure of five million inhabitants. This study indicates that there was a 3.4 percent annual average population increase in the Central Region of the Kingdom between 1962 and 1972 and that the population distribution was approximately 42 per cent urban, 44 percent rural, and 14 percent nomadic (Alnowaiser, 1983).



**Figure 1.02 MAP OF THE KINGDOM OF SAUDI ARABIA**



**Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF PLANNING,  
FIFTH DEVELOPMENT PLAN (1990-1995), p.1**

1.31 Towards the end of 1974, a formal census was taken in Saudi Arabia. It revealed that the population in the Kingdom exceeded seven million inhabitants. Of this total, 1.8 million were rural. There were sixteen cities whose population exceeded 30,000 (see Table 1.01), representing 37 percent of the total population. Riyadh, the capital, had the largest population with 660,000 inhabitants, while Jeddah ranked second with 561,000. However, these figures have recently shown a dramatic increase, even more than doubling in the case of Riyadh and Jeddah. Moreover, it was revealed that 27 percent of the population are nomads who are unevenly distributed among the country's administrative areas (see Table 1.02). The most recent population statistics, prepared by the Gulf International Bank (1988), show that the population of Saudi Arabia at the end of 1986 stood at ten million inhabitants, 31 percent of whom were foreign workers.

#### RELIGION AND LAW

1.32 Islam is the religion of Saudi Arabia and all its people. Islam was founded in the Saudi city of Makkah which is the city where the Holy Koran was revealed to the Prophet Mohammed.

1.33 Islam is a world-wide faith. Today there are approximately seven hundred million Muslims all of whom must repeat the profession of the faith which is "There is no god but Allah and Muhammed is His Prophet". This profession of

**TABLE 1.01: Principal Towns in Saudi Arabia with a Population of over 30,000**

Town	Administrative Area	Number of Families	Population
Riyadh	Riyadh	101,506	666,840
Jeddah	Mecca	97,363	561,104
Mecca	Mecca	67,947	366,801
Taif	Mecca	30,877	204,857
Medina	Medina	35,390	198,186
Dammam	Eastern Province	21,513	127,844
Hofuf	Eastern Province	14,551	101,271
Tabuk	Northern Province	10,696	74,825
Buraida	Qasim	8,744	69,940
Mubarraz	Eastern Province	7,775	54,325
Khamis Mushayt	Asir	9,142	49,581
Khobar	Eastern Province	9,023	48,817
Najran	Najran	9,149	47,501
Hail	Hail	6,065	40,502
Jizan	Jizan	5,648	32,812
Abha	Abha	5,413	30,150

Source: Ragaei Elmallakh, Saudi Arabia: Rush to Development, (Baltimore and London, The Johns Hopkins University Press, 1982, p.22).



TABLE 1.02: Population of Saudi Arabia by Administrative Area

Administrative Area	Number of Demographic Units	Number of Families	Sedentary	Nomadic	% of Nomadic Total Population	Total
Riyadh	1,992	198,936	956,805	306,470	24.0	1,272,275
Mecca	4,088	325,789	1,513,634	240,474	13.7	1,754,108
E. Province	667	120,684	690,188	79,460	10.3	769,648
Asir	4,597	127,131	434,884	246,477	36.2	681,361
Medina	1,742	98,835	282,195	237,099	45.7	519,294
Jizan	4,537	85,483	387,161	15,945	4.0	403,106
Qasim	509	48,724	215,447	101,193	32.0	316,640
Hail	504	45,338	117,210	142,719	54.9	259,929
Tabuk	472	33,642	105,388	88,357	45.6	193,763
Al-Baha	1,296	34,323	156,997	28,908	15.5	185,905
Najran	242	25,569	91,555	56,415	38.1	147,970
N. Frontiers	130	19,345	42,666	86,079	66.9	128,745
Jawf	85	10,243	34,093	31,401	47.9	65,494
Gurayyat	98	5,873	18,432	12,972	41.3	31,404
Frontier Nomads	-	30,000	-	210,000	-	210,000
Saudis resident abroad at time of Census	-	-	73,000	-	26.8	73,000
<b>TOTAL</b>	<b>20,995</b>	<b>1,210,915</b>	<b>5,128,655</b>	<b>1,883,987</b>	<b>-</b>	<b>7,012,642</b>

Note: a. Demographic units: consisting of towns, villages, settlements, farms, water wells and nomad agglomerations. Source: Abdel R. Al-Madani and Muhamed Al-Fayez, Population Bulletin of the United Nations Commission for Western Asia, nos. 19 and 11 (1976), p.186.

Source: Ragaei Elmallakh, Saudi Arabia: Rush to Development, Baltimore and London, The Johns Hopkins University Press, 1982, p.21.

the faith must be repeated with full awareness of its meaning and complete consent from the heart (Stacey International, 1983). To be a Muslim, which requires a belief in the one and only God (Allah), a person must pray regularly, i.e. five times per day, fast during the month of Ramadan, give a fixed percentage of his or her income as alms (Zakat), and perform the Pilgrimage (Hajj) at least once in his or her lifetime if he or she is able. These are the five Pillars of Islam.

1.34 Saudi Arabia is governed by the law of Islam in its Hanbali interpretation. Article Six of the Fundamental Law of the Hejaz (1926) unequivocally declares that "the law of the Kingdom of the Hejaz shall always conform to the Book of God, the Sunnah of the Prophet and the conduct of the companions of the Prophet and their pious followers". A year later, King Ibn Saud proposed that a code of Islamic Law should be drawn up based not only on the doctrine of the Hanbali School but on whichever school seemed closest to the Koran and the Sunna (Stacey International, 1983).

#### SOCIETY AND CULTURE

1.35 According to Lipsky (1969, p.4) "... in Saudi Arabian culture, the relationships which dominate the life of an individual are entirely personal and the strongest loyalties felt by the citizens are loyalty to Islam, family and tribe. These basic loyalties are remarkably stable social factors and without interference from unfriendly



external influence, the present social and political institutions will remain as they are. Families and tribes are still the basic centres of Saudi life and within this traditional order, authority is assigned to tribal and political chiefs but it must be exercised within the context of a council of senior personalities."

1.36 Nevertheless, society has been very much affected by a rise in the level of education. As a result of the discovery and exploitation of oil, education is now available to everyone and this fact has had an important impact on development and industrialisation.

1.37 Traditions in Saudi Arabia continue to define the goals of individuals and individuality is only definable in terms of traditions. Individuals must belong to a family if they are to have a meaningful life in society and within the family, each individual has specific obligations and duties which are clearly defined. These family obligations constitute an individual's major social obligations.

1.38 The culture of Saudi Arabia does not really exist in material things, rather in words of the Arabic language. This is so because of the existence of the Arabic Koran which is deemed to be the very fountainhead of the culture and the lifeblood of religion. This Islamic culture has been the most significant part of the heritage of the Arab tribes since the Holy Koran was revealed to the Prophet



Muhammed, and Islam regulates the daily actions of everyone in Saudi Arabia. It teaches the people how to behave properly, and how to communicate with one another. Praying, fasting, helping the poor and each other are common in Saudi Arabia and these actions, which are commanded by the religion, constitute the basic behaviour patterns of the Muslim peoples of the Arabic Peninsula.

1.39 Although there is no doubt that Saudi society has undergone major changes in the last two decades, most particularly during the period 1975-80, the structure of the family and the culture of the society have survived remarkably intact in spite of the impact of these changes. Moreover, in its Fourth Five-year Development Plan (1985-90, p.65) the government established significant policies with respect to culture and social issues. These policies are worth quoting in full. They are:

"All Government agencies will be required to assess the social consequences of their programmes and projects, together with the long-term social implications of their policies;

The mass media will be encouraged to stimulate the discussion and promote cultural activities, and to give prominence to the achievements of Saudi artists, writers and poets;

The private sector will be encouraged to sponsor cultural activities and publications and to invest in wholesome recreational and leisure facilities; The Ministry of Planning will give increased attention to the social aspects of development planning and follow-up;

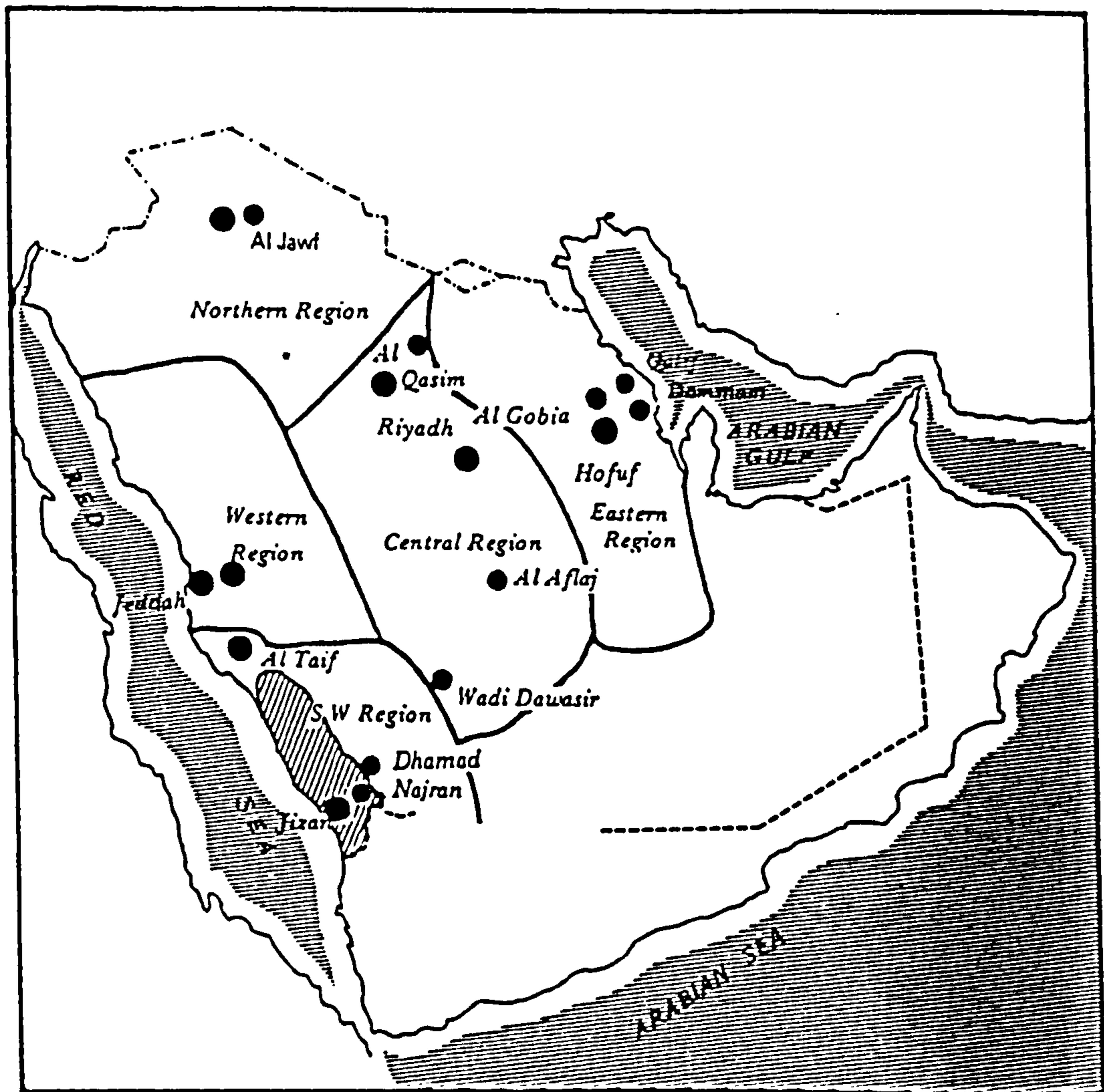
The government agencies concerned will increase the provision of cultural facilities and activities;

The education and training agencies will give special attention to the understanding of advanced technology by the population."

#### AGRICULTURE

1.40 During the First Five-year Development Plan (1970-75), the agriculture sector represented only 3.6 percent of the gross national product. By the end of the Second Five-year Plan, it had risen to 5.4 percent while the annual growth rate amounted to 5 percent in the Third Five-year Plan (1980-85). This is due to the fact that government strategy gave emphasis to the productive sectors (see Figure 1.03). In 1963, the government established the Saudi Arabian Agricultural Bank with an original capital of SR 10 million (approx. 1.6 million pounds sterling). With headquarters in Riyadh and four provincial branch offices, the bank's function was mainly to provide credit to the

**Figure 1.03 PLANNING REGIONS FOR AGRICULTURAL DEVELOPMENT**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF PLANNING, THIRD DEVELOPMENT PLAN, 1980-1985 (RIYADH, SAUDI ARABIA, 1980), p.135



agricultural sector by offering short-, medium- and long-term cash loans for the purpose of agricultural development.

1.41 During the Fourth Five-year Development Plan (1985-90), the government has given high priority to efforts aimed at increasing agricultural productivity. It was aiming at the achievement of an annual growth rate of 6 percent which would involve a marked improvement in the welfare of the rural population. It also hopes to improve marketing efficiency, to distribute arable land where water resources are available and to continue the drive towards greater agricultural achievement.

#### THE ECONOMY

1.42 Prior to the advent of petroleum revenues, livestock raising by bedouins, primitive agriculture and the production of simple tools were the only source of economic activity outside Hejaz (Western Region). What agriculture there was, was impeded from development by harsh weather conditions and a meagre rainfall, thus severely limiting production and, by extension, economic activity. The discovery of oil in 1938 coincided with the beginning of World War II, thus interrupting the process of development. However, after the war, production rapidly increased and the total output tripled within four years from 60 million barrels in 1946 to 200 million barrels in 1950. Since then, oil has been the single largest source of revenue in Saudi Arabia (Elmallakh, 1982).

1.43 The highest growth rates were achieved during the period 19740-80. This led to a high growth of liquidity and a consequent growth of inflation which became a major problem (Elmallakh, 1982). A look at Table 1.03 will reveal the extent of the economic development during this period. This table shows that the construction of roads, ports, airports and telecommunications systems, as well as public housing and schools, including the establishment of new industries, received the most attention from the government. It there-fore happened that this rapid upsurge in the economy brought with it a massive range of urban growth problems which were associated with this rapid growth rate. The government is now giving priority attention to the solution of these problems.

1.44 The Kingdom has completed four five-year development plans and it is now in the beginning of its fifth one. The primary purpose of the First Five-year Plan (1970-75) was to put the nation's physical infrastructure in place. The intention of the Second Five-year Plan (1975-80) was to continue to accelerate the construction of the physical infrastructure while allowing for more overall development. The Third Five-year Plan (1980-85) emphasised the development of manpower, while the Fourth Development Plan (1985-90) stressed the completion of physical infrastructure projects that are necessary to achieve long term economic and social development goals.



TABLE 1.03: Project Budget Expenditure, 1974/75 - 1979/80 (in Saudi Riyal)

FISCAL YEAR	1974/75	1975/76	1976/77	1977/78	1978/79	1979/80
Total project expenditure	26,397.0	74,379.0	74,433.4	74,866.0	83,047.0	105,680.0
Council of Ministers & related budget headings	1,658.9	4,761.8	4,756.9	4,924.5	4,399.4	13,964.0
Municipal and rural affairs	3,683.8	13,221.6	14,758.0	11,681.3	7,966.8	9,789.8
Public works & housing	114.4	185.7	9,061.4	7,856.8	5,649.4	3,022.5
Information	205.3	636.7	959.8	1,064.0	723.5	634.3
Civil aviation	1,150.8	4,469.9	4,469.9	4,370.0	3,912.8	6,804.6
Interior	973.2	2,301.3	3,078.9	3,293.4	3,330.5	4,131.9
Labour & social affairs	165.7	1,408.5	2,040.8	2,237.0	1,452.3	2,126.5
Health	435.1	2,061.6	1,737.0	1,758.3	1,855.0	1,822.0
Education	1,265.6	6,355.1	6,367.6	7,955.3	5,123.1	5,771.5
Communications	4,212.0	10,994.2	15,380.7	7,822.5	7,377.0	9,811.3
Finance & national economy	1,955.3	7,030.1	3,984.8	3,754.3	3,309.5	7,868.3*
Industry, electricity & commerce	144.4	586.7	1,081.0	488.0	337.3	3,450.5
Agriculture, water & resources	1,053.5	1,718.0	1,721.4	1,511.4	1,854.4	3,112.0
Public investment fund	3,000.0	1,600.0	-	-	4,000.0	4,250.0
Other	6,409.0	17,047.8	25,396.3	39,002.7	50,433.0	49,379.4
Less: expected shortfall	-	-	-20,361.1	-22,853.5	-18,676.3	-20,258.6

Source: Kingdom of Saudi Arabia, Saudi Arabian Monetary Agency (SAMA), Annual Report, 1979

\* including gathering and liquefaction of gas.

Ragaei Elmallakh and Dorothea Elmallakh, Saudi Arabia: Energy, Developmental Planning and Industrialization, Lexington, D.C. Heath & Company, 1982, p.4.



1.45 According to the Fifth Development Plan (1990-95), the need for transportation infrastructure projects will be relatively low, since the majority of projects have been completed.

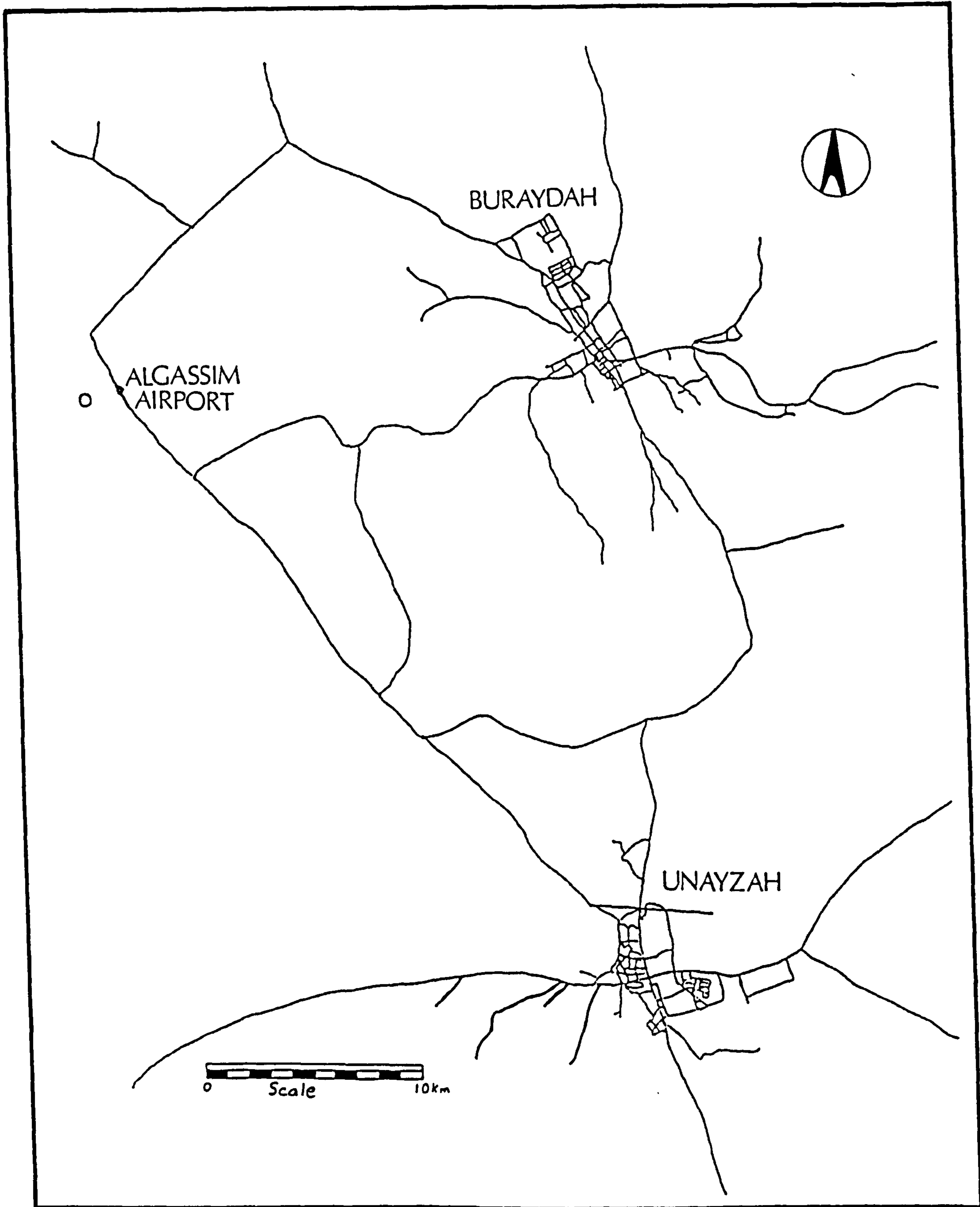
1.46 Having illustrated some aspects of Saudi Arabia, the thesis now will begin its investigation by reviewing literature read and materials used in relation to the aims and objectives of this thesis, and which have been practised in other countries.

#### THE STUDY AREA

1.47 The study area of this research project consists mainly of the twin cities of Buraydah and Unayzah and their environs (see Figure 1.04). It is considered the central core of the Alqassim region for the following reasons:

1. The largest cities in the region are Buraydah and Unayzah; the former is the regional administrative capital, and the latter the second largest city in the CCAAR;
2. Alqassim Airport is within proximity of the twin cities (approximately 20 kms from Buraydah and 25 kms from Unayzah); and
3. The Government Services Area (GSA), with a number of government, private and public facilities, is located between the twin cities.

**Figure 1.04 CENTRAL CORE AREA OF ALGASSIM REGION  
(C.C.A.A.R.)**



Source: NORCONSULT A.S., ALGASSIM COMPREHENSIVE DEVELOPMENT PLAN, 1989.

## CHAPTER TWO: THE IMPACT OF TRANSPORTATION DEVELOPMENTS: AN INTERNATIONAL REVIEW

2.01 This chapter will summarise different viewpoints contained in previous research concerning the social and economic impacts of transportation, in addition to associated and essential impacts. A summary of these impacts will be presented at the end of the chapter, along with possible impacts that might occur in the study area (CCAAR). Furthermore, comparative impacts will be presented, thus resulting in a combination of socio-economic impacts that will be investigated in the study area.

2.02 An effort was made to include materials which were written from the points of view of planners, engineers and sociologists. An overall summary of the impacts will be presented at the end of the chapter, in addition to possible socio-economic impacts that might occur in the research study area.

### SOCIAL IMPACTS

2.03 In order to investigate the social impacts of transportation in the CCAAR, a search for existing impacts in Europe (in particular in Britain) and the United States has been conducted using various sources. These impacts will be discussed in this section and are of importance to the research objective.



## DISRUPTION OF NEIGHBOURHOOD

2.04 The history of the destruction of American neighbourhoods by the urban highway is familiar to almost everyone. Small businesses were lost; entire communities uprooted. Even if residents were fortunate enough to relocate quickly, they often suffered the psychological side effects of the loss of a sense of community (Taebel and Cornehlis, 1977).

2.05 Downs (1981) points out that transportation facilities and their operation have major impacts upon the physical condition of each city's residential neighbourhoods. Hence, policies concerning them should be at least partly incorporated into the city's overall strategy for improving such neighbourhoods.

2.06 Downs continued by indicating that major transportation arteries, like expressways and railroads, often act as the boundaries of neighbourhoods and sometimes seriously disrupt them. Such arteries provide benefits for many persons scattered over large areas but concentrate their direct physical costs upon a small number of persons living nearby. Whenever any major motorway is built through the middle of a neighbourhood, its former unity is often destroyed. In some cases, to prevent this, residents of neighbourhoods in the planned paths of interstate highways in Washington D.C., New York City, San Francisco, Baltimore and Chicago have permanently blocked their completion.

Traffic plans in these cities have had to be redesigned. To avoid such eventualities, authorities should take account of the neighbourhood disrupting impact of transportation arteries in the planning stages, in consultation with local residents. They should also recognise that bus stops, subway stations, and expressway interchanges become places where people or vehicles congregate, with major impacts upon the immediately surrounding territory.

2.07 The US interstate's boost to suburban settlement contrasted sharply with its spatial impact on the city. The interstate, frequently an elevated structure, was a voracious devourer of city space. Neighbourhoods were levelled or cut in half by its concrete and steel structures. The interstate system, in fact, became a leading policy tool in the federal urban renewal effort. Unfortunately, the limited housing options of the displaced poor black and white ethnic population were thus reduced even further, and in some cases, their families' neighbourhoods were destroyed for ever. By the 1970's, urban residents were rebelling against this attack on their residential space. In Boston and San Francisco, local groups were successful in halting construction on interstate projects (Goldfield and Brownell, 1979).

#### COMMUNITY CONTRIBUTION

2.08 When a highway project is viewed as part of an area-wide development, the lowest-cost solution from a



transportation point of view is generally a very expensive solution from the standpoint of the community. Conversely, many cities have learned to take maximum advantage of a high-quality highway. European cities in particular offer many good examples of how streets can make a positive contribution to the environment (Owen, 1972).

2.09 This positive contribution can be seen in Scotland's East Kilbride, nine miles from Glasgow. "The street layout avoids uniformity, making use of dead ends by traversing them with pedestrian walkways or stairways. Apartments often span the walkways. The pedestrian streets introduce belts of green throughout the city ..." (Owen, 1972). Another example is the town of Cumbernauld (Scotland), where it "... has abandoned the division of the city into neighbourhoods and has instead built its housing around the town centre at sufficient densities to enable more people to get to the main centre on foot." (Owen, 1972).

2.10 In addition, this positive contribution has given people a variety of options, particularly automobiles, to travel within a metropolitan area. In fact, Morlok (1978) stated that "the range of options is extremely great, and this has enabled many people to move from places fairly close to their places of employment to more distant places, which are desirable for other reasons".



2.11 With the advances in transportation technology and the introduction of railways and intercity buses, travelling has become an extremely common thing to do, even for a long journey. This, of course, has resulted in a mixture and understanding of culture among the different groups and the mutual respect of one socio-economic group for another in US society (Morlok, 1978).

2.12 "... promoting specialisation a higher standard of living has been made possible; on the other, through the spread of information and ideas; the desire for improvement has been fortified ... transport creates its own difficulties. Improvements in transport facilities act as a spur to production, and attract labour and capital into the area over which they are effective. If the improvements in transport have been made without allowing for this effect, they will shortly be outpaced." (Bonavia, 1960, p.12).

### ECONOMIC IMPACTS

2.13 This section will identify impacts that result from the transportation system, according to various authors and writers. The economic impacts that have been identified have occurred in Western Europe and the United States.

### PROMOTION OF ECONOMIC DEVELOPMENT AND ACTIVITIES

2.14 Transport decisions are not made in isolation from the economic environment. The provision of accessibility can provide a base for economic development. Equally,

growth itself creates activity patterns which pose a demand for transportation. The relationship between transportation and development patterns has long been of interest to planners and economists (Paquette et.al, 1972).

2.15 Geographers have employed the regional location theories (Von Thunen's Isolated State; Location of Centers within a Regional Hierarchy; and the Theory of Industrial Location) attempt to explain the location of cities within their region. These theories postulate that the functional structure and inter-relationships of cities within a region are related to distance and therefore to transportation networks. A more apparent relationship between transportation and development patterns occurs at the metropolitan level since changes in metropolitan structure occur at a much more rapid rate than changes at the regional level.

2.16 Moreover, urban development takes place both in spatial expansion and by over-building. Spatial expansion, the most obvious form of urban development, takes place as urbanisation spreads into formerly rural areas. In the years since World War I, cities have rapidly increased their urbanised areas with the phenomenon of low-density suburban development. This form of development has continued at an accelerated pace since the 1950s.



2.17 Lichfield (1981) stated that transportation is the active movement of people and goods along the various centres or zones of socio-economic activity. This is the essence of the land-use/transportation system and the nub of land-use/transportation studies. This relationship can be described precisely through modelling the relationship at any moment between the potential for traffic generation by land-use and the capability of the various transportation modes to carry that traffic. The traffic generated is thus a joint consequence of the land-use potential and the capability of the transport system to carry the traffic, both in terms of quality, categories, desired origins, destinations, desired times of travel, etc. And the introduction of a transport capability will in itself generate the possibility of socio-economic activities on land. The generation of such activities will stimulate the provision of transport capabilities.

2.18 Morlok (1978), however, summarised the economic roles of transport thus: it extends the range of sources of supply of goods to be consumed in an area, thus providing cheaper sources of better quality materials/products outside the area; a regional specialisation of labour will result from the use of more efficient sources of supply; and an area can have more than one source from which to obtain and import goods for consumption locally.



2.19 And according to the Arizona State University (1987) study of the socio-economic impact of urban freeways, the access-ibility advantages of the freeway system allows better land use and industrial development than a comparable area without a freeway development. Moreover, the strongest conclusion about the study is that the freeway by itself is not enough cause for development to occur, other factors (e.g. transportation modes, municipal planning and infra-structures) are equally important. The freeway simply initiates a situation that improves the market opportunity to change, and most importantly, the development that occurs around the freeway can be controlled by land use planning. But these developments will be directed by private development in the absence of strong planning.

#### RELOCATION OF BUSINESSES AND INDUSTRIES

2.20 Palen (1981) expressed his view on the American city: the move of manufacturing and industry out of the central city was greatly accelerated by the building of interstate superhighways. The building of the interstate expressway system in the 1950's and 1960's gave industry genuine alternatives to central-city locations.

2.21 Increasingly, industry has leapfrogged over intermediate city residential areas and moved directly from the inner city to suburban industrial parks.

2.22 The location of factories in suburbs in turn encouraged workers to move to new suburban tract-type housing developments that were growing up near the factories. Before long, shopping centres followed; and more and more mixed industrial-residential suburbs were established. Furthermore, what made the widespread outward flow of urban population possible was technological breakthroughs in the areas of transportation and communications. The city based on steam power was transformed into one dependent on petroleum and electricity. The widespread use of cars, heavy goods vehicles and telephones increased the movement of people, goods and ideas. The car provided mobility to the average urban dweller and allowed or even encouraged rapid settlement of previously inaccessible areas on the periphery of the central city. Moreover, the transportation technology of limited-access and expressway systems that caused suburbs to boom in the 1950's and 1960's is now permitting an even more dispersed pattern of economic as well as residential development. Transportation access, coupled with lower wage rates, land costs and taxes, has attracted some firms to localities that twenty years ago would not have been considered (Palen, 1981).

2.23 Furthermore, "... transport will not greatly influence the shape of future regional development in the United States, although under certain circumstances it may help a region to capture a fair share of decentralised



industry. In this respect, service considerations more than costs may determine the attractiveness of a particular transportation network." (Kraft et.al, 1971).

#### EFFECTS ON LAND VALUES

2.24 Coyle et.al (1982) explained that improvements in transportation enhance an area's economy by increasing the value of land that is adjacent to or served by the improvements as the land becomes more accessible and more useful. Today, suburban centres provide excellent examples of land areas that have increased in value due to the accessibility that results from efficient transportation systems. Suburbanites are able to take advantage of nearby city life for work and pleasure and then retire to rural areas via the public transportation network to avoid crowded living conditions.

2.25 Conversely, Moulthrop, in his "Study of the Effects of a By-pass Road upon Business and Land Values" (1962) found very little change in land value and land use, i.e. land use and land value in the study area have become stabilised, hence the by-pass had no great impact (Moulthrop, 1975).

#### ASSOCIATED AND ESSENTIAL IMPACTS

2.26 In addition to what has been previously discussed in the last two sections of this chapter, other important transportation-related impacts have been witnessed in



developed nations. These impacts are discussed here because of their relevance to the research study.

#### INFLUENCE ON URBAN FORM

2.27 The ancient city of Miletus in Asia Minor is often mentioned as one of the first systematically planned cities (about 450 B.C.). It had a regular grid pattern of streets, indicating the attention given to communications within the city. In the Middle Ages, the dominant role of the market in the creation of the city influenced the formation of its core; typically, markets remained the central places and the church, city-hall, and other religious and secular central facilities were located immediately around them. As most movement was on foot and the city had to be surrounded by defensive walls, cities had to be built with a very compact structure. This resulted in high population densities. Such cities typically had irregular street patterns, because the basic modes of transportation did not require any special roadway geometry. With the passing of the Middle Ages, the need for defensive walls gradually decreased and new patterns of urban development appeared. Political, functional and often aesthetic factors began to influence urban form and street patterns. Thus the cities of Karlsruhe in Germany and Versailles in France were laid out with distinct radial/circumferential street networks. Moscow has a ring and radial network. Royal palaces and government seats were usually focal points in cities with radial networks. Furthermore, the role of transportation in

determining street network has varied with times and conditions. Transportation has practically no influence on the layout of the irregular streets in Medieval cities, but it has been a major factor in the design of more regular networks (Vuchic, 1981).

2.28 Netzer (1970) indicated that there are at least two reasons for hesitation in wholly accepting the proposition that transportation has little effect on urban form: firstly, individual location decisions by both businesses and individuals are made in response to the transportation services actually offered; secondly, the pricing of transportation services. Individuals making residential location decisions surely do consider, as one of the costs of housing, the costs of travelling to work. Thus, the highly dispersed form of residential development characteristics of most American urban areas, involving heavy car use, is faster, more comfortable, and relatively cheaper than the present alternatives and is consistent with one pattern of urban development. If car use were no longer faster, more comfortable, and cheaper, it is a fair assumption that some consumers would choose other modes of transport, and some of these would alter their residential location choices as well. No doubt many would prefer very low densities even so, but the urban fabric is the sum total of individual choices.



2.29 In the developed world, with a slow population and economic growth rate, the marginal change in urban expansion is slight (perhaps half of one per cent). The corresponding change in a city in the developing world can be dramatic (perhaps ten per cent), e.g. Sao Paolo, Mexico City, Seoul. This offers the advantage that the management of changes in land-use can potentially produce more significant results for the current urban areas of developing countries than for those in the developed world. For example, there is the opportunity to influence urban form more dramatically in comparison to a slow growth rate. Plans could arise for a poly-nucleated town (as opposed to one which is heavily centralised), with the advantage of facilitating shorter trips to local centres, and avoiding a concentration in the main centre which is often too congested to absorb it. When this consideration is related to the general lack of resources and large sectors of low income, there is clearly some need to consider all forms of transportation, not only that of the private motor car which only a minority can afford, at least for a considerable period ahead. Thus, if attention were to be given to the alternative and "suppressed" modes, not only would there be greater benefits in transportation services for a wider section of the population, but habits and facilities could be initiated which would head off too dramatic a push towards modernisation (Lichfield, 1981).



2.30 Levinson (1981) looked at the American city in the context of current trends and public policy options. He shows that various land development strategies, social programmes, transportation technologies and energy supplies will affect urban forms, life styles and mobility. It describes the steps needed to bring about major changes in existing development patterns and trends. It presents various futures in the form of scenarios for twenty-five, fifty and seventy-five year planning horizons. Moreover, cities throughout the world continue to grow in size, complexity and importance as economies strengthen and populations expand. Managing this future urban growth to maintain mobile and liveable environments will remain an important challenge in the years to come.

2.31 He added that there is no simple answer. Cities of differing size, culture and economy will have their own specific needs, both in the developed and developing countries, and each will have its unique set of land-use and transportation requirements.

2.32 Relations among nations, the stability of governments, and rates of economic growth will have an important bearing on a future metropolis. Other key factors include population expansion; willingness to renew old cities and build new ones; energy availability; new systems for acquiring, allocating, managing and servicing urban land; energy and resource availability; and continued

advances in technology and governmental structure. Furthermore, predicting how these factors will interact is no easy task. It calls for understanding the past, assessing the present and probing the future to find ways to bring resources, society and technology together (Levinson, 1981).

#### EFFECTS ON URBAN AND METROPOLITAN GROWTH

2.33 Derbyshire and Brown (1979) stated that the social and economic pressures for continuous urban growth were balanced and controlled by the availability of public transport. This relationship affected the absolute scale of cities' growth as well as their physical form. Towns with existing road patterns tended to grow outwards in relatively high density bands of development following these routes as first horse-drawn buses, then trams and trolley buses, and lastly motorised buses exploited the main lines of communication.

2.34 "Burgess Concentric-Zone Hypothesis" was an attempt to explain the reasons for cities growing the way they do. Burgess was concerned with how industrial cities change over time from the pre-industrial model, in which most of the central land is occupied by a residential elite and there is no clear segregation of city land for specific functional purposes. His hypothesis is a model, and only a model, of how cities develop spatially as a result of competition. Competition for space meant that prisons, organisations, and



institutions were distributed within urban space in a non-random fashion. Results of this can be seen in American cities (Palen, 1981).

2.35 According to Palen (1981), what Burgess's "Concentric-Zone Hypothesis" suggested is that cities grow radially in a series of concentric zones or rings. Zone 1 was the central business district: the economic and the geographic centre of the city. Zone 2, the zone in transition, contained both older factory complexes, many from the last century, and an outer ring of deteriorating neighbourhoods of tenements. Zone 3 was the location for working people's homes. Zone 4 called the "zone of the better residences". The ring included the area beyond the neighbourhood of the second-generation immigrants. Zone 5 was the commuter area. Furthermore, the concentric-zone pattern of urban growth, which says that there is an increasing status gradient as one goes from city core to periphery, is far less useful in describing patterns of ecological growth outside North America. Thus, the East End of London was, before the bombing of World War II, composed of small factories, workshops and poor homes surrounding the dock area. On the other hand, the central and western districts of Westminster, Marblebone, and Kensington have continued to retain their upper-class airs for two centuries in spite of their central location. Moscow, before the Russian Revolution, clearly had the urban structure of a pre-industrial city, with its inverse zonal pattern.



2.36 Banfield (1974, p.25) explained that a "... typical city or metropolitan growth area can be understood in terms of three imperatives. The first is demographic: if the population of a city increases, then city must expand in one direction or another, i.e. up, down or from the centre outward. The second is technological: if it is feasible to transport large numbers of people outward (by train, bus and automobile) but not upward or downward (by elevator) the city must expand outward. The third is economic: if the distribution of wealth and income is such that some can afford new housing and the time and money to commute considerable distances to work while others cannot, the expanding periphery of the city must be occupied by the first group (the "well-off") while the older, inner parts of the city, where most of the jobs for the unskilled are, must be occupied by the second group (the "not well-off").

2.33 "... Given a rate of population growth, a transportation technology, and a distribution of income, certain consequences must inevitably follow; that the city and its hinterland must develop according to a predictable pattern and that even an "all-wise" and "all-powerful" government could not change this pattern other than by first changing the conditions that give rise to it. It is not that nothing can be done to improve matters, rather it is that there are limitations to those things which can be done. And it is not that the only factors influencing

metropolitan development are those related to population, technology and income. Countless others also influence it." (Banfield, 1974, p.26).

2.38 Owen (1974) stated that every metropolitan area in the United States is confronted by a transportation problem that seems destined to become more aggravated in the years ahead. Growth of population and expansion of the urban area, combined with rising national product and high incomes, are continually increasing the volume of passengers and freight movement. At the same time, shifts from rail to road and from public to private transportation have added tremendous burdens to highway and street facilities.

2.39 He added that the most notable characteristics of urban change are the rapid growth of the fringes and the loss of population in central core areas. But there has been little evidence that declines in population or economic activity will be sufficient to diminish transport problems in the heart of the city in the near future.

2.40 Despite the patterns of urban growth to date, and the presumption that centrifugal forces will gain rather than lose strength in the future, there is still no clear indication of the extent to which present trends in urban growth will continue. It is not known to what degree economic change and developments in technology will alter the process of urbanisation (Owen, 1974).



2.41 In addition, a United Nations projection of urban growth for all regions of the world (1991) was recently released (see Table 2.01). The report indicates that there are 580 million people living in poverty, and as a result of mass migration, urban growth will explode, with the population in 85 countries double that of a decade ago. Also, it projects that the urban population of developing countries will double that of the developed world in 10 years time.

2.42 Hall (1984) indicated that there are three principal reasons behind urban growth. The first one is the huge increases in the population of the world, particularly in the developing world. The second is the shift of population in most countries into urbanising areas where industries and services are found within the cities. And the third and most important factor causing urban growth is that metropolitan cities of the world are attracting greater numbers in this population shift. For example, Hong Kong and Mexico City are still showing an explosive growth. This, according to Hall (1984) has created a tremendous amount of problems of land use competition and transportation.

2.43 Yeates (1990) stated that the electric street car had made it possible in North American cities for middle-class people to move out along the major transportation network and away from the city centres. Thus, this shift in



TABLE 2.01: World Population Indicators

	Population (in millions)		Average growth rate (%) 1990-95	Birth rate per 1000 1990	Death rate per 1000 1990	Infant mortality per 1000 1990	Per cent urban 1990	Urban growth rate (%) 1990-95
	1990	2025						
World Total	5292.2	8504.2	1.7	26	9	63	45	3.0
More developed regions	1206.6	1353.9	0.5	14	10	12	73	0.8
Less developed regions	4084.6	7150.3	2.1	30	9	70	37	4.2
AFRICA	642.1	1596.9	3.0	43	13	94	34	4.9
Eastern Africa	196.9	542.5	3.3	48	15	103	22	6.4
Middle Africa	70.1	192.3	3.1	46	14	89	38	5.1
Northern Africa	140.6	274.4	2.5	34	9	69	45	3.9
Southern Africa	40.9	80.1	2.3	32	9	67	55	3.5
Western Africa	193.7	507.5	3.2	47	15	102	33	5.3
NORTH AMERICA	275.9	332.0	0.7	14	9	8	75	1.0
LATIN AMERICA	448.1	757.4	1.9	27	7	48	72	2.6
Caribbean	33.7	50.4	1.4	24	8	46	60	2.3
Central America	117.7	213.2	2.2	29	6	39	66	2.9
South America	296.7	493.7	1.9	26	7	52	75	2.6
ASIA	3112.7	4912.5	1.8	27	8	64	34	4.3
Eastern Asia	1335.6	1736.9	1.3	20	7	26	39	4.3
S-Eastern Asia	444.8	726.0	1.9	28	8	55	30	4.1
Southern Assia	1200.6	2161.8	2.3	33	11	91	27	4.0
Western Asia	131.8	287.8	2.8	34	7	60	63	4.1
EUROPE	498.4	515.2	0.2	13	11	11	73	0.7
Eastern Europe	113.2	122.9	0.3	14	11	16	65	1.0
Northern Europe	84.2	88.3	0.2	13	11	7	84	0.4
Southern Europe	144.1	147.8	0.3	12	10	13	66	1.0
Western Europe	156.9	156.3	0.2	12	11	8	81	0.4
OCEANIA	26.5	38.2	1.4	19	8	23	71	1.4
Australia/NZ	20.3	27.2	1.1	15	8	7	85	1.2
USSR	288.6	352.1	0.7	17	10	20	66	0.9

Source: United Nations Population Fund, 1991

population has required a change in land use, with houses to be built and services to be provided. "Although the street car systems played an important role in facilitating suburbanization, the street car did not initiate the growth", as White and Yago (1985) indicated (cited in Yeates, 1990).

2.44 Before the introduction of the motor car, Hurd suggested that cities tended to grow along the major lines of transportation. By viewing cities from above, the shape of the city would be similar to a star shape where the new development takes place at the end of transportation routes. This view, however, could not be applied to underdeveloped areas (cited in Lambert, 1975). And furthermore, according to Harris and Ullman "... cities tend to develop several separate functions, but roughly of equivalent importance." (cited in Lambert, 1975).

2.45 Hawley (1978) indicated that transportation and communications play a major role in the process of ecological expansion. He stated that expansion "begins at an intersection of heavily travelled routes, e.g. a city, and proceeds with the extension of improvement of transportation and communication facilities". He differentiated between three stages of ecological expansion where each type has its own transportation and communication system. He points out that "the modern history of the conquest of distance may be regarded as consisting of three major stages. The first,



which lasts from the 1830s to the first quarter of the 20th century, was an era of steampowered transportation. A second stage began around 1920 and has not faded from view; it is marked by the petroleum and electrically powered methods of bridging distances. During this period, the expanded metropolitan phase of urbanization developed. A third stage which started early in the present century, became more noticeable after 1950 ... In this stage transportation is guided by electronic instrumentation and may be powered by atomic reactions, hydrogen fuels, and other unconventional energy sources. These innovations are leading to a phase of diffuse urbanization." (cited in Alkhalifaha and Frisbie, 1989).

#### INFLUENCE TOWARDS DISPERSAL

2.46 "The motorised bus, which became an influence after 1920, was much more flexible and allowed suburban development to spread continuously outward at lower densities, filling in the interstices between the ribbon along the main roads, and extending those ribbons even further into the rural areas." (Maltby and White, 1982) Furthermore, Buchanan et al. (1963) explained that "... the invention of the motor vehicle because it soon exerted a strong influence toward spread and sprawl of development".

2.47 Consequently, Tak (1971) emphasises that the primary effect of the Interstate Highway Act was to reinforce the spatial trend toward the vital fringe. The limited-access



highways expanded the range of the car and encouraged dispersed settlement. In fact, when suburbanites explained where they lived, the name of the town was frequently an afterthought; the important piece of information was the exit on the expressway. Besides determining the boundaries of residential growth, the ribbon highways, like the trolley tracks that preceded them, generated commercial and industrial uses. The Capital Beltway, an interstate road circling Washington D.C. ten miles out, which was completed in 1964, sprouted numerous "beltway industries" drawn by the easy access to the motor truck.

2.48 In addition, Goldfield and Brownell (1979) indicated that the internal structure of the city was characterised by significant spatial expansion, typically along transportation routes radiating from the city centre. Growing affluence, the tremendous influx of racial and ethnic groups into the city centres, and improved transportation technology encouraged the move outward. As the city expanded, it became segregated. Downtown areas became primarily retail, wholesale and financial; some small industry clung to its edges, but larger industries moved to the periphery for more and cheaper space. Residential neighbourhoods became more clearly defined by economic, radial and ethnic status. This should not imply that urbanites were locked into specific spatial and social situations. They were not. Residential mobility continued and, depending on the city's economic growth and age and the

particular ethnic group, social mobility occurred as well, though much less frequently than geographic mobility.

#### CHANGES IN LAND USE PATTERNS

2.49 Hoyt (1952) traced the historical trends in transportation and urban development and analysed the impact of the former on the latter. He established, with case studies based on Chicago, New York, Philadelphia, Boston, etc., how transportation modes and developments have led to considerable changes in land-use patterns, e.g. industrial and commercial decentralisation, and future highways and land-use planning.

2.50 Baerwald (1982) indicated that the characteristics of a transportation system affect the development of clusters and corridors. Especially important are the configurations of the metropolitan freeway networks and local characteristics within a concentration. Proximity and access to other modes may also be important. Furthermore, the configuration of a motorway has a significant impact on the number and desirability of sites for cluster and corridor development. Since circumferential freeways (motorways) offer greater access to larger parts of the metropolis than radial freeways, clusters and corridors are usually more intensively developed along beltways. Metropolitan areas with complete motorway networks therefore tend to have a well-defined set of suburban concentrations, as do metropolises that have their motorway networks truncated by



a lake or ocean or restricted by a large river. In contrast, metropolises that have complete motorway networks because of topographic restrictions or conscious decisions not to construct freeways, offer few links or nodes for large cluster or corridor development. Development that would have taken place in these motorway-oriented concentrations is instead arrayed with major streets.

2.51 He added that the characteristics of a transportation system within a cluster or corridor affect its form and development. Where frontage roads are present and have easy access to and from the freeway, as is true in most Texas metropolises (USA), all sites fronting onto the motorway are desirable, especially for commercial activities and hotels/motels. If frontage roads are absent or have restricted access, development is concentrated around interchanges.

2.52 Thus, Salter (1989) stated:

"Changes in transport mode frequently produce changes in land-use patterns; for example, the introduction of frequent and rapid rail services in the outer suburbs of London resulted in considerable residential development in the areas adjacent to local stations. More recently the availability of private transport has led to the growth of housing development which cannot economically be served by public transport."



2.53 Young Lee (1985) indicated that "Transportation network improvements result in changes of and use pattern. The most salient measures of the intensity of urban land use are population density and land value. Transportation network improvements bring an increase in accessibility and these heighten the utility of certain areas. Land value is a reflection of the utility of land, and population density is the reflection of demand of the land." He illustrated his view on the increased accessibility as a result of transportation by giving an example of the construction of a bridge connecting north and south Seoul which eventually enhanced development south of the city and increased the accessibility of that area.

2.54 Accordingly,

"... the effectiveness of any transportation system is very much influenced by the land use and travel patterns in the area it serves. Many transportation problems would be substantially alleviated if not eliminated simply by land use changes which resulted in changes in travel patterns. Thus, it is important, in transportation planning, to be aware of the interrelationships with land use, and in certain cases it may be appropriate to consider alternative patterns of land use in addition to the more usual transportation facility and service option." (Morlok, 1978).

2.55 In a study conducted by the Transportation Research Center of Arizona State University (USA) in 1987 into the socio-economic impact of urban freeways in the metropolitan area of Phoenix. The two freeways which were included in the study, the Black Canyon and the Superstition freeways, both pass through the metropolitan area of Phoenix.

2.56 The objective of the study was to identify patterns of change that might accompany the development of new urban freeways in Arizona. These patterns include:

1. Property values of land immediately adjacent to and contained within the corridors parallel to freeway development.
2. Land use patterns at major intersections and along freeway routes.
3. Industrial, office and commercial development patterns generated by freeway construction.
4. Altered urban growth patterns created by freeway construction and attendant improvement in access to employment centres.
5. Attitudes of the population concerning their living environment and the relationship between improved transportation and their own wellbeing (Transportation Research Center, ASU, 1987).

2.57 The major findings of the case study were as follows (Transportation Research Center, ASU, pp.3-10):

- "- Freeways merely create a condition that improves the market opportunity for change.
- More importantly, development around freeways can be controlled by strong urban land use planning.
- It is clear that income-generated properties (non-residential uses and apartments) have strong locational preferences for freeway corridors.
- Freeway intersections are most likely to be developed into non-residential areas.
- 90% of home owners who moved to the area after the freeway was built thought its impact was positive.
- The majority of home owners who lived more than 200 feet from the freeway would again buy a house as close to the freeway. Only 21% who lived within 200 feet would do so.
- People who live within 600 feet of the freeway are most uncertain about its property value effect. The further away people live, the more they believe the freeway has no effect.



- Both the Black Canyon and Superstition areas developed quickly after completion of the freeways.
- The rapid industrial development of the western Black Canyon area was due more to the completion of zoning, rail proximity and available land with utilities in place with Black Canyon Freeway than to the freeway alone.
- Over a long period, from 1959 to 1987, residential density has increased with the encroachment of multi-family dwellings, especially along freeway and arterial corridors.
- The rate of non-residential development in the Black Canyon area grew at an annual 7% compound growth rate for almost a twenty year period after the completion of the freeways.
- In the Black Canyon, those areas which grew the most intensely combined favourable zoning, land and utility availability, and a mix of transportation modes to develop into a large industrial centre.
- From the research conducted in other areas and based on urban growth theories, the importance of major transportation systems in general, and urban freeways in particular, is known. A commercial site

with freeway access and visibility will be preferable to a site that lacks the freeway frontage.

- In addressing the question of urban form, the difficulty is in quantifying the potential impact of urban freeways. Although the impacts can be described in concept, it is difficult to predict what the form of the metropolitan area would have been if the urban freeway system had been developed differently."

2.58 In addition there are generalised land use patterns along freeway corridors, according to the same study (pp.14-16):

- "1. Freeway interchange areas are typically the most economically desirable pieces of real estate along freeways due to their "focusing effect".
2. Hotels and motels, at interchanges along major interstate routes, and in areas where two freeways intersect.
3. Office complexes are found throughout the freeway corridor.
4. Condominiums, townhouses and apartment complexes are usually developed along arterials off freeway interchanges.

5. Single family residential areas are protected from direct contact with freeway interchange uses.
6. Industrial uses are usually located on land along the freeway routes that are not desired by higher commercial uses."

2.59 However there are a number of local factors that will distort the above generalised land use patterns, which are also from the same study (pp.16-17), and they are as follows:

- "1. The development of land along freeways depends on local supply and demand conditions. One of the factors that influences this situation is the metropolitan area's economic base.
2. The supply of corridor land relative to demand for corridor land.
3. The specific impacts freeway development have on surrounding land uses obviously depend on whether the area is already developed or not.
4. The local government responsible for land use planning. The selection of a new freeway route often prompts the review and possible revision of a city's general plan. Local government may want to



slow down freeway corridor development because they want to encourage development in other areas they deem of more strategic importance to their overall objective."

## SHAPING THE URBAN STRUCTURE

2.60 In earlier times, transportation determined the nature of urban settlements because transportation was a constraint on development: the population of urban settlements was no larger than could be supplied and fed by the transport system. Most workers walked to their jobs, the radius of the city was small, and the area was small. Cities later grew larger as modern sewer and transport systems permitted, and they spread further as railways, transit and motor vehicles extended the radius of the urban area. Today, transportation has the capability of supporting any conceivable size or shape of city, but the urban community can no longer afford to settle for growth patterns merely because technology happens to make them possible. Urbanites must decide what kinds of communities they want to live in and then must use transportation technology to help achieve them. Otherwise no amount of transportation will solve the transportation problem (Owen, 1976).

2.61 Owen (1972) indicated that new cities and urban redesign have demonstrated that transportation infrastructure is often successfully combined with parks and recreation projects, housing and commercial developments on

large tracts of land. The highway can serve as the structural setting for such a development, its design and landscaping can enhance the whole area, and traffic problems can be alleviated at the same time.

2.62 The physical patterns of growth of a city strongly reflect the physical layout of the transportation system which is created to serve the urban area. Since facilities are designed to serve not simply the existing demand, but rather the demand at some point in future development, transportation systems not only serve the urban area, but also tend to shape the urban structure (Paquette et al., 1972).

#### EFFECTS ON TRAFFIC CONGESTION

2.63 Taebel and Cornehlis (1977): As the original suburbs became congested, the logical solution was to move even further out into the countryside. As developments leapfrogged ahead, they went beyond city boundaries, either landing in small, outlying communities' backyards or opening unincorporated areas, which imposed little or no restrictions or demands on the developers. The new municipalities and communities hastened the bulldozing and building and helped to get the roads and highways needed for these new developments. What was referred to almost everywhere as "progress" was in reality developmental chaos. Soon problems associated with this style of residential development were too obvious to ignore.



2.64 These problems were reflected in a study conducted in Walnut Creek, California. According to Cervero (1986), an origin-destination study - in the town - along the community's most congested boulevard showed that 48 per cent of all peak trips were through-trips. In general, morning traffic headed to San Francisco and Oakland-Berkeley from the exurbs of Contra Costa County was being funnelled through Walnut Creek to gain access to the regional freeway system regardless of whether Walnut Creek increased its employment base or not. As long as other fringe communities continue to grow, Walnut Creek will witness even greater traffic within its municipal boundaries over time (Cervero, 1986).

2.65 A pathway of 'criss-cross' or 'lateral movement' flows in most of America's urbanised regions has taken over from the radial commutes as the commanding pattern of travel. This had led to more complicated patterns of travel than was the case ten or fifteen years ago (Cervero 1989).

2.66 As a result of the 'criss-cross' flow, traffic is forced to use secondary and ring roads which were not actually designed to handle such traffic. This traffic congestion in the United States has surpassed the limit of acceptance and it is becoming unbearable in the 1980s and 1990s. A reflection of this is the broad dissatisfaction in many metropolitan areas across the USA where most people have come to consider that traffic congestion is the number



one urban problem. Such unpleasant conditions can be seen in Houston, New Orleans and Los Angeles, where severe congestion of traffic is witnessed throughout the day. And it is not only traffic which can be a distressing factor when rush hours begin to or from the city centre as "a decade ago", but now congestion is taking place in suburban locations in most metropolises for many hours of the day (Cervero, 1989).

2.67 In the "Traffic in Towns" report, Buchanan et al. (1963) illustrated the problem of through traffic by indicating that "... in every town there will be a certain amount of traffic, on all approach roads, which passes straight across the town without stopping to conduct any business." Thus, "... through traffic is a complicating factor in towns, which first needs to be disentangled from the problems of town traffic proper, and then needs careful consideration for the best way to deal with it."

2.68 It is also worth noting that providing new road infrastructures to meet the demands for transport is crucial, especially in old cities that have developed before the existence of motor vehicles. Even the newly introduced ring roads, which take traffic around the centres of cities, do not guarantee that traffic using the inner cities can be coped with, while still ensuring the quality and level of service that are aimed for (Organisation for Economic Co-Operation and Development, 1977).

## IMPACTS OF MODERNISATION

2.69 "The semantics of the word 'modernisation' are still subject to heated discussion, particularly among sociologists. However, if we accept Moor's definition that modernisation involves 'entering the modern world economically, politically and socially' (1965, p.6), then we can recognize that several 'modernisations' have occurred in the world to date. Such an approach also reduces the ambiguity of such terms as 'growth' and 'development'; these are often but not necessarily concomitant" (Santos, 1979, p.12).

2.70 "A modernization, then, is the diffusion of an innovation from a 'polar' region to peripheral subordinate regions, and far from an anterior historical period to a subsequent one. On a global scale, 'polar' regions are developed countries, peripheral regions are underdeveloped countries. The evolution of any given Third World country therefore depends on when it first felt the impact of external forces of modernizations. The first impact of modernization brings a country or region into a global economic system; the order in which subsequent modernizations are experienced determines the contemporary economic, social, political and spatial characteristics of a country or region" (cited in Santos, 1979, pp.12-23).

2.71 Roweiss (1970) postulates that "... contemporary modernisation is controlled by large-scale industry which



basically consists of multinational firms and their supporting systems (such as the means of mass communications)" (cited in Santos, 1979, p15).

2.72 "The rapid rate of change clearly differentiates the present period from the preceding ones. The implications of the present-day period for underdeveloped countries are manifold and profound. For the first time in the history of underdeveloped countries, two variables emanating from the centre of the world's economic system have become generally diffused throughout the periphery. The two variables in question are information and consumption, the former serving the latter; together they transform the economy, society and spatial organization. They generate the forces for concentration and dispersion, which in turn determine spatial organization. Information permeates all levels of society and creates demands that mirror those of the developed countries. This process is facilitated by the more recent advances in communications" (Santos, 1979, p.15).

2.73 Eisenstadt (1973) states that "... the relatively recent emergence and acceleration of technological development has increased resource outputs and has changed the level of economic, political and social sophistication and complexity". Furthermore, this acceleration of modernisation can lead to spatial inequalities in



productivity and the relative importance of cities will be altered as a result (Santos, 1979).

2.74 Inkels (1974) writes that the main features of modernisation include industrialisation, urbanisation, mass education, mass communications, rapid transportation systems and bureaucratisation, as well as an increase in the socio-political complexities of life (cited in Alnowaisir, 1983).

2.75 The social aspects of modernisation are described by Karl Deutsch (cited in Eisenstadt, 1973) as '... the process in which major clusters of old social, economic and psychological commitments are eroded and broken, and people become available for new patterns of socialisation and behaviour' (Eisenstadt, 1973, p.23). This occurs through sudden changes in local economic or political conditions, or through outside intervention, as in the process of colonisation or from international market forces (cited in Alnowaisir, 1983).

2.76 The increasing influence of urbanisation and industrialisation seem to weaken the traditionally strong extended kinship relations that have existed in Saudi Arabia from pre-Islamic times. The combined and cumulative effects of modernisation in employment, education systems, styles of living, mass media, market forces and other areas, influence the change from a traditional society to one which has a more modern personality. The changes in the state of the

economy, in the patterns of settlement, in the fabric of society and in international exposure are also part of the main effects of modernisation in Saudi Arabia (Alnowaisir, 1983).

2.77 Consequently, "urbanisation" and "rapid transportation" can be accepted as modernisation in accordance to what has been indicated above. In addition, these two elements are in existence throughout the country of Saudi Arabia, where urbanisation is taking place in most of the Kingdom's regions and rapid transportation such as motorways is being introduced throughout the land as a means of rapid communications and linkages.

2.78 The socio-economic impacts of rapid transportation (modernisation) in particular will be dealt with in this study as part of the overall socio-economic impact of transportation in the Central Core Area of Alqassim Region (CCAAR).

#### SUMMARY OF THE IMPACTS

2.79 From the ideas of the writers who have been quoted above, a summary of socio-economic and related impacts is listed below:

#### SOCIAL IMPACTS

2.80 The positive and negative social impacts of transportation are briefly described as follows:

1. It has a destructive effect on neighbourhoods;
2. It can uproot entire communities which suffer because their unity has been destroyed;
3. It cuts communities in half and divides residential areas;
4. It is a prime mover of people and goods along the various centres or zones of socio-economic activity.
5. It tends to have a negative social effect on human settlements.
6. It creates a mixture and understanding of culture among the different socio-economic groups in a society; and
7. It influences the location of residential areas.

#### ECONOMIC IMPACTS

2.81 Both positive and negative economic impacts of transportation are briefly listed below:

1. It influences the spatial distribution of economic activities and the redistribution of social and political institutions.



2. It extends the range of sources of supply of goods to be consumed in an area.
3. It influences the location of businesses and industrial areas; and
4. It increases the value of land adjacent or near to the network.

#### ASSOCIATED IMPACTS

2.82 Essential and related socio-economic impacts that were discussed in this chapter are also summarised as follows:

1. It affects urban form;
2. It expands the range of the automobile;
3. It encourages the dispersement of settlements;
4. It determines the boundaries of residential growth;
5. It generally leads to significant changes in land use patterns.
6. It has a significant impact on the number and desirability of sites for cluster and corridor development.

7. It determines the nature of urban settlements and it shapes the urban structure.
8. It sometimes creates traffic congestion; and
9. Modernisation (mass communication and rapid transportation) affects the transformation of societies from traditional to modern.

2.83 Methods of assessing the impacts of transportation development and their relevance to Saudi Arabia, in addition to the criteria for impact assessment in the study area, are discussed in detail in the next chapter.

### CHAPTER THREE: METHODS OF ASSESSING THE IMPACTS OF TRANSPORTATION DEVELOPMENTS AND THEIR RELEVANCE TO SAUDI ARABIA

3.01 This chapter will discuss the principal established methods of assessing the impacts of transportation developments which have been used in Western countries. Their limitations and relevance to Saudi conditions will be discussed, prior to examining the desirability and feasibility of criteria by which to assess the socio-economic impacts of Saudi transportation developments.

#### ESTABLISHED METHODS OF ASSESSING THE IMPACTS OF TRANSPORTATION DEVELOPMENTS

##### COST-BENEFIT ANALYSIS (CBA)

3.02 Cost-Benefit Analysis has been widely employed in Western countries in particular, where it is most commonly used by highway engineers and those involved in road projects, to justify the construction of new roads. But the method has been widely criticised for its insensitivity. So it is necessary for us to consider its definition, its application in the field of transportation and its practicality. In addition, and more importantly, its usefulness and limitations will be illustrated with reference to the report of the British Advisory Committee on Trunk Road Assessment (ACTRA), commonly known as the Leitch Committee.

3.03 Cost-benefit analysis is a technique which was developed in the 1930s and 1940s for the evaluation of water resources projects to ensure economic efficiency. Its model, however, was derived from the theory of the firm and the



endeavour of the firm to maximise its profits. Thus, the most profitable project is to be chosen out of various project alternatives, based on monetary revenues and cost predictions. The profitable project chosen is then developed to reach the point where marginal benefits equal marginal costs (Hill, 1968).

3.04 Within the context of CBA, benefits are defined in terms of "contribution towards", and costs are defined in terms of "detractions from" the objectives of a project. It deals with both economic efficiency in the use of resources available to society, and equity in the distribution of welfare among different groups in society (Schofield, 1987).

3.05 Furthermore, economic CBA reflects the effects of the economy which comprise positive and negative impacts on production and consumption opportunities. It also involves welfare impacts that are not priced in the market. Both benefits and costs in economic CBA present a true economic impact which is defined in terms of shadow prices. Regarding social CBA, the issues of distribution and economic efficiency are included and it also involves a setting of differential weights to monetary benefits and costs for different groups, to reflect judgements regarding each group (Schofield, 1987).

3.06 In short, social CBA (or SCBA) was defined by Williams, 1967), to be:

"essentially a means of adapting the rules for profit-maximising investment behaviour by private firms to fit the different circumstances under which governments operate, which in turn means trying to take account on the one hand of externalities and the peculiarities of 'public goods' compared with 'private goods', and on the other recognising that the budgeting processes of government may require further information of the rules if they are to be appropriate in a setting which is far removed from the classical one of a small firm operating in a large and perfect capital market" (cited in Lichfield et al., p.58).

#### LIMITATIONS OF COST-BENEFIT ANALYSIS

3.07 Lichfield et al. (1975) explained that cost-benefit analysis is limited to those items which are in monetary values and are readily obtainable, and these items must be aggregated to provide an overall result. Some believe that CBA is biased towards the rich simply because the rich demand more than the poor. However, in CBA there are two types of adjustment that can be made regarding the findings attained by the use of the willingness-to-pay criterion which can overcome any criticism of bias towards the rich. "The first adjustment is to weight the sums of gain and loss by the presumed marginal utilities of income of their recipients so as to arrive at magnitudes which truly reflect prospective changes in utilities." And the second adjustment is to "adjust the figures of gain and loss assessed on the



willingness-to-pay criterion by factors which reflect considerations of fairness and justice in the distribution of those gains and losses between different community groups. These factors are usually referred to as equity weights."

3.08 There are problems of choice in which Cost-Benefit Analysis cannot yet prove useful, either because of lack of evidence of people's values or because prediction of the consequences of schemes is too difficult. Yet, its usefulness depends 'inter alia' on the quality of evidence on values. Moreover, present CBAs are likely to be of more limited assistance to decision makers in planning studies (Lichfield et al., 1975).

#### ECONOMIC APPRAISAL OF TRUNK ROAD SCHEMES, AND THE COBA PROGRAMME

3.09 Economic appraisal of trunk road schemes takes account of benefits which accumulate from saving of time and vehicle operating costs, and sometimes costs involving accidents. Appraisals in the UK for the government's transport departments are executed using a computer programme called COBA.

3.10 Cost-Benefit Analysis of trunk roads is concerned with the costs and benefits to the road users. These are the journeys for a variety of purposes which lead to certain costs. These costs, however, are the cost of time in travelling, accident costs and the costs of fuel and vehicle maintenance.



3.11 All time savings are of value and are divided between working and non-working time. On the one hand, working time is valued at its cost to the employer, while no direct market values are allocated for non-working time. The accident rates on existing roads are usually derived from data available from the police and they are expressed in terms of the number of personal injury accidents per million vehicle kilometres. However, vehicle operating costs are not normally considered significant among benefits of a road's construction (ACTRA, 1977).

3.12 COBA is a rigidly specified set of instructions for measuring and estimating the relevant quantities for evaluation of a scheme, whereby an arithmetical calculation is performed by computer which will lead to an economic evaluation of a scheme. But it is more important in this section to understand the principles behind the method of COBA, rather than its technicalities.

3.13 The Advisory Committee on Trunk Road Assessment (1977) put forward two major areas of criticism concerning the use of COBA. The first was that:

"... COBA is obscure, unintelligible to the layman, inflexible in application and an impediment to proper public participation in the decision making process".

This criticism firmly indicated that COBA has fallen short in the understanding of what is being measured and in the basic limitations of the method. And:

"Cost-benefit analysis in the way it is embodied in COBA does not seem applicable to the average road scheme. It simply clothes it in an aura of scientific precision which looks logical and seems to be more rational than any other method of evaluation. The apparent sophistication nevertheless may be a myth which not only obscures the basic assumptions but also hides the implicit judgements being made by the evaluator himself" (ACTRA, p.54).

3.14 The second area of criticism argued that not all benefits and costs can realistically be quantified and used in COBA; other costs in the environmental and regional areas must be assessed by other means. Therefore, the question remains whether or not it is actually worth quantifying the limited range of costs and benefits considered by the method. This particular problem was considered to be a serious one by ACTRA, because of the undue weighting given to the factors covered by COBA.

3.15 Additionally, more criticisms of COBA were made concerning the fact that monetary value attributed to non-working time was questioned on the grounds of validity regarding the value of time savings. Also, expressing accidents as a purely monetary value was a controversial point. Accordingly, ACTRA have put forward recommendations on how road schemes could be better served and assessed using the framework approach, which uses COBA as an element of its process.



## THE ADVISORY COMMITTEE ON TRUNK ROAD ASSESSMENT

3.16 In response to criticisms of COBA, the British government appointed the Advisory Committee on Trunk Road Assessment (ACTRA) to review the procedure for assessing the impacts of trunk road projects. Under the chairmanship of George Leitch, the Committee's terms of reference were:

"to comment on, and recommend any changes in, the Department's method of appraising trunk road schemes and their application, taking account of economic and environmental factors, and of the extent to which these methods give a satisfactory basis for comparison with investment in alternative methods of transport ..." (ACTRA, 1977, p.xi).

3.17 During the 1960s, the trunk road programme grew rapidly due to the traffic increase on British roads. By the end of the 1960s, the government White Paper, Roads for the Future, proceeded with the concept of:

"... a comprehensive national system of trunk roads on which commercial traffic and private cars can move freely and safely and on which congestion and the frustration and economic costs it creates will have been virtually eliminated. This will make a major contribution to the long term planning of the economy, and to the planning of regional and industrial development and of the whole physical environment" (ACTRA, 1977, p.3).



3.18 In addition to the review of costs and benefits in the form of cost-benefit analysis for trunk road schemes discussed earlier, ACTRA also reviewed costs and benefits which that analysis did not include. They categorised these under two headings: consideration of regional economic development; and environmental factors.

3.19 Regional strategies are utilised to assist the achievement of co-ordination of economic, social and land-use planning policies, and are prepared in consultation with central government, local authorities and other groups involved in regional development. These strategies are then submitted to central government for final reply. The purpose of these strategies is to direct local authorities in preparing their own development plans, and to assist central government in its decisions on public expenditure and the achievement of social and economic policies for regional development.

3.20 ACTRA reviewed environmental factors and concluded that since the Department of Transport was using cost-benefit analysis, which had been shown to be impractical when dealing with such factors, the Committee recommended the adoption of a standard format for their presentation. The format is set out under several headings such as noise, vibration and air pollution.

3.21 The Advisory Committee on Trunk Road Assessment inspected the Regional Highway Traffic Model (RHTM). RHTM's

objectives were described by the Department of Transport as:

- "a. the development of relationships within the RHTM;
- b. the establishment of centralised data files containing survey data, planning data, network data, calibration functions for the model and basic model outputs;
- c. the development of procedures based on the output of the RHTM to enable major schemes to be designed and appraised by the Department of Transport;
- d. the establishment of a data collection procedure from continuous surveys to check model output over time, to monitor the values of the calibration functions and to refine the assumptions used in the development of the various procedures." (ACTRA, 1977, p.29).

3.22 The employment of the model in the design of the Department's trunk road schemes requires the input of national forecasts for future years, and then the model will estimate traffic levels which will be used for engineering and economic appraisals for suggested improvements to the network. However, ACTRA have made the following criticisms of the model:

1. Although the model can be utilised within the overall context of the trunk road programme, RHTM

is as yet unable to properly fulfil economic and environmental objectives.

2. RHTM would have worked best in the country 10 years earlier, in the mid 1960s (since it adopted the assessment of redistribution, which is mainly relevant to strategic route improvement), at the peak of the programme of this quality.

3. Some of the analyses RHTM is intended for are complex and expensive. This complexity can be seen in the mathematical process of the model. Nevertheless, mathematical models are sometimes useful and of great value to those who understand them.

3.23 Finally, ACTRA reviewed the study of the Urban Motorways Committee. This committee appointed three teams to develop three alternative techniques of evaluation. The first alternative is the Environmental Evaluation Index approach which consists of weighting each environmental effect according to a judgement of its importance to people, thus arriving at a single index number. The second, a Cost Effectiveness approach, which seeks to achieve an environmental condition through a comparison of costs with a range of types of construction. The third alternative, the Matrix approach, sets out the different elements of cost and benefit (construction, environmental, traffic, etc.) and quantifies them in monetary terms.



3.24 The committee concluded that the use of a Matrix approach had most merit because it provided a comprehensive measurement to represent all the advantages and disadvantages of a scheme by using cost-benefit analysis where possible. However, they also felt that the Matrix approach could present a problem in estimating the values people attach to environment in monetary terms. In addition, they recommended the development of cost-benefit techniques to take account of the external costs imposed on the community, so that they could be set against other costs and benefits arising from the construction of major urban roads. Consequently, none of the approaches discussed presented social and cultural factors within their process. This could present problems in understanding the impacts on the community. The two factors are of importance to reach a judgement regarding such impacts which the Committee overlooked.

#### THE FRAMEWORK APPROACH

3.25 The current approach to road appraisal in the United Kingdom, and in Scotland in particular, is the use of framework which allows a number of effects of a transport scheme to be brought together, which will then provide a total effect of a scheme. It is a comprehensive approach because it allows the involvement of social, economic and environmental effects (Peedle, 1991).

3.26 The framework approach was recommended by the Advisory Committee on Trunk Road Assessment as it provided

"a comprehensive and consistent evaluation which would enable the total effects of any one particular option, and the differences between options, to be readily seen". It involves both quantifiable (for example, loss of time) and non-quantifiable (for example, visual loss) costs and benefits which assist in decision-making. But even at the time when ACTRA were investigating the methods of evaluating road schemes, cost-benefit analysis was an essential part of the investigations, since it was used widely throughout the UK for road schemes in the 1960s.

3.27 The framework approach is useful in comparing different routes. "The relative merits of two or more alternative routes can be studied for each of the framework rows, and conclusions on the relative effectiveness or impact can be drawn." However, the approach does not assist judgements between ranges of impacts and is of limited use in assessing the impact of a single route since it involves absolute impacts rather than relative ones.

3.28 Additionally, the approach is dominated by the use of items that can be quantified in monetary terms (an example of the framework approach is shown in Appendix J), and the specific objectives for the proposed road set out do not exist, which makes it difficult to judge how well the scheme meets its aims. Also, there is no 'overall score' emerging as a consequence of the framework appraisal, thus the decision maker must evaluate the scheme, or a variety of schemes, from a large amount of information (Peedle, 1991).



METHODS AND CRITERIA FOR IMPACT ASSESSMENT IN SAUDI ARABIA  
AND THE CENTRAL CORE AREA OF THE ALGASSIM REGION

ESTABLISHED METHODS APPROPRIATE TO THIS STUDY

3.29 Of the methods of evaluation described above, none seems to apply to our type of study since our research deals with matters only infrequently measurable in monetary values which are based on subjective judgement emerging from community perceptions.

3.30 The cost-benefit analysis, as it has been seen, is dominated by the use of monetary values. Although in some cases, CBA has been used in Saudi Arabia, its deficiencies for our purpose have been noted already. This form of approach is also applicable to the cost-effectiveness method and the regional highway traffic model, in addition to the environmental evaluation index. The framework approach which was recommended by ACTRA as a comprehensive method also consists of items that can be quantified in monetary terms. It is difficult within the approach to judge how well the scheme meets its aim due to the lack of specific objectives for the proposed road.

3.31 Another method which has been used in the planning process is Goal Achievement Methods (GAM). This involves a setting of transport goals and objectives, defining measures of performance by which the achievement of objectives will be monitored, and analysing the performance of alternative schemes in achieving the objectives.



3.32 According to Lichfield et al. (1975), there are four main characteristics of GAM:

"First, goals or objectives are always formulated in advance of both the design of alternative plans and the analysis of their consequences ... Second, the objectives are said to be 'multi-dimensional', that is, to include those of an 'aesthetic', 'environmental', and 'political' nature, as well as those which the advocates of the approach characterise as 'economic' ... Third, all goals-achievement methods have been designed to compare mutually exclusive plans only ... Fourth, the objectives used for the evaluation are generally either assigned a 'weight' to reflect their relative importance, or are ranked in order of presumed importance, prior to the comparative analysis of plan consequences."

3.33 Within GAM, there are two different groups. The first group represents the simple ranking of plans with regard to the various goals, and the second group involves the use of performance measures as a way of assessing the achievement of the objectives. In short, Goal Achievement Methods employ quantitative assessments such as the utilisation of monetary values in the effectiveness matrix approach. It is, however, extremely difficult to see the principles guiding their application. The method is concerned with general procedures to achieve a choice of

plan rather than with the governing principles. Thus, Goal Achievement Methods would not be of assistance to this research due to the long and complicated process involved, and to the use of monetary values.

3.34 Consequently, two possible forms of assessment might be appropriate to this research study. First, the use of the check-list of criteria. "In its simplest form, this approach ranks alternative proposals on an ordinal basis in relation to a number of specific criteria ... with a subjective judgement on the alternative preferred according to the criteria employed" (Lichfield et al., 1975).

3.35 The second possible approach is the Planning Balance Sheet (PBS) which was developed by Lichfield. PBS "... enumerates the various groups who play a role in establishing and running the various projects. These groups are collectively terms 'producers/operators' and are listed vertically in balance sheet form." Then, each of the producers/operators is matched with the appropriate groups who will be using the goods and services of that project. It is the aim of PBS, however, to introduce a comprehensive set of social accounts. A 'transaction' (which includes visual intrusion imposed upon residents by the construction of an urban motorway) contains all outputs, and estimates emerge from the supply costs involved in producing the goods and services (Lichfield et al., 1975).



3.36 Accordingly, the use of the check-list of criteria approach, as an evaluation method, is appropriate to this type of study since it does not employ monetary values. This method will be used later in the work, when the thesis attempts to evaluate the different alternatives that might emerge from the various surveys conducted to arrive at a preferred transportation strategy for the study area.

3.37 In doing so, the check-list of criteria method is achieved through two stages. First, the advantages and disadvantages of each strategy in relation to the criteria (using all available data) are enumerated, and second, the findings are recorded in a summary table ranking the alternative from 1-4 (1 being the best, 4 being the worst). This will lead directly to a conclusion (Lichfield et al., 1975). Moreover, the approach was developed in which costed items were introduced but I believe it would be inappropriate to use them since we are not dealing with monetary terms. The approach, as it is, is sufficient in this research for the purpose of evaluating different alternatives without the introduction of monetary values.

#### TRANSPORTATION IMPACTS FOR THIS STUDY

3.38 Following our study of prior research in other countries, we can hypothesise that the transportation system in the Central Core Area of Algassim Region has created a number of possible social and economic impacts. These social and economic impacts would be reflected within the



society of the area. From a social viewpoint, the transportation system has possibly:

1. Affected family unity;
2. Affected neighbourhood unity;
3. Changed the life style of the citizens of the area;

3.39 From an economic viewpoint, the transportation system has possibly:

1. Affected the location of businesses and industries;
2. Promoted agricultural products;
3. Damaged small businesses;
4. Attracted government, public and private facilities;
5. Promoted economic activity.

3.40 These possible socio-economic impacts that might have resulted as a consequence of the network of transportation, are derived from our literature search as illustrated in Table 3.01. Accordingly, these socio-economic impacts in the CCAAR will be examined in the next section.

#### **Examination of Social and Economic Impacts of Transportation on the CCAAR**

3.41 Table 3.01 defines the comparison between the social and economic impacts of transportation according to what has

**TABLE 3.01: Comparison between Social and Economic Impacts of Transportation extracted from Literature and those to be examined in the Study Area**

Literature Review	The Study Area (CCAAR)
<p><b>Social Impacts</b></p> <ul style="list-style-type: none"> <li>. destructive effects on neighbourhood</li> <li>. uproots entire communities</li> <li>. prime mover of people</li> <li>. negative effects on human settlement</li> <li>. mixture and understanding of different groups in a society</li> <li>. location of residential areas</li> </ul> <p><b>Economic Impacts</b></p> <ul style="list-style-type: none"> <li>. spatial distribution of activities</li> <li>. range of sources of supply of goods</li> <li>. location of businesses and industries</li> <li>. increased land values</li> </ul> <p><b>Associated Impacts</b></p> <ul style="list-style-type: none"> <li>. effects on urban form</li> <li>. expansion of car use</li> <li>. dispersement of settlements</li> <li>. determination of residential boundaries</li> <li>. changes in land use patterns</li> <li>. desirability of sites</li> <li>. nature of urban settlement and structure</li> <li>. traffic congestion</li> <li>. transformation of societies</li> </ul>	<p><b>Social Impacts</b></p> <ul style="list-style-type: none"> <li>. affects family unity</li> <li>. affects neighbourhood unity</li> <li>. changes life style</li> <li>. relocation of residential areas</li> <li>. active movement of people</li> <li>. modernisation (transformation from traditional to modern)</li> </ul> <p><b>Economic Impacts</b></p> <ul style="list-style-type: none"> <li>. location of businesses and industries</li> <li>. damages small businesses</li> <li>. increases in land values</li> <li>. promotes economic activity</li> <li>. attracts government, public and private facilities</li> </ul> <p><b>Associated Impacts</b></p> <ul style="list-style-type: none"> <li>. changes in land use patterns</li> </ul>

been determined from the review of literature and materials, and those potential and possible impacts of the transportation network in the CCAAR.

3.42 It is evident that some of the social and economic impacts identified in the international review (Chapter Two) and indicated on Table 3.01 are not included in this research. This is mainly due to the fact that not all transportation impacts identified in western nations can actually be applied to Saudi Arabia. For example, the network was seen to have a positive social impact in that it encouraged the integration of different cultural groups within society in western countries, as discussed in Chapter Two. This type of impact would not exist in a society like that of Saudi Arabia, where the entire population shares the same culture and background, with the exception of those who had immigrated from neighbouring countries. Therefore, such an impact was omitted from the study.

3.43 Accordingly, socio-economic impacts of transportation to be investigated on the Central Core Area of Algassim Region are as follows:

1. Social impacts: the effects of transportation network on family unity; disruption of neighbourhoods; change in life style; relocation of residential areas; and most important, movement of people; and the effect of modernisation as society changes from traditional to modern.



2. Economic impacts: the effects of transportation network on location of businesses and industries; damage to small businesses; attraction of government, public and private facilities; promotion of economic activity; and the increases in land values.

3.44 In addition, there will be one important associated impact that should be included in the study: the influence of the network on the change of land use patterns.

#### SOCIAL IMPACTS

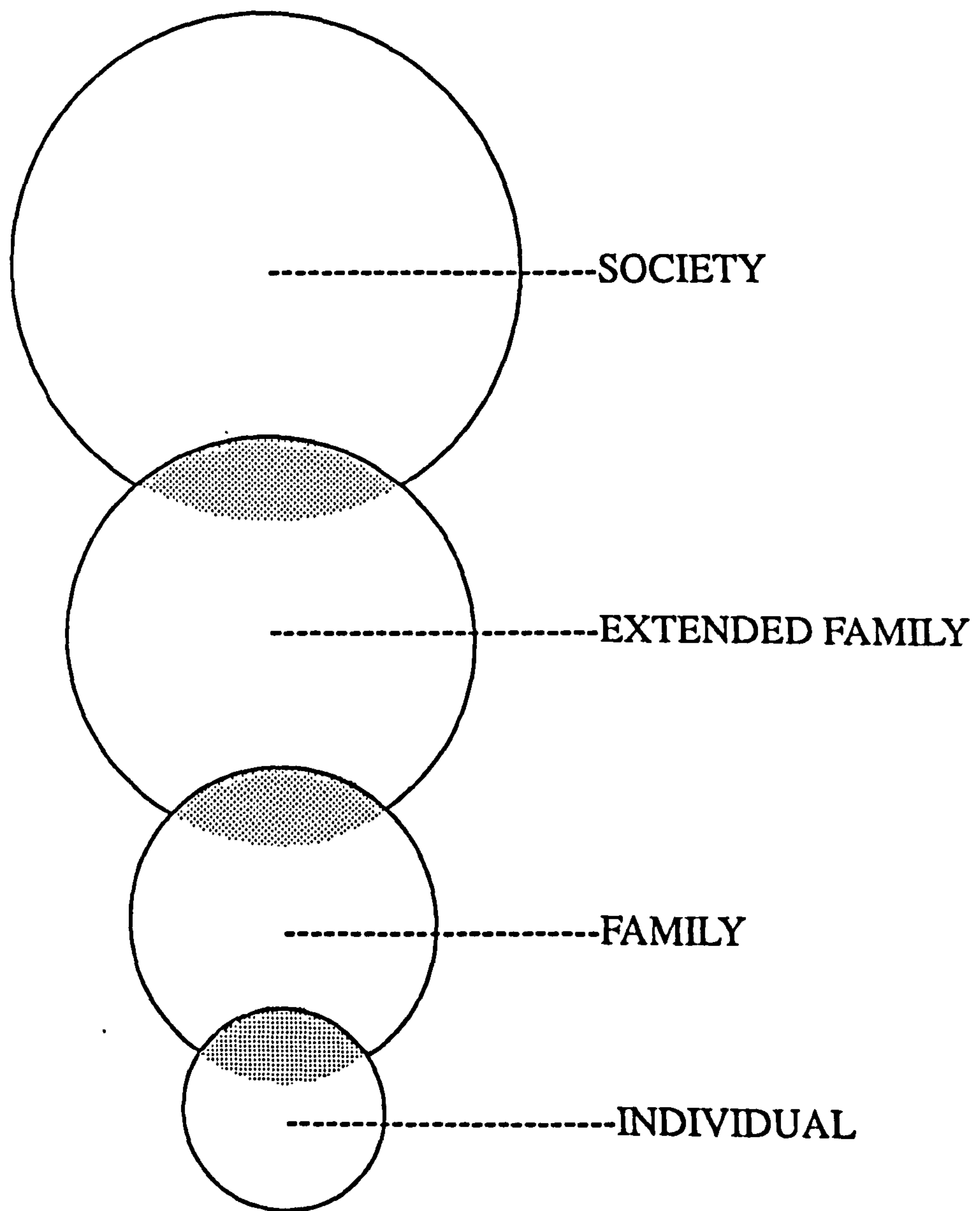
3.45 The specific social impacts that are involved in the study are explained in the following sections.

##### Family Unity

3.46 Saudi Arabian society places great value on the family, which covers not only the immediate family, but also the extended family of cousins, second cousins and so on.

3.47 In a traditional society like that in Saudi Arabia, an individual is part of a family, and the family is connected to its extended family where it is linked to society (see Figure 3.01). The father, however, is considered the head of the family, and the mother is the most respected member of the family. As the famous hadith stated: A man asked the prophet Mohammed, who is my closest companion, the prophet replied it is your mother (he repeated that three times), then said it is your father.

**Figure 3.01 FAMILY UNITY WITHIN THE SOCIETY OF SAUDI ARABIA**



3.48 Accordingly, each member of the family has an obligation and commitment to fulfil towards his or her own family. The reputation of the family lies in the hands of its members who must maintain its strength and success.

3.49 Having illustrated the importance of family unity in Saudi Arabia, the research will investigate the impacts of the transportation network on family unity, which has potentially been affected by:

- Frequent communications: The network has enabled family members to live in one place and communicate with other members of the family by using the highway system. Although members may readily connect whenever they wish, it is uncertain whether their dispersal affects ties between family members; and
- Choice of work place: The network similarly provides opportunities for family members to choose their place of work, as they can now live in one place and work in another using the highway system to commute. It remains a question as to whether the choice is available to all members of the family.

### **Neighbourhood Unity**

3.50 The term 'neighbourhood' refers to the traditional communities of the Central Core Area. To illustrate further the definition of the neighbourhood in an Islamic society like that of Saudi Arabia, Marrakis (1984) indicated that Al-Madina (second holiest city in the Kingdom) was the first



community built by the prophet Mohammed when he emigrated from Makkah. The first step was to define the location of the prophet's mosque and residence and the second step was the identification of the surrounding area which was for housing (cited in Al-Olet, 1991). Thus, the pattern of a traditional neighbourhoods consisted of densely packed buildings designed around courtyards and divided by narrow streets and cul-de-sacs, and providing a mixture of various elements such as mosques, shops and houses. These elements have created a sense of physical relationship and socio-cultural inter-relationship.

3.51 In the Central Core Area, people used to meet quite often in the neighbourhoods and they were attached to one another, sharing the same way of life. This was due to the fact that the houses (mud houses) were close together and the streets were narrow, and people walked everywhere, e.g. going to the mosque or simply visiting.

3.52 The towns of the area were very compact and neighbours met and socialised on a daily basis, in addition to formal gatherings in the two festivals of the year, and at wedding parties and other occasions.

3.53 In short, the community as a whole was simple in its way of life and in the relationships between its residents, since they shared the same beliefs and culture. In fact, the Islamic religion stresses the importance of respecting neighbours. The prophet said:

"... By Allah, he has not faith (the prophet repeated it three times) whose neighbours are not save from his wickedness (repeated by Al-Bukhari);

and another hadith by the prophet:

"... He is not a believer who eats his fill while his neighbour remains hungry by his side" (repeated by Baihaqi on the authority of Ibn-Abbas) (cited in Al-Olet, 1991, pp.64-65).

3.54 With the introduction of the transportation network (modern streets and public transport) in the area, space has had to be made for new streets, and houses and communities have been separated to make room for the network. Thus, there was no alternative for many people but to move out of their old communities, which meant having new neighbours.

3.55 The new communities, however, were designed by the municipalities to cope with modern developments in which parcels of land are larger and streets are wider than before. Consequently, the relationships among people in the new communities are less close than before. With the new villa type of housing with an average size of 540 m<sup>2</sup> (see Appendix I), residents no longer walk for daily outings (work, visiting, shopping), but rather use private cars, and the new types of homes have planned for car parking/garage space.

3.56 Accordingly, the introduction of the modern transportation system has disrupted old communities and separated

neighbours. The daily face to face contact and gathering of neighbours in the old communities do not take place in the new communities, except at formal festivals and occasions. Everyone has been affected by the introduction of the transportation system. So the specific criteria to be investigated with respect to neighbourhood disruption are the separation of neighbours and the lost sense of community.

### Changes in Life Style

3.57 The introduction of the highway system in the Central Core Area of Algassim Region (CCAAR) has changed the life style of both families and individuals, and modern technologies have come into the lives of the people via the highway system. These technologies include refrigerators, washing machines, microwave ovens and other household items that are associated with modern living.

3.58 In recent times, certainly within living memory, Saudi society was more or less isolated from the rest of the world and the life style of the people was very simple. The family was considered to be the major unit within the society and it provided the necessities of life for all its members. By extension, the tribe became the greater family because families were usually members of one tribe or another.

3.59 Prior to the mid 1970s, there were only a few roads connecting certain regions of the country and many of the



cities and towns, including some in the CCAAR, were very difficult to reach, with some areas connected only by dirt roads.

3.60 Many changes followed in the course of putting in place a new and modern highway system. In the Algassim Region, for instance, and more specifically in the CCAAR, as a result of the economic boom of the mid 1970 which led directly to the expansion of the highway system, rapid urbanisation took place, thus opening doors to undreamt-of change. People began to leave the inner cities, moving to the outskirts of towns where space was abundant. This caused a number of problems for the municipalities because they were unable to manage this growth due to lack of control, and because planning was not able to keep up with the rapid changes.

3.61 When certain individuals became aware that a major new road network was to be constructed, those who could do so built houses in the path of construction in the hope that their property would be taken over by the government at inflated prices. It was the same in respect to other aspects of public construction projects, such as water supply and sewerage lines. It would appear from this that there was poor co-ordination between the developers and the public agencies, as well as between the agencies themselves. Thus, two criteria regarding the change of life style as a result of the modern transportation network are to be investigated

and these are the change of type of housing from mud to villa type, and the increasing use of private cars.

### Relocation of Residential Areas

3.62 In the study area, it was rather difficult to relocate to a different area prior to 1970, since areas located outside the urban centres had no design or planning provisions. Residents owned their homes by inheritance and they did not want to move into the unknown. At the time, there were only a few asphalted roads connecting the towns. Thus there was no reason why people should move to other areas.

3.63 But following the economic boom in the 1970s, and with the introduction of the major road network in the area, coupled with the increasing number of private cars, people began to leave their old residential areas in favour of the new areas. Although the new communities lacked the basic services such as water and electricity, roads were under construction at the time and people felt that the primary roads might bring other services. So the residential areas of the CCAAR started to become concentrated around the major routes.

3.64 Private cars have also encouraged people to live outside the inner cities and to commute to work. The mass migration of people to outer areas has left many vacant buildings in the inner cities, which are difficult for the local authorities to deal with.

3.65 Accordingly, the thesis will look at the issues of accessibility and the transport services as the two main criteria for relocation of residential areas from the city centres to the new suburban communities.

#### **Active Movement of People**

3.66 Many people in the area use the transportation network to reach their work places and schools, or simply to visit and shop. The three zones of the CCAAR are very much inter-related with regard to various activities. Social and economic activities are distributed among the three centres. Thus, there is an inter-relationship between them and people use the transportation network to commute from one centre to another.

3.67 Accordingly, there are two matters to be investigated with regard to impact of transportation on the active movement of people in the area. These matters are primary movement to work and choice of travel options.

3.68 **Primary Movement to Work:** In the CCAAR there are large numbers of government employees and others who do not work in the city where they reside. Therefore, travel to other cities and towns in the region becomes a necessity for the purpose of work. In most cases, these employees travel to their job sites in their own cars, unlike in other countries such as Britain, where other forms of transportation are available, e.g. trains and buses.



3.69 Many female Saudi teachers who live in Unayzah, for example, are required to travel to schools in neighbouring villages or to the region's capital, Buraydah. They travel by bus laid on by their employer. These teachers cannot be employed in the city where they live because there are too many female teachers for too few posts. However, it is preferable if a society can provide a choice of alternative forms of transport to its citizens as they go about their daily tasks.

3.70 To have easily accessible means of transport available to the inhabitants of the CCAAR has brought about a number of changes and given people much more freedom of choice and movement. One of the choices now available to both families and individuals is the wide range of options of place of employment. The range of options they have now is very high and indeed people are now able live much further from their work places, thus choosing the most desirable residential locations. This is also true of people living in the outlying areas of the Central Core Area who can now travel to and within the cities for a variety of purposes such as shopping and visiting.

### **Transformation of Society**

3.71 The recent adoption of technological development, and the speed with which it has been adopted, has had a dramatic effect in changing the nature of Saudi society. This transformation has been referred to as "modernisation",

and its main features are urbanisation, mass communications and a rapid transportation system.

3.72 The social aspects of modernisation are described by Karl Deutsch (cited in Eisenstadt, 1973) in Chapter Two of this thesis. But, with the increasing influence of modernisation on society, of which the transport system is a part, it seems apparent that the traditional strong relations within Saudi families have been weakened. Modernisation has had its effect on society in various ways, among the most important of which being the expansion of employment, the nature of employment now available to Saudi nationals (including women), changes in life style of individuals and social groups, and very importantly, in the availability of education to all classes in society.

3.73 All these changes have helped to transform the society from its traditionalist mode to a modern type. Furthermore, the major effects of modernisation, particularly with respect to the transportation system and technology, lie in the drastic changes of life style of individual members of the society and sometimes of entire families. More important still are the effect that modernisation has had on the status of women.

3.74 Accordingly, there are three factors that arose from the impact of modernisation of the transportation system on Saudi society, particularly on a fairly traditional area

such as the CCAAR. These factors which are to be investigated in the study are:

- usage of public transportation (the bus system);
- the increased number of motor vehicles, particularly private cars; and
- the willingness of society to adopt modern transport technologies.

### ECONOMIC IMPACTS

3.75 Similarly, there are a number of economic impacts that have been affected by the transportation network and which this thesis is attempting to investigate. These impacts are explained according to the headings employed in Table 3.01.

#### Location of Business and Industry

3.76 The network of transportation has had an influence in relocating and moving the large businesses in both cities of the Central Core Area from their old location into areas adjacent to or near the system. The network has also influenced the location of the region's industrial area by placing it along the major road network between the twin cities.

3.77 It is the intention of this research to look into the issue of relocating these businesses from in and around the city centres to the periphery of the area, due to the



network of transportation, and also to see how new businesses were influenced to locate around the major transportation network.

### **Small Businesses**

3.78 The term "small business" covers most of the business activities practised by the residents of the Central Core Area. These businesses are, for example, grocery stores, jewellery and craft shops, and small petrol stations.

3.79 When the modern system of transportation was first introduced in the late 1970s, the main roads in the area - in particular leading into and out of the Central Core Area - began attracting many businesses. That is, either existing businesses moved from other locations within the area or new ones started up, such as fast food restaurants or minimarkets.

3.80 This has created a loss of trade for existing businesses in favour of newly established businesses adjoining the transportation network. Therefore, as part of the economic impact of transportation, the aim here is to investigate the damage caused by the network of transportation to small and existing businesses in the area.

### **Land Values**

3.81 Because it is a medium-sized region, the Central Core Area of Algassim region was not developed as Riyadh

area or Jeddah area, or even the Dammam-Alkhubar-Dhahran metropolitan area, prior to 1970. Thus, the land surrounding the Central Core Area, particularly outside the two centres of Buraydah and Unayzah, was only used for agricultural production from scattered farms for local consumption.

3.82 This land was sold very cheaply, and only a few groups within the society owned these parcels of land, in addition to some real estate agents. In view of that, as a result of the transportation network introduced in the 1970s, land near the newly introduced system became very expensive. Therefore, it is part of the investigation of economic impacts to discover how much the transportation network affected the value of land in the area.

#### **Promotion of Economic Activities**

3.83 Before the discovery of oil, agriculture in Saudi Arabia was the nation's major, if not only, resource. Since the 1950s, agricultural development has increased rapidly, largely because of government encouragement. Advanced irrigation methods have been introduced, replacing old methods, and this has had the effect of increasing cultivated areas.

3.84 Because of the absence of transportation and an inadequate road system in the past, agricultural produce could only be sold in the areas immediately around the place of origin and at very low prices. However, with the opening of the modern road system, farmers need no longer market

their produce only in their local area. They can now easily transport produce to the larger urban markets and sell it at higher prices, thereby improving their income and consequently their standard of living.

3.85 The transportation system in the Algassim Region is to a large extent adequate. There are various means of transport available, although the region is heavily oriented towards automotive transport. Cars have been observed to be the mode of transport used by the overwhelming majority of the people in the region as they move from city to city, or from region to region. The same is true for the transportation of goods and commodities into and out of the region.

3.86 Consequently, there are two specific matters regarding the impacts of transportation on the promotion of economic activities to be investigated in this research. These matters are:

- 1) Market opportunities generated by the network of transportation regarding agricultural production; and
- 2) The extended range of sources of supply of goods for local consumption through the use of motor vehicles.

#### **Government, Public and Private Facilities**

3.87 The city of Buraydah is the regional capital and the city of Unayzah is a district centre and second largest city



the region. The government has placed most of its regional headquarters in Buraydah, such as branches of various ministries, while in Unayzah, a number of governmental and educational centres have been set up.

3.88 The area that is located between the twin cities, the Government Services Area (GSA), is presently occupied by government facilities (e.g. Imam University and Saudi Telephone); public facilities (e.g. Algassim Industrial City); and private facilities (e.g. Public Transport Company and petrol stations).

3.89 Prior to 1980, the twin cities were connected by a single lane road, but when the single lane was upgraded to a highway after 1980, the above-mentioned facilities began to transfer into the area and their number in the area is currently increasing. Accordingly, the matter to be investigated regarding the impact of transportation in the attraction of various facilities, is the provision of accessibility by the network in bringing and attracting these facilities to the area.

#### Land Use Patterns

3.90 Similarly, the thesis will investigate changes in land use patterns as a result of the rapid expansion of the highway system in the CCAAR. Rapid expansion and urbanisation have opened doors to fast and unforeseen change. People began quickly to desert the inner cities,

moving to the outskirts of the towns where space was abundant. This has caused a number of problems to the municipalities, because they have been incapable of managing this growth due to their lack of control and because development planning could not keep up with the rapid changes.

#### CRITERIA FOR IMPACT ASSESSMENT IN THE STUDY AREA

3.91 Throughout the discussion of the social and economic impacts of transportation, a number of possible criteria were highlighted. It is, however, now necessary to systematically consider which criteria are the ones which are most applicable to the Central Core Area of Algassim (the study area), and therefore the ones most worthy of investigation.

3.92 It was concluded earlier in this chapter that the nature of the social and economic impacts with which the thesis is concerned means that much of the data upon which the assessment is based must necessarily reflect people's perceptions and attitudes. Thus, three approaches dominated in data collection, in addition to a traffic count survey, and to incidental data from other sources:

- 1) The use of a survey questionnaire;
- 2) Interviews with government officials whose areas of responsibility are related to the subject matter;

### 3) Interviews with influential community leaders.

3.93 This clearly means that perceptions and attitudes are the central focus of the survey questionnaire. Perception of people illustrates the reality of the surrounding nature, while attitudes provide accurate information regarding people's satisfaction, as well as their preferences in terms of what they enjoy in their environment. Both are significant and play a leading role in achieving a meaningful choice, thereafter they are the focal points of the survey questionnaire, as well as the interviews.

3.94 It is important here to note that because of the special scope of the assessment, some of the criteria cannot be precisely measured and depend upon subjective judgement. It is essential here to point out the exceptional difficulties in gathering data in a country like Saudi Arabia because of cultural, environmental and political factors. A summary of social and economic impacts of transportation and of the broad criteria arising from the review in Chapter 2, together with sources of measurement data, is shown on Table 3.02. These impacts go beyond conventional Western practice, but it is necessary to more fully discuss the criteria and the difficulties of assessment in the very exceptional circumstances of Saudi Arabia. This follows.



TABLE 3.02: The Desired Criteria for the Study of Socio-Economic Impacts of Transportation in the CCAAR

A. SOCIAL IMPACTS

IMPACTS	CRITERIA	SOURCES OF MEASUREMENT DATA
- Family Unity	<ul style="list-style-type: none"> <li>(x) Frequent communications</li> <li>(x) Choice of work place</li> <li>(x) Positive family unity</li> <li>(x) Negative family unity</li> </ul>	SQ; IWGO; IWCL SQ
- Neighbourhood unity	(x) Separation of neighbours	Traditional & con- temporary dwellings; SQ; IWGO; IWCL Traditional & con- temporary streets; SQ
- Change of life style	<ul style="list-style-type: none"> <li>(x) Sense of community</li> <li>(x) Perception of negative neighbourhood unity</li> <li>(x) Modern housing</li> </ul>	Traditional & con- temporary dwelling design; SQ; TCS; IWCL
- Relocation of residential areas	<ul style="list-style-type: none"> <li>(x) Increasing use of private cars</li> <li>(x) Perception of the changes in life style</li> <li>(x) Accessibility and linkages</li> </ul>	Concentration of population; SQ; IWGO SQ
- Active movement of people	<ul style="list-style-type: none"> <li>(x) Transport services</li> <li>(x) Relocation of residents</li> <li>(x) Prime movement to work</li> <li>(x) Prime movement, multi-purpose</li> </ul>	SQ; TCS SQ
- Transformation of society	<ul style="list-style-type: none"> <li>(x) Use of public transport by Saudi women</li> <li>(x) Willingness to adopt modern</li> <li>(x) Adoption of modern transport network</li> </ul>	Past and present SQ

B. ECONOMIC IMPACTS

IMPACTS	CRITERIA	SOURCES OF MEASUREMENT DATA
<ul style="list-style-type: none"> <li>- Location of businesses and industrial areas</li> <li>- Small businesses</li> <li>- Land values</li> <li>- Government, public and private facilities</li> <li>- Promotion of economic activities</li> </ul>	<ul style="list-style-type: none"> <li>(x) Relocation of business and industrial areas</li> <li>(x) Initiation of new businesses</li> <li>(x) Damage to small businesses</li> <li>(x) Increase in land values</li> <li>(x) Attract government, public and private facilities</li> <li>(x) Market opportunities</li> <li>(x) Extend the range of supply of goods for local consumption</li> </ul>	<p>Past and present; SQ; IWGO</p> <p>Past and present network of road type; IWGO SQ</p> <p>Past and present land values; SQ; IWCL</p> <p>SQ; IWGO</p> <p>TCS; SQ; IWGO; Past and present road network TCS</p>

IWGO : Interviews with Government Officials  
 IWCL : Interviews with Community Leaders  
 SQ : Survey Questionnaire  
 TCS : Traffic Count Survey

## SOCIAL IMPACTS

### Family Unity

3.95 The concept of family unity cannot be simply reduced to a number of readily measured indicators. The common supposition that family unity is breaking down in Western societies is generally based upon evidence that Christian customs are less comprehensively observed, divorce is more prevalent, and homelessness is increasing. But these are indirect measures for a not wholly tangible phenomenon. They also reflect value judgements to a considerable extent; for instance, the family which worshipped together in Victorian England was one in which relations between fathers and sons now appear to have been often stiff and distant, and it cannot be positively concluded that the supposedly casual relationships of fathers and sons in the more secular Britain of the 1990s reflect an inherent weakening of family unity. Nor can the greater ability of young married couples now to set up independent households be regarded as a failing in family unity, if it means escaping from the overcrowding and lack of privacy of a dwelling housing two or more generations in miserable discomfort.

3.96 Similarly, changing circumstances in Saudi Arabia and the tendency for extended families to divide into separate households need not mean that family unity lessens. It may merely be reinterpreted and be reflected in new ways.

3.97 Accordingly, we cannot simply measure family unity by the kind of data on household composition obtainable from



censuses or other sources of statistical information. Nor, indeed, could surveys of the number and frequency of meetings of family members be taken as accurately measuring family unity; the family might be meeting to quarrel, rather than to enjoy more enriching satisfactions.

3.98 These problems of measurement suggest that, as with most others considered in this thesis, the impact of transportation upon family unity must be measured by a number of criteria. Several different measurements are required to illustrate different aspects of impact. Collectively, the measurements may give a multi-dimensional picture of what is a multi-dimensional issue. And the perceptions of interviewees are an essential part of the measurements.

3.99 The four criteria related are:

1. Frequency of communications: the ability to live in one place and communicate with other members of family living in a different place;
2. Choice of work place: opportunity for family members to live in one place and work in another;
3. Positive family unity: closer relationships among family members by the provision of the road network;
4. Negative family unity: the network has separated members of family away from each other.

## Neighbourhood Unity

3.100 Despite the fact that modern neighbourhood communities provide the inhabitants with better services than those of the traditional neighbourhoods, the fact remains that they do not fulfil the various cultural requirements. The modern network of transportation has created a number of problems. For example, social interaction among residents has been weakened, the privacy of dwellings has been destroyed and the sense of community has been lost. All these problems have emerged from the kind of transportation that has been used and introduced as a modern type of network. The demolition of such communities was done to make room for the newly introduced network, for example, to widen streets. Unfortunately, no consideration was given to the relationship of residents in the area.

3.101 This problem will be dealt with and measured through a survey questionnaire and interviews with both government officials and community leaders. Thus, the criteria that are involved in assessing neighbourhood unity are:

1. Separation of neighbours: when their homes are destroyed to make room for the new wide streets, residents have no choice but to leave and move elsewhere;
2. Sense of community: the modern road network with its wide and long streets has lessened the socialisation of residents within neighbourhoods;

3. Negative neighbourhood unity: perceptions of residents regarding the negative impact of transportation in relation to one another.

### **Change of Life Style**

3.102 Because of the introduction of a modern transportation network, people's lifestyle has changed and they have adopted a modern way of life. The road network, for example, has not only provided people with modern commodities and goods, but it has given inhabitants the opportunity to buy cars and thus initiate the idea of moving to the outskirts of the city and building a new type of housing.

3.103 People's perception regarding the change of lifestyle is significant in justifying such a change, and also to investigate the increase in traffic through the traffic count survey. Consequently, three criteria are included in the impact of transportation on the change in lifestyle:

1. Modern housing;
2. Increasing use of private cars; and
3. Perception on the changes in lifestyle.

### **Relocation of Residential Areas**

3.104 Through its accessibility and services, the network of transportation has influenced the inhabitants of the twin cities to shift their places of residence. The movement of



people from their own traditional areas into areas adjacent to or serviced by the network created difficulties for the local authorities to cope with. Residents would not have had to relocate if there had been proper management when the network was introduced. In finding a better location served by transportation services and accessibilities, the movement, therefore, was a better choice.

3.105 In view of this particular impact, three main criteria are to be investigated:

1. Provision of accessibility by the network;
2. Services provided by the system such as public transport; and
3. Perception of people themselves regarding their relocation as a consequence of the introduction of the system.

#### **Active Movement of People**

3.106 In the past (30 years ago or earlier), the population of the study area used different methods of transportation as they moved from one place to another within the city or from one town to another. Those means of transportation included a dependence on walking, especially within the towns, for a variety of purposes. Also the use of donkeys for short distance travel, and camels for long distance travel, was widespread. This was, of course, due to

the small size of the towns, and the non-existence of motor vehicles.

3.107 The introduction of motorways and the primary road network, in addition to public transportation and cars, has had an effect on the movement of people around the CCAAR. It therefore became their primary method of transport to work places, and for various purposes. These two criteria are to be investigated through a survey questionnaire and a traffic count survey.

#### **Transformation of Society**

3.108 It is not an easy task to measure how a society changes from purely traditional to modern, and certainly the newly introduced transportation network, with its public transportation and motorways and the increase in motor vehicles, are a form of modernisation. The question remains as to how much a society like as that in Saudi Arabia has been affected by the introduction of the system, particularly in a traditional area like the study area.

3.109 Therefore, two major criteria are involved in the investigation. First, the thesis will look into the question of how Saudi women use the public transport system, and second, how willing the inhabitants are to adapt to new types of modern transport services, such as rail services. Moreover, much of the explanation of the influence of transportation on the transformation of Saudi society will

be clarified through a discussion of past and present trends.

## ECONOMIC IMPACTS

### Location of Businesses and Industrial Areas

3.110 Businesses in the study area were located in or around the city centres of both major cities in the Central Core Area. As the modern network of transportation was introduced, it seems that these businesses moved to sites adjacent to the main roads. Similarly, light industrial units were located just outside both towns. The thesis therefore attempts to investigate the influence of the network on the relocation of businesses and industrial areas, and also looks at how many new businesses have been set up as a result of the modern roads network.

3.111 Consequently, the relocation of businesses and industrial areas, and the starting up of new businesses, are the two criteria to be studied and will be measured through interviews with government officials; past and present trends through observation, and the perception of business owners through the survey questionnaire.

### Small Businesses

3.112 If the introduction of modern transportation has led to the relocation of businesses, then it may have had an effect on small businesses. The small businesses owned by the people of the area, and located in the centres of both cities, might have been damaged as a result. Thus, there is



one major area to be examined, that is, the damage to small businesses caused by the network. This criterion, however, will be measured through the perception and attitudes of business owners who responded to the survey questionnaire.

### **Land Values**

3.113 Similarly, value of land is less systematically recorded in a country like Saudi Arabia than in Western countries like Britain and the United States. Land values vary greatly from one location to another. Nevertheless, the research will investigate the impact of transportation on land values.

3.114 This will be done by inspecting past and present land values through interviews with people who have the required knowledge. In addition, since it is expected to be difficult to gather data regarding the past value of land, the perceptions of those individuals concerned will be extracted through the survey questionnaire.

### **Government, Public and Private Facilities**

3.115 The aim of investigating this last economic impact of transportation is to find out the element of accessibility in providing a site for government, public and private facilities. These facilities were located within the boundaries of the twin cities, but the thesis will look at the effect of the network of transportation in influencing both government and the private sector to construct these facilities near or adjacent to the transport network. The

provision of accessibility by the network might have an important impact in creating and locating such facilities. The interviews with government officials and the survey questionnaire results with regard to this subject might assist and provide an indication as to the extent of the effect of the system.

3.116 Finally, prior to designing the survey and obtaining the data for the research, important issues will first be discussed. These issues include the growth of transportation in Saudi Arabia, the growth of Algassim region and the study area (CCAAR), and the planning and management of transportation in the Central Core Area of Algassim Region. However, growth of transportation from past to present, policies and responsibility for the network in Saudi Arabia, and a discussion of the different modes of transportation and the methods used by the government to manage the system, will be presented in the next chapter.

#### **Promotion of Economic Activities**

3.117 The economic base of the region in general, and the study area in particular, before the turn of the century and until recent years, was simply trading local produce with other parts of the country. However, the region as a whole was mainly agricultural, and therefore farming was the major occupation of the people in the area.

3.118 It is the intention of this study to examine two criteria involved in the promotion of the area's economic

activity:

1. Market opportunities: the impact of the network of transportation in providing a market opportunity for the local economy, by looking at the agricultural sector to see how it was influenced and encouraged by the introduction of the network; and
2. Looking at the impact of the system of transportation in extending the range of supply of goods for local consumption.

3.119 Both criteria will be measured by studying the perceptions of people and the attitudes of government officials, and by conducting a traffic count to extract valuable data regarding the range of supply of goods and commodities.



## CHAPTER FOUR: THE GROWTH OF TRANSPORTATION IN SAUDI ARABIA

This chapter of the thesis will discuss the course of planning in the Kingdom throughout the past thirty years, which will be followed by the discussion of the history of the network of transportation and how it is managed by the government.

4.01 The structure of the transportation sector in Saudi Arabia is similar to that of other developing countries. The public sector is involved in the infrastructure of new industries and for the most part, transportation operations are undertaken by private operators and in some instances by public corporations.

4.02 In 1953, the Ministry of Communications (MOC) was responsible for the management of the communications and transportation sectors. In 1956, the Ministry became responsible for all postal, telephone and telegraph services as well as roads, bridges, railways and ports throughout the Kingdom. But in 1977, royal approval was given to create two deputy ministerships in the MOC, one for roads and highways and the other for public transport (MOC, Land and Marine Transport, 1982). Each deputy ministership is headed by a deputy minister who is supported by assistant deputy ministers and technical departments.

4.03 The construction of roads has played a major role in Saudi Arabian development and the MOC has largely been

responsible for the construction of roads required for new agricultural or industrial projects. Thus, the Ministry is keeping pace with development in accordance with modernisation. As a result, most towns and villages in the Kingdom are now connected to each other and with major conurbations. This has been done to fulfil the government's responsibility to facilitate the orderly movement of citizens in their daily routine.

4.04 In 1954, there were only 237 kilometres of paved roads in the entire country (MOC, Great Achievement, 1978). According to the Ministry's fifth five year plan (1990-1995), this figure had reached 8,438 kilometres by 1970, and by 1990, there were 20,076 kilometres of primary roads, with 13,542 kilometres of secondary and feeder roads, and 3,542 km of asphalted agricultural roads. This is an impressive achievement in road building of which the nation is very proud, especially the transportation section of the Ministry of Communications. The total length of roads in the Kingdom of Saudi Arabia at the end of 1990 was 113,193 kilometres (see Table 4.01).

#### PLANNING: THE PAST THIRTY YEARS

4.05 Prior to the discovery of oil in the Kingdom, there is no record of any true planning for transportation. One reason for this is that the population of the country consisted of a series of tribal groupings distributed over a large land mass. For their subsistence, they relied heavily

TABLE 4.01: Historic Development of Saudi Arabian Road Network

Period	Primary Roads	Secondary and Feeder Roads	Asphalted Roads	Agricultural Dirt Roads	TOTAL (cumulative)
1390 (1970) Before First Plan	--	8438	--	3487	11925 km
1395 (1975) End of First Plan	6141	6029	--	8510	20680 km
1400 (1980) End of Second Plan	11853	8385	--	24186	44424 km
1405 (1985) End of Third Plan	17911	11744	2173	52226	84054 km
1410 (1990) End of Fourth Plan	20076	13542	3540	76340	113193 km

Source: Kingdom of Saudi Arabia, Ministry of Communications, Fifth Development Plan: The Working Plan, 1410-1415 (1990-1995), p.5.



on the trade of animals with neighbouring countries. This was the basis of their economy and the principal tradeable commodity was sheep.

4.06 However, following the unification of the Kingdom of Saudi Arabia and the discovery of oil, the late King Abdulaziz undertook the planning and construction of the Damman/Riyadh railroad, one of the first major development projects in the transportation sector of the country. The purpose of the railroad was not only to facilitate faster communications between the Arabian Gulf seacoast and the interior but also to facilitate the transportation of materials to the capital and its hinterland for further overall development.

#### COURSE OF PLANNING

4.07 Planning in Saudi Arabia was limited in the early 1960s partly because of the large sums needed for economic development in the private sector. At that time, the government's effort was focused on developing human resources and a transportation system in addition to other aspects of the physical infrastructure. But shortages of trained economists blocked the planning process.

4.08 Later on, when the government no longer had any financial constraints, a plan was developed which covered the overall planning system of Saudi Arabia. This plan outlined and proposed the following actions:

1. The creation and staffing of a central planning body in the office of the Prime Minister which would be responsible for the planning, co-ordination, execution and operation of economic development activities.
2. The establishment of a separate ministry to prepare and carry out programmes for the development and conservation of the Kingdom's water resources.
3. A reorganisation of the Ministry of Agriculture to improve its efficiency in carrying out a more comprehensive programme for the improvement of rural welfare, and eventually to make the Kingdom largely self-sufficient in food and other raw materials.
4. The accelerated completion of a number of infrastructure projects in progress.
5. The undertaking of pre-investment surveys for certain water, agricultural, communications and mining projects and the beginning of various projects already in the planning stages.
6. The expansion of education programmes, with special emphasis on teacher training, technical training and vocational training in agriculture.

7. The stimulation of private enterprise in power and industrial ventures and giving monopolistic franchises in order to ensure adequate services at reasonable rates (Knauerhause, 1975, pp.318-319.)

4.09 All the above proposed actions would have cost millions of dollars and half of the total cost was to have been spent during each budget year. Unfortunately, the plan was not accepted and none of the actions were included in the budget. There are two main reasons for its failure. First, the plans were not detailed enough and they failed to present a precise guideline for the projects. Second, the government agencies did not have enough trained personnel to implement the plan.

4.10 To help detail the plan and provide guidelines for it, the Central Planning Organisation (CPO), now known as the Ministry of Planning, was established in 1965. The CPO was involved in the status of the economy and to correct and stimulate the growth of the economy. Its functions were defined as follows:

1. To write a periodic economic report.
2. To formulate economic development plans (the first plan was to have a duration of five years and it was to be approved by the Council of Ministers before implementation).



3. To estimate the overall resources needed to implement the plan. These estimates were intended to be the basis for the preparation of the state budget and the budgets for public corporations.
4. To assist the various ministries and government agencies in their economic planning.
5. To assist in the establishment of planning units in each ministry and public agency.
6. To supply the King with needed technical advice. The head of the CPO reports directly to the King (Knauerhause, 1975, pp.316-317).

4.11 This organisation consists of four departments:

- the planning department which prepares economic reports and formulates department plans;
- the research department which is responsible for the co-ordination of research;
- the follow-up department which reports on the implementation of programmes;
- the general administration department which handles day-to-day control of the organisation.

CPO is part of the government structure. It is involved in the design of economic policy and co-ordinates the needs of various government agencies. Access to the King guarantees that CPO is in touch with the highest level of policy makers and offers a means to involve the partners in the planning process.

#### THE FIRST DEVELOPMENT PLAN, 1970-1975

4.12 It is understandable that every underdeveloped country must go through a number of experiences to reach and achieve planning development. But this also depends on the country's budget which keeps the plan alive. A country like Saudi Arabia can function through this process because the government can afford it. Other underdeveloped countries cannot.

4.13 The First Plan was proposed by the Central Planning Organisation in 1969 for the following five years (1970-1975). The specific objectives of this plan were:

1. To raise the rate of growth of the gross domestic product (GDP).
2. To diversify the economy and to reduce the country's dependence on oil by increasing the contribution of the other productive sectors to the national product.
3. To lay the foundation for sustained economic growth.

4. To develop human resources so as to enable different elements of society to contribute more effectively to the growth of the economy and to participate more fully in the process of development (ElMallakh, 1982, p.145).

4.14 The plan called for the creation of the necessary physical infrastructure within the Kingdom. Among the physical infrastructures which were earmarked for development were: the expansion of the two major ports (Jeddah on the west coast and Dammam on the east coast); the construction of seven airports; the establishment of civil aviation training centres; the establishment of an automatic telephone network; and the expansion of electrical services.

4.15 ElMallakh (1982) stated that the First Plan emphasised the creation of physical infrastructure to sustain economic growth. A total of 4,312 km of main roads and 2,000 km of rural roads were planned. So, the physical development, including urban development, transport and communications, was considered of major importance.

4.16 Midway through the First Development Plan period, there was a huge increase in the price of oil, thus increasing the total income of the state. Although the plan was prepared at a time of financial constraint, it soon became clear that this new income would adequately support the Second Development Plan.



## THE SECOND DEVELOPMENT PLAN, 1975-1980

4.17 The government of Saudi Arabia spent eighty billion Saudi riyals in developing the basic infrastructure during the First Development Plan. As for the Second Development Plan, expenditures reached seven hundred billion Saudi riyals (MOP, Summary of Fourth Plan 1985-1990)

4.18 ElMallakh (1982, pp.163-164) stated the goals of the government's Second Development Plan. These goals were to:

1. Maintain the religious and moral values of Islam.
2. Assure the defence and internal security of the Kingdom.
3. Maintain a high rate of economic growth by developing economic resources, maximising earnings from oil over the long term, and conserving depletable resources.
4. Reduce economic dependence on exports of crude oil.
5. Develop human resources by education, training and raising standards of health.
6. Increase the well-being of all groups within the society and foster social stability under circumstances of rapid social change.

7. Develop physical infrastructure to support the achievement of the above goals.

4.19 Although the above goals were defined by the government of Saudi Arabia, this did not mean that no conflicts arose in achieving these goals or that conflicts did not occur. In fact conflicts were the rule in this situation and they became a crucial factor in ensuring success in the development planning process.

4.20 The Second Development Plan gave priority to agriculture and industrial expansion as paths for the diversification of the economy; the expansion of both the quantity and quality of manpower resources; and the distribution of economic and social programmes to the regions.

4.21 The planners hoped to achieve self-sufficiency by reducing the over-dependency on oil through the expansion of investment in petrochemicals and other oil-based industries. This again required the co-operation of the private sector.

4.22 The planning process according to the plan needed a substantial amount of labour but the size of the Saudi labour force was insufficient. Thus, the importance of importing manpower from other countries became a necessity at this stage. The labour force was expected to grow at an

annual rate of 3.4% over this five year period from 1975 to 1980 (ElMallakh, 1982).

4.23 The Second Development Plan was very ambitious and it reflected freedom from any financial constraint. Almost any project which was proposed appears to have been included. At that time, the planners thought that Saudi Arabia's development did not and probably would not face any of the financial problems which are usually met by developing countries but they anticipated other constraints that would complicate development in other ways. One of these constraints was thought to be the paucity of trained Saudi labour.

4.24 The Third Development Plan dealt primarily with the areas of manpower, efficiency and participation.

#### THE THIRD DEVELOPMENT PLAN, 1980-1985

4.25 The Second Development Plan which ended in 1980 was very successful inasmuch as all of the goals which were defined in 1975 had been achieved by the end of the plan.

4.26 The Third Development Plan set the scene for the next five years (1980-1985). And during the first two years of the plan, an increase in construction activity took place as a result of the government intention to emphasise planning (ElMallakh, 1982).



4.27 The need for foreign labour appeared to be important and necessary in order to cope with the vast expansion in all fields as a result of development activities, since the Saudi manpower shortage remained a problem facing the country.

4.28 Manpower development was given the highest priority in the Third Plan which made provisions for the training of Saudi workers in various economic activities. Some of the training in appropriate skills was undertaken by foreign experts in the hope that trained Saudis would replace foreigners in managerial positions. It was hoped that when this became general, the nation's dependence on foreign workers would be considerably reduced.

4.29 During the Third Plan, the foreign labour force grew by over 1.1 million or at an average annual rate of 11.7% and as a result of the decline in the oil sector, the share of the non-oil sector of the GDP rose from 34.8% in 1399/1400 (1980) to 60.2% in 1404/05 (1985), as crude oil exports fell from over 9 million barrels per day in 1401/02 (1982) to less than 4 million barrels per day in 1985. Moreover, at the end of the Plan, the construction sector showed a decline of -1.4%, less than anticipated at the beginning of the Plan since the sector represented 77% of the producing sectors at the beginning of the Plan (1980). The transport sector also witnessed a decline in its actual growth from 12.9% to 7.1%. Moreover, details of government

expenditures on project development and other activities during the period 1400-1405 (1980-85) in relation to revenues from the oil and other sectors are presented in Table 4.02 (Fourth Development Plan, 1985-1990).

4.30 Saudi Arabia is one of the largest oil exporters in the free world and it will maintain its exports in accordance with its policies because of the funding needed to continue and complete its development projects. However, it is anticipated that the manpower sector has the greatest potential for future difficulties in implementing these projects.

#### THE FOURTH DEVELOPMENT PLAN, 1985-1990

4.31 The ultimate objective of the Fourth Development Plan is to reduce the Kingdom's dependence on oil inasmuch as the need to create a structural base for future growth is an absolute necessity. Therefore, since twenty-five per cent (25%) of the world's oil reserves are located in the Kingdom of Saudi Arabia, as well as huge quantities of associated and non-associated gas, the Kingdom is a natural and logical site for the production of petrochemicals, especially since the costs of producing these petrochemicals in Saudi Arabia is 80% cheaper than it would be elsewhere.

4.32 In order to take full advantage of these circumstances in exploiting and expanding these sources of income, the government has undertaken the following:

**TABLE 4.02: Government Revenues and Expenditures During the Third Plan (1980-85)**  
(SR billion)

	1400/01	1401/02	1402/03	1403/04	1404/05	THIRD PLAN TOTAL
<b>REVENUES</b>						
Oil	319.3	326.6	186.0	128.0	118.0	1,079.9
Other	28.9	39.4	60.2	62.8	57.0	248.3
<b>Total</b>	<b>348.2</b>	<b>368.0</b>	<b>246.2</b>	<b>190.8</b>	<b>175.0</b>	<b>1,328.2</b>
<b>EXPENDI- TURES</b>						
Project	123.1	140.7	125.7	112.7	100.0	602.2
Other	113.5	144.0	119.2	110.5	120.0	607.2
<b>Total</b>	<b>236.6</b>	<b>284.7</b>	<b>244.9</b>	<b>223.2</b>	<b>220.0</b>	<b>1,209.4</b>

Source: Kingdom of Saudi Arabia, Ministry of Planning, Fourth Development Plan, 1985-1990, p.25.



1. It has taken the necessary measures to collect and process gas for use as fuel and feedstock;
2. It has established a refinery industry which makes it unnecessary to import oil products and which will pre-empt future imports;
3. It has laid the foundation of a huge petrochemical industry with international ramifications which will profoundly affect the future supply of products manufactured from petrochemicals; and
4. It has created the necessary material conditions which will enable the Saudi private sector to establish "downstream" petrochemical industries (Fourth Plan, 1985-1990).

4.33 The overall objectives of this Plan are not actually different from those of the previous plans. However, there are additional items which have not previously appeared in any of the plans. The national objectives as they appear in the Fourth Plan (1985-1990, p.41) are as follows:

1. To safeguard Islamic values, duly observing, disseminating and confirming Allah's Sharia (God's Divine Law);
2. To defend the faith and the nation; and to uphold security and social stability;

3. To form productive citizen-workers by providing them with education and health services, ensuring their livelihood, and rewarding them on the basis of their work;
4. To develop human resources, thus ensuring a constant supply of manpower and to upgrade and improve its efficiency to serve all sectors;
5. To raise cultural standards to keep pace with the Kingdom's development;
6. To reduce dependence on the production and export of crude oil as the main source of national income;
7. To continue with real structural changes in the Kingdom's economy to produce a diversified economic base with due emphasis on industry and agriculture;
8. To develop mineral resources and to encourage the discovery and utilisation thereof;
9. To concentrate on qualitative development through improving the performance of the utilities and facilities already established during the three previous plan periods;

10. To complete the infrastructural projects necessary to achieve overall development;

11. To achieve economic and social integration between the Arab Gulf Co-operation Council (GCC) countries.

4.34 It is obvious that the plan strongly encouraged both the public and private sectors to contribute to the Kingdom's economic diversification especially since there was a significant lessening in the world demand for oil. The encouragement was given by the government through the Saudi Industrial Development Fund (SIDF) which extends substantial loans to Saudi citizens for the establishment of industries which involve the non-oil industries (i.e. chemical, cement and metal product sectors). It is hoped that these loans will encourage many entrepreneurs to enter these fields and therefore assist in the development and diversification of the entire national economy.

#### THE FIFTH DEVELOPMENT PLAN, 1990-1995

4.35 This plan for the next five years represents an important phase in the continuation of the social and economic development of Saudi Arabia. The government, according to the plan, will continue to guide the national economy and make progress towards establishing a diversified competitive economy.



4.36 The overall objective of this plan is similar to that of the Third Plan. Moreover, the plan pointed out a number of strategies to be achieved in conjunction with the overall objective. Such strategies include stabilising the economy, developing human resources and maintaining the quality of life in Saudi society.

4.37 Furthermore, the Fifth Plan showed the expenditure on various sectors of development during the previous five years (1985-1990). The transport and communication sector consumed more than originally planned (see Table 4.03), compared to the other sectors. This was due to the ongoing infrastructures committed and not completed. Also, the Gross Domestic Product fell during the same period (Fifth Plan, 1990-1995).

4.38 The transport sector, however, specifically the Ministry of Communications, will receive SR 9,693 billion from the government, which will cover operation, maintenance and projects during the Fifth Plan (Fifth Plan, 1990-1995).

#### THE ROAD NETWORK OF SAUDI ARABIA

4.39 It is true that the wider the spread of high standard road networks, the faster the pace and the greater the depth of the nation's comprehensive development. It is also true that as the difficulties of communication between towns, villages and cities in the Kingdom recede as a result

of intensive road building projects, so the prosperity of all its citizens increases.

4.40 The Kingdom of Saudi Arabia has put a modern network of roads in place in a period of only two decades. This network has become a symbol of the modernisation of the country and a national landmark. The experience which has been gained in constructing this network and the upgrading of the nation's ability to undertake huge highway construction projects under very difficult conditions have given the Kingdom experience in the field of modern highway construction.

4.41 The principal object of constructing roads in Saudi Arabia is to connect the major urban centres with the villages and towns, thereby opening up the entire nation to development and the consequent improvement of the quality of life by providing all citizens with the ability to move from place to place. The Kingdom of Saudi Arabia, with a size of 2,253,300 km<sup>2</sup>, has multifarious physical characteristics and it has been a monumental task to interconnect all its different regions with each other. One of the most significant results of the construction of highways, bridges and tunnels has been to bring modern services into all parts of the country, such as educational, medical and social services, as well as industrial activity and telecommunications, thereby ending the isolation of all towns

and villages and forever after changing the social, economic and health situation of the entire population.

4.42 Commercial relations between the Kingdom's cities and towns have been further enhanced by the installation of a modern system of communications and one can now find adequate postal, telephone and telegraph services in even the smallest of Saudi towns.

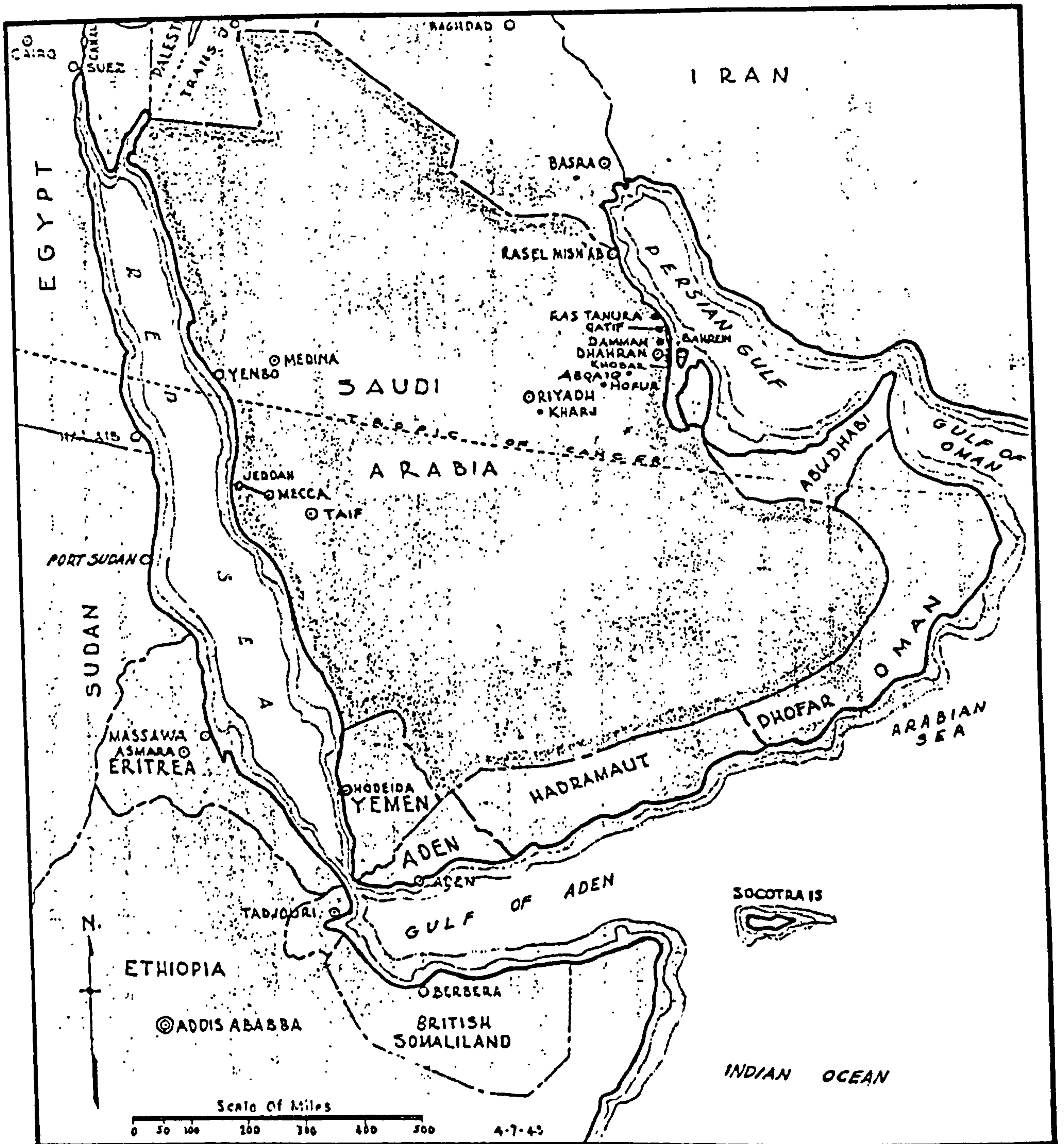
#### HISTORICAL PERSPECTIVE

4.43 Although the Ministry of Communications was established in 1952, it was not until a year later in 1953 that it assumed total responsibility for the nation's roads. At that time, there were only 239 kilometres of paved road in the Kingdom. This figure had reached 4,147 kilometres in 1963, in spite of the handicap of a severe shortage of technical expertise. However, by 1964, the Ministry was able to put together a programme called the "Main Programme" which was based on its own hard-won experience. The objective of this programme was to construct thousands of kilometres of modern roads which would connect all the regions of the country (IRF, 1986).

4.44 One of the earliest of the Kingdom's asphalted roads was put in place by April 29, 1948. It connected the city of Jeddah with the Holy Places in Makkah (see Figure 4.01). This road covered a distance of 45 miles at an estimated cost of US\$ 1,313,000 and it was primarily intended to serve



**Figure 4.01 THE EARLIEST SAUDI ARABIAN ASPHALTED ROADS**



**KEY**  
 — ASPHALTED ROADS

Source: KINGDOM OF SAUDI ARABIA, PUBLIC WORKS DEPARTMENT, JEDDAH, SAUDI ARABIA, 1948.

the pilgrims arriving at the seaport of Jeddah. A secondary objective was to promote trade and tourism (Public Works Department, 1948).

#### OBJECTIVES AND POLICIES OF THE NETWORK

4.45 The objectives of the road programme have conformed with the content of the Kingdom's five-year development plans which the government implements. These objectives are as follows:

- a. Promoting the rate of growth of the various sectors, such as reducing the costs of transport and communications required for economic and social activities through the co-ordination of road development programmes with the development of public services in order to realise balanced investment which will ensure a maximum limit of national income in all sectors.
- b. Strengthening and supporting the national integrity and regional economic growth by linking all villages whose population exceeds 10,000 through the construction of primary roads.
- c. Meeting the increasing growth in traffic with the lowest possible costs, by creating an equilibrium between road maintenance costs and vehicle consumption average which they use, in addition to the time element and increasing travelling

expenses (MOC, Land and Marine Transportation, 1982).

4.46 From the above objectives, clear policies have been derived and they are:

- a. Selecting appropriate design standards for each road according to an estimate of the intensity of its usage. This is because high standards require high investments. Although low standards cost less, they have a tendency to increase operation and maintenance costs. In light of this fact, the Ministry of Communications has always been keen to select ideal standards for roads which, it is felt, keeps maintenance expenses within reasonable limits.
- b. Designing criteria which are in force and are always reconsidered at the beginning of each of the five-year development plans in an attempt to increase the safety level of the roads. The width of the hard shoulder has been increased from 2m to 2.6m. These hard shoulders are now asphalted and they are distinguished from road surfaces by the use of stone materials. Moreover, it has been taken into consideration that road inclines should be flatter ( $1/4$ ) and bridge widths should be equal to the road and hard shoulder widths with adequate drainage facilities to keep the roads operational during all seasons of the year and continue to be useable for



the entire length of an estimated lifetime of 20 years.

- c. Comprehensive studies have been made of all transportation facilities in the Kingdom, their development, average usage, needs, and the estimated future manpower requirements. As a result of these studies, it has been possible to identify routes for new roads, make feasibility studies, determine the possibility for execution of projections, define road locations, determine which technology is to be used in road construction, estimate usage and make an analysis of all data.
- d. The Maintenance Department is a permanent and important part of the Ministry of Communications. It is the responsibility of this department to take all the necessary action to ensure that the Ministry continues to provide the highest standard of service to travelling citizens. Suitable road signs have been put in place to organise traffic. Also, the size and weight of vehicles using these roads have been fixed in order to facilitate maintenance works in such a way as to establish a reasonable balance between the life expectancy of the highways, the manpower required to keep them in serviceable condition and maintenance costs (MOC, Land and Marine Transportation, 1982).

## RESPONSIBILITY FOR THE NETWORK

4.47 The Ministry of Communication was initially charged with responsibility for postal, telephone, telegraph and telex services, road construction, ports, lighthouses, railroads, land and marine transportation and communications affairs.

4.48 In 1395 A.H. (1975), postal, telephone, telegraph and telex affairs became the responsibility of a separate ministry. The Ministry of Communications, however, retained control of all land and maritime transportation services in the Kingdom, including road and bridge construction and maintenance, land and marine transport and railway supervision. It continues to have technical and administrative responsibility for all planning and construction which concerns all services under its jurisdiction (MOC, Communications And Its Role In Development, 1988).

4.49 The extensive experience of the Ministry of Communications which was acquired in the early years of its existence has influenced the development of its later projects, including the fixing of standards and the choice of the most advanced technology. This is particularly evident in the Kingdom's bridge projects where advanced technology has been adopted which meets the special characteristics of the Kingdom's circumstances such as climate, while at the same time conforming to international

standards in respect to design and safety (MOC, Communications And Its Role In Development, 1988).

4.50 The Ministry of Communications has generally relied on foreign consultants, firms and contractors to design, construct and supervise its road projects. This is due to the fact that in the early stages of development in the Kingdom, there was an insufficient number of Saudi technicians. Nor were there any Saudi engineering consultants or construction firms. However, partially as a result of the excellent education programmes in the Kingdom, plus the great increase in the national income which in turn increased the per capita income of individuals and families, more and more young Saudis entered the fields of engineering, architecture and planning. As a result, there are today large numbers of Saudi engineers and consultants, as well as Saudi engineering and construction firms, all of which are used to a maximum degree by the Ministry. Many of these young graduates have joined the Ministry as permanent employees and, with good on-the-job training, they are now capable of designing and supervising the Ministry's large road projects.

4.51 As previously mentioned, the Ministry of Communications developed what is known as the "Main Programme", the overall objective of which was to construct a major road network connecting the principal regions of the Kingdom. As



has also been previously mentioned, at that time, the Ministry lacked the technical capability and manpower to undertake this mammoth project on its own. So there was no recourse but to engage foreign consultants to study and supervise the construction of 5,000 kilometres of highway. And despite the Ministry's limited experience in selecting and working with foreign consultants and contractors, the paved road network grew to 8,027 kilometres by mid 1970 (IRF, 1986). Figures 4.02 and 4.03 give an indication of the Saudi road network in 1963 and 1970 respectively.

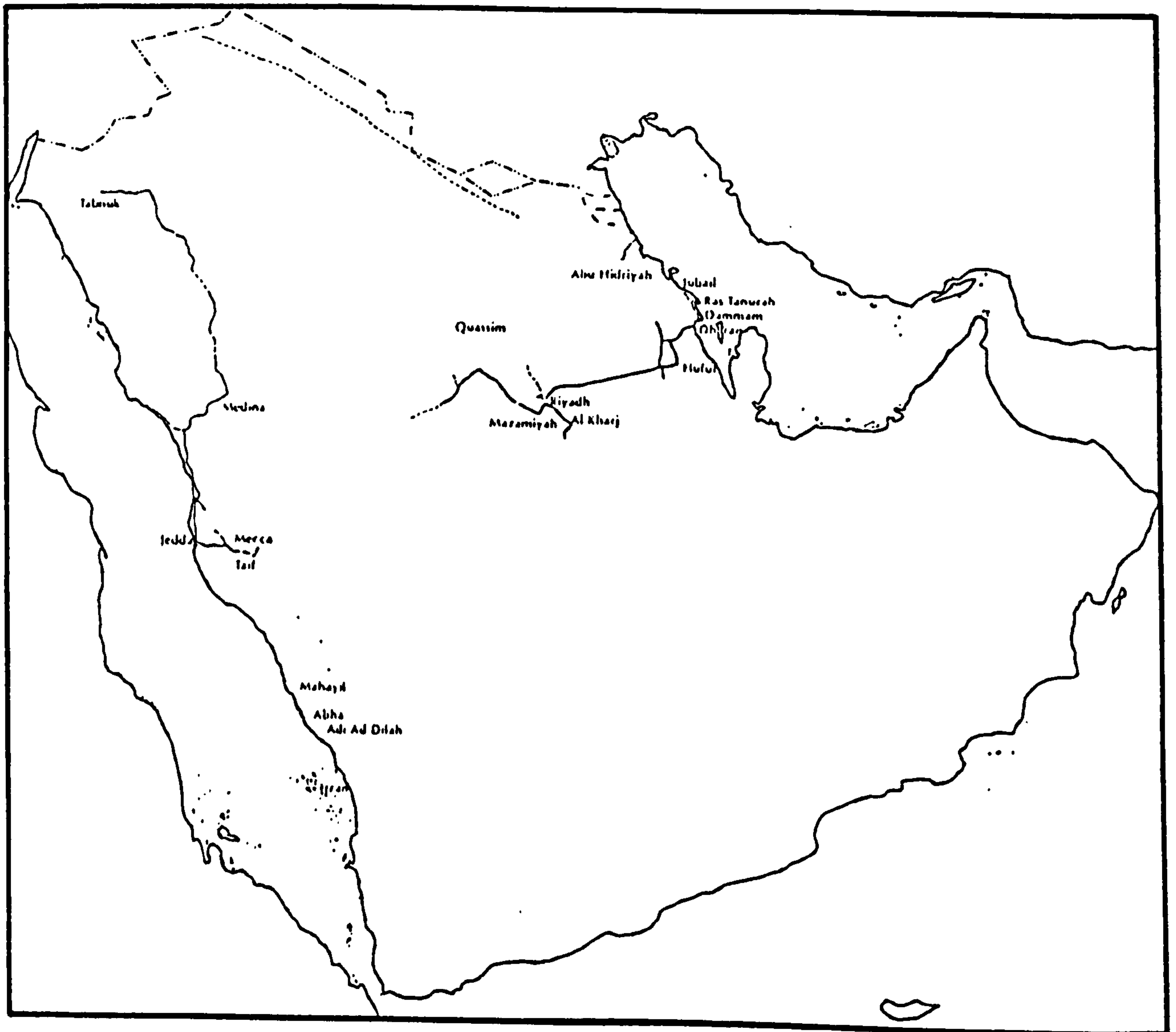
4.52 In addition to the Main Programme, in 1964 a programme of rural road construction was inaugurated by the Ministry of Communications. This programme involved the improvement and up-grading of existing desert and mountain tracks while expanding the network of unpaved roads to connect as many settlements as possible with the growing primary road network.

4.53 At the same time, the Main Programme was being implemented in four phases:

PHASE I : Completing the connection of main regions and ensuring that roads pass through the maximum number of towns and villages.

PHASE II : Shortening travel distances between the main cities.

Figure 4.02 SAUDI ARABIA'S ROAD NETWORK IN 1963

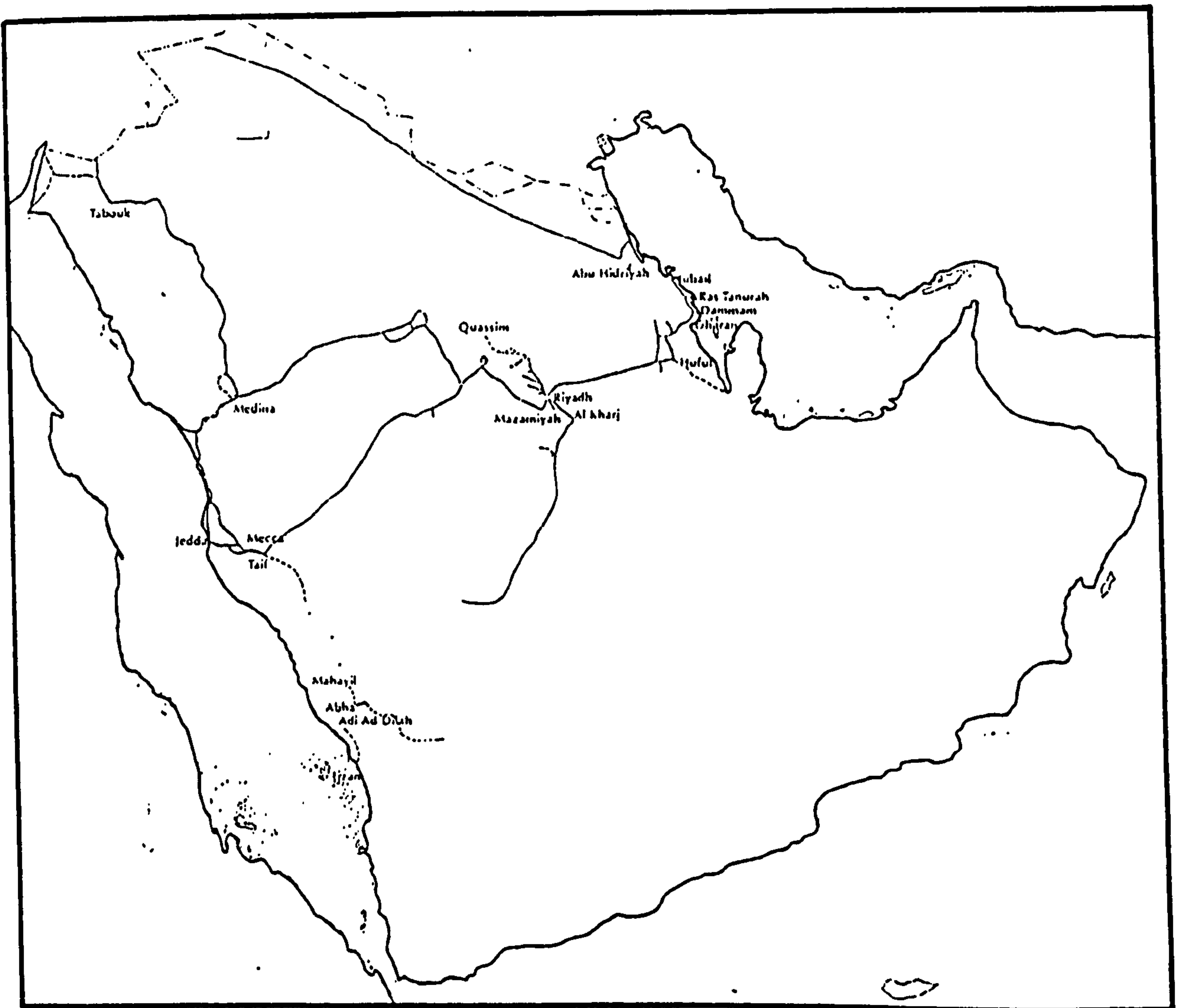


**KEY**

- ASPHALTED MAIN ROADS
- - - ROADS UNDER CONSTRUCTION
- · · BOUNDARIES

Source: INTERNATIONAL ROAD FEDERATION, "THE SAUDI ARABIAN HIGHWAY PROGRAM: AN I.R.F. CASE HISTORY," RIYADH, 1986, p.6

**Figure 4.03 SAUDI ARABIA'S ROAD NETWORK IN 1970**



**KEY**

- ASPHALED MAIN ROADS
- - - ROADS UNDER CONSTRUCTION

Source: INTERNATIONAL ROAD FEDERATION, "THE SAUDI ARABIAN HIGHWAY PROGRAM: AN I.R.F. CASE HISTORY," RIYADH, 1986, p.7.



PHASE III: Widening and constructing roads where anticipated future traffic indicates that they will eventually be upgraded to dual carriageways or expressways.

PHASE IV : Improving the standards of services and developing safety features for the roads (IRF, 1986).

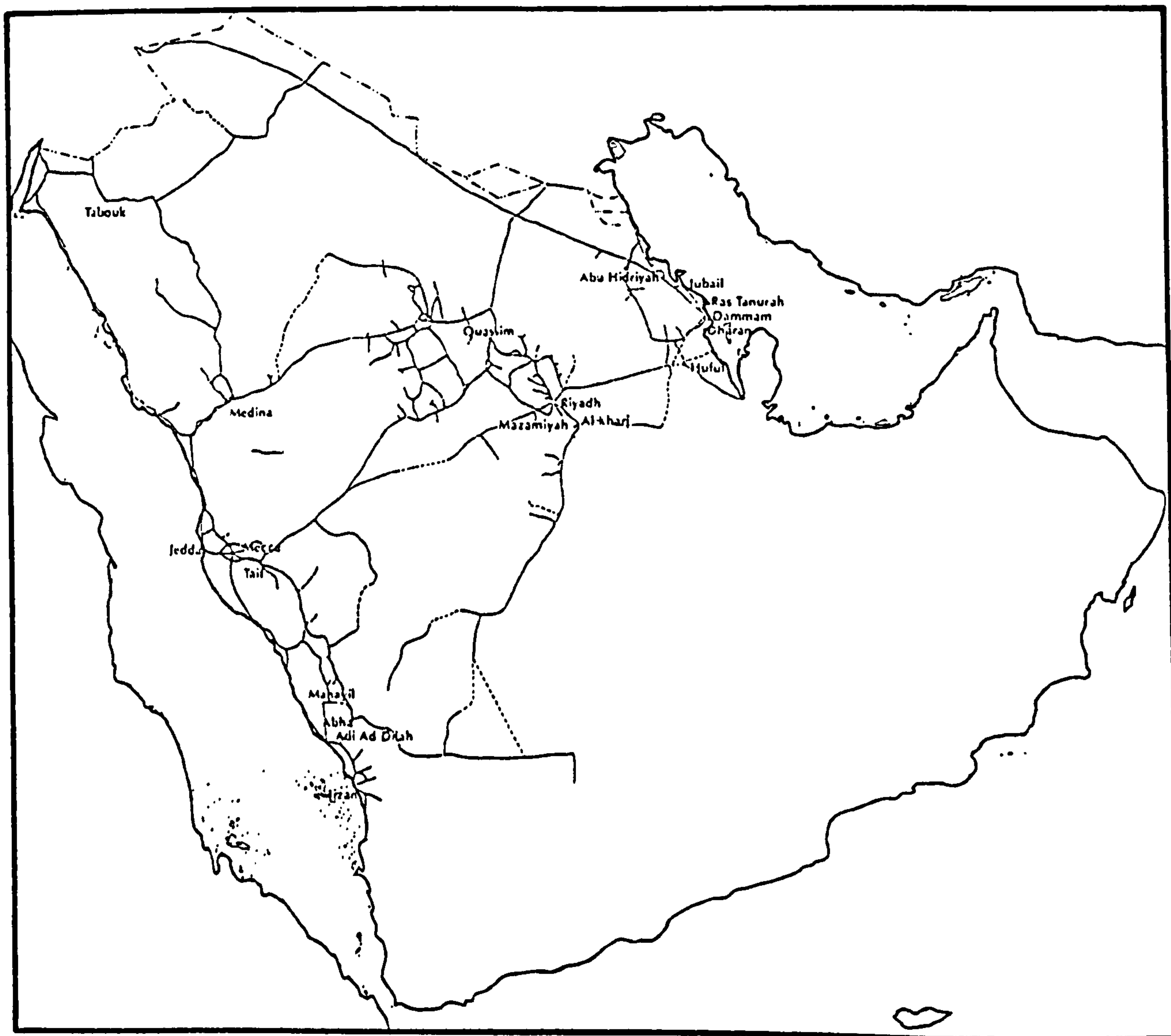
4.54 In conjunction with the Kingdom's five-year plans, the MOC prepared its own comprehensive plan which was known as the Five-Year Road Programme. The first phase in this programme, as indicated above, was concerned with connecting the maximum number of towns and villages. Phase II (see above) was introduced in 1970 and was concerned with the construction of short distance roads.

4.55 A separate programme for the construction of feeder roads was also initiated in 1970. The aim of this programme was to connect villages to the main highway network and there was no doubt that this programme would bring social and economic benefits to the people of these villages. Again, this programme was carried out by foreign consultants who designed and constructed the roads under the supervision of the MOC.

4.56 The implementation of Phase II (widening roads and upgrading them to dual carriageways) did not begin until 1975. At the same time, there was an upsurge in the national economy which caused those roads which had been constructed in 1963 to generate more traffic than they could accommodate and the need became obvious to begin the implementation of Phase III. Consequently, the Ministry of Communications undertook a survey/study which included a traffic count in preparation for Phase III. As a result of this survey/study, 4,000 kilometres of dual carriageways and expressways were constructed during the last part of the 1970s (IRF, 1986). (See Figure 4.04.)

4.57 By mid-1980, the total length of paved roads in the Kingdom was 21,583 kms (17,939 primary asphalted roads and 3,644 feeder roads). During the Third Five-Year Plan which began in 1980, the MOC spent US\$ 12.24 billion on the construction of 8,074 kms of paved roads and 26,469 kms of unpaved agricultural roads. It is important here to note that the actual pace of road construction during this period surpassed the targets established in 1980 for all types of roads and at the end of the Plan period, 32,582 kms of road had been constructed (IRF, 1986). Furthermore, the total length of paved roads in the Kingdom reached 32,000 kms by the end of the Fourth Development Plan (1990) (Fifth Plan, 1990-1995). Figure 4.05 shows the road network in Saudi Arabia as of 1988.

**Figure 4.04 SAUDI ARABIA'S ROAD NETWORK IN 1980**



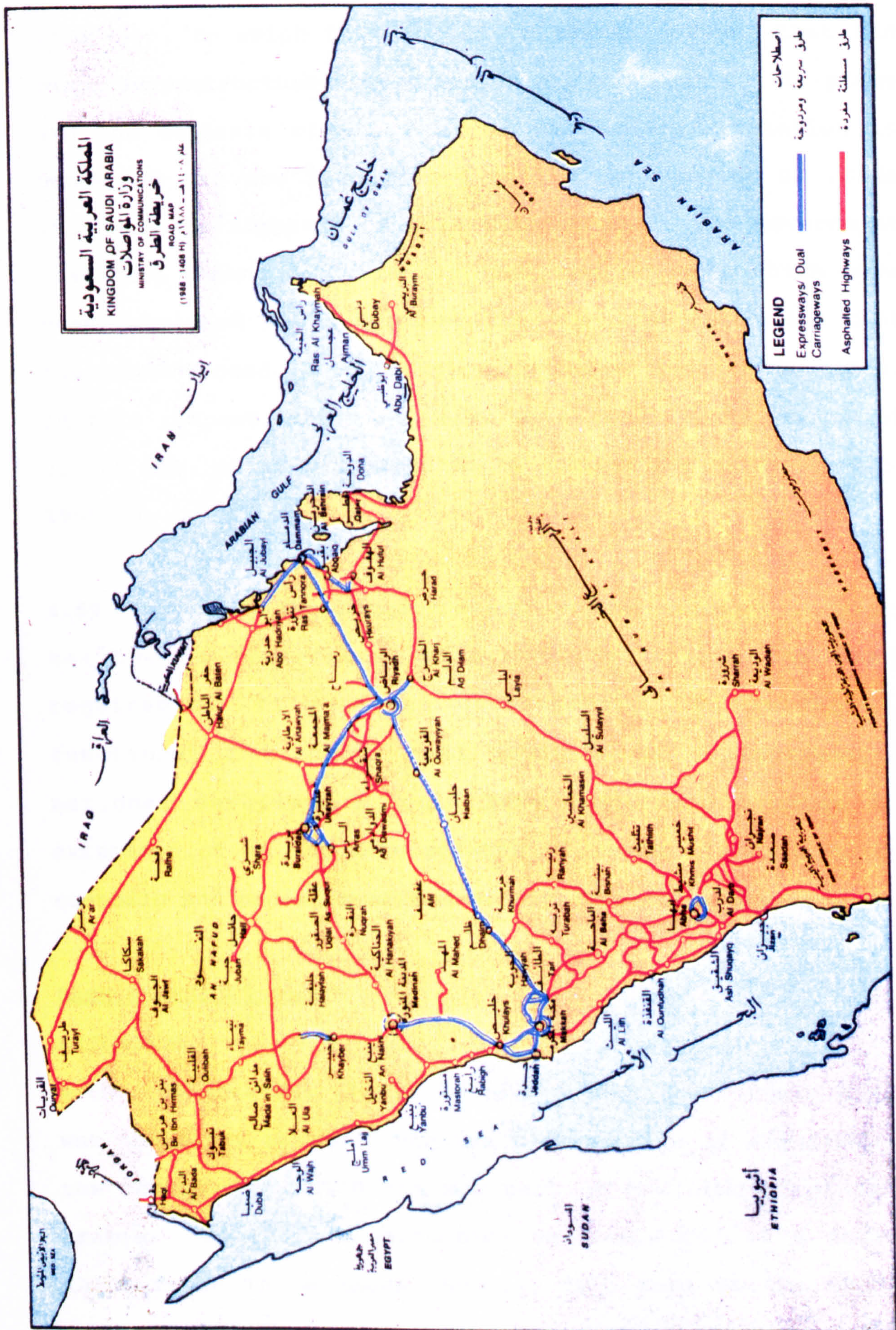
**KEY**

- ASPHALTED MAIN ROADS
- - - - ROADS UNDER CONSTRUCTION

**Source: INTERNATIONAL ROAD FEDERATION, "THE SAUDI ARABIAN HIGHWAY PROGRAM: AN I.R.F. CASE HISTORY," RIYADH, 1986, P.6.**



FIGURE 4.05 SAUDI ARABIA'S ROAD NETWORK IN 1988



SOURCE: MINISTRY OF COMMUNICATIONS, THE 3rd IRF MIDDLE EAST MEETING, ADDARB NEWSLETTER, ISSUE No. 8- 2/19/1988.



4.58 In conclusion, the Fourth Five-Year Development Plan (1985-90), on which this thesis is based, assumes that the basic infrastructure of the nation has now been put in place and the emphasis of the Plan as far as transportation is concerned has now been placed on the improvement of roads with a major emphasis on road maintenance. The government reasoning behind this Plan is that the projects which have been completed are sufficient for the time being and that the current need is to focus on secondary and feeder roads. In this respect, the plan ended with total roads length of 32,000 kms, as it was expected to achieve during the period 1985-90.

4.59 Putting the Kingdom's entire road network in place has been a fundamental effort to facilitate the basic requirements of national development. For without a functional and modern road network, no achievement in national development could have been made because the existence of an adequate network of roads is basic to the economic and social progress of any developing country.

#### MASS TRANSPORTATION

##### RAILROADS

4.60 Daghestani (1983) indicated that the Ottoman Empire was the first to undertake the construction of a railway in the territories which are now part of the Kingdom of Saudi Arabia. In 1900, construction was completed of a railway which began in Damascus (Syria), then part of the Ottoman

Empire, extending to the city of Al-Medina in the Al-Hijaz on the Arabian Peninsula which also at that time constituted a part of the Ottoman domains. The Turkish government planned to extend the railway system to Jeddah and Makkah but this branch of the line was never completed. The railway was intended to serve Muslim pilgrims coming to the Holy Land from Turkey, Syria and beyond. The line was never completed because of the declining power of the Ottomans as well as for other, largely political, reasons. Eventually, during the course of World War I, the entire railway was destroyed and it was never again put back into use. This effectively put an end to all rail transport on the Arabian Peninsula until after the unification of the Kingdom of Saudi Arabia under King Abdulaziz, the founder of the country whose first development project - once oil revenues permitted - was the construction of a 562 km railway line between the port of Dammam on the Arabian Gulf and Riyadh, the capital in the interior, passing through Hofuf, Ain Haradh and Al-Kharj along the way. The aim of this railway line was to provide faster and safer communications for passengers as well as to transport imported goods from the seaport to population centres in the interior of the vast peninsula (Daghestani, 1983).

4.61 In 1951, this railway was completed. Then, in 1982, work began on the construction of a new rail line running between the Arabian Gulf seacoast and the capital. One of the purposes for constructing the new line was to shorten



the distance to 450 kms. It became operational in 1987 and the Saudi Railways Organisation (SRO) now has a fleet of 47 locomotives, 58 passenger cars and 2,165 freight cars (MOC, Roads and Transportation, 1988).

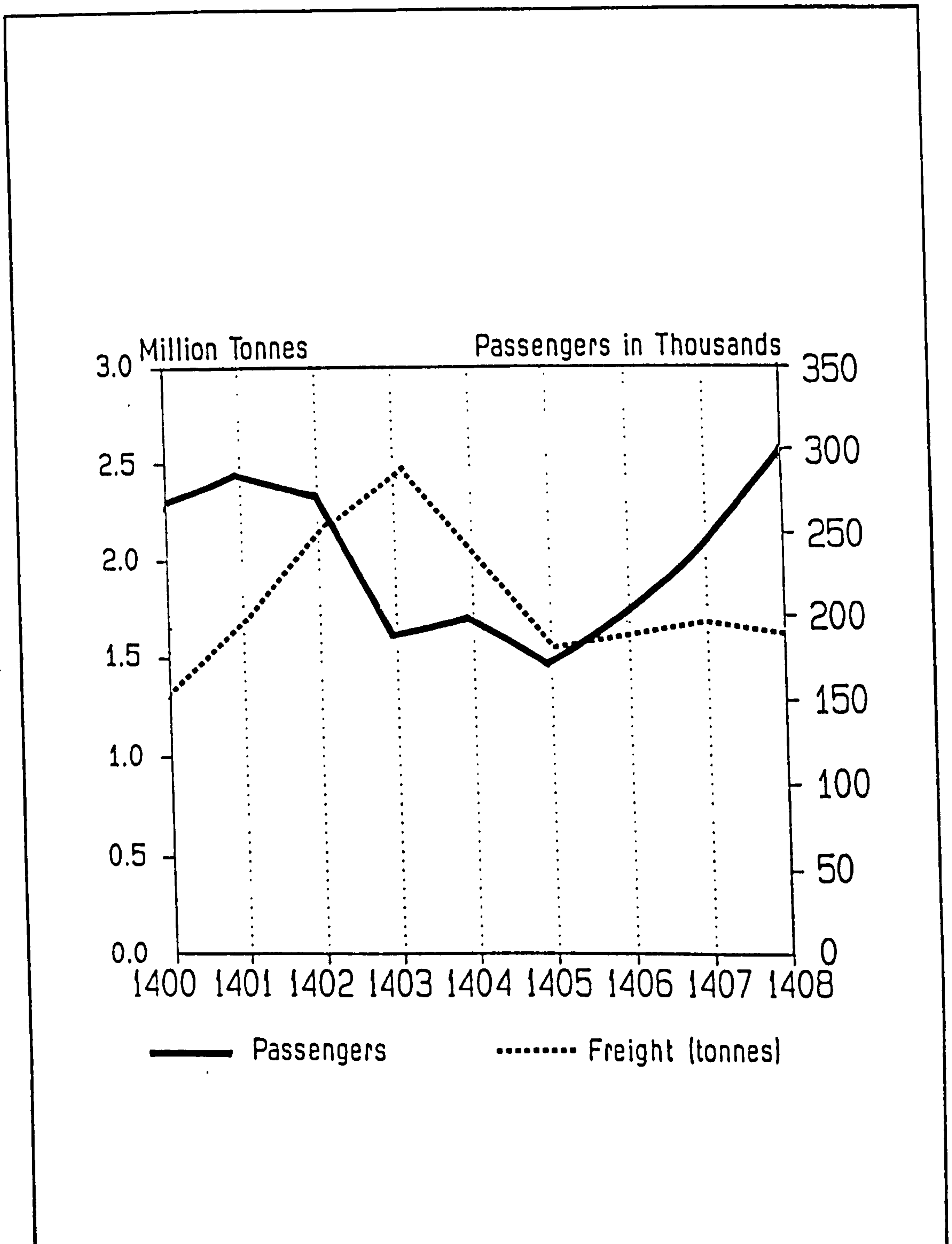
4.62 A number of feasibility studies have been made with respect to the expansion of railroad services to cover the primary regions of the Kingdom. However, the number of passengers using the Riyadh-Dammam line which is currently operational appears to be increasing in recent years due to the improvement of services (see Figure 4.06).

#### SAUDI PUBLIC TRANSPORT COMPANY (SAPTCO):

4.63 In order to solve or at least to minimise traffic congestion, the Ministry of Communications sought to adopt a policy of introducing a modern public transportation system. Eventually, royal decree number M/48 was issued on 13.12.1399 (1979), establishing the Saudi Public Transport Company (SAPTCO) with a capital of one billion Saudi riyals of which thirty per cent was funded by the government (SAMA, 1987).

4.64 As a consequence of the Kingdom's economic boom which began in the mid-1970s, thousands and thousands of foreigners were brought in as specialists, advisors, workers and labourers to assist in the development of the various sectors of the economy (i.e. planning, transportation, construction, etc). This of course led to massive traffic

**Figure 4.06 THE INCREASING VOLUME OF PASSENGER AND FREIGHT TRANSPORTATION TRAFFIC BY RAILWAY IN THE KINGDOM**



Source: MINISTRY OF PLANNING, FIFTH DEVELOPMENT PLAN 1410-1415 A.H. (1990-1995 A.D.), p. 343.

problems in the cities of the country, especially in the large cities of Riyadh, Jeddah and Dammam.

4.65 The company began its intra-city operations (see Figure 4.07) in the Kingdom's capital city of Riyadh in 1979. Similar operations were later introduced to the cities of Makkah, Al-Medina, Jeddah, Dammam, Taif and the Alqassim Region.

4.66 Inter-city operations were later introduced between major cities including routes between the Eastern and Western Regions via the Central Region. These operations also included routes between the cities of Dammam, Jubail, Al-Hofuf, Riyadh, Al-Kharj, Majma'a and Alqassim. Other cities and districts in the Western and South-Western Regions were also covered by inter-city operations.

4.67 In addition, SAPTCO services eventually reached some of the more remote cities located in the Southwestern and Northern Regions of the country, such as Jizan and Abha in the Southwestern Region and Hail in the Northern Region.

4.68 The Saudi-Bahraini Causeway (King Fahd Causeway) was completed and opened for traffic on November 26, 1986. It is a 25-kilometre bridge across the Arabian Gulf connecting the Kingdom of Saudi Arabia with the island state of Bahrain. This provided the incentive for the Transport Company to begin the extension of bus services to



Figure 4.07 TYPE OF BUSES USED BY S.A.P.T.C.O.





neighbouring Arab countries, beginning with Bahrain. Bus transport services were later established between Yemen and Saudi Arabia and the Saudi-Turkish transport Company Ltd has also been established to facilitate the overland transportation of passengers between Turkey and Saudi Arabia.

4.69 During the first few years of operation, the bus company transported more passengers than expected with some 22 million passengers taking advantage of company services in 1980. Thereafter, the number of passengers sharply increased every year, reaching a peak in 1402-03 (1983) with 146 million passengers. The number of passengers then began to decrease and in the following year (1984), only 109 million passengers used the company services. In 1988, there were only 50 million passengers (MOC, Fifth Plan 1990-1995). (See Table 4.04.)

4.70 This massive reduction in the annual number of passengers created major financial problems for the company. According to the analysis of the office of the Deputy Minister of Communications for Transport Affairs, this decrease had two major causes. Firstly, the number of foreign workers living in the Kingdom is much reduced now that the largest of the infrastructure development projects are largely in place and it was precisely these workers on whom SAPTCO relied to fill their buses on both their intra-city and inter-city routes. Secondly, of the vast numbers of lower income labourers remaining in the Kingdom, many of

**TABLE 4.04: SAPTCO Achievement during the First Three Years of the Fourth Five-Year Development Plan (1985-88)**

Year	No. of Buses Intra-City	No. of Buses Inter-City	No. of Passengers Intra-City (millions)	No. of Passengers Inter-City (millions)	Total Revenue from Fares (SR millions)
1405/06 (1986)	753	240	54,488	2,145	187,011
1406/07 (1987)	877	240	49,497	1,990	173,580
1407/08 (1988)	880	234	48,181	2,060	171,431

Source: Ministry of Communications, Deputy Ministry for Transport Affairs, Riyadh, 1989.



them stopped riding the SAPTCO buses when the fare for each ride was increased from one to two Saudi riyals. Rather, they chose to use the smaller independently-owned buses which ply the streets of Saudi cities whose fares per ride remained at one Saudi riyal.

4.71 The individual owners of these independent non-SAPTCO city buses are licensed by the Ministry of Communications to operate in the cities and they serve whatever areas of the city they choose since they are in fact quite uncontrolled, stopping wherever they choose to collect or discharge their passengers. Furthermore, these buses were in business long before SAPTCO was created, notwithstanding the fact that their existence has created many traffic problems and that they are the cause of a considerable number of accidents because they have no regular bus stops and do not always obey traffic regulations. It is a simple matter for a potential passenger who wishes to travel from one point in the city to another to hail one of these omnipresent buses. The bus drivers are always anxious and on the lookout for custom and they are willing to stop anywhere any time to increase their income. But, in fact, it was the increase in SAPTCO fares which paradoxically added to the financial loss of the company. In order to resolve this specific problem, the MOC has adopted a new policy with respect to the independent city buses whereby the Ministry will offer employment opportunities in SAPTCO to the independent bus owners/

drivers. They have the option of joining the company on terms favourable to them within five years from the beginning of 1987. It is therefore hoped that the problem of SAPTCO's financial viability will at least be somewhat alleviated by 1992. Since the government owns thirty per cent of the shares in SAPTCO, they are keen to prevent further losses by the company and to put an end to the company deficit.

4.72 In addition to its intra- and inter-city services, SAPTCO is also involved in providing special services to both government agencies and private institutions. Among the institutional customers of SAPTCO are King Saud University, Riyadh, for the transportation of students of both sexes to and from the university campus; the Imam Mohammad bin Saud Islamic University in Abha in the Southwestern Region; some of the public schools in the cities of Taif and Riyadh; the Vocational Training College in Riyadh; the Immigration and Naturalisation Administration in Riyadh; King Khalid University Hospital in Riyadh; and other institutions. Profit accruing from the use of bus company services by these institutions in 1988 amounted to 36,295 million Saudi riyals, compared to 25,773 million riyals in 1985 (MOC, Fifth Plan 1990-1995).

4.73 The bus company is a major participant in offering transportation services to pilgrims (Hajj) during the holy season and it has developed an efficient programme for

carrying these pilgrims to the holy places in the cities of Makkah and Al-Medina.

4.74 In 1980, five million pilgrims were transported by the company using 467 buses. In 1981, the number of buses was increased to 989 and 9,400,000 pilgrims were carried during the season. In 1983, SAPTCO carried 4,500,000 pilgrims (MOC, Transport and Communications, 1986). The figures for 1984, 1986 and 1987, respectively, were: 5,900,000; 4,200,000; and 5,100,000 (MOC, Fifth Plan 1990-1995). It will be noted that the number of pilgrims which the company carried to the Holy Areas remained relatively stable during the last few years even though the total number of pilgrims increased incrementally during this period. This is because of the corresponding increase in the number of independent companies offering similar transportation services to the pilgrims.

#### MODES OF TRANSPORTATION

4.75 Before the unification of the country, and prior to the discovery of oil in the 1930s, the population of the territory which is now the sovereign territory of the Kingdom of Saudi Arabia consisted of a series of tribes moving over the face of the land. In moving from place to place, the people were totally dependent either upon their own two legs or upon "The Ship of the Desert" which is, of course, the camel.



4.76 Camels can endure sandy, hot and dry desert areas and they are able to remain without food and water for as long as one full week which is one of the reasons why, in the pre-automotive era, the nomadic and settled population of the Arabian Peninsula could rely on this beast of burden as a means of transportation for themselves and their goods. It was also the principal means of transport for Muslim pilgrims making their way to the holy cities of Makkah and Al-Medina.

4.77 During the early stages of the reign of King Abdulaziz, camels, horses and donkeys were the only available means of transport for people and their goods in the Arabian Peninsula. It was on the back of a camel that the late King Abdulaziz approached Riyadh for his historic attack on that city, an attack that brought the return to power of the Al Saud family, a power that eventually spread beyond the heart of the province of Nejd to include most of the territory of the Arabian Peninsula to create a country which later became known as the Kingdom of Saudi Arabia.

4.78 It is the camel caravan which from time immemorial has transported pilgrims to Makkah and a good sized caravan would perhaps consist of as many as three thousand beasts, all of which were protected and made secure by a series of government-manned guard posts along the way.

4.79 When King Abdulaziz was about twenty years old (i.e. about 1900), a journey from the city of Al-Hofuf in the Al-Hasa Oasis (now a part of the Eastern Province) to Riyadh in the heart of the Province of Nejd (now known as the Central Region), a comfortable three-hour ride by car today, took a full eight days to cover the 340 kilometres, riding eight or nine hours a day at an average speed of a little over five kilometres per hour. A small caravan, loaded only for the journey, could cross the country from the east coast of the Arabian Gulf to the west coast of the Red Sea in one month (Rihani, 1928, and Nawab, 1980, et al.) (cited in Daghestani, 1983). So, at the turn of the century, the camel reigned supreme as the sole means of transportation for people and goods throughout the length and breadth of the entire Arabian Peninsula.

#### AUTOMOBILES

4.80 According to Daghestani (1983), automobiles were not introduced into Saudi Arabia until around 1920. Their introduction proved to be the beginning of the end of the age of camel transportation. In the beginning, there were only a very few cars and trucks in use in the Western Province. Later on, the geological survey parties of what later became ARAMCO were the first to introduce automobiles into the Eastern Province. Later on still, King Abdulaziz imported a few cars and trucks which he sometimes loaned to the oil company survey parties by way of assisting them in their search for oil.

4.81 In 1944, the first trucking service to bring vital food supplies to Riyadh was begun with ten trucks and the first "service station" in Arabia to supply and repair them was established at Al-Hani. By the end of 1946, the route from Al-Khobar to Riyadh may be said to have become a regular "highway" which was used by 43 trucks (MOC, Highway Planning and Improvement, 1988).

4.82 The number of cars continues to increase and the road system continued to improve. According to the General Directorate of Traffic, in 1971 the number of registered motor vehicles in the Kingdom totalled 144,768. By 1986, this figure had become 4,280,986. Of this total, there were 1,979,297 trucks; 2,131,270 private passenger vehicles; 113,772 taxis; 44,068 buses; and 12,579 motorcycles (MOI, Automobile Statistics in Saudi Arabia, 1986).

#### OTHER MODES

4.83 Of all types of vehicles, automobiles, therefore, appear to be the preferred mode of transport for the majority of the population of Saudi Arabia and most of them are privately owned, although there are considerable numbers of taxis and rental cars in existence. The very low number of motorcycles at the end of 1986 (12,579) indicates that this mode of transport is held in low esteem by the population and in fact one can hardly find a motorcyclist on the streets of any of the Saudi cities, unlike western



countries where special lanes are set aside on the highways for the use of cyclists. Of the trucks in use in the Kingdom, most are used for the commercial transportation of goods and commodities although a considerable number of pick-up trucks appear to be primarily used as family vehicles.

4.84 If one considers the development of the various modes of transportation in the Kingdom of Saudi Arabia, from the beginning of this century until the present day, it is nothing short of miraculous. To move from the camel as principal beast of burden to jet aircraft, a modern network of super highways and a railway using the very latest technology in less than a century is a tremendous achievement. Of course, all this would not have been possible had not the financial resources been available to pay for it, but it also took a great deal of expertise, far-sightedness and cultural flexibility to envision the changes as well as a mentality which remained open to new ways of doing things and was not afraid to experiment with the new and unknown. The Arabs of the Peninsula have always been known for their practicality in face of insuperable difficulties and their experience over the past century in the field of transportation has shown them to be as sensible and expedient as they are known to have been throughout their long history.

4.85 Although in some of the remote valleys of the Southwestern Province, one can still sometimes see local farmers

who, for various reasons of necessity, are still using their camels and donkeys for transportation, the use of these beasts for transportation is now a thing of the past and it will not be very long until the sight of a heavily laden donkey or camel will be an amusing rarity. The Kingdom is still in the process of absorbing the meanings of all these changes which have transformed the entire lifestyle of its people, and it will be some time before the new way of life has been fully adopted. Meantime, now that all eyes are open to the future possibilities of new technology, and the poverty-stricken past with its outmoded forms of transport is well and truly over, the way is open for the adoption and adaptation of whatever future developments occur in transportation.

#### ISLAMIC ENVIRONMENT AND TRANSPORTATION FOR FAMILIES

4.86 The population of the Kingdom of Saudi Arabia is predominantly Muslim. It therefore follows that Saudi Arabia is an Islamic society. Law in Saudi Arabia is based on the Law of Islam and the Law of Islam is based on the Koran (The Book of God) and Hadith (statements attributed to the Prophet Mohammed).

4.87 The first two objectives of the nation's long-term strategy for development are as follows:

- To safeguard Islamic values, duly observing, disseminating and confirming God's Divine Law;

- To defend the faith and nation, and to uphold the security and social stability of the realm (Fourth Development Plan: 1985-1990).

#### STATUS OF WOMEN IN SAUDI SOCIETY

4.88 In Saudi society today, mothers and women in general are considered to be the most important members of a family by dint of their responsibility for their husbands and children. Added to this, in urban areas today, many Saudi women now hold down public jobs as wage-earners. They may work as teachers or headmistresses in schools; as accountants, cashiers or managers in women's branches of banks; as physicians in hospitals; and as social workers. However, in rural areas, the majority of women continue to work beside their agriculturalist husbands in the fields while at the same time continuing to bear their responsibility for raising and caring for their offspring.

4.89 Their present condition is far better than it has been traditionally. Their lives in the past were much more limited by conditions imposed on them because of the traditions of the society itself. Where they could once only work as housewives or beside their husbands on the farms, under certain conditions, they may now accept public employment and make a contribution to the development of their society.



4.90 Saudi Arabia was never ruled by western countries, as was the case with her sister Arab countries (Jordan and Iraq by Britain; Morocco and Tunisia by France; Libya by Italy, etc). However, considerable chunks of territory which are now part of the Kingdom of Saudi Arabia were once part of the non-European Ottoman Turkish Empire, the dominant culture of which was Islamic and eastern. There are those today who believe that it was the Ottomans who imposed the use of the veil on women in the Arabian Peninsula and some scholars state that "Turkey and Persia used the veil as a symbol of aristocracy, the mark of distinction of well-to-do women" (Alnowaisir, 1983). Therefore, the veil became first fashionable and then traditionally mandatory. However, with time, the veil became a symbol of the status of women in society and it remains so today.

4.91 In recent years, the Saudi government has paid great attention to the status of women in an attempt to give them a prominent participatory place in the development of the country, especially in the field of education. Women began to work in this field in the 1960s after they had received their first state-sponsored education. Prior to that time, education was largely in the hands of lady teachers from neighbouring Arab countries. Today, Saudi women form the backbone of the teaching cadre at all levels of education, including the university level. Thousands of Saudi women have graduated from colleges and universities with degrees

in education, history, geography, the social sciences, religion, etc. . Even so, the Kingdom continues to rely on foreign teachers to staff the schools in remote towns and villages where a Saudi woman may not venture by herself unless she is accompanied by a "mahram" (a relationship by marriage or close blood ties). It is expected, however, that even the schools in these remote villages will one day also be staffed by Saudi lady teachers.

4.92 At the university level, women students may now study in virtually every field, and today in the Saudi universities there are separate sections for female students in medicine, dentistry, pharmacy, the physical sciences, business administration, etc. However, as throughout the education system, male and female students may not occupy the same classroom at the same time. Furthermore, upon completion of their studies, when female graduates are prepared to join the national work force, they may not be employed in offices or other places in which men are employed. Their workplaces must be exclusively female and the sexes may not mix in public. For instance, in Saudi Arabia there are special bank branches for women. These banks have an all-female staff and employ many women graduates. It is the same in other fields with the exception of medicine where Saudi female physicians are allowed to work alongside their male counterparts. The rationale behind this allowable mixing of the sexes is that they are partners in the

alleviation of human suffering and the saving of human lives.

#### TRANSPORTATION FOR FAMILIES

4.93 From the preceding section of this chapter, it is obvious that the role of women in Saudi society is in a state of flux as they shift from being dependent non-participants in society at large to being less-dependent participants, taking an active and potentially potent role in the society. So long as women remain socially inactive and remain at home, so half of society will remain handicapped. However, women are increasingly assuming a public role in society and, as they assume more active roles, they are increasingly forced into some kind of social interaction with their male counterparts and are being obliged to communicate directly with men, such as in the field of Medicine.

4.94 These experiences, coupled with rising educational opportunities, have had a strong impact on the social status of women and have literally catapulted them out of their role as passive participants and have made them more active in the world around them.

4.95 However, if women are to take up an active role in society, what about their role in the field of transportation? The fact of the matter is that in Saudi society women are not allowed to drive automobiles. The reason for



this is perhaps that the religion does not allow contacts between males and females and if women were allowed to drive, a situation would be created whereby direct contacts between the two sexes could not be avoided. Consequently, the authorities determined that the solution was to prohibit women from driving, even though in other Islamic countries such as Kuwait, Jordan, Egypt and Pakistan, women are allowed to drive.

4.96 These days, now that women are beginning to play an important and active role in the public work place as real participants in society, they must be transported to and from their jobs and/or their schools. There are, however, five different choices of transportation for women in Saudi Arabia.

4.97 First, SAPTCO (Saudi Public Transport Company) carries female intra-city passengers in an enclosed section at the back of their buses which has a separate entrance exclusively for women. However, most Saudi families frown on their women using these public transport facilities and consequently most of the female bus passengers are non-Saudis. Another drawback to the use of these buses by Saudi women is that in all too many cases, the bus routes are not conveniently located to include the neighbourhoods where they live.

4.98 Second, each agency which employs women (hospitals, schools, public institutions, etc) provides for their transportation to and from the job site.

4.99 Third, licensed limousines are used for intra-city transportation. Limousine services were initiated in 1984 and 125 permits have so far been issued nationwide by the Ministry of Communications (60 in Riyadh, 53 in Jeddah, 6 in Dammam and 6 in other areas of the Kingdom) (MOC, Fifth Plan 1990-1995). These services are regulated and supervised by the MOC and special efforts are made to ensure that all areas of the cities are adequately served. For instance, the 60 permits issued in the city of Riyadh are for specific areas and 85 specific parking spaces have been assigned to these permit holders. It then becomes a matter of agreement between the limousine companies and families wishing to use their services for its female members who require regular transportation to and from their jobs or their schools.

4.100 Fourth, a family driver may be employed. Most families in the Kingdom are now bringing in drivers from Third World countries with the permission of the government, and under specific regulations. The employment of these drivers has led directly to countless problems within the family and beyond. These drivers command high salaries. Living accommodation must also be provided. More often than not they do not understand Arabic or Saudi society.

Misunderstandings often arise which create problems for the families and the drivers.

4.101 Lastly, the male members of the family must be available to drive their female relatives to and from their places of work or study.

#### GOVERNMENT MANAGEMENT OF TRANSPORTATION

4.102 The transportation system in the Kingdom of Saudi Arabia is built, directed and supervised by the government and the entire system is managed and regulated by government agencies.

4.103 The railroad operating from the Arabian Gulf coast to the Central Region is under the management of the Saudi Government Railroad Organisation (SGRRO). Once approval has been given, this organisation may run the railway as it sees fit. For instance, it initiated the policy of offering family sections to the travelling public whereby a family is provided with complete privacy during the trip, separated from the rest of the passengers.

4.104 The government is involved in the operation of SAPTCO, the Saudi Public Transport Company, inasmuch as it is government which draws up the regulations and specifications for company operation. In this case, it is the Ministry of Communications which is the responsible agency. However, the company itself belongs to the private sector



and it alone is responsible for the maintenance of quality operations, including maintenance, personnel, schedules and programming.

4.105 The Ministry of Communications is the agency which issues permits to companies wishing to establish limousine services (special services) in the Kingdom. These companies provide the public with transportation within cities and to and from airports. Companies apply to the Ministry for a permit to operate within a specific city and if they meet all the requirements, a permit is issued. The two major cities in the Kingdom, Riyadh and Jeddah, are now oversupplied with limousine transportation services, but other cities and regions are still inadequately provided with such services. For instance, there is only one such company in the entire region of Alqassim. Other regions of the Kingdom are in need of the establishment of such services.

4.106 The operations of special limousine services are controlled and supervised by the MOC. Theoretically, each company is permitted to work only in a specific area within a city. However, the fact is that in practice this is not always the case and the MOC is unable to control affairs because it does not yet have the necessary trained staff to supervise affairs and follow up the punishment of violators. In addition to granting permits to limousine companies for special transportation services, the Ministry also licenses privately owned taxis to operate within and between the

cities. These taxis are also under the Ministry's supervision. The number of taxis operating in the Kingdom has been in decline since the establishment of special limousine transportation services.

4.107 The responsibility for the construction and maintenance of the nation's highway system lies with the Ministry of Communications. While generally speaking the municipality (under the authority of the Ministry of Municipality and Rural Affairs) of each city has the responsibility for the construction and maintenance of internal roads within their city limits, the Ministry of Communications takes responsibility for some of them. It also maintains district offices in the country's major regions and these offices take the responsibility for the management of the entire network of roads and highways within their districts. Staffed by a large number of well-qualified employees, these offices also have the responsibility for supervising the work of the highway and road consultants and contractors operating in their districts.

4.108 The growth of the region and the CCAAR (the study area) will be discussed in the next chapter.

**CHAPTER FIVE: GROWTH OF ALGASSIM REGION AND THE CENTRAL  
CORE AREA OF ALGASSIM REGION (CCAAR)  
(RESEARCH STUDY AREA)**

Since the study area (the Central Core Area of Algassim Region) forms one part of the Algassim region, the intention of this chapter is to present the growth of the region and to provide a full knowledge of the study area with regard to its function, advantages and future growth.

**INTRODUCTION**

5.01 The Kingdom of Saudi Arabia is divided into five main regions; they are as follows:

Central Region

Western Region

Eastern Region

Northern Region

Southwestern Region

5.02 The Central Region, from the point of view of government and administration, is the most important of the Kingdom's regions since the nation's capital is located therein. This region is made up of a number of regions among them being the Algassim Region which is one of the largest of these regions. The principal concern of this study is the Central Core Area of the Algassim Region (CCAAR). Buraydah is the largest of the region's cities, as well as being the regional capital and the location of all the regional headquarters of the central government.



5.03 All the provinces of Saudi Arabia have been subjected to extensive development as a result of the implementation of the Kingdom's development plans which have been financed by massive oil revenues.

5.04 This development has greatly affected growth and has had a dramatic impact on the social, economic and physical structure of all the provinces of the nation. From a social point of view, the most important phenomenon has been the mass movement of rural populations from their traditional areas to the cities even though modern agricultural equipment has been introduced into the rural areas and has resulted in the growth and development of huge commercial farms. The Saudi Arabian Agricultural Bank (SAAB) has played a major role in agricultural development. With regard to economic development, the Saudi Industrial Development Fund (SIDF) has been instrumental in promoting the establishment of manufacturing and business in general. The physical impact of this development on the traditional population centres of the region can be observed by taking a close look at the rapid and generally uncontrolled urban growth which has changed the very nature and form of these urban areas. These regions are now exclusively car-oriented and the traditional core areas of the population centres have mushroomed so that the cities have grown more or less indiscriminately and cover much larger physical areas than ever before.

## THE ALGASSIM REGION

5.05-----The Algassim Region is located within the Central Province as shown in Figure 1.01. It lies approximately 330 kilometres northwest of the capital, Riyadh, and covers an area of 50,820 km<sup>2</sup>. It is principally composed of plateaux (44%), hills (33%), dunes (14%) and valleys (7%). The remaining 2% of the region is composed of high plains (MOMRA, Socio-Economic Survey Of Villages And Hajar, 1984).

5.06 Early settlements in the region were established under conditions of extreme disorder, war and feuds. These settlements were usually surrounded by walls, as were the wells and agricultural lands on which the inhabitants depended for subsistence and, in effect, they were independent city states. The Algassim Region came under the influence of the Saudi State in 1190 A.H. although it remained a politically disrupted region until 1324 A.H. when it finally became an integral part of the territories ruled by the central government in Riyadh (MOMRA, Algassim Region Comprehensive Development Plan, 1983).

5.07-----The Algassim region is one of the major agricultural areas of the Kingdom since about 2% of its total land area is suitable for agriculture, although only 0.4% of the total is actually under cultivation. According to a 1984 study made by SOGREAH Consulting Engineers of France, the major crops of the area are: 48% winter cereals, mainly wheat;

25% fodder crops; 18% vegetables; and 9% palm groves and orchards.

5.08 According to the same study, the total cultivated area of the region is estimated to be about 20,000 hectares. The city of Bukayriah has the most land under cultivation in the region (29-30%), whereas the area under study (Buraydah/Unayzah) is third in this respect (12-16%).

#### DEFINITION OF THE REGION

5.09 In regional planning, there are three types of approaches to the definition of a region: the homogeneity of the region; the nodality of the region; and the region as a planning unit. Moreover, regions with a high degree of homogeneity are those which display a single dominant feature based on physical features such as topography or natural vegetation and features, such as water and economic resources or mineral exploitation. Nodal regions, however, are characterised by a central unifying bond within the region. For example, they may be defined on the basis of a local transportation system. A nodal region is an ideal planning unit from a local point of view because its structure is easy to understand and analyse and planners are able to build on existing structures (MOMRA, Algassim Region Comprehensive Development Plan, 1983).

5.10 A region may sometimes be designated as a planning unit because of arbitrarily designated administrative and



political boundaries. Correspondence between basic administrative areas and regional planning areas is vital if regional development strategies are to be implemented within an administrative and political context (MOMRA, Algassim Region Comprehensive Development Plan, 1983).

5.11 For planning purposes, the Algassim Region (see Figure 5.01) may be considered as a region where both homogeneity and nodality are in evidence. It is an agricultural area and therefore homogeneous and it is also a typical nodal region with the twin cities of Buraydah and Unayzah lying at the centre of the core area.

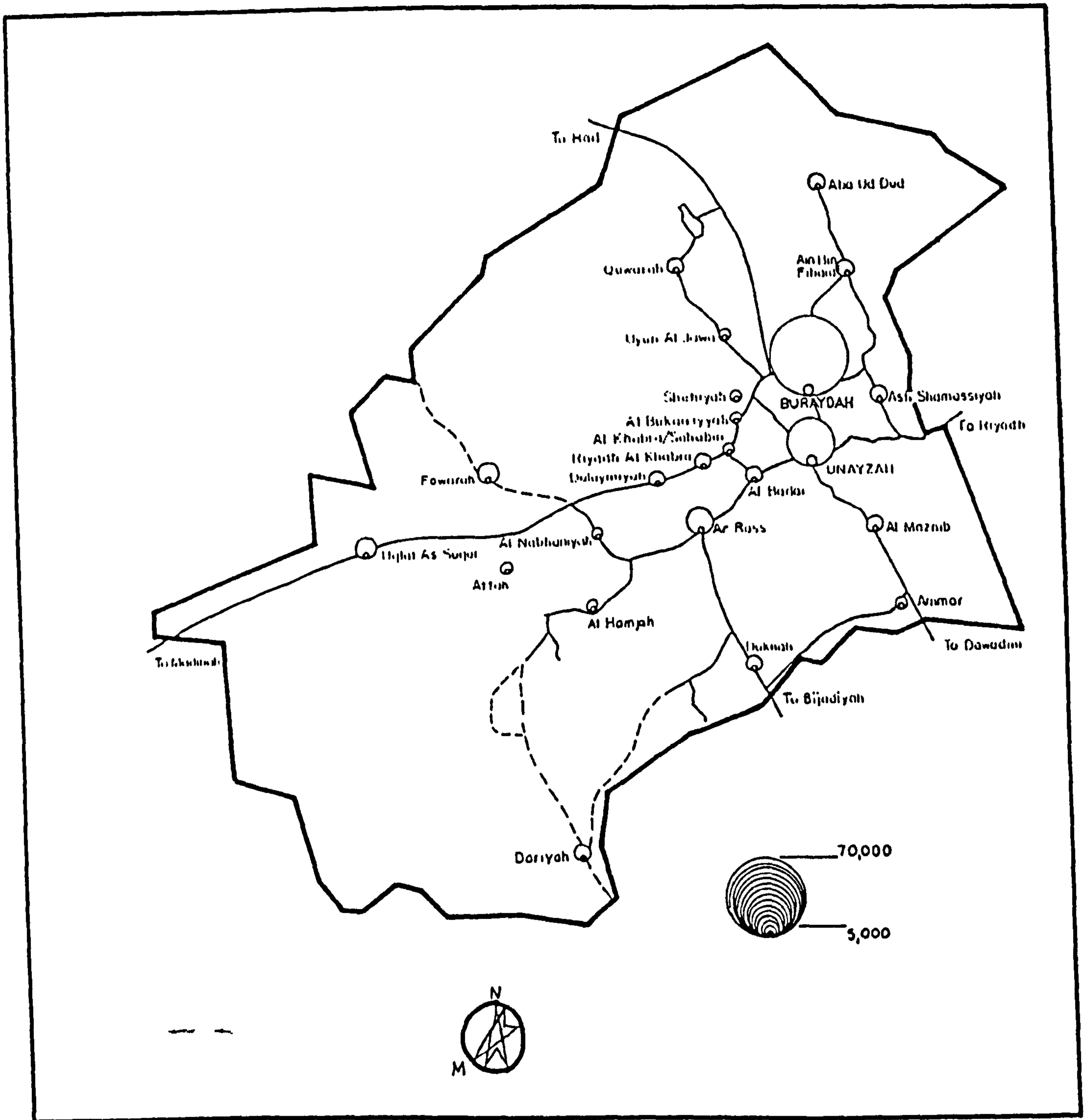
5.12 The Algassim Region is also a political and administrative unit, with its own governor who resides in the city of Buraydah. Other cities and towns in the region are governed by amirs (local governors) who are subject to the regional government in Buraydah.

#### POPULATION STRUCTURE

5.13 The only official document on population available is "The Official Population Census of 1394 A.H. (1974 A.D.)". However, this data is now seventeen years old which is a considerable period of time in view of the dynamic development of the Kingdom during this period.

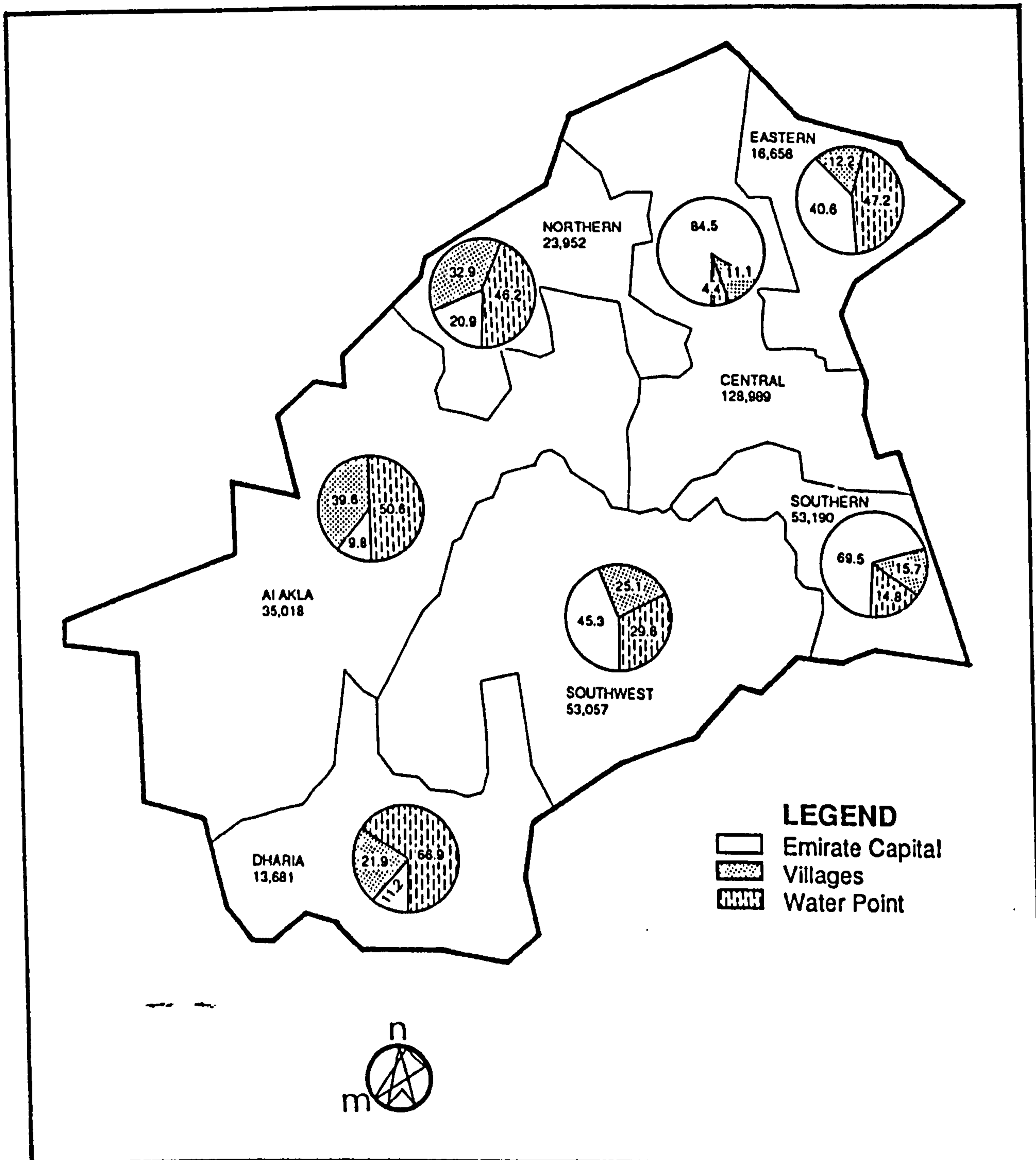
5.14 The census divides Algassim Region into seven sub-regions (see Figure 5.02): the Central, Northern, Southern,

**Figure 5.01 ALGASSIM REGION: EXISTING TOWNS AND SETTLEMENT PATTERN**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN," REPORT 1, REVIEW OF BACKGROUND INFORMATION, 1983, p.42.

**Figure 5.02 THE SUB-REGION OF ALGASSIM REGION AND THE POPULATION CONCENTRATION**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN," REPORT 1, REVIEW OF BACKGROUND INFORMATION, 1983, p.40.



Eastern and Southwestern regions, plus Al-Akla and Dhariya regions. The total population of the Algassim Region was estimated to be 324,523 with the central sub-region (CCAAR) having the highest number of inhabitants (128,989).

5.15 Only a very small portion of the land in the region has high population concentrations and this area is described by a triangle which encloses the three major towns: Buraydah, Unayzah and Ar-Rass. The populations of these three towns according to the 1974 census were estimated to be about 70,000, 27,000 and 12,500 respectively. A further estimation at that time was that one third of the population of the Algassim Region lived in this core area (MOMRA, Algassim Region Comprehensive Development Plan, 1983).

5.16 Other centres with a population ranging between three and seven thousand persons are the following: Riyadh Al-Khabra, Al-Bukariyah, Al-Midhnab, Al-Badaya and Shehiya. Figure 5.02 also illustrates existing towns and settlement patterns according to the census. With the exception of Al-Midhnab, all the above centres are located in or around the triangle formed by the towns of Buraydah, Unayzah and Ar-Rass.

5.17 According to the census, half the region's population was under 14 years of age and only four per cent (4%) were 65 years old or over, thereby indicating that the

population of the region tends to be overwhelmingly young (see Figure 5.03). Furthermore, the census revealed that there was an average of 106 men for each 100 women in the region. Thus, by applying the commonly accepted natural annual growth factor (i.e. 3%) to the 1974 population of the Algassim region (324,523), it is assumed that the 1990 population is approximately 480,294 persons.

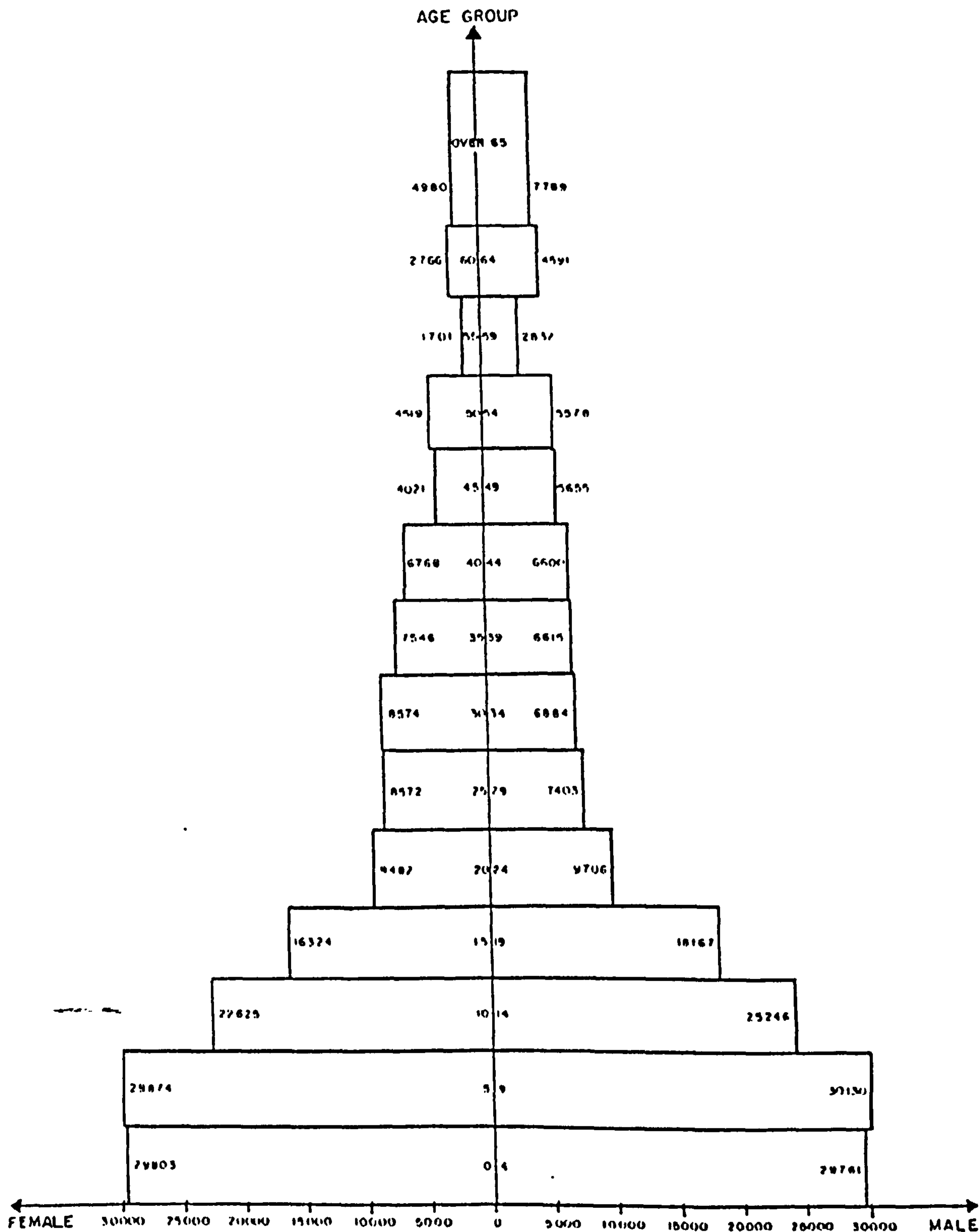
#### ADMINISTRATIVE STRUCTURE

5.18 The Algassim Region is one of fourteen (14) administrative areas in the Kingdom of Saudi Arabia. It covers an area of approximately 50,820 km<sup>2</sup> which represents 2.7% of the total area of the Kingdom.

5.19 As previously stated, this region is considered to be one of the main regions of the Central Province and its proximity to the nation's capital of Riyadh has given it a beneficial advantage with respect to many aspects of development.

5.20 The seven sub-regions of the region have nine municipalities which are located in the largest towns of the sub-regions: Buraydah, Unayzah, Ar-Rass, Al-Bukayriah, Al-Midhnab, Al-Badaya, Al-Assiyah, Riyadh Al-Khabra and Al-Khabra Al-Sahabain. Each is responsible for the provision of public services to all the towns and villages within their sub-region including social services, water, electricity, roads, etc.

**Figure 5.03 THE ALGASSIM REGION POPULATION BY AGE GROUP AND SEX 1394 A.H. (1974 A.D.)**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN," REPORT 1, REVIEW OF BACKGROUND INFORMATION, 1983, p.47.



5.21 In recent years, the Ministry of Municipal and Rural Affairs (MOMRA) has initiated the idea of cluster centres in various regions of the Kingdom. There are six such cluster centres in the Alqassim Region: Ash-Shamsiyah, Dariyah, Uyun al-Jawa, Al-Nabhaniya, Uqlat al-Sugur and Dukhnah. These clusters are located some distance away from major cities or towns and they have responsibility for providing basic utilities to the population centres surrounding them. But even with the creation of such centres, some villages and agricultural settlements are still not being provided with basic services such as telephone and postal services.

5.22 The city of Buraydah, which is located in the central part of the Alqassim Region is the site of ministerial and government branch offices for the sub-region. Branching off from Buraydah, however, there are sub-offices for those government organisations in towns such as Unayzah, Ar-Rass and Al-Bukayriah which have responsibility for their own areas.

5.23 The main responsibility of the municipality in Buraydah is the political administration of the entire region but it also has the ultimate responsibility for ensuring that all public demands for basic services are met. The sub-regional municipalities have the primary responsibility for the actual provision of services to the communities such as roads, building permits, electricity and water.

5.24 The Ministries of Communications (Transportation), Municipalities and Rural Affairs and Agriculture and Water all maintain offices on the general directorate level in Buraydah. However, on the sub-regional level, we may also find ministerial offices on the same level depending on the type of service which is being offered. In Unayzah, for example, the Ministry of Agriculture and Water maintains a large office on the directorate level which reports directly to the Ministry in Riyadh. The reason for this is that agriculture in the sub-region of Unayzah is large enough and important enough to warrant an office on this level.

5.25 A further example of this phenomenon in the Alqassim Region is provided by the Ministry of Education which maintains two offices on the directorate level, one each in Buraydah and Unayzah. Both these offices report directly to the ministerial headquarters in Riyadh.

#### GROWTH IN TRANSPORTATION

5.26 An intra-city bus service was introduced in the region in 1985-86 but not many Saudi citizens actually took advantage of it. By 1988, this bus service connected most of the principal cities of the Alqassim Region with other cities in the Kingdom, including the Hail Region (MOC, Fifth Plan 1990-1995). The inter-city bus service is more popular than intra-city bus services. The Saudi Arabian Public Transport Company (SAPTCO), which operates the nation-wide bus service in the Kingdom, is very much dependent on the

patronage of the huge number of foreign workers from Asian countries such as India, Pakistan, the Philippines, etc, in order to make the services they provide both feasible and profitable. Saudi citizens use the bus system to a much lesser extent.

5.27 As of October 1987, SAPTCO operated nine different bus routes in the Algassim Region: four routes serve the city of Buraydah; two routes serve the city of Unayzah; and three routes ply between Buraydah, Unayzah and Ar-Rass. These last three routes also service the towns of Al-Bukayriah, Al-Khabra, Riyadh Al-Khabra and Al-Badaya, as well as the Algassim Airport (SAPTCO, 1987). Future SAPTCO plans are to add more routes to the existing ones and to extend services to other towns and villages.

5.28 The highway system in the Algassim Region was greatly expanded during the 1980s. Due to its geographical position in the Kingdom, as well as its importance as a prime agricultural area, the region was given special attention in respect of road construction.

5.29 The agricultural nature of the region required an adequate road system in order to enable the farmers to transport their agricultural products to market. The government of Saudi Arabia, realising this, has invested huge sums of money to develop a major network of highways (see Figure 5.04).



**FIGURE 5.04 ROAD CONSTRUCTION TRENDS IN ALGASSIM REGION IN 1983**



**SOURCE: MINISTRY OF COMMUNICATIONS AND MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN," REPORT 1, 1983, p. 97.**

5.30 In the mid 1980s, the region was linked to the city of Riyadh by an excellent 350-kilometre motorway. The region is already linked by good asphalted highways to the Hail Region in the north and to the Al-Madinah Region in the west. During the period 1990-1995, the Ministry of Communications (Transportation) is planning to construct a motorway from Algassim Region to Al-Madinah (second holy place). The motorway to Al-Madinah will cover 500 kilometres while the one to Hail will cover 260 kilometres. These new motorways (if constructed), in addition to the Riyadh/Algassim motorway which is already in place, will complete the linkage of the Algassim Region to the rest of the Kingdom and beyond, thus making it eminently accessible through a series of high-quality highways, and replacing the old asphalted roads.

5.31 Over the twenty year period (1968-88) the growth of the road network in the Algassim Region, whether primary, secondary or feeder and agricultural roads, has been phenomenal. In 1970, the total length of asphalted roads in the region did not exceed 600 kilometres. This number doubled by 1980 as a result of the boom in the economy during the seventies, when the Kingdom began its massive development. Special emphasis was given to the construction of agricultural roads in the region with a view to its essentially agricultural nature, and a total of 509 kilometres of agricultural roads were built during the period 1980-88, whereas the total length of roads (primary,

secondary and feeder) built during this period was 2,045 kilometres. At the end of 1988, the total length of the roads in the region, including the agricultural roads, was 2,981 kilometres (MOC, Planning Department, 1990).

#### CENTRAL CORE AREA OF ALGASSIM REGION (CCAAR)

##### THE STUDY AREA

5.32 Historically, the earliest settlement in Algassim was Unayzah which was founded in 620 A.H. (1210 A.D.) (see Figure 5.05). Buraydah was not established until 958 A.H. (1538 A.D.). Many of the Algassim settlements were created by members of a single nomadic tribe of Bedouin who were later joined by members of other tribes (MOMRA, Algassim Comprehensive Development Plan, 1983).

5.33 Until this century, Buraydah was a city surrounded by protective encircling walls but they were destroyed to make room for modern growth.

5.34 Unayzah was built around an oasis, and there are many historical references to this oasis in the ancient poetical literature of the region. The village of Unayzah gradually established itself around this oasis which became the pattern for the establishment of other villages in the region. These villages grew as the nomadic population of the area came to settle alongside the original inhabitants. Eventually these villages became urbanised and agriculture



Figure 5.05 UNAYZAH IN THE 1930'S



Source: DAGHISTANI, A. KINGDOM OF SAUDI ARABIA AND A CENTURY OF PROGRESS,  
JEDDA, 1983, p.85.



and trade became the basis of the people's lives (AlNowaiser, 1983).

5.35 The Buraydah/Unayzah area lay astride the main trade routes coming from points in Southern Arabia and going toward Iraq and Kuwait in the north, as well as on the route to the important shrine and pilgrimage cities of Makkah and Al-Madinah. In time, these two settlements became the centre of an important agricultural zone where a system of agriculture and markets was developed which was complementary to the requirements of the surrounding nomadic population. The growth of this area has been steady, particularly since 1320 A.H. (1900 A.D.) when Buraydah overtook Unayzah as the main town of the region (MOMRA, Algassim Comprehensive Development Plan, 1983).

#### THE ADVANTAGES OF THE LOCATION

5.36 The location of the CCAAR makes it the natural core area of the region, an area which is linked by asphalted motorways to all the main towns in Algassim as well as to all the other regions of the Kingdom. This area is centrally located in the eastern half of Algassim and the site is generally flat although contained by an escarpment to the east and a belt of sand dunes to the west which have forced the development of Buraydah toward the wide plains which lie north of the city.

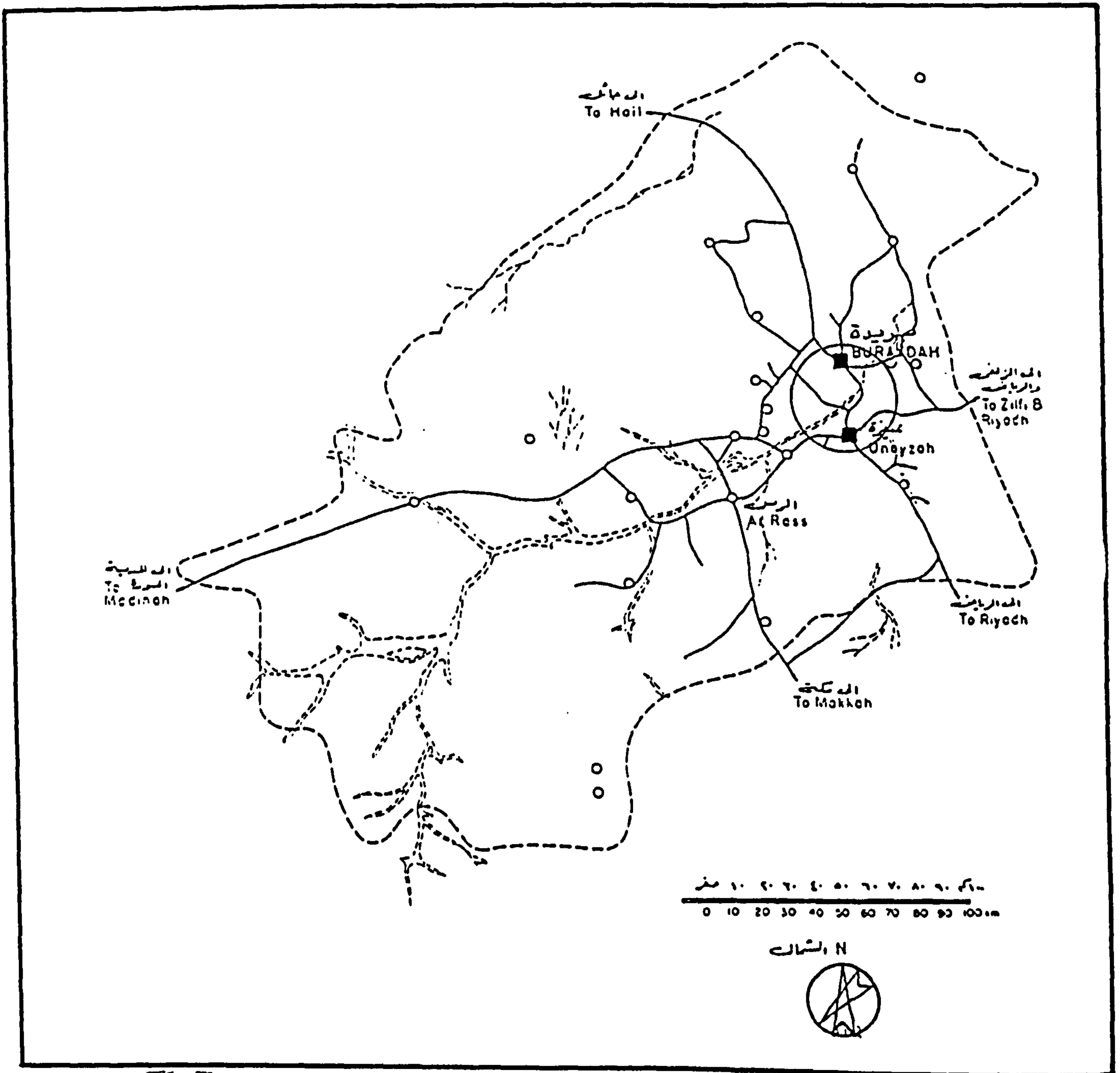
5.37 Unayzah is the second largest city in Algassim and it is situated in the centre core area of the region about 30 kilometre south of Buraydah. It has a valley setting between sand dunes and agricultural areas to the west, and a low escarpment to the east. Wadi ar-Rimmah, which is considered one of the major wadi systems in the Kingdom, is the dominant physical feature of the Algassim Region. It passes within five kilometres of the northern limits of the city. This wadi, along with the underlying groundwater, is the source of water supply which led to the early settlement of Unayzah (Norconsult A.S., 1984). Thus, the location of the CCAAR (see Figure 5.06) has three primary advantages:

- a. It is the focal point of the region's primary road network;
- b. It is near the other main urban centres of Algassim; and
- c. The area, taken together, forms a development core of Algassim.

5.38 Compared with other parts of the Kingdom, the Algassim Region has a developed road network. The backbone of this network consists of a north-south route from Hail to Riyadh and an east-west route from Riyadh to Al-Madinah. These two national roads meet in this area and make it a focal point of the road network.



Figure 5.06 LOCATION OF THE C.C.A.A.R. WITHIN ALGASSIM REGION



○ C.C.A.A.R.

Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN," REPORT 5, VOLUME 3, NORCONSULT A.S., OCTOBER 1984, p.27.

## FUNCTION OF CCAAR

5.39 In its role as the capital as well as the largest city of the Alqassim Region, Buraydah (see Figure 5.07) functions as the regional headquarters. Support services for the agricultural sector are centred in Buraydah which strengthens its role as the regional centre.

5.40 Once the government chose Buraydah to be the regional capital, more and more government offices were established in the city and in fact government is now the employer of more than 45% of the population, compared to only 32% for the entire region (Norconsult A.S., 1984).

5.41 The great mercantile organisations in the Kingdom have also established branch offices in Buraydah, giving it the air of a solid trading centre, and more and more local citizens are becoming involved in commerce. This is in keeping with the age-old commercial traditions of the city which, along with its sister city of Unayzah, was an honourable trading centre centuries ago as a result of its favourable location.

5.42 Recently, Buraydah has strengthened its position as a significant centre of religious education in the Kingdom.

5.43 Until this century Unayzah was the largest settlement in the region, as well as the most important commercial and agricultural centre. But, when Buraydah was



**Figure 5.07 BURAYDAH, THE ADMINISTRATIVE CAPITAL OF ALGASSIM REGION**



**Source: MINISTRY OF INFORMATION, FOREIGN INFORMATION.**



chosen as the regional capital by the central government, this position began to change in favour of Buraydah. However, both cities continue to maintain a commercial and mercantile importance for the entire country.

5.44 Unayzah (see Figure 5.08), like Buraydah, is located on a major route to the holy places of Makkah and Al-Madinah. But once Buraydah was selected as the regional administrative capital, it was only a matter of time until its importance exceeded that of its sister city.

5.45 In the Kingdom's Third Five-Year Development Plan (1980-85), the city of Unayzah was designated as a "district centre". This designation had greatly enhanced both the commercial and administrative importance of the city and both the government and private sectors are beginning to increase their activities in the city. However, Unayzah still maintains its importance as an agricultural community as testified by the existence of its many small farms and plantations (see Figure 5.09).

#### POPULATION GROWTH

5.46 The official government census of 1974 gave the total population of the twin cities as 96,914 persons (Buraydah: 69,924, Unayzah: 26,990). In 1983, a population survey conducted by Norconsult A.S. indicated that the twin cities then had a total population of 154,428, Buraydah: 107,546 and Unayzah: 46,822 (see Tables 5.01 and 5.02).



Figure 5.08 UNAYZAH, A DISTRICT CENTRE AND SECOND LARGEST CITY OF THE REGION





**Figure 5.09 AGRICULTURAL FARMS WITHIN THE RESIDENTIAL AREAS OF UNAYZAH**



Item	Value
Area	10,000
Volume	10,000
Net Adjusted Total	10,000
Adjusted Total	10,000

Includes various types of agricultural farms within residential areas of Unayzah.

Source: Ministry of Urban Planning and Construction, Unayzah Municipality, Unayzah Urban Development Plan, Report 2, Volume 1, Unayzah Urban Development Authority, Unayzah, 1990.



**TABLE 5.01: Buraydah Population Growth according to Sex:  
1394-1403 A.H. (1974-83 A.D.)**

SEX	1394 A.H. (1974) PERSONS	1403 A.H. (1983) PERSONS	ANNUAL INCREASE (PER CENT)
Male	36,820	56,882	4.95
Female	33,104	46,960	3.96
Non-Adjusted Total	69,924	103,824	4.5
Adjusted Total	69,924	107,546*	4.9

\* Includes persons living in company compounds, hospitals, military areas, airports, etc.

Source: Kingdom of Saudi Arabia, Ministry of Municipal and Rural Affairs, Deputy Ministry for Town Planning, "Algassim Region Comprehensive Development Plan", Report 2, Volume 2, Section 1.0, "Buraydah: Existing Conditions", September 1984, p.4.

**TABLE 5.02: Unayzah Population Growth according to Sex:  
1394-1403 A.H. (1974-83 A.D.)**

SEX	1394 A.H. (1974) PERSONS	1403 A.H. (1983) PERSONS	ANNUAL INCREASE (PER CENT)
Male	13,945	23,650	6.05
Female	13,045	22,132	6.05
Non-Adjusted Total	26,990	45,782*	6.05
Adjusted Total	26,990	46,882	6.3

\* Includes persons living in company compounds, hospitals, military areas, airports, etc.

Source: Kingdom of Saudi Arabia, Ministry of Municipal and Rural Affairs, Deputy Ministry for Town Planning, "Algassim Region Comprehensive Development Plan", Report 2, Volume 2, Section 1.0, "Buraydah: Existing Conditions", September 1984, p.5.

5.47 As these two tables indicate, there were population increases of 37,532 in Buraydah and 19,892 in Unayzah during this period. This means that an additional 57,524 persons then inhabited the metropolitan area of the twin cities.

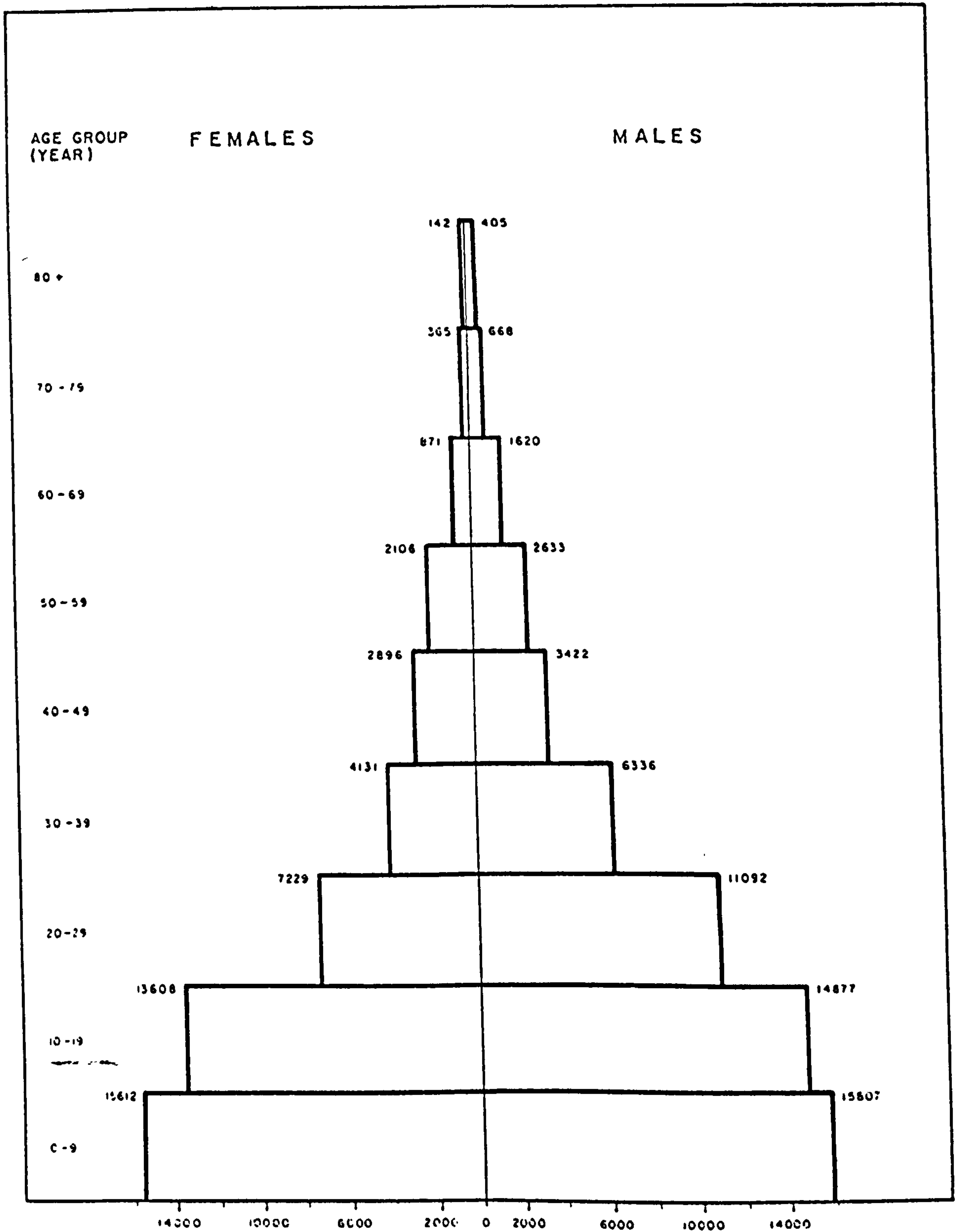
5.48 The Norconsult A.S. socio-economic survey (1983) reveals the following characteristics of the population structure of the CCAAR:

1. The population of Buraydah was young, with 59% being under 20 years old compared to less than 4% of the population of 60 years or more (see Figure 5.10);
2. Over 54% of the population in Unayzah was less than 20 years old and only 4% was 60 and above (see Figure 5.11); and
3. There was a preponderance of males over females in the area, especially in the 20 to 39 year old age group where the ratio of female to male was 1:1.5 in Buraydah and 1:1.91 in Unayzah.

#### ECONOMIC STRUCTURE

5.49 The Algassim Region is one of the few agricultural regions in the Kingdom of Saudi Arabia where a sizeable proportion of the population is dependent on agriculture for its livelihood. Many varieties of fruit and vegetables are grown on the farms of the region with dates being by far the

**Figure 5.10 BURAYDAH, POPULATION BY AGE GROUP AND SEX 1403 A.H. (1973 A.D.)**



Source: KINGDOM OF SAUDI ARABIA, MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, "ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN, "REPORT 2, VOLUME 2, SECTION 1.0, NORCONSULT A.S., SEPTEMBER 1984, p.7.



PAGE  
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ORIGINAL

largest crop. The "sukary" and "barhy" type of dates of this region are in high demand throughout the Kingdom.

5.50 Before the discovery of oil, the region was known as a trading area, largely due to its favourable geographical position. Many of the people of this area, especially from Buraydah and Unayzah, have traditionally travelled to neighbouring countries such as Iraq, Syria and Jordan in search of commerce and trade. The region is also known for its stock-breeding, camel-breeding and local craftsmen.

5.51 Bollens and Schmandt (1982, p.66) explained that:

"... the most important single determinant of social well-being and growth in any metropolitan area or region is the level of production and expansion in the national economy. A rise or decline in the rate of production for the country as a whole will be reflected in varying degrees among its parts. When the nation surges ahead economically, most of the regions evidence substantial growth; when the nation lags, so do the regions."

5.52 Between the time of the discovery of oil in the Kingdom in March 1938 and 1990, the greatest period of growth experienced by the Kingdom of Saudi Arabia occurred between 1974 and 1980. During this period, the government instituted massive economic development plans for the purpose of modernisation. No field of endeavour was

neglected but special emphasis was placed on transportation, housing, industrialisation and agriculture.

5.53 Also during this period, all regions of the Kingdom developed in a very dramatic way and phenomenal progress was made in all fields. Thus the economic boom of the seventies was a time of great change in the Kingdom and the Algassim Region very much benefited during this period.

5.54 The importance of the founding of the Saudi Arabian Agricultural Bank (SAAB) and the Saudi Industrial Development Fund (SIDF) cannot be over-emphasised. It was through these two institutions that the government distributed interest-free loans to citizens involved in developing agricultural projects of all kinds and to establish factories and industries for the production of almost any type of goods. The total effect of these two institutions on the Saudi Arabian economy was immense, almost incalculable.

5.55 Today, agriculture remains the primary economic activity of the Algassim Region as a whole but on a much greater scale than in past years. The introduction and expansion of dairy farming and vegetable production have in particular become vital economic factors of Kingdom-wide importance and the introduction of the most advanced farming technology has increased the productivity and the quality of



the agricultural production of Algassim and thus enhanced its economic position beyond recognition.

5.56 The branch office of the Saudi Arabian Agricultural Bank in the Algassim region financed approximately 130 major agricultural projects from the time it was founded in 1965 until 1985. During the same period, it granted 42,158 loans with an approximate value of four billion Saudi riyals (Ministry of Information: Algassim Growth and Development, 1985). And according to the SAMA (1987), about 1,330 agricultural loans were granted by the bank with a value of approximately 316 million Saudi riyals in 1986 alone.

5.57 The Algassim region as a whole does not greatly depend on industry as an economic base although the government has very much encouraged the public to participate in industrial production as a tool of economic development. Through the SIDF, an individual may obtain an interest-free loan to enable him to establish an industrial unit for the production of most types of materials or goods. SIDF has granted loans for the establishment of manufacturing units in many fields such as leather production, wood and paper products, printing materials, etc. Factories for producing other commodities such as beverages, food and textiles have also received generous loans. In the Algassim Region as of 1988, SIDF distributed industrial loans amounting to 572 million Saudi riyals, according to the 1988 SIDF report.

5.58 The major industries of the Kingdom of Saudi Arabia are located in urban centres and, with the exception of the huge petrochemical industries located in Jubail and Yanbu, these industries are mainly concerned with the transformation of raw materials, both local and imported, into manufactured goods for the domestic market. However, the government, in keeping with the objectives of its national development plans, is attempting to make an equitable distribution of the benefits of development to all areas of the Kingdom, including even its most remote areas.

5.59 The economic and agricultural characteristics of the CCAAR are unite in Saudi Arabia. It has an excellent location for further development, particularly in agriculture, as a base for economic activities. Therefore, many suppliers of agricultural equipment and other farming necessities maintain offices in the area to supply the farmers' needs in the entire region.

5.60 The area is host to Algassim Industrial City located in the GSA between the twin cities. In addition, there is a great variety of large, medium and small trading companies which supply the necessities for businesses and homes. There is also the normal quotient of other support businesses such as auto repair shops, light industrial units (plastics, paper, etc), and commercial/retail outlets.



## LOCATION OF ACTIVITIES

5.61 . . The activities of the various branches of the government in Saudi Arabia have a tremendous impact on the pattern of urban and regional development and there can be no doubt that the government offices with major capital expenditure programmes have a direct effect on the physical growth of the Kingdom's towns and cities. For instance, the administrative capitals of the various regions, the locations of schools, universities, hospitals, public housing, government offices, roads and airports, all exert a great influence on the way in which urban areas develop. Thus, the Ministries of Communications (Transportation), Municipal and Rural Affairs, Planning, Education and Public Works and Housing all fulfil most important roles in the urban development process.

5.62 In the Alqassim Region, there are 348 villages and 120 small agricultural settlements, many of which are still in need of basic services such as roads, electricity and schools.

5.63 . . . The Central Core Area dominates the region and the fact that not more than 30 kilometres separate the twin cities of Buraydah and Unayzah has given them a great advantage over the rest of the towns in the region as well as the fact that they are the largest of its cities.

5.64 However, in spite of being the capital where most government offices are located, Buraydah does not totally dominate the entire region. Unayzah, which is part of the CCAAR and the second largest city in the region, as well as Ar-Rass, the third largest city in the region, are home to a number of government offices.

5.65 In this way, most of the principal activities of government administered within the region take place within the Buraydah/Unayzah area in the CCAAR. The Algassim Airport, opened in 1964, with both local and international services, is located in close proximity to the CCAAR, as are the new campuses of the two regional universities, the Islamic University being situated at the mid-point of the Buraydah/Unayzah main road and the King Saud University (Algassim campus) near the airport. The College of Agriculture and Veterinary Science of King Saud University is currently located in Buraydah, while the College of Administrative Sciences and Economy is in Unayzah. These colleges serve the entire Algassim Region. With respect to institutions for higher learning for women students, in Buraydah there is a College of Education for Women, while in Unayzah there is a Women's Junior College. In addition to the above, there is the usual complement of elementary, intermediate and secondary schools for both boys and girls.

5.66 There are a number of institutions serving agriculture in the CCAAR. Among them are the Saudi Arabian



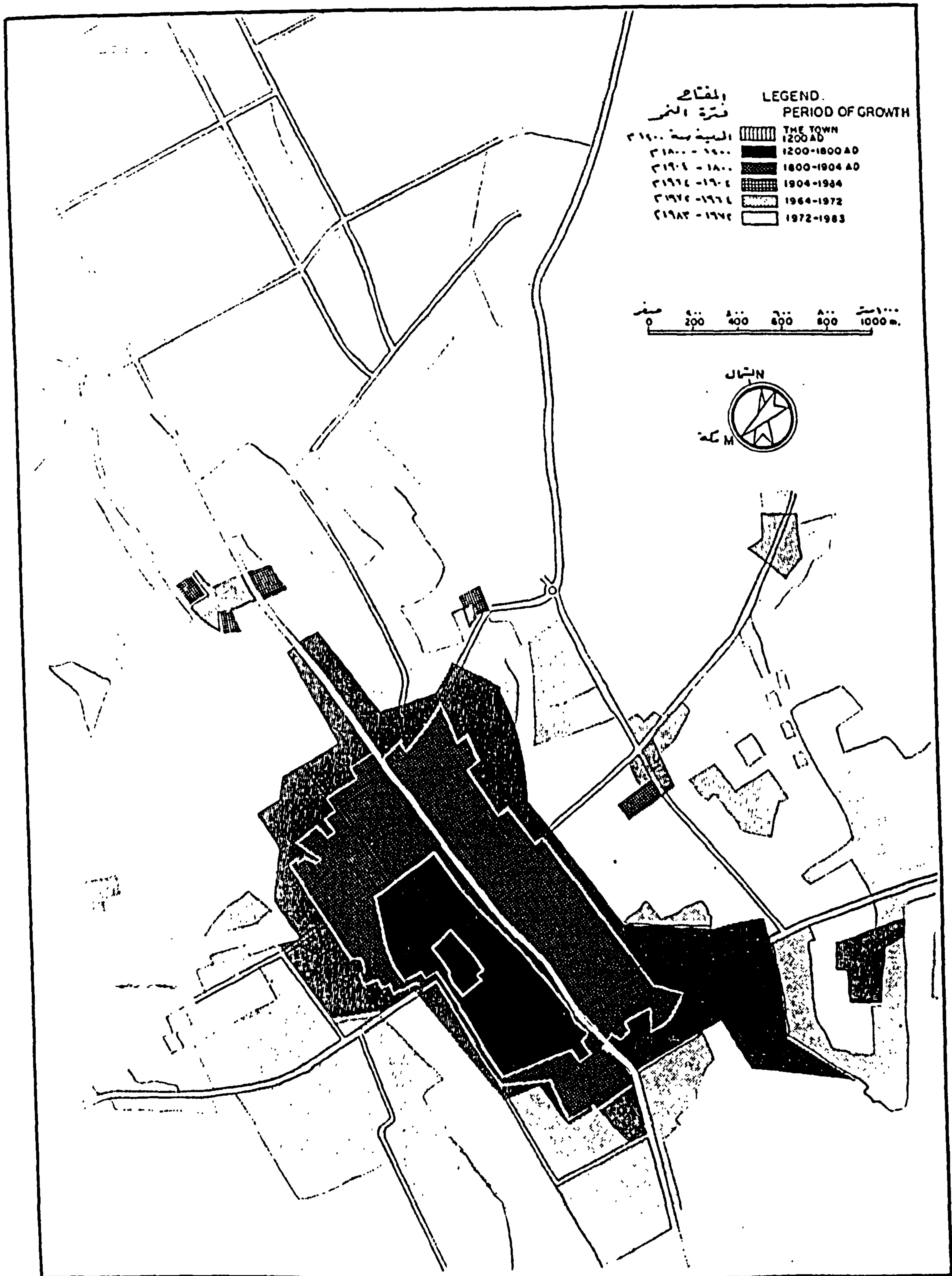
Agriculture Bank (Buraydah); the Directorate for Agriculture and Water (Unayzah); the Branch Agricultural bank (Unayzah); the Algassim Agricultural Research Centre (Unayzah); the Agricultural Training Centre (Unayzah); the Hydrological Research and Meteorological Centre (Unayzah); the Secondary Industrial Institute (Unayzah); the Technical Agricultural Institute (Buraydah); and the Water Purification Station (Buraydah). In the area, there is also an Industrial City, the Algassim Medical Factory and the Algassim Mineral Water Plant.

5.67 The CCAAR also has a number of social and cultural centres as well as centres for health and medical services, a complete banking system, public libraries, a television station, the usual municipal services and philanthropic services.

#### FORECASTS OF FUTURE GROWTH

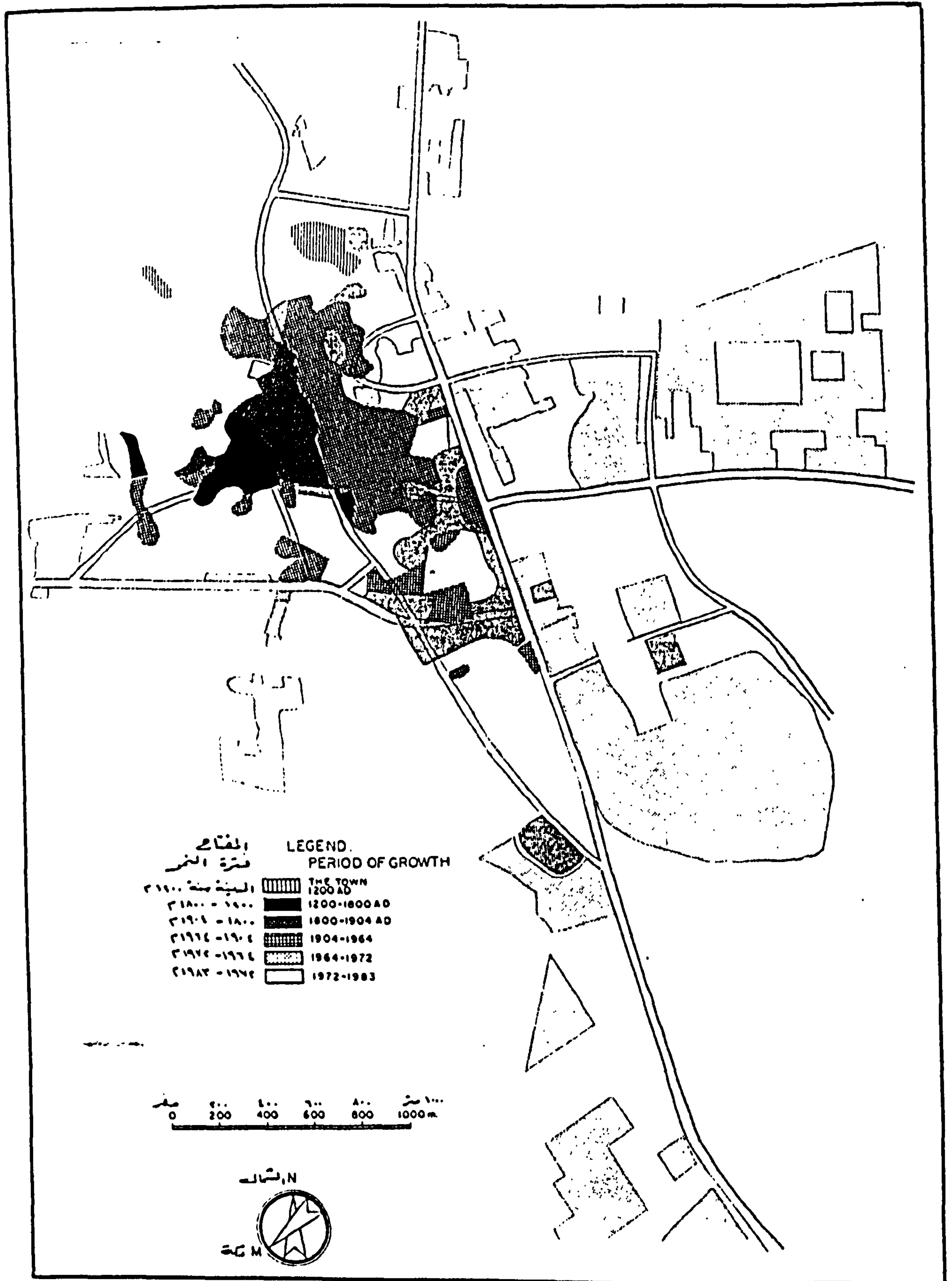
5.68 The commercial area of the city of Buraydah will expand southwards toward Unayzah while residentially it will expand in a northerly direction towards the region of Hail, there being barriers to expansion to either the east (shallow escarpment) or the west (sand dunes). The city of Unayzah will gradually extend itself eastward and southward since the wadi in the north and the large planted areas and sand dunes in the northwest and west prevent expansion in these directions. Both cities' period of growth are shown in Figure 5.12 and 5.13.

Figure 5.12 BURAYDAH PERIOD OF GROWTH 1200 - 1983.



SOURCE: NORCONSULT A.S., ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN, REPORT 2, VOLUME 2: BURAYDAH, 1984, pp. 3-4.

Figure 5.13 UNAYZAH PERIOD OF GROWTH 1200 - 1983



SOURCE: NORCONSULT A.S., ALGASSIM REGION COMPREHENSIVE DEVELOPMENT PLAN, REPORT 2, VOLUME 2: UNAYZAH, 1984, pp. 3-4.



5.69 It is predicted that the population of Buraydah will reach 250,000 by the end of 2005 A.D. while the population of Unayzah is expected to reach 100,000 in the same year, thus bringing the total CCAAR population to 350,000, according to Norconsult A.S. (1984).

5.70 The expected CCAAR population growth will be due to a number of factors. Firstly, migration to urban areas will be a continuing process. Secondly, the central government in Riyadh is expected to increase its investments in the CCAAR, therefore laying the groundwork for expansion. It is further expected that Buraydah will become increasingly important as an administrative centre for local government, while Unayzah's importance will increasingly lie in its role as a commercial and social services centre.

5.71 The major change which is foreseen for Unayzah is that, in line with the current government policy of centralising administrative facilities in Buraydah, there will be a gradual weakening of its administrative function and the replacement of this function by strong commercial and cultural activities. However, both towns will retain a certain level of administrative duties in accordance with their status as "direct centres" and they will both benefit from the projects to be built in the metropolitan area.

5.72 There are regional projects which are already benefiting the CCAAR and they are expected to continue to

stimulate growth. Among them are the following:

- a. The Algassim Industrial city: this city, located between Buraydah and Unayzah (GSA) has had a great effect on the industrial development of the region with its fifty or so factories of different kinds. It is regarded as a medium-to-long term development strategy for the entire region which attempts to diversify the area's economic activity, thereby lessening its dependence on agriculture alone.
  
- b. The King Saud University (Algassim campus) is currently under construction near the Algassim Airport to serve the entire region. With an area of eight million square metres, this centrally located institution is expected to attract thousands of students and thus add to the growth of the CCAAR. When construction has been completed, the two colleges now located in Buraydah and Unayzah will move to the new campus and more colleges are expected to be added to the university.
  
- c. The Iman Mohammad bin Saud University, an institution devoted to the teaching of the Islamic religious sciences, also has a new campus in the CCAAR. It is located near the Industrial Area and it, too, attracts many students who in turn add to the growth of the area.

- d. The importance of the CCAAR as a primary hub of transportation in the road network of the Kingdom will be greatly enhanced when the following road projects are completed: the Riyadh/Al-Madinah motorway which passes between the twin towns; the Algassim/Hail motorway; the Buraydah Ring Road; and various Algassim interior road projects.
- e. The capacity of the major existing facilities in the area (i.e. the airport, the cement plant, the power plant, etc) is expected to be expanded in the future and this will encourage greater overall growth in the area. But the fact still remains that both the city of Buraydah and the city of Unayzah will continue to benefit from their locations. Thus the further urbanisation of the CCAAR and the development of its industrial and commercial activities will generate a self-sustaining momentum which will further widen the development gap between the CCAAR and the other parts of the Algassim Region.

5.73 If the government continues its current policy of heavily encouraging and supporting the nation's industrial and agricultural development, the CCAAR is likely to experience tremendous growth in the next few decades and if present trends continue, it will become one of the most highly urbanised metropolitan areas in the Kingdom of Saudi



Arabia. A discussion of the planning and management of transportation, in addition to the strategies and their effectiveness, will follow in the next chapter.

CHAPTER SIX: PLANNING AND MANAGEMENT OF TRANSPORTATION IN  
THE CENTRAL CORE AREA OF ALGASSIM REGION  
(CCAAR)

INTRODUCTION

6.01 This chapter will focus on the planning and management of transportation with specific reference to the social and economic impacts of the system. Existing strategies for transportation in the Central Core Area of Algassim Region (CCAAR) in particular will be dealt with, followed by some discussion of strategies in the area.

6.02 According to Morlok (1978, p.31):

"... transportation is an integral part of the functioning of any society. It exhibits a very close relationship to the style of life, the range and location of productive and leisure activities, and the goods and services which will be available for consumption. Thus, the introduction of new or improved technologies of transportation has been very closely correlated with the development of modern civilization. While many historians and others have tended to view this as a simple cause and effect relationship, which is to say that the development of new transportation technology has not only enabled but also caused changes in the societies which use that technology, this is surely an oversimplification. In many instances, new requirements for transportation have led to the development of new technology which could meet those emerging needs. Transportation is such an integral

part of almost all human activities that, in principle, it is impossible to differentiate completely between cause and effect. Rather, advances in transportation have made possible changes in the way in which we live and the way in which societies are organized, and thereby have influenced the development of civilization."

6.03 The transportation system as a whole is composed of a set of elements in which there are inter-relationships between these elements and their attributes. The elements of a transportation system can be broadly defined as: (1) modes of transportation; (2) the transportation infrastructure; and (3) land and the uses to which it is put. In addition, the system itself exists to move people and objects from one place to another. Any change occurring in one of these elements could perhaps affect the other elements. Such effects may be either beneficial or detrimental.

6.04 The primary objective of the system is to move people and objects from one place to another. Such movement is effected through the employment of either private vehicles or public vehicles such as buses, taxis and rapid transport.

6.05 With the development of advanced transportation technologies, especially rapid transit systems, fast trains have been introduced into Europe, Japan and North America,



thus making it easier for people (employees, shoppers, tourists, etc) to travel from one point to another.

6.06 In Saudi Arabia, people still rely heavily on their private vehicles. The reasons for this phenomenon have been outlined in Chapter Three of this research paper. However, as time goes by and with an ever-increasing population and the resultant expansion of the urban areas, the introduction of modern modes of transportation such as the rapid transit system and the underground train may well become a necessity if only on a minimal basis.

#### PLANNING FOR TRANSPORTATION

6.07 The two most important factors in putting a transportation system in place and then maintaining it are: (1) planning the system and, once it is operational, (2) ensuring that it has proper management. Without these two elements, it will not be a reliable and efficient system.

6.08 Morlok (1978, p.171) stated that:

... the natural hierarchy which exists among the various components of the complete planning effort is one of the most important characteristics of almost all planning. The basic structure of a hierarchy is that there are many different levels of activity and each level involves a number of activities." (see Figure 6.01)

**Figure 6.01 THE HIERARCHICAL STRUCTURE OF TRANSPORTATION PLANNING**



SOURCE: EDWARD MORLOK, INTRODUCTION TO TRANSPORTATION ENGINEERING, 1978, p. 172.

6.09 From Figure 6.01, it can be seen that priority in the hierarchy of activities is given to national planning which is concerned with the overall economic development of the nation and its transportation infrastructures. The next level in order of priority is concerned with comprehensive regional planning but does not include the transportation system itself. Rather this level is concerned with land use patterns which leads directly into regional transportation planning. On the next level comes planning for transportation in specific sub-areas. This is followed by planning for particular facilities. Finally, there are the operational plans for these facilities.

6.10 Alternative hierarchies exist, but this particular hierarchy is an accurate reflection of how the transportation system actually relates to its environment.

6.11 Long-range planning is the target of efficient transportation planning because long-range plans are essential in implementing most major changes in the transportation system and it is understood that all long-range planning must take the maximum benefits of the society into consideration as it looks into the future. However, it does not follow that a long-range plan for a transportation system in a region or an area must be implemented according to the letter of the original plan. Changes may occur in the area as other development takes place. Therefore, in drawing up the plan in the first place, it is obligatory to



co-ordinate with others in respect of land use in order to ensure maximum efficiency with the minimum change in the basic plan (Morlok, 1978).

6.12 In the Kingdom of Saudi Arabia, the entire process of transportation planning was developed rapidly because of the rapid growth in the population and the subsequent urbanisation. The Saudi government, through the Ministry of Municipal and Rural Affairs, continues to conduct on-going comprehensive long-range planning for every region in the Kingdom. Transportation planning is part of this on-going planning process. Undoubtedly, as a result, socio-economic factors are the decision makers for any given region or metropolitan area to select the best and most efficient transportation system.

#### MANAGEMENT FOR TRANSPORTATION

6.13 Having been well planned and properly put into operation, any transportation system must then be maintained through efficient and practical management. If it is not, then its survival is limited and its efficiency will be marginal.

6.14 According to Morlok (1978), the basic concept of a transportation management system (TMS) is to bring together the managerial units concerned with the various parts of the urban transportation system and to foster co-operation in much the same manner that comprehensive regional planning

has already led to joint decisions regarding any major capital expenditure or new facility improvements anywhere within the system. The primary objective of the unification of the management of publicly-owned portions of the transportation system, which usually consists of the road network, major facilities, and the public transit system. However, through the control over use of roads, there is also some degree of control over private carriers such as bus lines and taxicab companies whose operations also influence the overall quality of traffic flow.

6.15 In addition, built into the concept of the transportation management system is a hierarchy which has managerial priorities which clearly define responsibilities. However, the responsibility for major policies regarding traffic movement in the region lies at the very top of this hierarchy. This includes decisions regarding the major road network and the public transit system in the region, as Morlok (1978) added.

6.16 There is, however, another way of defining the concept of a transportation management system and it is succinctly described in a regulation of the federal government of the United States of America (1975):

"Automobiles, public transportation, taxis, pedestrians, and bicycles should be considered as elements of one single urban transportation system. The objective of urban transportation system

management is to co-ordinate these individual elements through operating, regulatory and service policies so as to achieve maximum efficiency and productivity for the system as a whole." (Cited in Fondriest, 1986, p.40.)

6.17 Transportation system management (TSM) heavily emphasises management rather than the expansion of the services. The management of the system should run in low capital. And, therefore, TSM is regarded as a means of improving the efficiency of the transport system through good management.

6.18 According to Polus and Tomecki (1986), the adoption of transportation system management as a short-term planning and implementational approach has a considerable effect on the planning process as a whole. For example, traditional long-range urban transportation planning process involves massive data collection and the development of long-range prediction models which do not always apply. Furthermore, although one can expect tangible benefits from TSM to be achieved relatively soon after its introduction, it is important to understand that TSM should be looked at as a continuous process, composed of inter-related marginal modifications, not a one-time improvement.

6.19 According to Morlok (1978), national planning is the premier activity of the natural hierarchy of the planning



effort. This is the case in Saudi Arabia where the central government of the Kingdom is responsible for the national planning which is concerned with the economic development of various sectors such as transportation, infrastructures, industrial and agricultural development.

6.20 Since a superior highway network plays such a key role in helping to: (1) increase the nation's agricultural and industrial production; (2) improve health care; (3) spread education; and (4) make social services available in all parts of the country, then it follows that an adequate and effective transport management system must exist at the highest possible level so as to control and manage the system as a whole.

6.21 Furthermore, since the highway network is part of the transportation system and the roads are part of the highway network, all the nation's agriculture, industry and commerce directly benefit from planning and development and management of an excellent road system.

6.22 Within the Central Core Area of Alqassim Region (CCAAR), where the bulk of the population is concentrated around the twin cities of Buraydah and Unayzah (see Figure 4.08), the responsibility for the management of the transportation system is divided between various government sectors.

6.23 The Ministry of Communications (Transportation) maintains a branch of its General Directorate of Roads and Transportation in the area. It is located between the twin cities (GSA) and its function is to recommend, construct, maintain and manage the highway and transport system (under the Ministry supervision), not only in the CCAAR but in the entire Algassim Region.

6.24 The Ministry of Municipal and Rural Affairs, on the other hand, maintains a Directorate General for Municipal and Rural Affairs in the CCAAR. It is located in Buraydah and it provides a variety of public services to the entire Algassim Region, including the CCAAR. One of its principal responsibilities is the management of roads within town and city limits. It is also responsible for paving, landscaping and maintenance.

6.25 Another government agency which is involved in the management of the highway system in the CCAAR is the Ministry of Interior. This ministry maintains a Directorate General in the area with responsibility for traffic control including the issue of citations for traffic violations and undertaking traffic surveys of the highways. In short, this department manages the smooth flow of traffic on the highways of the region, unlike in Western countries where the Traffic Department is usually part of either the Department of Transportation or the State Highway Patrol Department.

## TRANSPORTATION STRATEGIES

6.26 Transportation strategies which are applied in the CCAAR form part of the overall strategies for the Algassim Region, and thus are a part of the comprehensive national strategy.

6.27 The overall strategies for transportation Kingdom-wide are stated in the Fourth Development Plan (1985-1990, p.389):

- "- To improve efficiency and productivity
- To improve safety standards
- To develop services to rural and sparsely populated areas"

6.28 These strategies are supported by policies outlined by the government with regard to the system of transportation:

- "- To use transport policy instruments (tariffs, user-charges, adjustments and subsidization) to minimize the cost of transport to the community
- To develop effective management and cost controls
- To provide opportunities for the private sector



- To meet national and international standards of safety, security and disaster protection
- To enforce licensing regulations and laws designed for safety
- To replace air service by bus service in areas with low transport demand
- To build roads to connect remote areas to the network
- To encourage the use of outlying port facilities"

6.29 The Fourth Development Plan (1985-1990) also outlined a number of road and rail transport programmes which are part of overall transportation strategies. These are namely Road Construction, Road Maintenance, Research and Studies, Monitoring, and the upgrading of the Single Rail Transport programmes. Moreover, the government has allocated expenditures for these programmes (see Table 6.01) in the hope of executing them during the plan.

#### DEVELOPMENT STRATEGIES

6.30 Development strategies are based on the preliminary appraisal of the potential and the constraints of each region as well as on the function of the region in relation to the nation as a whole. Development alternatives are then

TABLE 6.01: Transport Sector Programme Expenditures

MINISTRY OF COMMUNICATIONS (ROADS)	SR Million
Main road development	8,386.3
Secondary and feeder road development	2,013.0
Rural road development	2,397.4
Settlement of completed projects	1,917.0
Operation and maintenance	2,849.8
Administrative efficiency	1,659.1
Technical and economic studies	61.5
DEPUTY MINISTRY FOR TRANSPORT AFFAIRS	
SAPTCO budget	1,496.0
Land transport development and performance monitoring	12.0
Saudi maritime development	9.0
Transport research, development, training	7.0
Transport safety improvement	5.0
Hajj (pilgrim) transport improvement	5.0
SAUDI GOVERNMENT RAILROAD ORGANISATION	
Management, operation and maintenance	1,126.8
Track	643.7
Rolling stock and equipment	168.9
Maintenance improvement	77.0
Riyadh dry port improvement	21.0
Studies	18.0

Source: Kingdom of Saudi Arabia, Ministry of Planning, Fourth Development Plan: 1985-1990 A.D. (1405-1410 A.H.), pp.393-94.

prepared, and the physical, socio-economic implications of each alternative are studied. Facility needs, such as transportation, are based both on population forecasts and the specific function of the region. Alternative strategies are then evaluated and the appropriate strategy is selected for implementation.

6.31 In 1967, the Central Planning Organisation (CPO), now known as the Ministry of Planning, undertook consultations with each Ministry with the aim of defining policies to be used as guidelines in anticipation of future growth. Already, at that time, the CPO recognised the fact that transportation was an important contributor to the development of agriculture and industry. As a result, the following policies were established to govern the development of transportation in the Kingdom:

1. All necessary measures must be taken to expedite programmes involving the construction of primary roads. Steps should also be taken to identify and eliminate all administrative obstacles standing in the way of progress in the construction of roads.
2. A system of secondary and feeder roads must be planned for and developed. The selection and justification of these roads must be based on feasibility studies.



3. A careful assessment must be made of the ability of contractors to construct high-quality primary roads of the type require by the Kingdom.
4. Comprehensive plans for road development must be based on an appraisal of socio-economic feasibility. These plans must take the town and settlements into consideration which are not linked by a road network and which in future might be suitable for development in agriculture, industry, mining and defence.
5. The importance of continuous and efficient road maintenance must be emphasised as well as planning for an adequate maintenance programme.
6. Increasing emphasis must be placed on reducing driving hazards in an expanding network of streets, roads and highways, on which motor vehicle traffic continually increases (MOC, Highway Planning and Development, 1988).

MINISTRY OF COMMUNICATIONS (TRANSPORTATION) STRATEGIES IN THE FIFTH DEVELOPMENT PLAN (1990-95)

6.32 The Ministry of Planning is the authorised government agency which is entrusted with the preparation of the government Five Year Plans in consultation and co-ordination with all government sectors. However, each ministry initiates and establishes its own plan according to its

needs. Final approval of the plan is granted by the Royal Court.

6.33 Transportation strategies for the CCAAR, as indicated earlier in this chapter, are laid down by the Ministry of Communications and executed through the Algassim Directorate General for Transport and Roads.

6.34 The strategies of the Ministry of Communications (Transportation), with respect to transportation, are set out by the Ministry in its working plan (1990-1995) as part of the government development plan:

1. To establish a higher quality of transportation services between and within cities by undertaking the following:
  - a. Studies to determine the best modes of transportation between the nation's cities and neighbouring countries;
  - b. Studies for the construction of public transport and taxi stations;
  - c. Studies of the possibility for extending public transport routes to cover more of the country's cities and towns;

- d. Ensuring that policies governing limousines, taxis and rental cars are implemented and followed;
  - e. Finding a more efficient way to transport school students;
  - f. Development and improvement of rail services along with studies of the possibility of constructing more railway lines connecting more of the Kingdom's cities for the purpose of carrying more passengers and freight.
2. Organising and monitoring the transportation of freight along the Kingdom's highways leading to the construction of weigh stations along the entire road network. Also to train employees to undertake the work of operating these weigh stations.
  3. To connect all the Kingdom's regions by dual highways and expressways through:
    - a. continuing current road construction; and
    - b. obtaining approval for the construction of more such highways.



4. The construction of the necessary road links to connect rural areas and small towns with the major road network.
5. To support agricultural development by constructing new roads and efficiently improving existing agricultural roads in economic ways.
6. To protect the existing road network through effective maintenance and to ensure safety.
7. To improve traffic safety during the pilgrimage season (MOC, Fifth Year Working Plan: 1990-1995).

6.35 Norconsult A.S., an authorised consultant for the Ministry of Municipal and Rural Affairs in Saudi Arabia, did a comprehensive development plan study for the entire region of Algassim in 1984. The consultant recommended the following transportation strategies for the region as a whole:

1. To upgrade 513 kms of existing road to dual carriageway status.
2. To construct 1,304 kms of new roads of which 347 kms would be of primary standard, 537 kms of secondary standard and 420 kms of feeder roads.

3. To substantially extend the inter-city bus services.

4. To construct a rail network in the area.

6.36 In addition, the consultant laid down some guidelines for the development of the transportation system in the region, such as:

1. Reduction of the total travel demand by carefully planned land use.

2. Designing a hierarchical road network that will cope with the expected requirements of different kinds of traffic.

3. Ensuring the safe and convenient movement of pedestrians.

4. Minimising the environmental effects of parked and moving vehicles.

#### EFFECTIVENESS OF PLANS AND STRATEGIES

6.37 As described in the previous section, the Kingdom of Saudi Arabia adopted a number of transportation strategies to be applied throughout the country. But to what extent have these strategies been effective? In this section, there will be a discussion of their effectiveness.

6.38 The road network and the public transport system of the Algassim Region have not been completed. There have been major modifications to existing single and double lane roads into main roads and expressways (motorways), in addition to studying the extension of public transport.

6.39 Some of the factors which led to changes in status of the Algassim highways have already been described in Chapter Three. Other factors having an influence on the situation are the location of the region; its size; the expansion of the cities and towns; agriculture as an economic base for the region; the population increase; and local political strategies.

6.40 Being the central focus of the Algassim Region, the CCAAR's transportation system is still developing: the Riyadh/Algassim/Al-Medina expressway is still under construction, as are the Buraydah Ring Road and the Unayzah East Ring Freeway. The public transportation system is still being expanded and, in general, the road network of the area remains unfinished.

6.41 To date, some of the strategies laid down by the government have not been implemented. Others have been implemented to a limited extent, while others have not been properly managed.



## IMPLEMENTED STRATEGIES

6.42 The Ministry of Communications remains the planning body for the road network, including all primary, secondary and feeder roads. This is an on-going process which takes into consideration feasibility studies, the socio-economic situation and other important factors related to road construction.

6.43 The Saudi Public Transport Company has extended bus services to remote areas of the region wherever there is a possibility of adequate road access, following a careful study of the area and public demands for such service. But overall, it appears to be a very slow process and it has not been fully effected. A strategy is being considered which calls for the replacement of air services by bus services in areas with low transport demand. Again, although a certain amount of success has been achieved in this respect, the region as a whole still lacks an adequate bus service.

6.44 It is a fact that SAPTCO has recently been losing passengers. Daily averages over the past few years, according to the Ministry of Communications, have been as follows:

<u>Year</u>	<u>Number of Passengers</u>
1986-87	145,422
1987-88	141,920
1988-89	119,362

6.45 Even so, the company remains determined to extend its services even though the decrease in passengers lies in the fact that there have been huge decreases in the numbers of foreign labourers who are the principal users of SAPTCO services inasmuch as government agencies employ their own buses to transport their employees. The financial difficulties faced by the bus company have yet to be overcome.

6.46 The private sector is increasingly being given an opportunity to participate in the construction, maintenance and design of roads in the Kingdom and it remains the policy of the government to increase the number of these opportunities which are available to private construction companies and establishments.

6.47 Safety standards have been improved and the number of traffic accidents has decreased as people begin to follow the directions on safety signs posted along the freeways. Also, as the number of highways has increased, the emphasis has tended to be placed on road maintenance. On the whole, this maintenance has been undertaken by private establishments under the supervision of the Ministry of Communications (Transportation).

#### UNIMPLEMENTED STRATEGIES

6.48 The Kingdom's Fourth Development Plan (1985-1990) called for a national railroad, beyond the single line which exists between Dammam and Riyadh. The idea of connecting

Riyadh and the Alqassim Region with a railway line has been thoroughly studied. The proposed line would continue on to Al-Medina. Another line connecting Riyadh with Jeddah via Taif and Makkah has also been studied. These studies were not implemented because of both economic and social factors.

6.49 Although the present transportation network is to some extent adequate, the time has now come to impose a "users charge" to cover the costs of some of the Kingdom's transportation facilities, as is applied in certain countries in Europe. Although such a charge has been studied, it has never been implemented.

6.50 Another strategy which has not been implemented concerns the reduction of the number of cars on the motorways. Programmes such as car-pooling and ride-sharing have been carefully studied but have not been implemented. If they had been, it would greatly help in reducing driving hazards, assist in the reduction of energy consumption and help reduce noise on the highways.

#### SOCIAL IMPACTS

6.51 Transportation in general and roads in particular have a great impact on society at large and the changes which come about in societies as a result of the construction of roads can indeed have a tremendous effect on the behaviour and life style of people, even affecting their entire way of life.



6.52 Through roads, regions, cities, towns and settlements are connected to one another. Therefore roads are a form of communications between widely scattered people.

6.53 The natural resources of the Kingdom of Saudi Arabia have enabled the government to provide the nation with an extensive highway system within a relatively short period of time and the highway system was carefully planned to facilitate the economic and social development of the Kingdom.

#### MODERNISATION

6.54 It was explained in Chapter Four that women in Saudi Arabia in the 1990s are more educated than they have ever been and that they are now qualified to enter the professions and hold down responsible jobs in society. There are few limitations to the education and employment specialisations which are available to women. Physicians, nurses, teachers are only the most obvious examples. The development of transportation has played a tremendous role in helping the women of Saudi Arabia expand their roles in society. The fact that a sophisticated highway system exists, the fact that there is a public transport system, that there are schools and school buses, as well as private drivers, has indeed opened up doors to Saudi women and has greatly accelerated their transformation from a traditionalist role to a more modernist stance.

6.55 As a working female physician or teacher, a Saudi woman must find transportation to her place of employment. Since females are not allowed to drive cars in Saudi Arabia, the employing agency must provide transportation for its female employees. Such transportation usually takes the form of minibuses. In some cases, however, the family itself provides its female members who are employed outside the household with private transportation to and from their places of employment. This is done by privately owned cars which are driven either by a male member of the family or by a male family employee who is usually a non-Saudi and who has been brought to Saudi Arabia as a family driver. Many traditionalist Muslim families cannot yet see their way clear to allowing their female members to use public transportation in travelling to and from their places of employment, including the use of transportation which is provided by the employer. That they allow their women to be employed outside the home is already a great step away from traditionalism.

6.56 Finally, the establishment of a highly efficient network of roads as part of a much wider development of the national infrastructure has helped to transform Saudi society from a simple rural society into a highly complex urban-oriented community. In support of this observation, according to Al-Ankary and El-Bushra (1989), between 1950 and 1985, the proportion of urban population in Saudi Arabia grew from 10 per cent to over 70 per cent, increasing seven-



fold during this thirty-five year period. The new modern transportation system of Saudi Arabia has not been the least of the factors which have influenced this extraordinary transformation.

#### ECONOMIC IMPACTS

6.57 Although oil was discovered in Saudi Arabia in March 1938 (see Chapter One), it was not until the mid-seventies when the price of oil skyrocketed that the nation began to tangibly feel the results of a massive development programme. There is no aspect of life in Saudi Arabia which has not been affected by this development, and it is particularly felt in the field of transportation.

6.58 The economic impact of this development has been felt even in the most remote areas of the country. Isolated areas have been cut through by super highways, modern houses made of bricks and steel (called "villas" by the Saudis) have replaced mud houses, and the car - a major symbol of economic progress and prosperity - has proliferated on all the highways and byways of the country.

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#### AGRICULTURAL PRODUCTIVITY

6.59 In developing countries, the most serious result of poor transportation in agricultural areas is that farmers are not able to introduce more efficient farming methods and techniques because of the lack of accessibility, machinery, tools, spare parts and maintenance. Furthermore, it is not



possible to deliver the crops to the market place. Poor transportation also prevents farmers from receiving their supply of fertiliser and equipment which are necessary for crop growing.

6.60 Owen (1976) suggests that, with regard to India, transportation must be linked to agriculture by increasing farm-to-market roads. There is a simple indicator of India's road needs: the ratio of miles of road per square mile of cultivated area. In Britain, for example, the ratio is about four to one, whereas in India the ratio is two thirds of a mile to one square mile of cultivated land (cited in Farouk, 1973).

6.61 It is a basic part of the strategies of the government of Saudi Arabia to support agriculture and industry as the two most important economic bases of the country. These strategies take the form of written government policies which define the incentives and credits granted to industrialists and farmers.

6.62 With respect to the physical infrastructure of the agricultural sector, apart from providing free water to Saudi farmers through several irrigation schemes, the government has invested heavily in the construction of rural roads. The construction of these roads began with the First Development Plan (1970-1975) and was later expanded in the Second and Third Plans (1975-1985) during which 24,178 kms

of agricultural roads were completed (Fourth Development Plan: 1985-1990). Strategies for the government's Fourth Development Plan (1985-1990) placed the emphasis on secondary and feeder roads (rural), as well as on links to new and expanding agricultural areas. This will no doubt go a long way to reducing any infrastructure constraints which might impede agriculture production and marketing. For example, the new asphalt roads which have been put in place in agricultural areas have allowed Saudi farmers to export their produce to neighbouring Arab markets (e.g. Jordan and Kuwait), thus taking advantage of facilities provided by the Arab Common Market which include exemption of agricultural exports from customs duties (Elmallakh, 1982).

#### ECONOMIC ACTIVITIES

6.63 Economic development requires adequate and effective transportation services. For given countries at specified stages of development, a theoretically optimum amount of transport capacity is generally accepted. Nonetheless, agreement on the determination of those capacities and their implied rate of investment is far from unanimous (Elmallakh, 1982).

6.64 However, investment in transportation may be conditional upon the fact that it is already being provided. It could be important for economic development. Transportation improvements alone cannot produce economic growth and a suitable environment could be the missing factor. These



investments are to "... increase the capacity of a transport system; replace older equipment with new and similar equipment; and modernise the operations of the sector" (Mahayni, 1972).

6.65 Furthermore, the promotion of industrialisation as an economic development through the system of transportation is a primary objective of the government of the Kingdom of Saudi Arabia, in order to lessen its overwhelming dependence on the export of crude oil.

6.66 In the Fourth Development Plan (1985-1990, pp.207-209), it was stated that:

"The industrial sector has a prominent role to play in the growth and diversification of the economy. During the Fourth Plan period the industrial sector is targeted to grow at an annual average rate of 15.5%. Manufacturing's total contribution to the GDP will increase to SR 25.76 billion by 1410 (1990 A.D.), of which basic industries will account for approximately 20 per cent, while total industrial employment will rise to 538,000. Excluding petrochemicals, employment in manufacturing industry is targeted to grow at an annual rate of 5.2%, and productivity is projected to grow by 5% annually. Furthermore, the government will continue to provide appropriate industrial infrastructure, with necessary utilities and services and



encourage the development of industrial support activities."

6.67 Consequently, the government strategies with regard to industrialisation are to distribute the major industrial plants in the various regions and cities of the Kingdom such as the urban areas of Riyadh, Jeddah, Dammam and the Alqassim Region (including the CCAAR). It is anticipated that this will promote the economic growth, productivity and efficiency of these regions all of which contain development potential.

6.68 The Alqassim Industrial City, located in the CCAAR, has much potential for the promotion of growth and development in the area. This industrial city is already connected to the transportation network, thus facilitating the movement of employees between their homes and job sites.

6.69 Finally, if these transportation facilities are well maintained and managed, this will encourage and support agricultural production and the growth of industry in the CCAAR, which are the principal factors on which the economy of the region are based. The CCAAR can then look forward to a strong local economy with continuing growth.

#### INDICATIONS FOR FUTURE STRATEGY

6.70 The Third Development Plan (1980-85) specified that Buraydah is the regional centre of Alqassim, with Unayzah as

a district centre. The Plan also stated that the city of Ar-Rass, which is the third largest city in the region but not included in the CCAAR, is also a district centre, as stated earlier in this chapter.

6.71 As a basic national aim, the national planning objective is to provide a full range of services and facilities to the entire population, both urban and rural. In doing so, the government strategy is to lessen the present regional dependence on the use of central funds generated from oil revenues by developing the region's productive sectors, especially agriculture, industry and mining.

6.72 In addition, the Third Development Plan emphasised regional economic growth in an effort to balance all regions economically to enable them to share equally in the national wealth. To achieve this objective, more attention is given to the development of regional resources. The Algassim Region has already made substantial investment in agricultural development in order to capitalise on the region's considerable ground water reserves.

6.73 There are a number of projects in the CCAAR planned for implementation in the immediate and near future which will transform the area both physically and economically. Meantime, the government is attempting to design and apply

strategies which will give them a stronger hand in controlling the growth of the area.

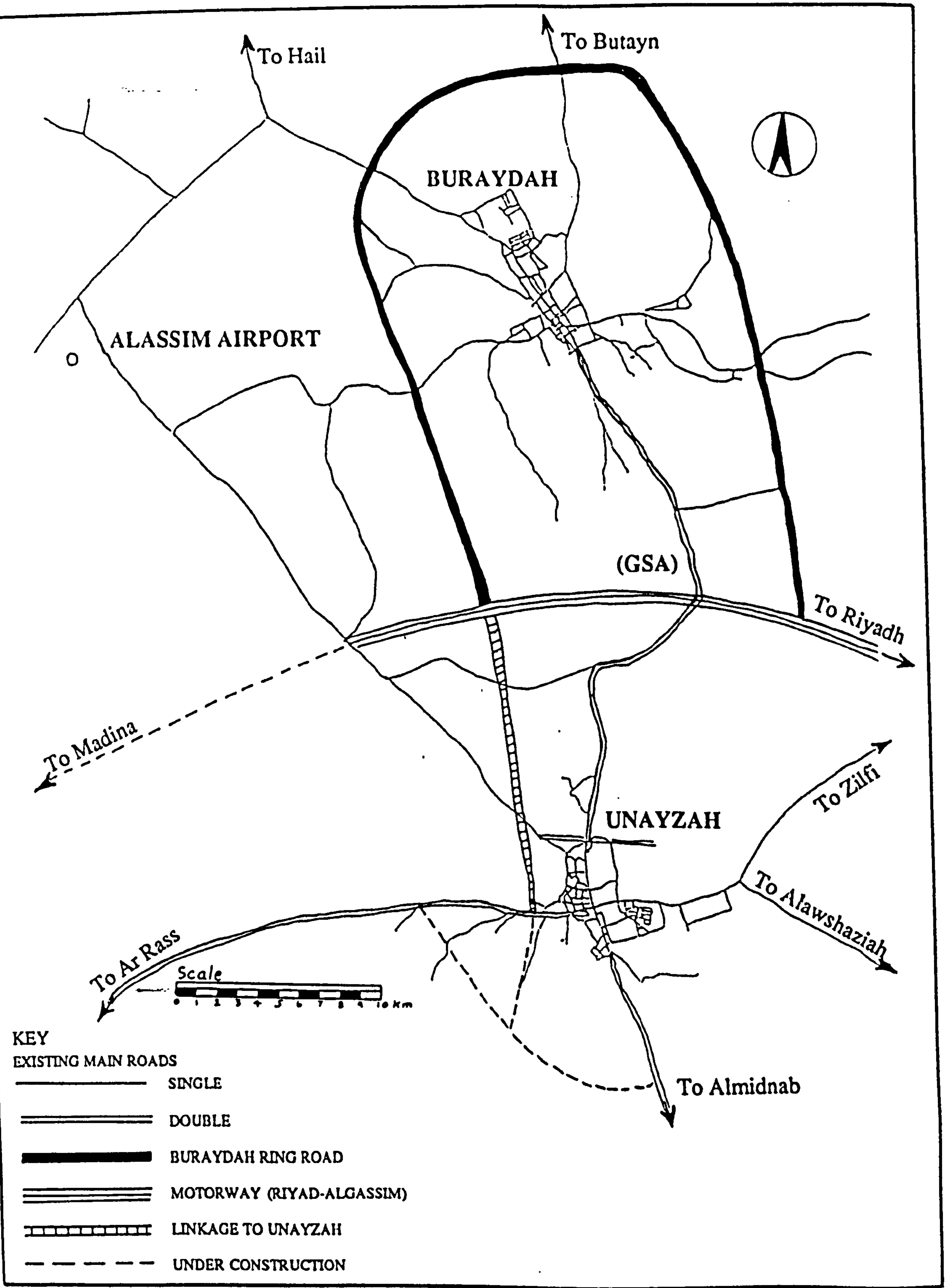
1. Population: As stated in Chapter Five, the combined population of Buraydah and Unayzah in 1983 was 154,428 according to a study carried out by Norconsult A.S., with an annual increase rate of 6%. This increase will contribute significantly to the CCAAR's growth.
2. Industrial Development: The Industrial City which is located between Buraydah and Unayzah (GSA) is operational and further expansion is under way. More factories in this area will certainly draw more economic activity to the CCAAR, bringing with it more employment to the benefit of both cities. This expansion will further increase the gap between the CCAAR and other sub-regions of Algassim.
3. Educational Expansion: There are two university branches in the CCAAR, of King Saud University and of Imam Mohammad bin Saud Islamic University. The ~~new~~ new campus of the Imam Islamic University has already been constructed and opened for students, while the new campus of the King Saud University (Algassim Branch) is under way. Both campuses are in the CCAAR and their presence will help promote development and growth as they attract many students from across the region and beyond.



4. The Road Network (Figure 6.02): There are a number of main roads that are under construction in the CCAAR: (1) the Unayzah/Buraydah motorway (extension of Buraydah ring road); (2) the Unayzah/Al-Badaya road going west; and (3) the southern portion of the Unayzah/ Al-Midhnab Express-way. All should be completed during 1990, or later. Furthermore, the Fifth Development Plan (1990-95) projected by the Ministry of Communications (Transportation) recommended the construction of the Algassim/Hail Expressway (260 kms) going north, the Algassim/Al-Medina Expressway (500 kms) (continuation of Riyadh-Algassim motorway) going west and 840 kms of agricultural roads, all to be put in place during the plan period. If completed as recommended, they will considerably enhance not only the economic position of the CCAAR in particular, but also the region as a whole. They will also facilitate the movement of traffic within and through the CCAAR.

6.74 During the eighties, the region's economy witnessed a considerable slow-down, as did the entire Kingdom, largely because of a sharp decrease in the international demand for oil, as well as a sharp decrease in the world price of oil. However, this situation is expected to improve in the nineties, when more emphasis will be placed on developing agriculture and industry in the region. To do this in the most effective way, regulations governing the protection of

Figure 6.02 THE ROAD NETWORK OF THE C.C.A.A.R.



SOURCE: ADOPTED FROM NORCONSULT A.S., ALGASSIM COMPREHENSIVE DEVELOPMENT PLAN, 1989

the industrial, agricultural and residential zoning measures must be implemented. More effective planning and better management are also necessary if the government is to improve its control of the growth and development of the area.

6.75 The two central business districts of the CCAAR, limited primarily to office complexes, civic buildings, specialised service facilities, and shopping centres, will become the region's managerial and governmental headquarters with Buraydah as the administrative capital and Unayzah as a district centre.

6.76 Before proceeding with the next chapter (design of survey and the gathering of data on the socio-economic impact of transportation), it should be emphasised that the growth and development of the CCAAR will always rely on the support of central government for funding. For it is a fact that industrial growth, agricultural development and the further expansion of the transportation system must always depend on central government for financial support and since the central government will remain the source of funding, so it will always have the power of final decision.



CHAPTER SEVEN: SURVEY DESIGN, METHODOLOGY AND DATA  
COLLECTION

INTRODUCTION

7.01 This chapter (of the thesis) deals with the specific issues or problems that the survey covers and have been covered in the Central Core Area of Algassim Region (CCAAR). This will be followed by an explanation of the methodology of finding better ways of handling these issues in future transportation policies for the subject area.

7.02 The transportation system in the Central Core Area is adequate for present conditions to a large extent, as has been explained in the early chapters. However, there is now continuous, network expansion of the system, and further transportation services in the Central core and in the region as a whole. These improvements are part of the Central Government policies to increase modernisation and to provide better services to the population of the area.

7.03 The social and economic impact of transportation are the neglected issues which this thesis is attempting to investigate in the Central Core Area of the Algassim Region. These impacts were accordingly covered in a survey comprising a questionnaire and a series of interviews with leading government officials and heads of communities, in addition to a survey of traffic count. The methods of data collection will be explained in detail in the second part of this chapter.

## THE SURVEY QUESTIONNAIRE

7.04 The survey questionnaire attempted to investigate the social and economic impacts that have been identified at the end of Chapter Two. The extent to which the survey questionnaire attempted to achieve an appraisal with regard to social and economic impacts is illustrated below.

7.05 First, several issues of social impacts were discovered through the survey and these were:

1. the influence of transportation network on residential locations;
2. the effect of transportation network on maintaining family unity;
3. the damaging effect on family unity as a consequence of the transportation network;
4. the damaging effect on neighbourhood unity as a result of the establishment of the network; and
5. the change in life style of the citizens of the area as a result of the network.

7.06 Second, issues that were related to economic impacts of transportation were also answered by the survey questionnaire:

1. the increased land values;
2. the influence on the location of business sites and industrial areas;
3. the promotion of agricultural products;
4. the damage to small businesses;
5. the attraction of government, public and private facilities; and
6. the promotion of economic activities in the area.

7.07 The type of transportation used among residents of the area, whether to commute to work, between the twin cities or within the cities themselves, for the purposes of shopping, visiting, etc., was addressed and investigated to support the social and economic impact of transportation.

7.08 In addition, other transportation issues were examined in the survey questionnaire. These issues included reasons for selecting mode of transport; the amount of travel between the twin cities; and level of people's satisfaction with the present road network and the public transport services in the area.



## INTERVIEWS: GOVERNMENT OFFICIALS AND COMMUNITY LEADERS

7.09 Government officials involved in the planning process within the political context of Saudi Arabia, and community leaders, have an influential role to play within Saudi society. Thus, their personal perception regarding the socio-economic impacts of transportation in the Central Core Area is highly important to understand. And more meaningful is their compliance and willingness to respond.

7.10 Those government officials who are concerned with transportation, and influential community leaders, were interviewed. The emphasis of the interviews centred around the socio-economic impact of transportation in the study area (see Appendix B and C). But other relevant matters were also discussed (e.g. past transportation strategy and growth of the area).

7.11 The purpose of conducting such interviews was primarily to support the investigation of socio-economic impact of transportation in the area by obtaining different views from the decision makers (government officials) and influential individuals (community leaders). The secondary purpose was to establish a framework of knowledge about the past and present transportation strategies in the area.

7.12 Accordingly, their attitudes were expected to be highly advantageous in the process of analysis in the next chapter. Such advantages were reflected by whether or not

they appeared likely to support a particular social or economic impact of transportation.

#### TRAFFIC COUNT SURVEY

7.13 It was necessary to undertake a traffic count survey within the CCAAR and specifically along the main road connecting the twin cities.

7.14 The purpose of carrying out such a survey was to serve two main impacts. First, to demonstrate that the transportation system was a prime mover of people through the expanded range of motor vehicles as a social impact. Second, to show that the system of transportation provided an optional means for an extended range of sources of supplies of goods to be consumed locally by examining the type of traffic as an economic impact.

7.15 In addition, comparing the results of the traffic count survey to past and similar counts will be advantageous to determine the possible increase of traffic in the CCAAR.

#### METHODOLOGY

##### THE STUDY AREA

7.16 The Central Core Area of Alqassim Region (CCAAR) is located at the heart of the region (see Figure 1.04). It consists mainly of the twin cities of Buraydah as the administrative capital of the region; Unayzah as a district

capital and second largest city; and their surrounding areas.

7.17 The area is very well connected, with the region airport on the west of the core area. With a modern main road connecting the two cities, there are other roads that are being constructed.

7.18 Buraydah, since it is the administrative capital of Alqassim region, has all government office branches and it is becoming more and more of a religious centre. In addition, the College of Agriculture and Veterinary Science of King Saud University is located in the city.

7.19 Unayzah also has some governmental office branches, and the College of Administrative Science and Economy.

7.20 The latest population survey taken by Norconsult A.S. (1983) shows that the twin cities had a total population of 154,428 (Buraydah: 107,546; Unayzah: 46,822).

7.21 It is very important here to note that the above mentioned has been discussed in detail in Chapter Five.

7.22 The area (see Figure 7.01) that is located between the two cities is considered by the government as a services district, not only to serve the twin cities but also to serve the whole region. These services include:



Figure 7.01 BURAYDAH - UNAYZAH MAIN ROAD





- Imam Muhammed bin Saud Islamic University (see Figure 7.02)
- Algassim Road District
- The Industrial City
- Saudi Public Transport Company

7.23 In addition, there are a number of services such as auto dealers, small factories and petrol stations. The site for a branch of King Saud University, the oil terminal and the Algassim Airport are within close proximity.

#### THE CHOSEN SAMPLING METHOD

7.24 Random cluster samples was the chosen sampling method for this research. Bowen and Starr (1982, p. 272) state:

"... Cluster sampling means selecting groups (clusters) of population elements. After the clusters have been selected, all, or part of, the elements in each cluster area included in the sample -- the procedure is called two-stage sampling. The first stage was selecting a sample of clusters. The second stage was selecting a sample of elements in each cluster."

7.25 It is very important to point out that since the research was carried out in an Islamic society, the selected approach of sampling the population based on their attitudes towards the social and economic impact of transportation



Figure 7.02 IMMAM UNIVERSITY ON THE BURAYDAH - UNAYZAH MAIN ROAD





had therefore to consider the culture and traditions of Saudi Arabia.

7.26 After a consultation with knowledgeable people in the capital city, Riyadh, from research backgrounds and from the Planning Department of King Saud University, the use of random cluster samples was suggested as the best means of carrying out this type of survey.

7.27 There were a number of reasons for choosing the random cluster method in my survey questionnaire:

1. Cluster sampling is very economical.
2. Its goal is to achieve a desired degree of precision at the lowest cost.
3. It works best for homogeneous populations, that is, populations which have uniform composition throughout. Therefore, it is appropriate for Saudi society, since the population is extremely homogeneous in its thinking and background, and it is almost impossible for the researcher to approach dwellings directly as is stipulated when using other methods.
4. Society in Saudi Arabia is dominated by an extreme degree of privacy, mostly with respect to women and

their domain. A house to house survey questionnaire would not result in a high degree of respondents. In addition, it is costly, time consuming and requires a government permit.

5. Selecting a random sample of categories: government employees, private sector employees, own business, and college students, would give a high degree of precision and respondents, and is therefore representative of the area.

7.28 Accordingly, a survey questionnaire of thirty-three questions (see Appendix A) on the social and economic impact of transportation was prepared and distributed to four different categories in the society: government employees, private sector employees; self-employed business owners; and college students. In addition, interviews with leading officials and with the heads of communities, and a traffic count, were all taken and will be explained in the following sections of this chapter.

7.29 But, how large should the sample be? As Bowen and Starr (1982, p. 323) stated:

"... The answer depends on three factors: (1) How precise (narrow) do we want a confidence interval estimate to be? (2) How confident do we want to be that the interval estimate is correct (e.g. that  $p$  is in a stated interval)? (3) How variable is the

population being sampled? In general, the higher the desired precision or level of confidence, the larger (more costly) will be the sample." And for determining the sample size, see Appendix E.

### Pretesting

7.30 Prior to consulting and deciding upon the chosen method to be used in the survey questionnaire, other methods such as systematic random samples were attempted. One method used in the area, using the questionnaire survey, was the conducting of house interviews. This approach, however, did not totally work for various reasons. People have not been exposed to such a way of interviewing, i.e. by simply knocking on the door and starting to ask questions. It leads to gathering of neighbours and people were not willing to respond. Therefore, time constraints were a big issue and would not render reliable results.

7.31 The dwellings selected randomly on the pre-test, using methods other than Random Cluster Sampling, led to difficulties and failed because the residents asked questions like: "Do you have government permission to approach our homes?". Others simply closed the door in my face. On one occasion, when a woman answered the door, there was a problem of communications since men and women cannot interact in a Moslem society like Saudi Arabia. It is prohibited by the Law of the Kingdom.



7.32 A pre-test of the questionnaire was carried out to find out which groups were most willing to respond satisfactorily. By distributing the questionnaire to various groups, i.e. farmers and taxi drivers, it was decided then that government employees, private sector employees, business owners and students were the most likely to respond. This means that there are groups who actually had to be excluded from the survey. Above all, women in the area were not included due to the restrictions of Muslim religion. Also, farmers could not be satisfactorily included since the pre-test showed that these groups were not interested in answering survey questions. Although they relate to some of the criteria to be tested, and particularly to the promotion of economic activity in the field of agriculture, they were not too eager to be involved. These omissions are unfortunately unavoidable, being an inherent problem in studies in cultures such as that of Saudi Arabia.

7.33 Others who were excluded from the survey were foreigners, of whom there were 13.8% in Buraydah and 11% in Unayzah, according to the Norconsult study of 1984. The foreigners in the Central Core Area are mostly building and agricultural labourers from Asia and the Indian sub-continent who tend to move about frequently, wherever the best work opportunities exist. Therefore, their exclusion from the survey has a relatively small effect on the study since they do not stay in the same area for long. If they

were skilled workers or held professional employment, as in the case of Riyadh or Jeddah, where they tend to reside for a long time, they would have been included in the survey and thus considered as part of the society. The study area is a medium traditional area within the Kingdom, and does not have many skilled and professional foreign workers.

## DATA COLLECTION

### THE SURVEY QUESTIONNAIRE

7.34 The CCAAR (see Figure 1.04) is divided into three zones:

1. Buraydah
2. Unayzah
3. Government Services Area (GSA) which is located between the twin cities

7.35 It had been decided to distribute the questionnaire (see Appendix A) to:

- Government employees
- Private sector employees
- Business owners
- College students

7.36 Table 7.01 explains how the 601 questionnaire sample size were distributed in the Central Core Area. Government agencies are distributed equally between Buraydah and Unayzah, 96 questionnaires each, although the total number of government branches in Buraydah is much greater than in

TABLE 7.01: The Survey Questionnaire Distribution in the Central Core Area

	BURAYDAH		UNAYZAH		GOVERNMENT SERVICE AREAS (GSA)		TOTAL DISTRIBUTED
	*NQD	Percent (%)	NQD	Percent (%)	NQD	Percent (%)	
Government Employees	96	40	96	40	49	20	241 (40%)
Private Sector Employees	60	50	48	40	12	10	120 (20%)
Own Business	108	60	72	40	-	-	180 (30%)
College Students	20	33	20	33	20	33	60 (10%)
<b>TOTAL</b>	<b>284</b>		<b>236</b>		<b>81</b>		<b>601 (100%)</b>

NQD = Number of questionnaires distributed



Unayzah: 85 - 37 respectively. The reason is that hospitals and religious institutions in Buraydah are considered to be part of government and they are greater in number than those in Unayzah. Forty-nine (49) questionnaires were distributed in the GSA since there are only 10 government agencies.

7.37 Sixty (60) were distributed at the private sector level, i.e. banks, corporations, in Buraydah, 48 in Unayzah and 12 in GSA. In addition, 108 were distributed to business owners. This group comprised all types of small shops and businesses, i.e. food stores, jewellery shops, small factories, workshops, clothes shops, etc. in Buraydah, and 72 in Unayzah. None were distributed to this category in GSA since there are no small businesses. With respect to students, twenty (20) questionnaires were distributed in each zone. The College of Agriculture and Veterinary Science is situated in Buraydah, Unayzah has the College of Administrative Science and Economy, while the Islamic University of Muhammed bin Saud is located in the GSA.

7.38 In summary, a total of 241 questionnaires (40%) were distributed to government agencies in the CCAAR, 120 (20%) to the private sector, 180 (30%) to independently owned business, and the remaining 60 (10%) to college students in the area.

7.39 The numbers of respondents in each of the four groups are clearly different from one another: government

employees, 241 (40%); own business, 180 (30%); private sector employees, 120 (20%); and college students, 60 (10%). The differences in the distribution among the groups is to roughly reflect their differing proportion in total employment. Government employees represent the majority of people working in the area due to the existence of large government offices. Thus, they were the largest group to be categorised (40%). The business owners are of a 'traditional' type, many having inherited their trade or profession, and they constitute the second largest group of workers in the area (30%), after government employees. The third group was private sector employees (20%), employed for example in banks and private corporations, and this type of employment was only introduced to the area in the 1970s. Since this group requires specially trained employees, such as accountants, administrators and engineers, only a small proportion of the areas workforce is employed in such enterprises. Accordingly, this category was ranked third among the respondents. College students were ranked fourth in the clusters (only 60 questionnaires were distributed, 10%). There are three university branches in the CCAAR (one each in Buraydah, Unayzah and the GSA), but not all academic fields are represented, e.g. medicine and some engineering specialities.

7.40 The reasons for selecting students as a group were that their level of education made them more sympathetic to the questionnaire, and their answers were expected to be

better thought out. Accordingly, college students were regarded as a separate group, albeit the smallest which the survey had to cover.

7.41 Unfortunately, due to the lack of available data for the year of survey which could have reliably indicated total employment figures, or groupings within that total, it was impracticable to calculate a sample according to the methods appropriate to countries in which data is more readily available. However, data published by the Norconsult study of 1983 suggests that in that year, in the case of Buraydah, the number of people in employment was 24,057 (see Table 7.02). In the case of Unayzah, employed total was 11,087. If government employees are regarded as being those in the sectors of government and public services, education, health services, utilities and other services, it can be seen that this comprised 51% of employees. The sectors in which business owners are prevalent (agriculture, retail/wholesale, and transport) comprised 28% of employees. The private sector (finance, manufacturing, and construction) comprised 21% of employees. These figures suggest that the numbers of respondents selected in the four sampled groups may have reasonably represented their actual distribution amongst the area's population in the survey year of 1990.

7.42 The selection of government branches in the Central Core Area to which questionnaires would be distributed was made on a random basis. The exception to this was the



TABLE 7.02: Buraydah and Unayzah, Employed Persons by Economic Sector of Main Job, 1403 A.H.  
(1983 A.D.)

ECONOMIC SECTOR	BURAYDAH		UNAYZAH	
	Employed Persons	Percent	Employed Persons	Percent
Agriculture	749	3.1	370	3.3
Manufacturing	830	3.5	287	2.6
Utilities	992	4.1	554	5.0
Construction	3544	14.7	1602	14.6
Retail/Wholesale Trade	5042	20.9	1848	16.7
Transport	1175	4.9	513	4.6
Finance	567	2.4	370	3.3
Education	4172	17.3	2689	24.3
Health Services	405	1.7	287	2.6
Government/Public Services	4577	19.0	2198	19.8
Other Services	1843	7.7	308	2.8
Other Activities	41	0.2	41	0.4
Unspecified	120	0.5	0	0
<b>TOTAL</b>	<b>24057</b>	<b>100.0</b>	<b>11087</b>	<b>100.0</b>

Source: Norconsult A.S.. Algassim Region Comprehensive Development Plan, Report 2, Volume 2, Buraydah (p.14)/Unayzah (p.14), 1983

Government Services Area (GSA) where only ten government agencies are located and therefore they were all covered. The questionnaire was distributed to each of the branches according to the total number to be distributed.

7.43 Another random selection was made in the private sectors in both Buraydah and Unayzah, and since there is only one private sector company in the GSA, it was totally covered by the questionnaire. Furthermore, since there is one college in each city, and one university branch in GSA, the students' questionnaire were distributed equally in the three zones.

7.44 In distributing questionnaires to independent businesses or business owners in the area, sixty percent (60%) were distributed in Buraydah and forty percent (40%) in Unayzah, due to the size difference.

7.45 A total response of 463 (77%) was collected - 213 (46%), 193 (41.7%) and 57 (12.3%) from Buraydah, Unayzah and GSA, respectively (see Table 7.03).

7.46 The highest response was from government employees 194 (41.9%), followed by business owners 134 (28.9%), private sector employees 84 (18.1%) and college students 51 (11%). Moreover, within the CCAAR, Buraydah's actual response was 46%, with 41.7% from Unayzah and 12.3% from GSA.

TABLE 7.03: Distribution and Actual Respondents of the Survey Questionnaire

	BURAYDAH		UNAYZAH		GSA		TOTAL	ACTUAL
	Dist*	Resp**	Dist	Resp	Dist	Resp	DIST	RESP
Government Employees	96	80	96	84	49	30	241	194 (41.9%)
Private Sector	60	42	48	32	12	10	120	84 (18.1%)
Own Businesses	108	75	72	59	-	-	180	134 (28.9%)
Students	20	16	20	18	20	17	60	51 (11.0%)
<b>TOTAL</b>	<b>284</b>	<b>213 (46%)</b>	<b>236</b>	<b>193 (41.7%)</b>	<b>81</b>	<b>57 (12.3%)</b>	<b>601</b>	<b>463 (77%)</b>

\* Distribution Respondents

\*\*



7.47 The questionnaire survey also carried data on the background of the respondents. As tabulated in Table 7.04, this data indicates the profile of the respondents.

#### VOLUNTEERS

7.48 Volunteers were needed for the research survey so as to cover the entire Central Core Area. After some difficulties, five volunteers were found to assist in distributing and collecting the survey questionnaire. It was important that these volunteers were from the area, so they were known by the respondents.

7.49 Two of the volunteers were from Buraydah, and three from Unayzah. Two of them were teachers, two had independent businesses and one was a student. Since the survey was carried out in the summer vacation, the student part was conducted at the beginning of the academic year in October. Although they were already familiar with the subject matter, they were briefed on the procedure. No volunteers were called for conducting the interviews with leading officials or with heads of communities. The author preferred to conduct these interviews himself for the purpose of recording and gaining better understanding from the interviews. The traffic count was done with the assistance of the Ministry of Communications (Transportation).

7.50 The distribution of the 601 questionnaires in the Central Core Area was assigned to the five volunteers as

**Table 7.04: Profile of the Respondents of the Survey Questionnaire**

Variable Labels	Value Labels	Total	Percent
Age	Less than 20 years	45	9.7
	21-30	136	29.4
	31-40	180	38.8
	41-50	78	16.8
	51-60	19	4.1
	Over 60 years	5	1.1
Marital Status	Married	327	70.6
	Single/never married	125	27.0
	Widowed	3	0.6
	Divorced	8	1.7
Level of Education	No formal schooling	9	1.9
	Ability to read and write	61	13.2
	Elementary school education	39	8.4
	Secondary school or equivalent	213	46.0
	University degree	134	28.9
	Post graduate	7	1.5
Annual Income	Less than SR 50,000	121	26.1
	SR 51,000 - 100,000	201	43.4
	SR 101,000 - 150,000	98	21.2
	SR 151,000 - 200,000	36	7.8
	Over SR 200,000	7	1.5

Variable Labels	Value Labels	Total	Percent
Place of birth	Buraydah	128	27.6
	Unayzah	161	34.8
	Algassim Region	108	23.3
	Saudi Arabia	66	14.3
Place of residence	Buraydah	209	45.1
	Unayzah	222	47.9
	Algassim Region	31	6.7
	Saudi Arabia	1	0.2
Length of time in present dwelling	Less than 1 year	36	7.8
	1-5 years	159	34.3
	5-10 years	155	33.5
	10-15 years	79	17.1
	More than 15 years	34	7.3
Type of Residence	Modern house (villa type)	408	88.1
	Old mud house	12	2.6
	Flat (apartment)	26	5.6
	Other type	17	3.7
Means of financing dwelling	Own expense	172	37.1
	Real Estate Dev. Fund	232	50.1
	Bank/private loan	3	0.6
	Other means	56	12.1



follows: The first volunteer distributed the questionnaire to the government and private sectors in Buraydah; the second to the government and private sectors in Unayzah, and in the GSA; the third distributed to the independent business owners in Buraydah; the fourth to business owners in Unayzah; and the fifth volunteer conducted the students' questionnaire survey.

7.51 The volunteers were given a full understanding of the research, and the importance of conducting the survey by ensuring the maximum number of questionnaires were completed.

7.52 Prior to the first distribution of questionnaires, especially to the selected government and private sectors, an important visit or telephone call to the head of the agency was made to explain the objective of the research and to stress the value of their assistance. Some asked for a letter confirming who was conducting such a survey. An official letter was provided by the Ministry of Transportation in answer to these requests.

7.53 The survey questionnaires for government and private sectors were given first to the head of the section with an important note stating that answering all questions was very important. Furthermore, the distribution of the questionnaires was carried out at random, and no selection of individuals was made. In some instances, the head or the

director of the section appointed me or the volunteer to distribute the questionnaires in the various offices of his branch. Therefore, the avoidance of biases was carefully executed, with random selection of employees.

7.54 The survey questionnaire for the independent business owners was distributed randomly in both cities. This however took longer than anticipated due to the fact that some of the randomly selected shops were owned by old people. Thus, explaining each question was very time consuming, but a positive contribution. Occasionally, the question was explained but no response was made by the selected respondent, either because of privacy or mistrust. Although the name of the respondent was not required, as stated on the covering letter of the questionnaire, difficulties in respect to confidentiality sometimes arose. In addition, getting acquainted with business owners, especially if they are old, was taken into consideration in order to receive accurate information and good results.

#### INTERVIEWS: GOVERNMENT OFFICIALS AND COMMUNITY LEADERS

7.55 Interviews with government officials and community leaders were conducted to elicit supportive information to the research area. This was done by establishing a frame of knowledge with regard to the past transportation strategy in the area, and to understand the impact of, and changes that took place following the development and growth of cities and towns. It is important to interview those who take part



in the decision-making process, and those who may influence the general public.

### Government Officials

7.56 The government officials interviewed are concerned with the social and economic impacts of transportation both directly and indirectly. A list of questions that were discussed with those officials is given in Appendix B.

7.57 All together, a total of nine government officials were interviewed and they were as follows:

- Deputy Governor Assistant of Algassim Region
- Director General of Algassim Road District
- Director of Algassim Public Transport Company
- Director General of Algassim Traffic Department
- Director of Unayzah Agriculture and Water Directorate
- Director of the Industrial City
- Director of the Saudi Real Estate Fund
- Director of Physical Planning (General Directorate of Municipal and Rural Affairs)
- Unayzah City Mayor

7.58 The interviews were conducted by an advance appointment, and with a varying waiting period of one to three weeks. They were conducted either in the interviewees' offices or in their residences. The approximate length of the interview depended on the willingness of the interviewee



to respond or to elaborate on the questions given, but interviews ranged between one and three hours.

7.59 Although most of the questions were not politically related, some of the officials declined to comment on some of the questions, and some gave full answers and explanations.

7.60 All the leaders who were interviewed were very aware of the subject matter. Some requested a letter confirming that the interviews were part of the research. This was provided. Nevertheless, the interviews were conducted formally in some cases, and in an informal way in others.

7.61 In a country like Saudi Arabia, where hospitality and generosity are part of society, an invitation for a meal or simply for tea and coffee for guests and visitors is a must, and accepting such an invitation is an obligation. Therefore, such invitations had to be accepted in order to be successful at this stage, despite the time occupied in doing the task.

#### **Community Leaders**

7.62 After consultation in the area to find the most knowledgeable people and influential individuals in the community, seven leaders were selected. Two of the leaders selected were reluctant to be interviewed. The five community leaders who were interviewed are:

- Hamad Alsolaie, a ninety year old retired man, born and raised in the area, and who worked in different sectors of government and as a merchant.
- Jahel Aljahel, a well known real estate agent who has operated this type of business for nearly 30 years.
- Abdullah Alsalman, former teacher and currently involved in the organization of charity, helping the poor and the needy.
- Abdullah Albassam, former mayor of the City of Unayzah.
- Abdulrahman Albuti, a local intellectual and the principal of an elementary school.

A list of the questions that were discussed in the interviews is shown in Appendix C.

7.63 In a traditional society like that of Saudi Arabia, these well known people have a unique type of personality. They are socially involved, well educated and well respected by the community. People go to them for advice or to gather around them for simple communication and discussion of various subjects and matters that concern the community or the society as a whole. Their houses are open for the general public to visit on a daily or weekly basis.

7.64 It was not easy to meet with them due to their involvement in the community. However, several attempts were made prior to the actual interview. They were informed about the purpose and the objective of this research before the meeting.

7.65 In addition, the implication of meeting these types of people in a place like Saudi Arabia must be understood. Choosing the right time and the right atmosphere was important. Sometimes, the author had to sit with guests including the person to be interviewed for several hours before it was possible to sit alone with the person to be interviewed. This was largely due to the obligation to get acquainted and be sociable in such circumstances, and on some occasions, dinner was presented as part of the social gathering. All the interviews went smoothly with an open discussion and willingness to reply and elaborate, despite these protracted social circumstances.

#### TRAFFIC COUNT SURVEY

7.66 With the valuable assistance of the Ministry of Communications (Transportation), a team of four specialized statisticians and their supervisor were assigned - with the author - to the study area to conduct the traffic count survey.



7.67 The traffic count covered two points in the area (see Figure 7.03): Station (A) counting the traffic from and to Unayzah, and Station (B) counting the traffic from and to Buraydah. The two parts of the count were carried out separately, with (A) done first.

7.68 The traffic count was conducted on a three day basis for each station (Thursday, Friday and Saturday). Thursday is half a working day, Friday is a holiday and Saturday is a full working day. These were considered representative days for traffic movement between the two cities.

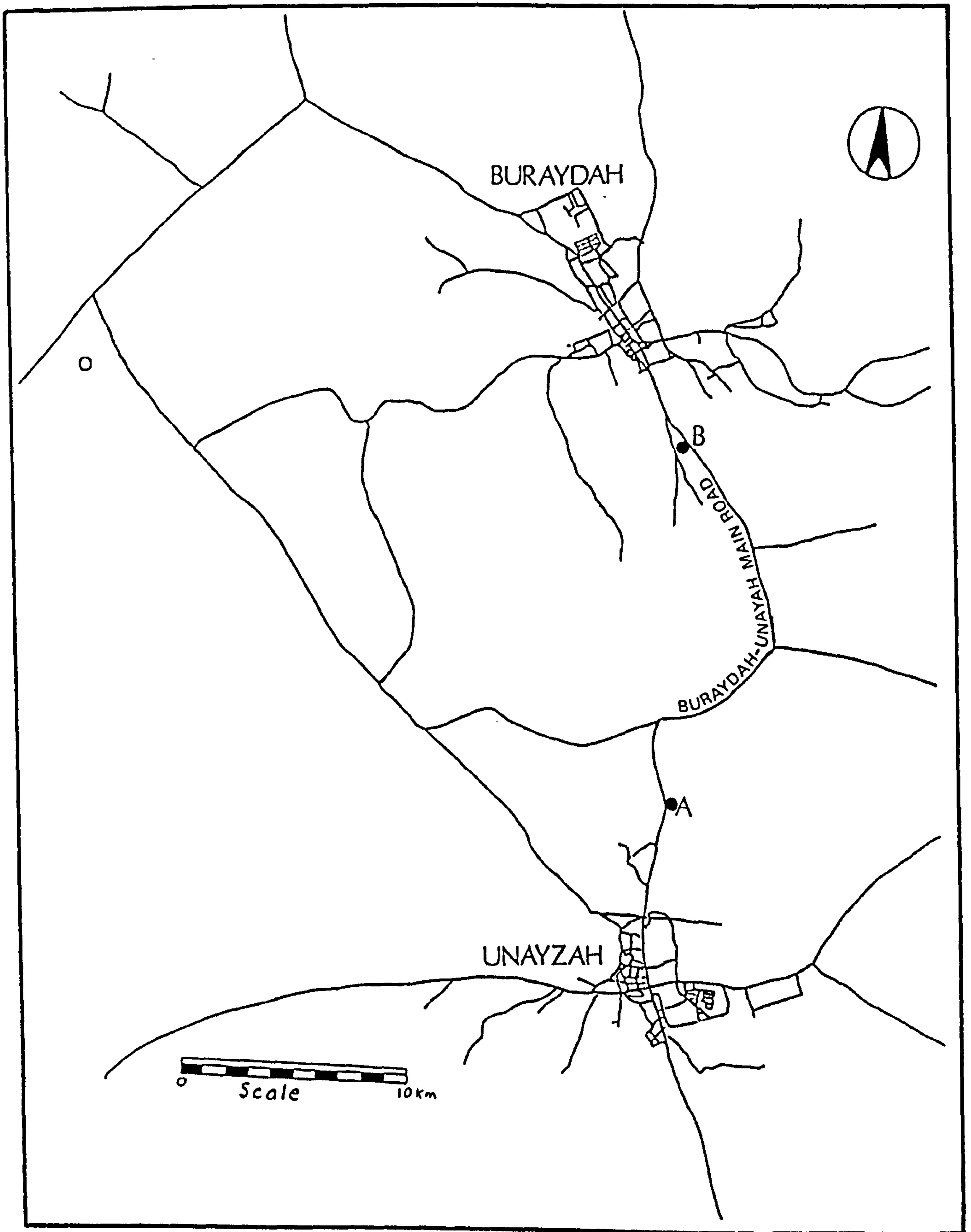
7.69 From 7:00 am till 7:00 pm the traffic was counted including the type of traffic, while from 7:00 pm to 7:00 am an automatic counting machine was placed on the road to count the amount of traffic passing on the main road.

7.70 Table 7.05 to Table 7.16 (pp.299-310) were the results of the traffic count taking in both stations (A) and (B). An indication of the total traffic count, and the type of traffic, is included in these tables, while Table 7.17 (p.311) defines the period of time that was spent on making the actual survey.

#### SCALE OF PREPARATION AND CODING

7.71 All the surveys (the survey questionnaire, the traffic count survey and the interviews with both government

Figure 7.03 LOCATIONS OF TRAFFIC COUNT STATIONS



**KEY**

● A STATION A

● B STATION B

— EXISTING ROADS

officials and community leaders) were conducted in Arabic, since it is the language of Saudi Arabia.

7.72 When all the surveys had been conducted, the first step was to translate all the data collected into English. Each survey was put together separate from the others. The traffic count survey, the interviews with both government officials and community leaders, did not require any computer analysis due to their simplicity, either in calculation (as in the case of the traffic count), or in recording the answers (as in the case of the interviews).

7.73 Results from the survey questionnaire, which constituted most of the surveys, required several steps in order to prepare them for computer analysis:

1. The number of responses received was 463 as indicated. These questionnaires were coded from 001-463 (see Appendix K).
2. Variable labels were entered in a survey coding sheet for all the questions, and a total of 48 variable labels were registered. The reason for 48 variable labels was that while we only have 33 questions, in questions 11 and 22, each choice within the question was coded as a variable label.
3. Value labels were coded for each question on the survey coding sheet (V1=Q1), except for questions



number 11 and 22 where each variable in these two questions was given a value label due to the involvement of ranking. Thereafter, a total of 38 value labels was recorded.

4. Both the previous steps were then entered into the computer as part of the statistical package for analysis. This process was not only to receive an output for each question, but also a correlation was required between different variables according to specific codes. Thus, the survey questionnaire at this stage was ready for computer analysis.

7.74 The next chapter comprises a detailed analysis of the data collected by the survey.

TABLE 7.05: Traffic Count, Station (A), Thursday, Unayzah-Buraydah

DATE 4.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	98	3	115	7	19	23	-	11	-	276
0800-0900	216	9	156	5	19	25	-	16	-	446
0900-1000	205	12	125	1	26	17	-	23	-	409
1000-1100	171	7	158	1	17	29	-	38	-	421
1100-1200	159	6	152	3	17	23	-	30	-	390
1200-1300	157	6	136	1	21	29	-	26	-	376
1300-1400	118	1	95	7	7	26	2	41	-	297
1400-1500	90	4	59	2	13	19	-	30	-	217
1500-1600	93	5	80	9	14	29	-	36	-	266
1600-1700	151	4	110	1	11	25	-	49	-	351
1700-1800	247	11	120	3	12	35	-	43	-	471
1800-1900	175	1	140	9	14	11	-	38	-	388
TOTAL	1880	69	1446	49	190	291	2	381	-	4308
Total Amount of Traffic between 1900-0700										1950
Grand Total of one Direction										6258

TABLE 7.06: Traffic Count, Station (A), Thursday, Burayday-Unayzah

DATE 4.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	75	3	85	5	16	16	-	36	-	236
0800-0900	118	6	160	5	32	22	3	31	-	377
0900-1000	105	4	135	5	25	36	1	40	-	351
1000-1100	117	5	158	3	42	29	1	39	-	394
1100-1200	175	7	155	3	55	36	2	47	-	480
1200-1300	200	10	177	6	42	32	-	53	-	520
1300-1400	163	7	162	2	17	23	-	27	-	401
1400-1500	123	2	80	2	12	15	1	30	-	265
1500-1600	103	7	89	3	12	21	-	25	-	260
1600-1700	105	4	68	5	10	24	-	29	-	245
1700-1800	196	4	129	5	16	37	1	16	-	404
1800-1900	217	7	138	9	13	17	-	27	-	428
TOTAL	1697	66	1536	53	292	308	9	400	-	4361
Total Amount of Traffic between 1900-0700										1928
Grand Total of one Direction										6289



TABLE 7.07: Traffic Count, Station (A), Friday, Unayzah-Buraydah

DATE 5.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	69	4	5	3	17	25	-	32	-	155
0800-0900	141	5	16	2	19	18	-	29	-	230
0900-1000	129	7	30	-	15	19	-	35	-	235
1000-1100	114	3	42	1	11	24	-	12	-	207
1100-1200	115	1	33	2	12	18	-	35	-	216
1200-1300	117	5	29	2	17	14	-	23	-	207
1300-1400	99	5	35	-	9	6	1	8	-	163
1400-1500	104	1	24	-	6	10	1	28	-	174
1500-1600	119	2	32	5	10	11	-	55	-	234
1600-1700	289	6	139	7	14	21	2	43	-	521
1700-1800	330	5	146	9	16	27	-	40	-	573
1800-1900	203	2	152	8	11	24	1	37	-	438
TOTAL	1829	46	683	39	157	217	5	377	-	3353
Total Amount of Traffic between 1900-0700										2337
Grand Total of one Direction										5690

TABLE 7.08: Traffic Count, Station (A), Friday, Burayday-Unayzah

DATE 5.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	61	1	5	1	12	13	-	10	-	103
0800-0900	103	2	11	1	12	14	-	41	-	184
0900-1000	159	3	38	-	9	19	2	48	-	278
1000-1100	152	4	61	2	10	14	-	34	-	277
1100-1200	137	1	54	1	13	14	-	31	-	251
1200-1300	131	-	42	2	14	23	1	40	-	253
1300-1400	101	5	36	-	8	10	-	7	-	167
1400-1500	110	-	29	-	8	12	-	34	-	193
1500-1600	109	1	30	4	7	14	-	28	-	193
1600-1700	126	5	44	4	12	19	-	13	-	223
1700-1800	116	2	38	1	13	21	-	19	-	210
1800-1900	140	4	32	7	10	22	2	31	-	248
TOTAL	1445	28	420	23	128	195	5	336	-	2580
Total Amount of Traffic between 1900-0700										2936
Grand Total of one Direction										5516

TABLE 7.09: Traffic Count, Station (A), Saturday, Unayzah-Buraydah

DATE 6.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	420	2	181	35	13	26	-	7	-	684
0800-0900	506	2	347	5	12	19	-	15	-	906
0900-1000	370	-	247	4	10	14	-	11	-	656
1000-1100	195	8	160	4	20	20	-	44	-	451
1100-1200	180	8	190	10	26	17	-	48	-	497
1200-1300	193	8	146	6	20	32	-	31	-	436
1300-1400	142	5	86	19	21	12	-	19	-	304
1400-1500	140	3	124	3	3	18	-	21	-	312
1500-1600	152	8	101	13	8	14	-	30	-	326
1600-1700	111	5	117	2	5	15	-	30	-	285
1700-1800	207	14	160	4	8	25	-	35	-	453
1800-1900	124	6	105	4	6	20	-	23	-	288
TOTAL	2740	69	1964	105	152	232	-	314	-	5576
Total Amount of Traffic between 1900-0700										1669
Grand Total of one Direction										7245



TABLE 7.10: Traffic Count, Station (A), Saturday, Buraydah-Unayzah

DATE 6.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	194	6	110	4	11	7	-	15	-	374
0800-0900	191	20	138	15	20	12	1	41	-	438
0900-1000	249	11	168	3	11	26	-	35	-	503
1000-1100	187	8	136	4	30	26	-	32	-	423
1100-1200	215	10	220	1	21	26	-	22	-	515
1200-1300	280	12	209	4	22	22	-	33	-	582
1300-1400	374	2	214	4	16	12	-	31	-	653
1400-1500	180	5	120	-	45	30	5	30	-	415
1500-1600	300	5	260	17	28	32	-	40	-	682
1600-1700	435	10	380	22	53	57	-	30	-	987
1700-1800	205	7	140	3	25	18	-	28	-	426
1800-1900	205	5	135	8	35	25	-	35	-	448
TOTAL	3015	101	2230	85	317	293	6	372	-	6419
Total Amount of Traffic between 1900-0700										1862
Grand Total of one Direction										8281

TABLE 7.11: Traffic Count, Station (B), Thursday, Buraydah-Unayzah

DATE 11.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	103	2	124	6	18	22	-	14	-	289
0800-0900	137	1	148	5	15	28	-	35	-	369
0900-1000	104	4	133	6	22	35	-	53	-	357
1000-1100	161	3	128	2	20	39	-	48	-	401
1100-1200	203	5	162	-	27	31	2	65	-	495
1200-1300	272	4	174	2	30	35	1	75	-	593
1300-1400	182	8	171	2	19	34	-	30	-	446
1400-1500	125	4	93	1	14	17	-	29	-	283
1500-1600	144	1	86	1	19	17	1	24	-	293
1600-1700	153	2	74	1	16	23	-	21	-	290
1700-1800	258	3	104	2	19	21	-	27	-	434
1800-1900	370	2	112	-	15	13	-	19	-	531
TOTAL	2212	39	1509	28	234	315	4	440	-	4781
Total Amount of Traffic between 1900-0700										2312
Grand Total of one Direction										7093

TABLE 7.12: Traffic Count, Station (B), Thursday, Unayzah-Buraydah

DATE 11.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	98	2	102	6	12	19	-	23	-	262
0800-0900	162	2	164	10	18	17	1	21	-	395
0900-1000	251	3	135	2	12	16	1	29	-	449
1000-1100	271	3	138	1	13	19	1	28	-	474
1100-1200	213	2	139	-	16	20	-	21	-	411
1200-1300	192	5	133	1	11	14	-	19	-	375
1300-1400	141	4	128	-	9	18	-	22	-	322
1400-1500	140	2	63	-	8	15	2	18	-	248
1500-1600	144	4	72	7	16	19	1	31	-	294
1600-1700	184	4	117	-	15	22	1	35	-	378
1700-1800	351	6	142	2	17	18	1	32	-	569
1800-1900	248	5	158	4	11	26	-	27	-	479
TOTAL	2395	42	1491	33	158	223	8	306	-	4656
Total Amount of Traffic between 1900-0700										2234
Grand Total of one Direction										6890



TABLE 7.13: Traffic Count, Station (B), Friday, Buraydah-Unayzah

DATE 12.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	15	4	26	3	16	25	-	8	-	97
0800-0900	70	2	35	2	14	22	-	16	-	161
0900-1000	183	1	47	-	19	25	1	17	-	293
1000-1100	156	3	76	1	22	24	1	19	-	302
1100-1200	147	-	61	1	19	26	-	20	-	274
1200-1300	161	1	65	1	10	13	-	17	-	268
1300-1400	152	2	57	-	8	7	-	18	-	244
1400-1500	134	2	46	1	15	18	-	23	-	239
1500-1600	148	4	41	5	19	30	-	14	-	261
1600-1700	206	4	43	4	10	28	1	16	-	312
1700-1800	194	3	68	4	15	29	-	9	-	322
1800-1900	391	5	73	3	24	22	-	11	-	529
TOTAL	1957	31	638	25	191	269	3	188	-	3302
Total Amount of Traffic between 1900-0700										2912
Grand Total of one Direction										6214

TABLE 7.14: Traffic Count, Station (B), Friday, Unayzah-Buraydah

DATE 12.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	66	1	71	1	8	12	-	3	-	162
0800-0900	106	2	115	-	11	16	-	7	-	257
0900-1000	117	2	127	1	14	17	-	13	-	291
1000-1100	121	3	58	2	18	9	1	24	-	236
1100-1200	119	3	62	2	10	15	1	21	-	233
1200-1300	152	9	83	6	17	8	-	18	-	293
1300-1400	28	6	77	1	9	14	-	13	-	148
1400-1500	79	4	52	-	8	13	-	9	-	165
1500-1600	185	2	69	-	6	8	-	17	-	287
1600-1700	281	4	55	5	9	16	-	22	-	392
1700-1800	473	7	68	4	19	12	-	21	-	604
1800-1900	323	6	72	5	14	17	-	16	-	453
TOTAL	2050	49	909	27	143	157	2	184	-	3521
Total Amount of Traffic between 1900-0700										2872
Grand Total of one Direction										6393

TABLE 7.15: Traffic Count, Station (B), Saturday, Buraydah-Unayzah

DATE 13.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Track w/ Trailer			
0700-0800	617	1	207	4	29	22	1	18	-	899
0800-0900	221	5	180	2	33	17	-	9	-	467
0900-1000	282	7	149	3	45	28	-	14	-	528
1000-1100	366	10	153	5	31	26	1	13	-	605
1100-1200	334	9	141	2	19	21	2	9	-	537
1200-1300	135	8	117	3	16	19	1	17	-	316
1300-1400	309	6	138	3	39	23	2	25	-	545
1400-1500	604	9	192	6	43	26	2	16	-	878
1500-1600	677	12	194	12	48	22	-	22	-	987
1600-1700	385	3	119	5	25	11	1	24	-	573
1700-1800	318	5	127	6	39	19	-	13	-	527
1800-1900	301	5	133	9	84	17	-	11	-	560
TOTAL	4549	80	1850	60	451	231	10	191	-	7422
Total Amount of Traffic between 1900-0700										2895
Grand Total of one Direction										10317



TABLE 7.16: Traffic Count, Station (B), Saturday, Unayzah-Buraydah

DATE 13.10.90	Private Cars	Taxis and Limos	Pick-ups and Vans	Buses	Trucks and Tankers			Tractor Trailer	Motor Cycles	TOTAL
					2 Axles	3 or more axles	Truck w/ Trailer			
0700-0800	724	5	91	18	36	52	1	54	-	981
0800-0900	716	7	113	13	17	32	-	28	-	926
0900-1000	617	4	133	7	19	14	-	48	-	842
1000-1100	594	4	151	3	28	21	-	46	-	847
1100-1200	602	3	132	2	13	11	-	20	-	783
1200-1300	365	4	110	1	34	9	1	12	-	536
1300-1400	432	5	119	1	28	7	1	14	-	607
1400-1500	632	6	144	6	64	41	1	19	-	913
1500-1600	629	7	112	4	35	18	-	33	-	838
1600-1700	363	3	123	2	29	16	-	13	-	549
1700-1800	419	5	109	4	32	11	-	8	-	588
1800-1900	260	4	98	2	43	16	-	11	-	434
TOTAL	6353	57	1435	63	378	248	4	306	-	8844
Total Amount of Traffic between 1900-0700										2804
Grand Total of one Direction										11648

TABLE 7.17: Survey Period

Type of Survey	Date of Distribution	Date of Collection/Receiving
Government Employee Questionnaire	2 - 5 July 1990	7 July - 25 October 1990
Private Sector Employee Questionnaire	7 - 9 July 1990	14 July - 3 September 1990
Own/Independent Business Questionnaire	2 - 27 July 1990	7 July - 12 October 1990
Students' Questionnaire	2 - 10 October 1990	13 - 18 October 1990
Interviews with government officials	July - August 1990	
Interviews with community leaders	July - August 1990	
Traffic count	4 - 13 October 1990	
Physical observation	July - October 1990	

## CHAPTER EIGHT: ANALYSIS OF THE SURVEY RESULTS: THE IMPACTS OF TRANSPORTATION DEVELOPMENTS IN THE CENTRAL CORE AREA

### INTRODUCTION

8.01 While this chapter details results analysis of surveys undertaken for the purpose of investigating the socio-economic impact of transportation on the Central Core Area of Alqassim Region in Saudi Arabia, the following two chapters present a planning and transportation strategy based on these results, and planning guidelines will be formed to be utilised on other areas of the Kingdom employing the CCAAR as a case study.

8.02 The survey questionnaire plays the major role in the investigation process, thus detailed results can be used to assist the socio-economic impact of transportation in the CCAAR. The outcome of these interviews with the government officials and the community leaders are presented throughout the discussion of the survey results wherever these are appropriate and applicable to the assessment of the socio-economic impact on the area.

8.03 The traffic count survey results were an aid to considering the primary 'movement of people' through the inspection of the expanded range of motor vehicles as a social impact. It also served the extended 'range of sources of supply of goods' as an economic impact of transportation by studying the type of traffic.



## SOCIAL IMPACTS

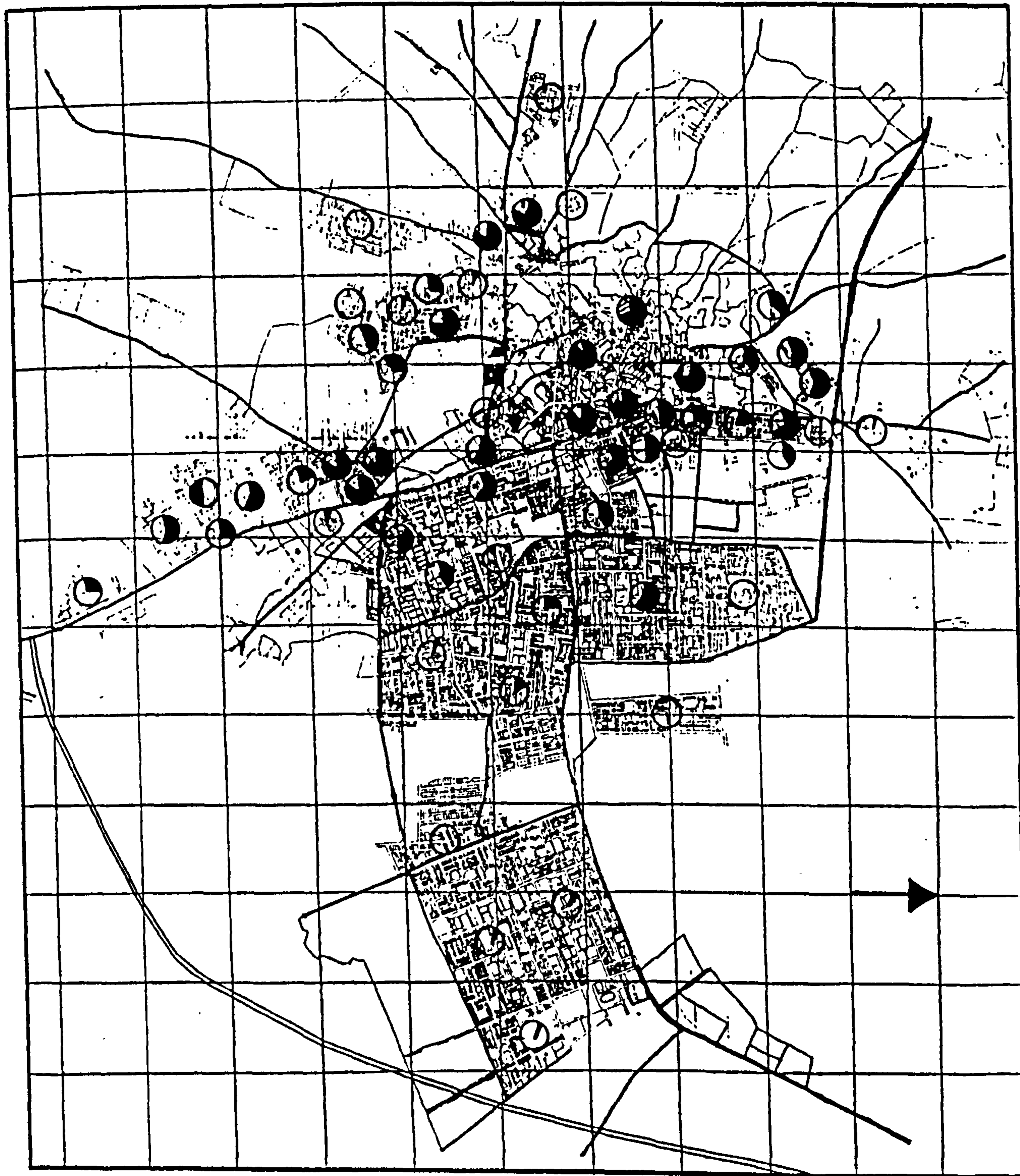
### RESIDENTIAL LOCATION

8.04 In the Central Core Area of Algassim Region, people do not change their residential location readily, unless influenced by a major factor. Transportation and its accessibility was an influence in moving residence from one place to another. When the new roads opened for traffic connecting the two city centres to their respective suburbs, residents of the CCAAR then rushed, and were encouraged by the network, to move to new communities. Such an attraction can be observed through the concentration of residential communities around the major network of transportation in Unayzah within the CCAAR (see Figure 8.01). This was reflected on Table 8.01, where respondents of the survey questionnaire answered positively that it influenced their location with (55%), answering Yes.

**TABLE 8.01: The Impact of Transportation on the Change of Location of Residential Areas**  
(Appendix A, question number 23)

PERCEPTION	TOTAL	APPROX %
Yes	257	55.5
To Some Extent	130	28.1
No	60	12.9
Uncertain/Do Not Know	16	3.5
TOTAL	463	100.0

**Figure 8.01 CONCENTRATION OF RESIDENTIAL COMMUNITIES  
ALONG MAJOR TRANSPORTATION NETWORK**



**SOURCE: MINISTRY OF MUNICIPAL AND RURAL AFFAIRS, UNAYZAH MUNICIPALITY,  
JULY 1990**



8.05 Private sector employees were the group most influenced and who changed residence, 65% (see Table 8.02), followed by government employees, 55%. The highest percentage not influenced by transportation to change their residence was among the business owners, 19%.

**TABLE 8.02: The Relationship between the Influence of Transportation on Residential Location and Type of Occupation**  
(Appendix A, question numbers 7 and 23)

TYPE OF OCCUPATION	YES		TO SOME EXTENT		NO		UNCERTAIN/ DON'T KNOW	
	Total	%	Total	%	Total	%	Total	%
Government employees	107	55	62	32	21	11	4	2
Private sector employees	55	66	22	26	6	7	1	1
Own Business	66	50	35	26	26	19	7	5
College Students	29	57	11	21	7	14	4	8
<b>TOTAL</b>	<b>257</b>	<b>55</b>	<b>130</b>	<b>28</b>	<b>60</b>	<b>13</b>	<b>16</b>	<b>4</b>

8.06 This is a clear indication that transportation did not force business people to change their residence. From interviews with some of the members of this group, it emerged that they tended to remain in the same place of residence. In these cases, business and shop owners simply walk to their shops, especially in the city centre, where they refurbish their old dwellings and modernize them. This involved upgrading formerly mud buildings to modern villa type dwellings.



8.07 One interviewee, Alsolai, a community leader, (Appendix C, question numbers 14, 15) supported the view of having not been influenced by transportation; he stated:

"... I did not move out of my old residence because of transportation. I do not accept that, and I have asked my children to build a new modern house for them in the backyard and I stayed in the same old mud house where I can be near my old shop."

#### FAMILY UNITY

8.08 The family in Saudi Arabia, and specifically in the Central Core Area of Algassim Region, functions as one unit. The father, the mother, and the children all form one unit, and live under one roof. Even when the son gets married, in many cases the married couple live with the son's parents.

8.09 This situation has not changed much in the CCAAR, even with the increase of family income, where individuals can afford to move out of their parents' house. However, in places such as the capital city Riyadh, or Jeddah, single people normally live apart from their family in a flat or a single unit, because of the size of the city and their attachment to work and businesses.

8.10 Having illustrated some aspects of family unity in the area, it is important to point out that this is mainly credited to the teaching of Islam. Alolet (1991, p.71) stated "... the family is the most fundamental unit of

society, since it achieves the development of the individual and his transition into society".

8.11 Schleifer (1986) stated what the prophet Muhammed said about family:

"... Indeed Allah has warned you about your responsibility to your fathers, indeed, Allah has warned you about your responsibility to your mother (He repeated this three times), indeed Allah has warned you about your responsibility to your relatives; so you relatives." (cited in Alolet, 1991 pp.72-73).

8.12 This is culturally exercised and religiously taught but to what extent has transportation had a positive effect on family unity? Table 8.03 reveals the result of the survey questionnaire and indicates the relationship between the positive effect of transportation, variety of work, of ages and of educational background.

8.13 A very high percentage of people (69%) from different age groups, educational backgrounds and occupations responded positively. 22% thought that the impact of transportation was to some extent to assist family unity. Only 4% of the respondents did not believe it had any positive impact, and 5% did not know or were uncertain.

8.14 In view of the highly positive impact of transportation on family unity, there are still some people

**TABLE 8.03: The Relationship between Transportation Impact on Family Unity and Various Elements of Society (Appendix A, question numbers 1, 3, 7 and 24)**

	PERCEPTION							
	YES Total	YES Approx %	TO SOME EXTENT Total	TO SOME EXTENT Approx %	NO Total	NO Approx %	UNCERTAIN Total	UNCERTAIN Approx %
<b>Age Group</b>								
Less than 20	34	10	4	4	2	10	5	22
21-30 years	90	28	31	31	6	30	8	37
31-40 years	114	36	51	51	8	40	5	22
41-50 years	60	19	11	11	3	15	4	19
51-60 years	16	5	2	2	1	5	0	0
Over 60 years	4	2	1	1	0	0	0	0
<b>Education</b>								
No schooling	5	1	2	2	1	5	1	5
Read & write	39	12	14	14	1	5	7	32
Primary school	28	9	8	8	2	10	0	0
Secondary school	164	52	32	32	8	40	8	36
University degree	78	25	42	42	8	40	5	22
Post-graduate	4	1	2	2	0	0	1	5
<b>Type of work</b>								
Govt employee	105	33	69	69	9	45	9	41
Private sector	69	22	10	10	3	15	2	9
Own business	103	32	17	17	6	30	7	32
Students	41	13	3	3	2	10	4	18
<b>TOTAL</b>	<b>318</b>	<b>69</b>	<b>103</b>	<b>22</b>	<b>20</b>	<b>4</b>	<b>22</b>	<b>5</b>



who believe that, with or without transportation, people and the family in particular are connected to each other, and as Albuthi puts it (Appendix C, question number 9):

"... No matter how much transportation separates family members from one another physically, they are nevertheless attached socially and act as one unit."

8.15 Table 8.03 also shows that the age group of 31-40 shows the most positive impact (36%), while 52% of those who hold a secondary school diploma in different areas believe the same. 33% of government employees formed the highest percentage in the group showing a positive impact.

8.16 It is clear that transportation has a very positive impact on family unity. But does it damage family unity to any extent? Although the result of this particular question (Appendix A, question number 25): - Do you think that the present modern transport network in the area has a damaging effect on family unity? - showed that 62% of the respondents disapproved.

8.17 Only 10% thought that it had a damaging effect, which is not a significant percentage. This view is reflected by some of the interviewees, who believe that with the introduction of a modern transport network, individuals from the area are no longer seeking opportunities in the area, as they can now work in other regions where there are better opportunities, and commute

easily because of the system of transportation. They can live and work in other regions and come home at the weekends or holidays.

8.18 Albuthi stated (Appendix C, question number 17):

"... There are a number of positive impacts of transportation, as an example, transportation has made it possible for people and families to move from one place to another and create alternatives for themselves in selecting their residential areas."

8.19 It appears that the family in the area is more united now than before as a result of the modern transportation network. The connection of motorways has given members of families job opportunities, educational opportunities at various levels (mostly college level) in different parts of the Kingdom and has enabled them to commute on a weekly basis, rather than monthly or even yearly as in the past, before the introduction of such a modern system.

#### NEIGHBOURHOOD UNITY

8.20 With the country's huge oil revenues, the mid 70s saw expansion and growth of the Central Core Area. In addition to the increase in family and individual income (see Appendix A, question number 4), there was the opportunity offered by the Saudi Real Estate Fund of



interest free loans. Residents of the area began building in the outskirts of the twin cities, even before any services could be provided.

8.21 The Real Estate Fund started offering loans to people to build their own housing, in any areas of the city without any restrictions on whether or not the area had been provided with basic services such as electricity and water. Furthermore, a report released by the Fund (1990) showed that up to mid-1990, 28,317 loans were offered to the residents of the native region of Algassim, and 16,210 loans were provided to the citizens of the Central Core Area (Burahdah and Unayzah combined).

8.22 And as the director of the Algassim branch of the Real Estate Fund indicated (Appendix B, Section F): "... the citizen is given a number indicating the date of application to receive a loan and it will be offered to him whenever his turn comes, without any other considerations." This, of course, has led many to take advantage of this interest free loan. The amount of the loan is SR 300,000 (approximately £50,000) paid in three stages depending on the progress of the dwelling constructed by the individual.

8.23 Accordingly, the residents began to leave their old dwellings for new areas, but the pace of the Real Estate Fund loans slowed down due to a set-back to the national economy. Another factor affecting neighbourhood disunity



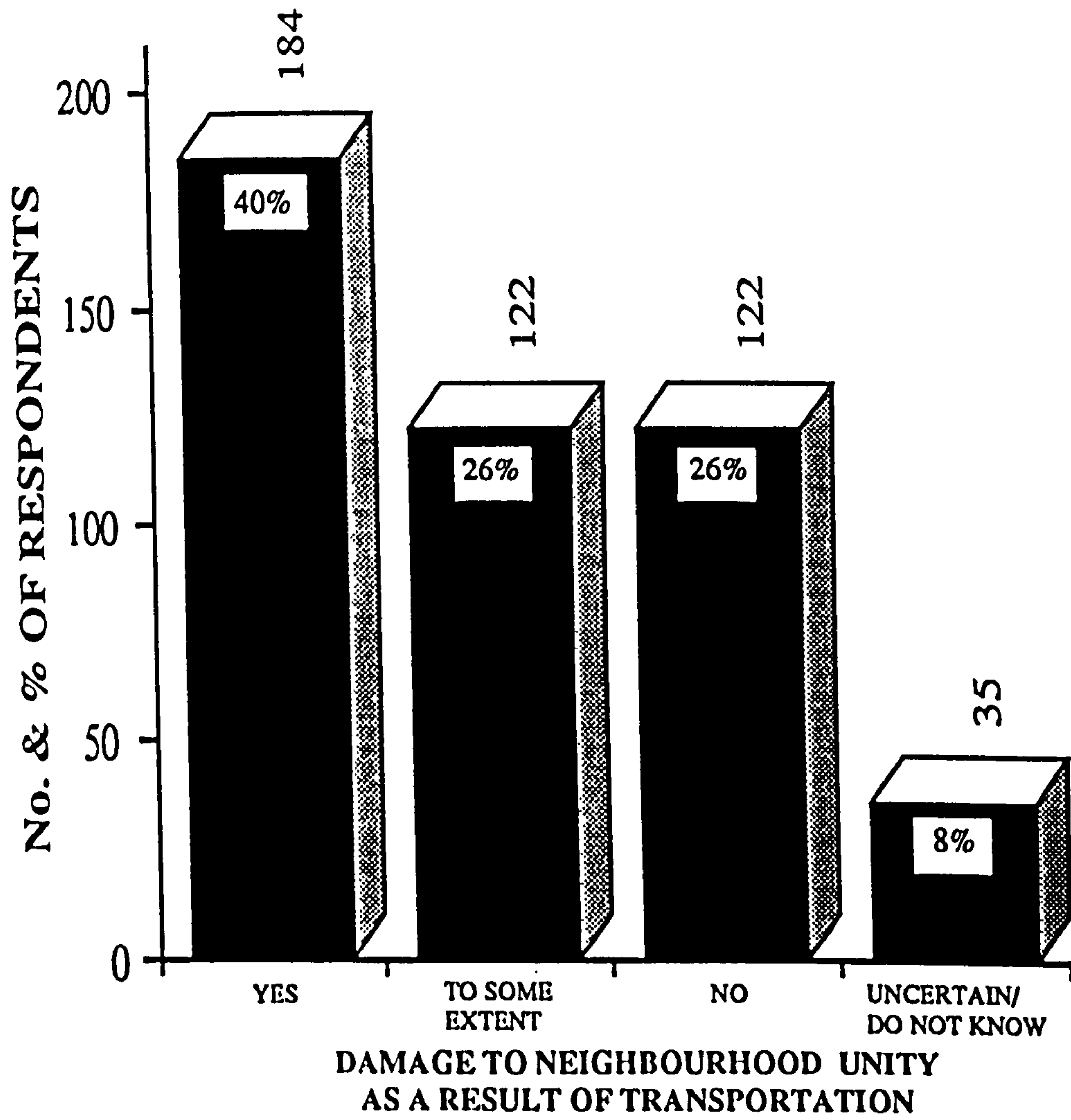
emerged with the introduction of modern motorways and main roads in the area, which in part resulted in people leaving their neighbourhood.

8.24 In the research questionnaire survey (Appendix A, question number 26), residents were asked whether neighbourhood unity has suffered as a result of the modern transportation network. Figure 8.02 shows the results where 40% (184) thought it has, while 26% (122) indicated the neighbourhood has suffered to some extent, and another 26% (122) did not think so. That was the overall perception of the respondents.

8.25 It is significant to look at the relationship between those who think neighbourhood unity has suffered as a result of transportation and the different age groups within society. Table 8.04 shows an interesting result, where the younger groups believe that transportation has disrupted the neighbourhood and that is due to the fact that up to the age of forty (40 years old), people tend to move out of the community in search of a better place to live with good transportation accessibility. Moreover, those in the older age group, 51 years old and above, have the tendency to remain in the neighbourhood and do not think their neighbourhood has suffered (32%).

8.26 This is supported by Albuti (Appendix C, question number 8):

**Figure 8.02 THE DAMAGE TO NEIGHBOURHOOD UNITY AS A RESULT OF TRANSPORTATION.**  
(APPENDIX A, QUESTION NUMBER 26)



**TABLE 8.04: The Relationship between Damaged Neighbourhood Unity and Age Group  
(Appendix A, question numbers 1 and 26)**

AGE GROUP	PERCEPTION									
	Total	YES Approx %	Total	TO SOME EXTENT Approx %	Total	NO Approx %	Total	UNCERTAIN Approx %	Total	
Less than 20 years	25	55	7	15	7	15	7	14	6	45
21-30 years	58	42	40	29	28	21	28	7	10	136
31-40 years	66	36	49	27	58	32	58	4	7	180
41-50 years	29	37	18	23	21	27	21	13	10	78
51-60 years	6	32	6	32	6	32	6	4	1	19
Over 60 years	-	-	2	40	2	40	2	20	1	5
<b>TOTAL</b>	<b>184</b>		<b>122</b>		<b>122</b>		<b>122</b>		<b>35</b>	<b>463</b>



"...Most residents have abandoned their old neighbourhood and moved to a newer residential area, except those with a traditional attachment still residing in their old dwelling."

Alsolai stated (Appendix C, question number 8):

"... It is true that the neighbourhood unity has suffered because of the modern transportation network and other reasons -- people have moved to the outskirts of the city far away from the city centre, and we have indeed missed that, but it is now a fact of life."

8.27 In some cases, an entire community is abandoned as in one case in Unayzah, where all the residents of one community in the city centre have moved out and left the area to be dealt with by the local municipality. This is exemplified in Table 8.05 which shows that most people in the city of Unayzah reside in the east side (37%), while only 11% reside in the city centre. Moreover, most residents in Buraydah live on the north side (35%), while 19% still live in the city centre. The east side of Unayzah, and the north side of Buraydah, are well provided with good transportation services.

#### LIFE STYLE

8.28 Societies change with time as modernisation and technology are introduced. This change depends on the type of technology and/or modernisation. Moreover, people differ

**TABLE 8.05: The Relationship between Place of Residence and Location within the City**  
 (Appendix A, question numbers 8 and 9)

PLACE OF RESIDENCE	LOCATION						TOTAL
	North Total Approx %	South Total Approx %	East Total Approx %	West Total Approx %	City Centre Total Approx %		
Buraydah	74 35	31 15	23 11	41 19	40 19	209	
Unayzah	28 13	52 23	82 37	36 16	24 11	222	

in adopting such changes in their lives. Some accept change faster than others, and this too may vary between individuals, depending on how traditional they are, and on their level of cultural attachment.

8.29 What our parents have taught us about how attached we should be to our tradition is totally accepted at the time. But, as we grow up into a different time cycle, things around us are not the same. Therefore, a change and adaptation of the new elements of life must take place.

8.30 Technology of the past is unlike that of the present, and certainly not the same as tomorrow's. Innovations and improvements in our lives are being introduced all the time. Transportation in particular has come a long way in Saudi Arabia as a whole and in the study area in particular. Prior to the 1960s, people of the area used camels, donkeys and walking as means of transportation, and the author can recall when his father used a donkey as a means of transportation for shopping and for travelling to his farm just outside the city of Unayzah, in the Central Core Area. Goods and necessities such as gasoline were transported by donkey caravans. Travel for a variety of purposes was by camel or donkey, or even on foot.

8.31 That was in the past, before the introduction of automobiles and roads. Life style has changed tremendously as a consequence of the transportation system. This is



shown by the research questionnaire survey results presented in Table 8.06.

**TABLE 8.06: The Impact of Transportation on the Change of Citizens' Life Style (Appendix A, question number 27)**

PERCEPTION	Total	Approx %
Yes	227	49
To some extent	128	27
No	63	13
Uncertain/Don't know	45	10
TOTAL	463	100

8.32 The table shows an enormous belief that transportation has indeed changed the life style of the residents in the area which is represented by a forty-nine percent (49%) acceptance by the respondents. Moreover, only 13% thought it did not change their life style.

8.33 All government officials and community leaders interviewed admitted that Saudi life style has changed as a result of the modern transportation network, as was discussed in Chapter 3. The system of transportation has led many people to relocate, and travel freely.

8.34 The way of life, means of communication and relationship between people are all part of the life style change that has taken place in the area as a result.

8.35 The intention of this particular question within the survey questionnaire was to show the overall perception of people with regard to the influence of transportation on the change of life style, as part of the social impact of transportation.

#### ACTIVE MOVEMENT OF PEOPLE

8.36 The transportation network provides mobility for the population of the area. An indication of the network as primary movement of the CCAAR residents is the traffic count that was conducted in the area.

8.37 As indicated in the previous chapter, a traffic count was taken over a three day period on each station. Station A is located outside the city of Unayzah on the main road to Buraydah, and Station B is located outside Buraydah, on the main road to Unayzah. The days chosen were Thursday, Friday and Saturday, as these are representative of the week and can give an estimate of the average daily amount and type of traffic on the main road. Hence, a comparison can be made with previous studies.

8.38 By comparing the two traffic counts from both stations which are summarised in Tables 8.07 and 8.08, we can see that the average daily traffic at Station A (see Table 8.07) is 13,093, and 16,185 at Station B (see Table 8.08).

TABLE 8.07: Summary of Traffic Count at Station (A)

Type of Traffic	THURSDAY			FRIDAY			SATURDAY		
	* ** UN-BU	BU-UN	Total	UN-BU	BU-UN	Total	UN-BU	BU-UN	Total
Private Cars	1880	1697	3577	1829	1445	3274	2740	3015	5755
Taxis & Limousines	69	66	135	46	28	74	69	101	170
Pick-ups & Vans	1446	1536	2982	683	420	1103	1964	2230	4194
Buses	49	53	102	39	23	62	105	85	190
2-axles***	190	292	482	157	128	285	152	317	469
3-axles***	291	308	599	217	195	412	232	293	525
Track w/ Trailer***	2	9	11	5	5	10	-	6	6
Tractor Trailer***	381	400	781	377	336	713	314	372	686
Total 0700-1900	4308	4361	8669	3353	2580	5933	5576	6419	11995
Total 1900-0700	1950	1928	3878	2337	2936	5273	1669	1862	3531
TOTAL	6258	6289	12547	5690	5516	11206	7245	8281	15526

\* Unayzah  
 \*\* Buraydah  
 \*\*\* Trucks and tankers



TABLE 8.08: Summary of Traffic Count at Station (B)

Type of Traffic	THURSDAY			FRIDAY			SATURDAY		
	** * BU-UN	UN-BU	Total	BU-UN	UN-BU	Total	BU-UN	UN-BU	Total
Private Cars	2212	2395	4607	1957	2050	4007	4549	6353	10902
Taxis & Limousines	39	42	81	31	49	80	80	57	137
Pick-ups & Vans	1509	1491	3000	638	909	1547	1850	1435	3285
Buses	28	33	61	25	27	52	60	63	123
2-axles***	234	158	392	191	143	334	451	378	829
3-axles***	315	223	538	269	157	426	231	248	479
Track w/ Trailer***	4	8	12	3	2	5	10	4	14
Tractor Trailer***	440	306	746	188	184	372	191	306	497
Total 0700-1900	4781	4656	9437	3302	3521	6823	7422	8844	16266
Total 1900-0700	2312	2234	4546	2912	2872	5784	2895	2804	5699
TOTAL	7093	6890	13983	6214	6393	12607	10317	11648	21965

\* Unayzah  
 \*\* Buraydah  
 \*\*\* Trucks and tankers

8.39 It is clear that the average daily traffic at Station B is rather higher than at Station A, 16,185 and 13,093 respectively. This is an indication that more people are commuting to and from the capital city Buraydah than its twin, Unayzah. Furthermore, it is clear that the majority of people use their own cars, rather than using other modes of transport such as buses or taxis, as Tables 8.07 and 8.08 illustrate.

8.40 To provide additional illustration of the social impact of transportation as a primary movement of people through the expanded range of motor vehicles in the CCAAR, a comparison of results of past traffic counts with the research traffic count was considered.

8.41 Doxiades Associates (1973) conducted traffic count studies in the area as part of their Central Region Master Plans study. Similarly, Dar Alhandasah Engineering Consultants (1982) conducted a traffic count study in the area as part of Algassim Area Wide Study of the Development of Primary Roads. Both had two traffic stations placed in the same area as the traffic count stations for this research. Their final reports of the traffic counts (1973) and (1982) compared to the results of this research showed the following:

	Doxiadis Associates (1973)	Dar Alhandasah (1982)	Research Traffic Count (1990)
Station A	1417	9426 (Mon)	15526 (Sat)
Station B	2203	10114 (Mon)	21965 (Sat)

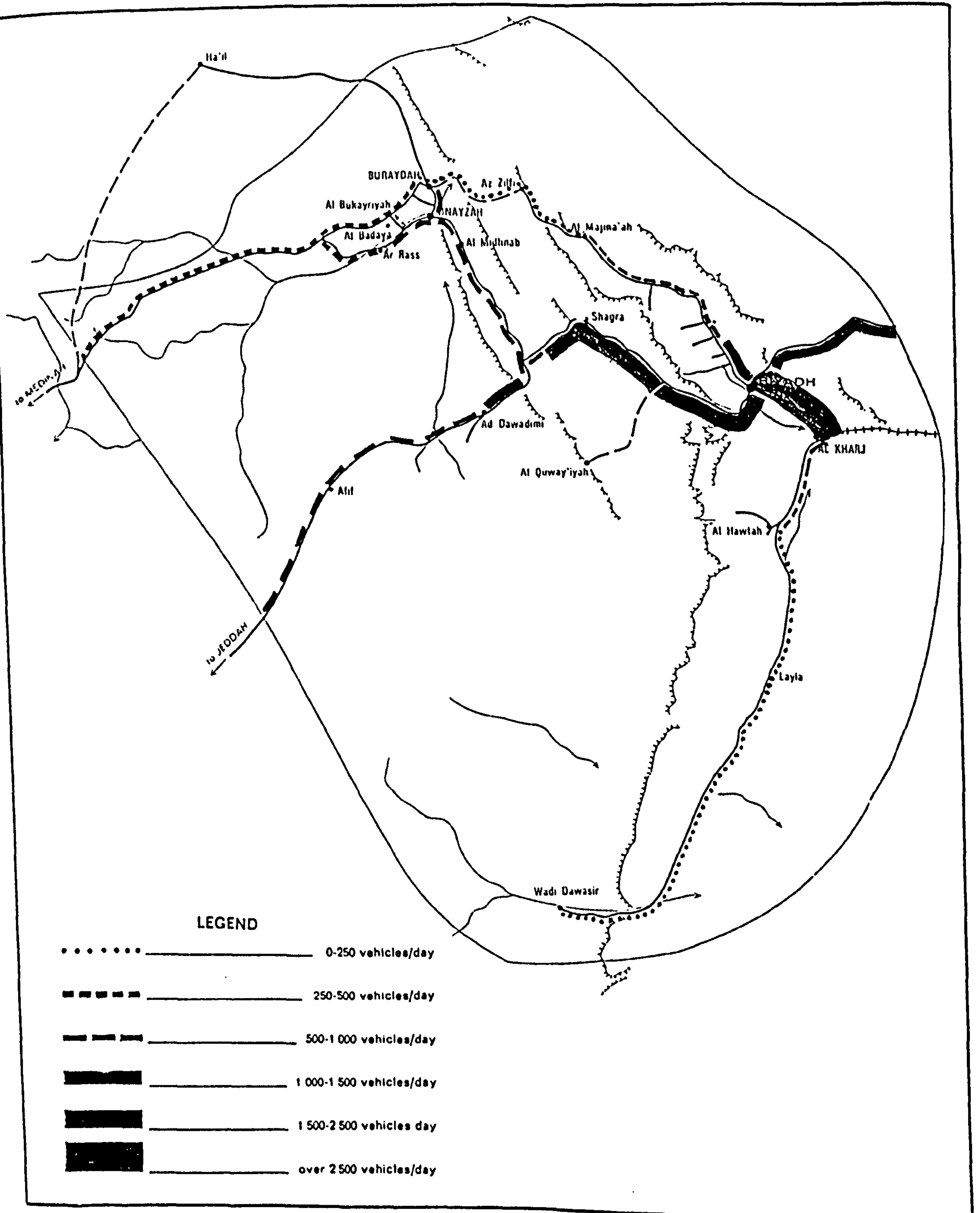
8.42 As a result of a comparison of the three studies, and from reading the above, it is obvious that traffic has greatly increased in a seventeen year period. Thus, an indication is given of the expanded range of motor vehicles through the use of the transportation network.

8.43 Two earlier studies have confirmed that the main road between the twin cities has heavy traffic movements compared to other roads in the region. A transport study conducted by SCET International in 1975 for the Central Region of the Kingdom revealed information regarding the traffic movement on the region's road network. The traffic movement was based on surveys conducted by the Ministry of Communications from 1964 to 1968, and by Doxiadis International for the Riyadh area, and by the surveys carried out in 1973 by SANTS.

8.44 The results showed heavy movement on the Riyadh-Alkharj road and the Riyadh-Dammam, Riyadh-Shagra roads (over 2500 vehicles per day and 1500-2500 vehicles per day, respectively (see Figure 8.03). Moreover, within the region of Algassim, the movement of traffic indicated that the



**Figure 8.03 CENTRAL REGION - DAILY TRAFFIC VOLUME ON MAIN ROADS (1973)**



SOURCE: S.E.C.T. - INTERNATIONAL, SOCIO-ECONOMIC DEVELOPMENT PLAN, CENTRAL REGION (TRANSPORT), JUNE 1975, p. 27.

Buraydah-Unayzah road carried most movement of all the roads in the region, as also shown on Figure 8.03.

8.45 A study for the development of the primary road network in Algassim Region was conducted by Dar Alhandasah Consultants in 1982 for the Ministry of Communications. Their final report showed that the desired lines of travel within the region were reflected by the Buraydah-Unayzah road and the Buraydah-Hail road to the north-west. These two main roads represented the heaviest traffic movement within the region: 11531 and 17959 vehicles per day respectively. Other important traffic movement was recorded in Buraydah East (11185), Unayzah West (11114), and Unayzah South (10986). The consultants projected that both for the year 1991 and 2001, flows on the two primary roads mentioned above would also increase considerably and they would continue to have the heaviest traffic movement (Dar Alhandasah Consultants, 1982). However, both studies mentioned above were actually conducted before the planning and construction of the Riyadh-Algassim expressway, which is likely to generate more traffic and affect movement patterns in the region.

### ECONOMIC IMPACTS

#### LAND VALUES

8.46 Prior to 1970, land outside the twin cities - in the Central Core Area - was very inexpensive. Small farms were scattered throughout the area, and no urbanisation

existed outside the centres of the twin cities. In fact, few people were interested in buying or investing in this land. This was mainly because there was no official physical plan for the parcels of land by the local municipality and citizens did not want to risk buying with the future of the surrounding areas unknown.

8.47 As the mayor of Unayzah city stated (Appendix B, Section H):

"... In the past, the physical plans of the areas were done and planned for regardless of a transportation network, but nowadays the consolidation of the transportation system is a high priority for us by coordinating with the concerned parties."

8.48 Land became more important as the modern network of transportation was introduced and grew. Residents started thinking about accessibility to work and shops, or simply about easier communication. So land close or near to motorways or main roads became expensive.

8.49 Alsolai stated (Appendix C, question number 10):

"... Lands become very expensive following the introduction of the modern transportation network ... these lands or areas outside the city were sites used mainly for sheep herding and/or for producing raw materials (i.e. rock and wood), and they were very low priced. But these areas became very



expensive as a consequence of growth and opening new roads network."

8.50 In support of the influence of transportation on the increase of land values, the survey question (see Appendix A, question number 28) about the impact of modern transportation on the increase of land values resulted in overwhelming agreement by the respondents (see Table 8.09), with 273 (59%) agreeing, while 19% were not certain, and 18% believing that the network has increased the value of land only to some degree. Only 4% disagreed with such influence.

**TABLE 8.09: The Effect of Transportation on the Increased Land Values**  
(Appendix A, question number 28)

PERCEPTION	Total	Approx %
Yes	273	59
To some extent	86	18
No	16	4
Uncertain/Don't know	88	19
TOTAL	463	100

8.51 In addition, during interviews with leading officials and community leaders, the issue of the impact of transportation on land values (see Appendix B, question number 11) was discussed. The interviewees believed that land values have increased due to the present modern

transportation network among other factors (i.e. Real Estate Fund and the increase of family income).

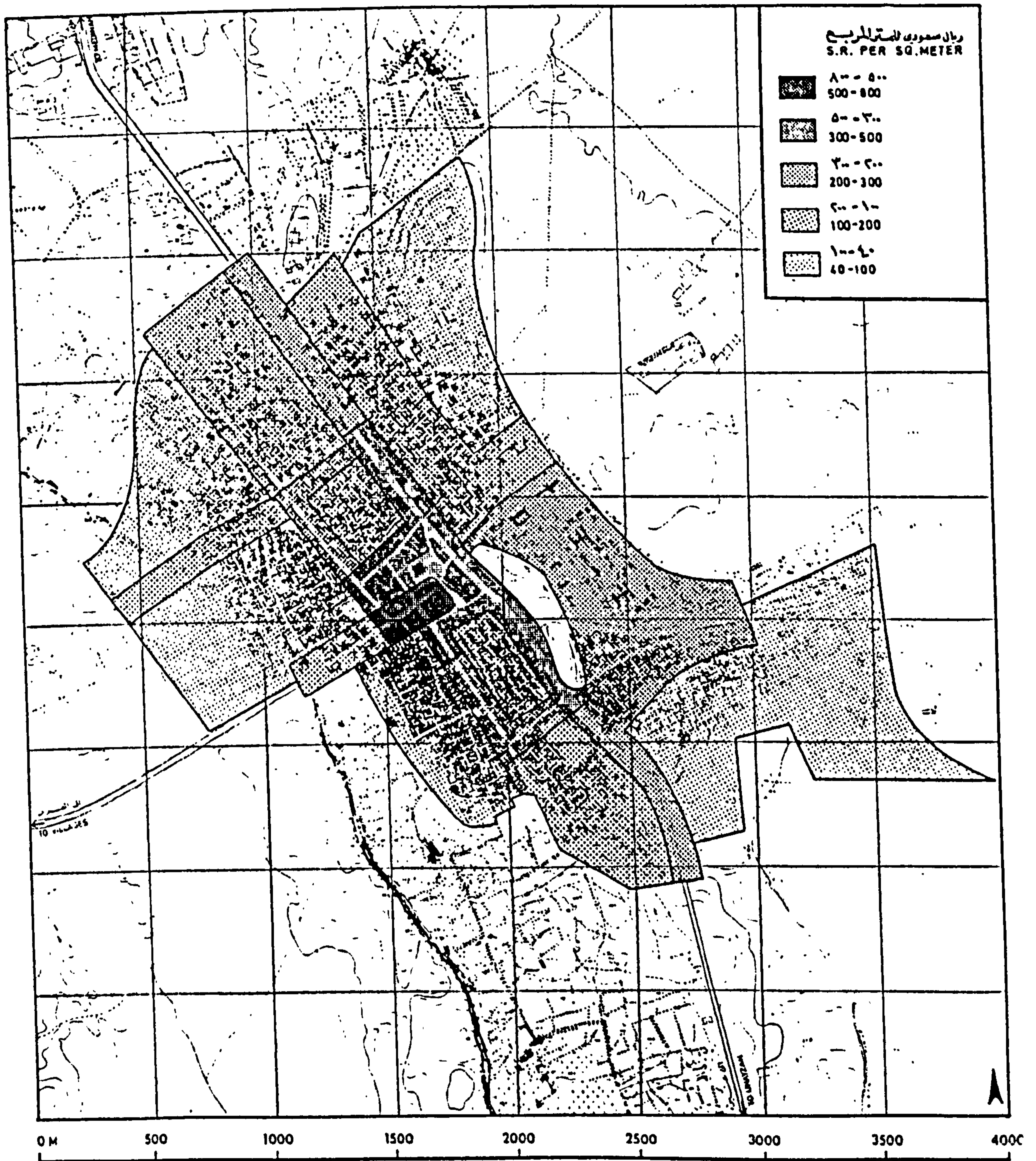
8.52 Albassam (a former mayor and presently a leading businessman) stated (Appendix C, question number 10): "... Land values have increased by 30-50%, and if the modern network had not been introduced, I do not believe it would have gone up." Furthermore, Aljahel (the best known Real Estate Agent) expressed his view in response to question number 10, Appendix C:

"... Prior to 1970 (approximately 30 years ago), land outside the city, specifically between the twin cities, was not owned by anyone ... you could simply plant a palm tree and claim it from the court and you will automatically receive a land ownership license ... between 1970-1975 a square metre can be sold for SR 10 (£1.40), but following the economic boom of the mid-70s and the introduction of modern transportation in the late 1970s and the beginning of the 1980s, the same type of land was sold for SR 100 (£14.30) per square metre."

8.53 According to Doxiadis (1973), within the city of Buraydah the highest prices of land were registered in the city centre (SR 500-800 per square metre), while the cheapest values of land were recorded between SR 40-100 per square metre in the area surrounding the city (see Figure 8.04). In the city of Unayzah, however, the city centre had



Figure 8.04 BURAYDAH LAND VALUES 1973



SOURCE: DOXIADIS ASSOCIATES, CENTRAL REGION MASTER PLANS 1973:  
BURAYDAH, EXISTING CONDITIONS, p.77.



the highest prices at SR 300-500 per square metre, while to the north and south of the town, land was worth less than SR 30 per square metre (see Figure 8.05).

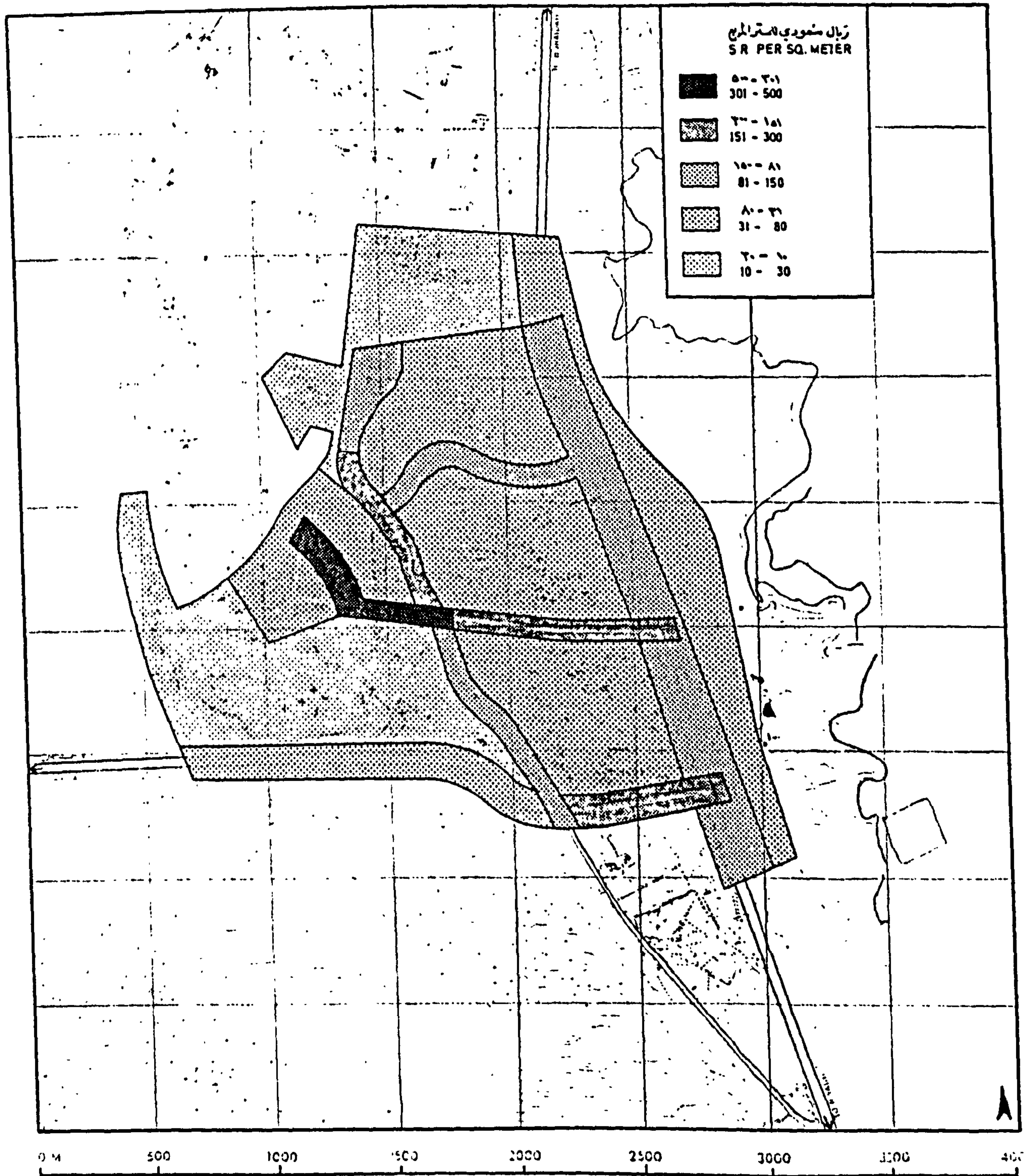
#### LOCATION OF BUSINESSES AND INDUSTRIES

8.54 Most of the small businesses and light industries are concentrated in the centre of both cities, and on the major roads leading to either city, with the exception of Algassim Industrial City which is located mid-way between the twin cities.

8.55 The degree of influence by the system of transportation on the businesses and industries is different in both cities. Prior to 1973, Buraydah small workshops and light industries were located on the north and south of the city along the major road leading to Unayzah (see Figure 8.06). Those located on the north have relocated their businesses either to the south side along the major (upgraded) road to Unayzah or joined the region's industrial city (see Figure 8.07).

8.56 In the case of Unayzah, the small workshops and light industries were located just east of the Riyadh-Buraydah road (see Figure 8.08) (the major road of the city) prior to 1973 (Doxiadis, 1973). Following that period these industries have relocated further east to the newly constructed industrial area on the major road to Alzulfi (see Figure 8.09). This relocation of business for better

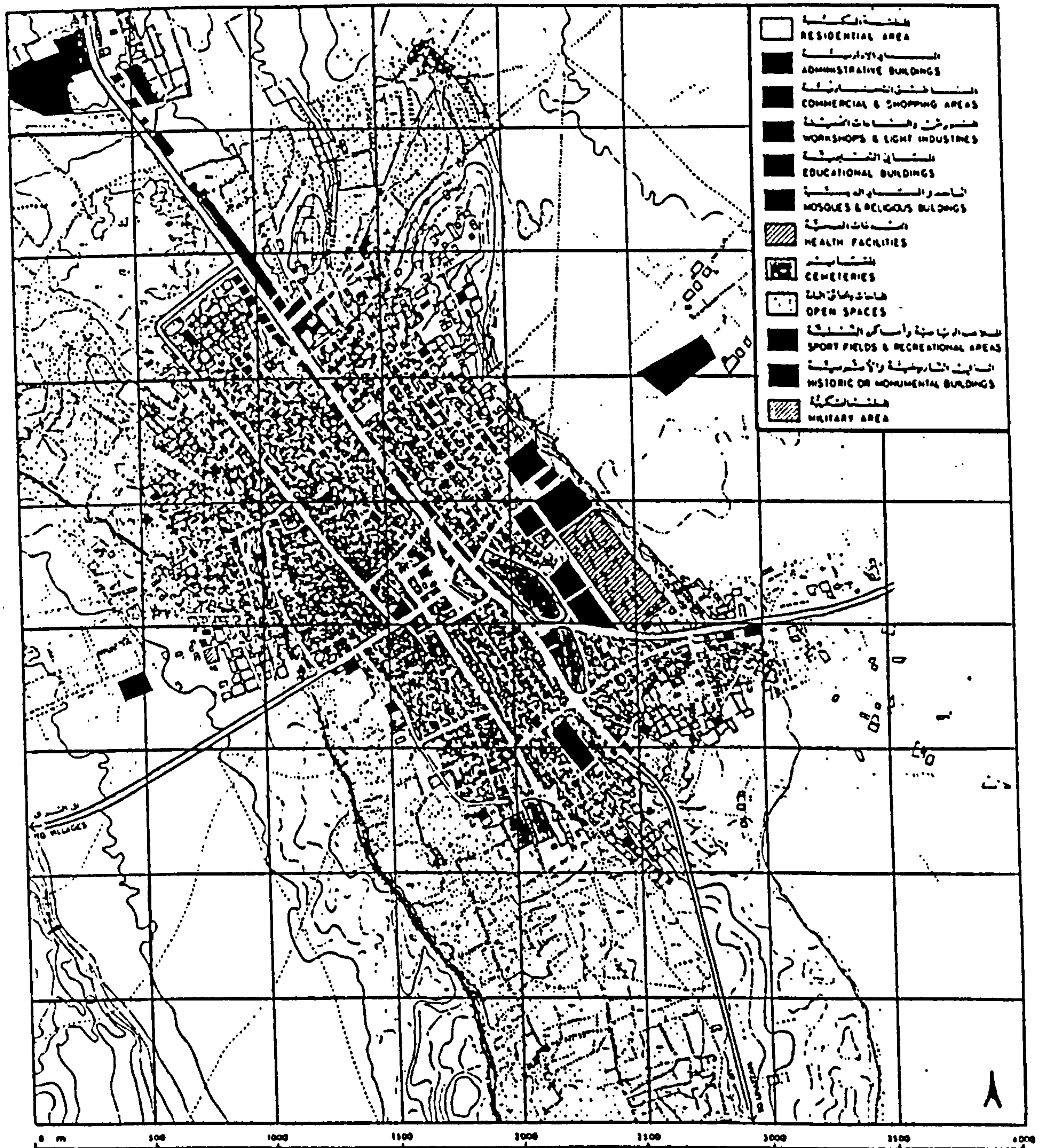
Figure 8.05 UNAYZAH LAND VALUES 1973



SOURCE: DOXIADIS ASSOCIATES, CENTRAL REGION MASTER PLANS 1973:  
UNAZAH, EXISTING CONDITIONS, p.83.



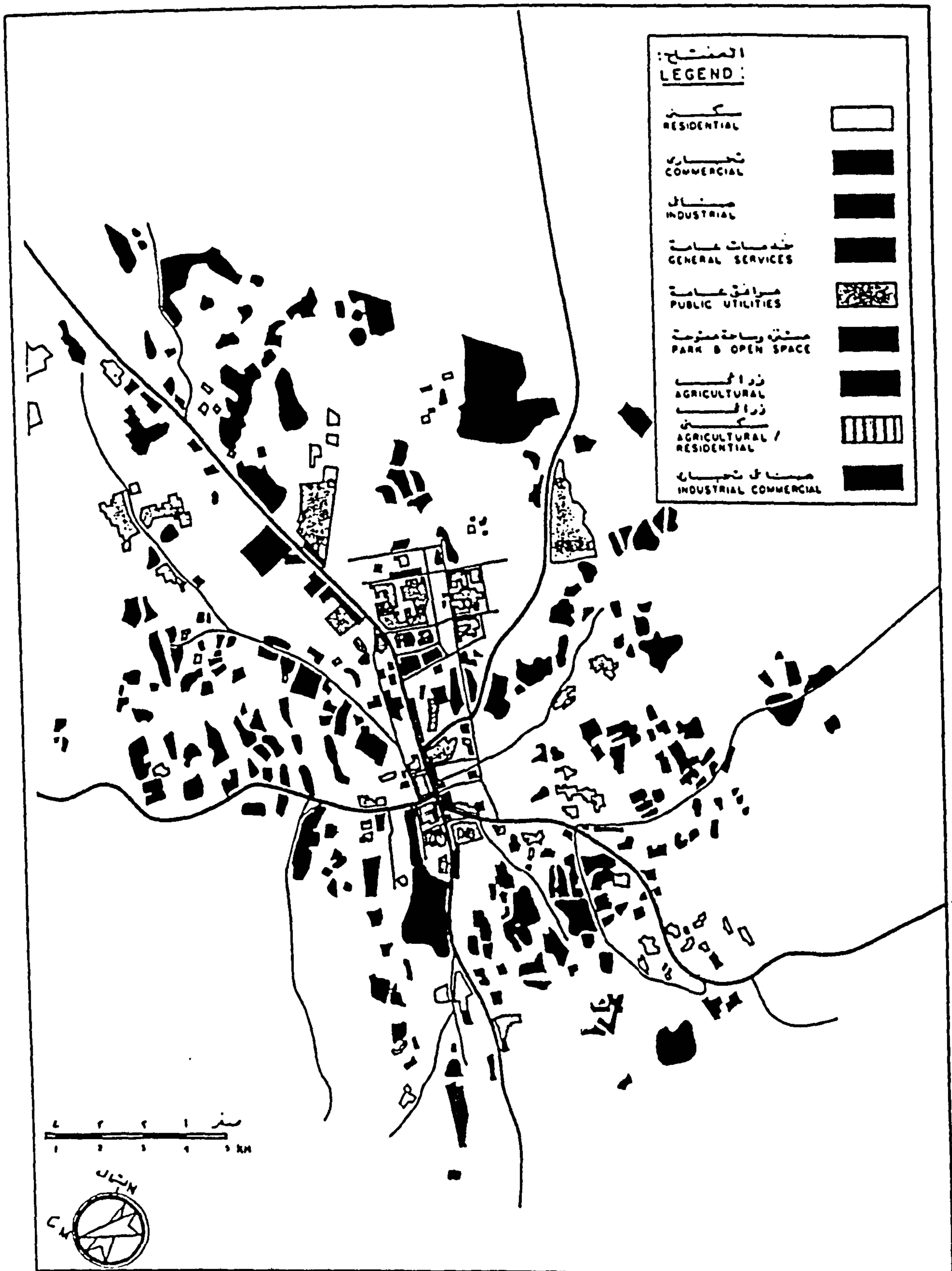
Figure 8.06 BURAYDAH, LAND USE ACTIVITIES 1973



SOURCE: DOXIADIS ASSOCIATES, CENTRAL REGION MASTER PLANS :  
BURAYDAH, EXISTING CONDITIONS, REPORT 6, 1973, p.97.



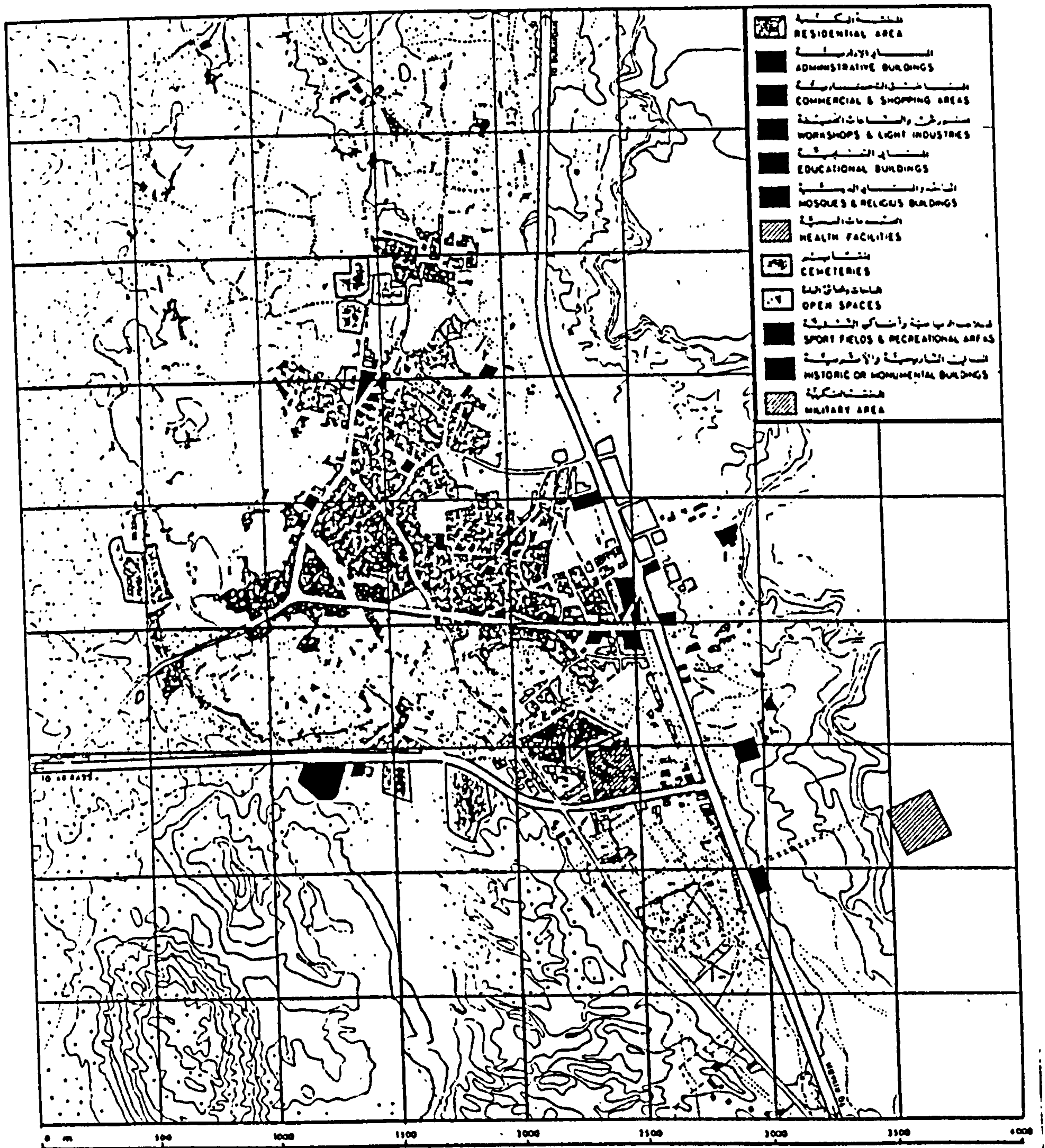
Figure 8.07 BURRAYDAH, LAND USE ACTIVITIES 1984.



SOURCE: NORCONSULT A.S., ALGASSIM COMPREHENSIVE DEVELOPMENT PLAN, REPORT 4, VOLUME 2, 1984, p.11.

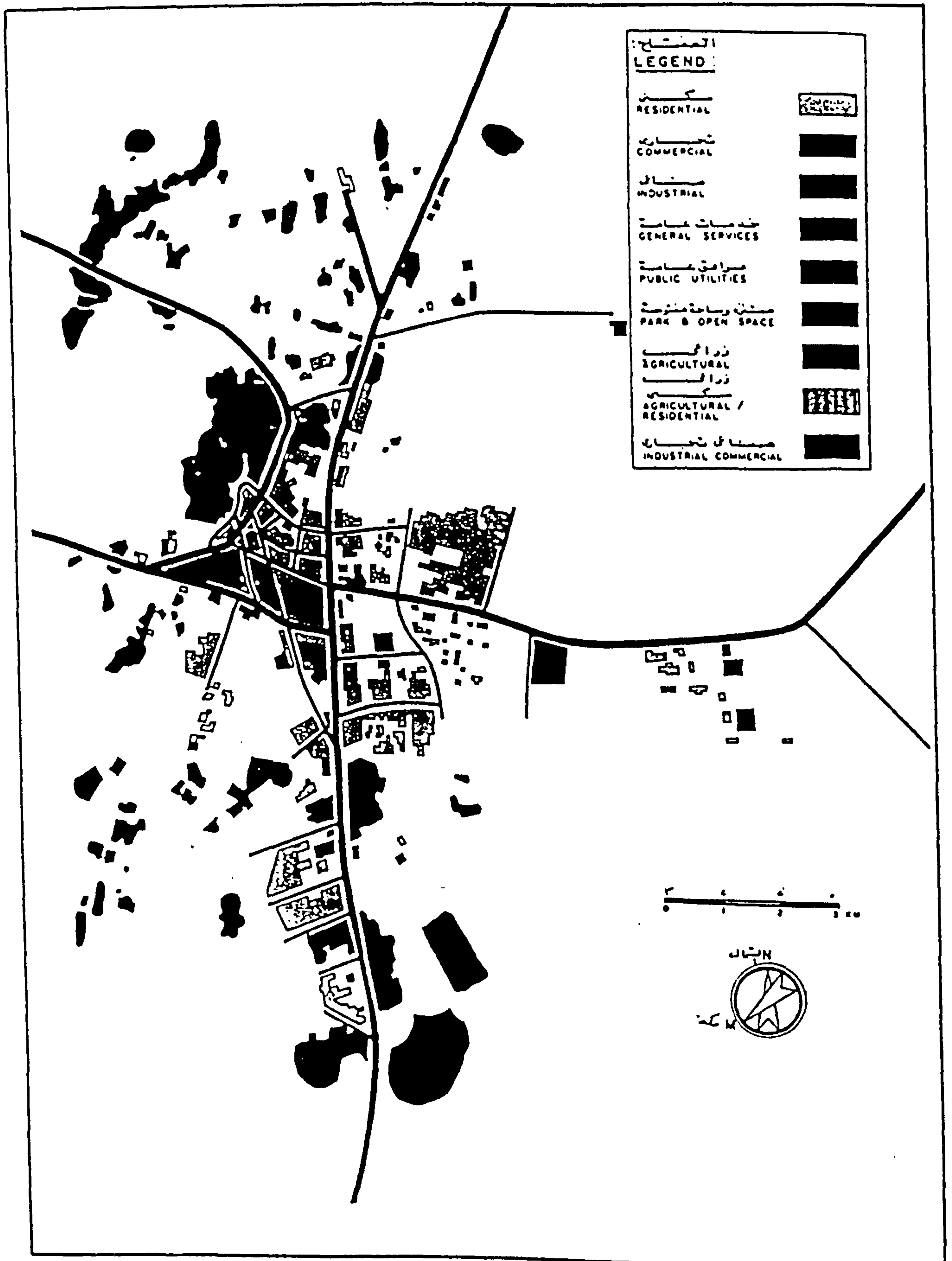


Figure 8.08 UNAYZAH LAND USE ACTIVITIES 1973



SOURCE: DOXIADIS ASSOCIATES, CENTRAL REGION MASTER PLANS : UNAYZAH, EXISTING CONDITIONS, REPORT 5, 1973, p.99.

Figure 8.09 UNAYZAH LAND USE ACTIVITIES 1984.



SOURCE: NORCONSULT A.S., ALGASSIM COMPREHENSIVE DEVELOPMENT PLAN, REPORT 4, VOLUME 3, 1984, p.12.



accessibility is supported by the research survey questionnaire (see Appendix A, question number 29).

8.57 As a result, 65% of the respondents (see Table 8.10) believed that the present modern transportation system has indeed influenced the location of businesses and industrial sites. 17% indicated some agreement to the influence, and 12% were uncertain. Moreover, a small percentage of respondents (6%) did not think it has had any effect.

**TABLE 8.10: Impact of Transportation on the Location of Business Sites and Industrial Areas (Appendix A, question number 29)**

PERCEPTION	Total	Approx %
Yes	300	65
To some extent	81	17
No	27	6
Uncertain/Don't know	55	12
<b>TOTAL</b>	<b>463</b>	<b>100</b>

8.58 Accordingly, this high level of acceptance by the respondents represented by the sixty-five percent (65%) agreement may only be applicable to small businesses and industries. Thus, the Director of Algassim Industrial City stated (Appendix B, Section E): "...The site for the industrial city was selected here, in this particular area, a long time ago, prior to the present transportation

network." But, in reality, the industrial city was built and constructed along the major road connecting the twin cities in the Central Core Area.

#### SMALL BUSINESSES

8.59 As an indication of the damage caused to small businesses by the transportation network, the survey questionnaire (see Appendix A, question number 31) resulted in a thirty-seven percent (37%) agreement that it has damaged small businesses, with 22% opting for "To some extent", while 19% were uncertain or did not know, and 22% thought that the network of transportation did not affect or damage small businesses (see Table 8.11).

**TABLE 8.11: Small Businesses Damaged as a Result of Transportation**  
(Appendix A, question number 31)

PERCEPTION	Total	Approx %
Yes	170	36.7
To some extent	105	22.7
No	101	21.8
Uncertain/Don't know	87	18.8
<b>TOTAL</b>	<b>463</b>	<b>100.0</b>

8.60 Apparently, the overall perception of respondents was that the system of transportation has damaged small businesses (37%), compared to those who did not agree (22%). However, by looking more closely at those who believed that

transportation did not damage small businesses (22%), and by relating that to the type of work (see Table 8.12), the survey showed that even among business owners themselves, 52% thought that businesses have been damaged by the transportation network, compared to only 25% who thought otherwise, as shown by Table 8.12.

8.61 In addition, out of the total number of 170 who considered transportation damaging to small businesses, the majority (41%) were business owners.

8.62 Consequently, the present modern transportation network must be considered to have harmed small businesses, as has been shown in this section.

#### ECONOMIC ACTIVITIES

8.63 The Central Core Area has 12-16% cultivated area (Sogreah, 1984), placing agriculture as predominant among the area's activities. The growing of palm trees, in addition to various types of vegetables and some fruit, remains one of the main agricultural activities of the people of the area. Thus, an excellent transportation network must exist to aid the distribution of agricultural products.

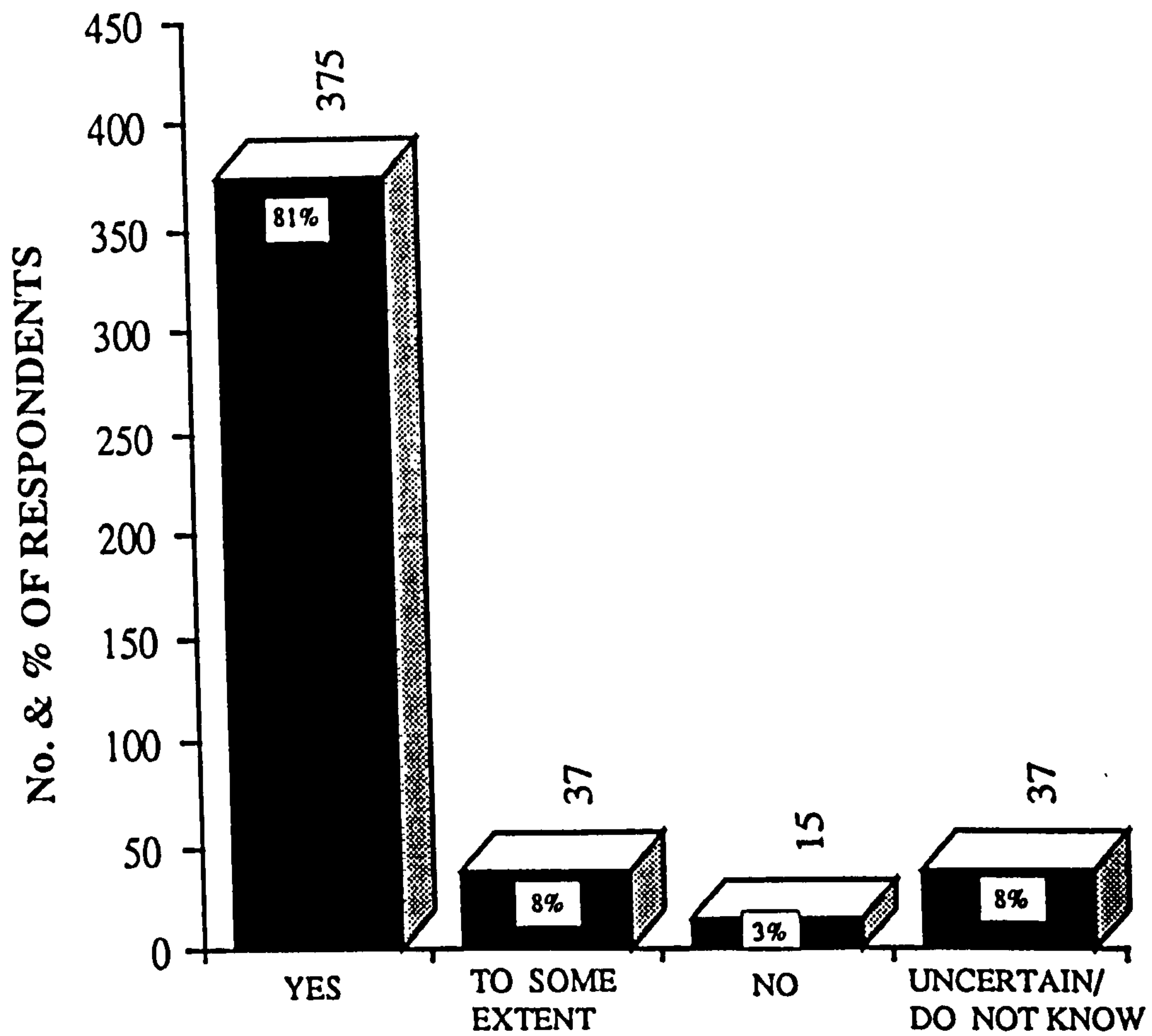
8.64 To support such an impact, the majority of respondents replied that transportation has assisted agricultural productivity in the area (see Figure 8.10).



TABLE 8.12: The Relationship between the Type of Work and Damage to Small Businesses  
(Appendix A, question numbers 7 and 31)

TYPE OF WORK	YES Total Approx %	TO SOME EXTENT Total Approx %	NO Total Approx %	UNCERTAIN Total Approx %	TOTAL %
Government Employees Total Approx %	43 25	51 48	60 59	40 46	194 42
Private Sector Employees Total Approx %	44 26	19 18	3 3	18 21	84 18
Own Businesses Total Approx %	70 41	19 18	33 33	12 14	134 29
College Students Total Approx %	13 8	16 15	5 5	17 19	51 11
Total Approx %	170 37	105 22	101 22	87 19	463 100

**Figure 8.10 THE EFFECT OF TRANSPORTATION ON THE PROMOTION OF AGRICULTURAL PRODUCTS**



**THE EFFECT OF TRANSPORTATION ON THE PROMOTION OF AGRICULTURAL PRODUCTS**

This is represented by 81% answering "Yes" to the impact of transportation on the promotion of agriculture. Moreover, this was the highest percentage "Yes" answer (81%) received to any of the survey questions.

8.65 Figure 8.10 also reveals that 8% have indicated that the transportation network has to some extent assisted agricultural products, and another 8% felt undecided. And only 3% of the total respondents thought there has been no impact in relation to agriculture.

8.66 From this question, it emerges clearly that the transportation network has had a tremendous impact in assisting agriculture, therefore creating market opportunities for the area.

8.67 All the interviewees, including the government officials and community leaders, agreed with the finding that the present modern transportation network has surely supported the growth of agriculture (Appendix B, Section A, and Appendix C, question number 6). In this context, Albassam stated:

"... Because of the modern road network, agricultural production has benefited greatly, and the farm owners have increased their production and expanded, in addition, since these farm owners are no longer worried about the time taken for their produce to reach other regions."



The Director of Agriculture also indicated (Appendix B, Section D):

"... The area is considered cultivated, and what we have needed for a long time is a good roads system to assist this massive production ... and now we have that and I believe the past few years have witnessed the furthering of production due to the transportation network, and those who are in the farming business started introducing the latest farming technology."

8.68 Because of the CCAAR's significant location within the region and within the country as a whole, the area has benefited economically by being on the route to the holy places for those travellers from the east of the Kingdom, and so it became a trading centre which in part promoted local activities. Albuti stated: "... The city of Unayzah in particular was well known historically as a stop over on the old road between Yemen (south of Saudi Arabia) and Iraq (north of Saudi Arabia)."

8.69 The economic activities which include industry, commerce and agriculture were part of the survey questionnaire (see Appendix A, question number 33); the aims of this research were to observe such activities in relation to the influence of the modern transportation network.

8.70 The survey results showing this particular impact are presented in Table 8.13. As might be expected, the

majority of respondents (69%) were convinced that the present modern network of transportation has had a huge impact on the area's economic activities.

**TABLE 8.13: Impact of Transportation on the Promotion of Economic Activity**  
(Appendix A, question number 33)

PERCEPTION	Total	Approx %
Yes	319	69
To some extent	72	15
No	22	5
Uncertain/Don't know	50	11
<b>TOTAL</b>	<b>463</b>	<b>100</b>

8.71 The impact, however, is supported by many of the Government officials who have been interviewed (Appendix B, Section A) and community leaders (Appendix C, question numbers 6 and 3), as Alsolai stated:

"...This area was a very important commercial centre and people used to come here from all over the land by different means of transportation, and it was and still is a passage to Makkah for those who come from the northern part ... It has, however, grown because of merchants who came to this area for various trading purposes."

8.72 Another indication was also pointed out by Alsalman who expressed his standpoint:

"... the transportation network has a long range impact, it is 'the artery' that feeds the country, and consequently the area's productivity is exported via the modern network of transport. This has enhanced the area's economic activity and made possible trading with other regions. Also, those in my age group certainly remember the days in which we could not import all the food and clothing we needed, but presently, thank God, with what we have today, we are able to satisfy our requirements through the modern network of transportation."

8.73 With the upgrading of the main road connecting the twin cities, the traffic has increased as illustrated by the social impact compared to previous studies. But since the region as a whole, and the CCAAR in particular, is predominantly an agricultural area, the road system has encouraged the production of various agricultural products.

8.74 Using such a system of transportation has assisted exporting, importing and economic trading in the area, not only within the CCAAR, but also from and to the region of Algassim and other regions of the Kingdom.

8.75 In Saudi Arabia, the transport of agricultural products (i.e. vegetables and fruit) is carried out mainly by pick-ups or trucks/tankers. Within the Central Core Area (between the twin cities), these vehicles, especially pick-



ups, are widely used, either to deliver or carry agricultural produce.

8.76 As a result of the research traffic count, pick-ups and vans (mainly pick-ups) were the second most commonly used vehicles (18%) after private cars (36.5%) (see Tables 8.07 and 8.08). A total of 16,111 pick-ups were recorded from both stations during the three day count.

8.77 These pick-ups have therefore extended the range of sources of supply of goods to be used and consumed locally which in part supports and enhances the economy of the area through the use of the modern system of transportation.

8.78 It is worth pointing out that these pick-ups were carrying not only agricultural produce, but were observed to also transport commodities.

#### GOVERNMENT, PUBLIC AND PRIVATE FACILITIES

8.79 Throughout the interviews with the government officials (Appendix B, question number 10), there was a discussion of whether or not the main road has had any influence in attracting these facilities. The deputy governor of Algassim Region (Appendix B, Section A) stated:

"... There is little doubt that the main road has attracted such facilities, also it is the Government's intention to locate these facilities in

the Central Core Area and it is hoping that the twin cities will one day be one large metropolitan area."

Another indication of the potential arising from transportation developments was pointed out by the Algassim Directorate of Municipal and Rural Affairs (Director of Physical Planning): "... The area that lies between the twin cities is expected and planned to be a regional services area for the entire region."

8.80 In addition, with regard to the attraction of Government, public and private facilities by the modern transport network, the survey questionnaire (see Appendix A, question number 32) reflected the survey result shown on Table 8.14. The table shows that 59% of the respondents believed that transportation networks have attracted the facilities discussed. Moreover 22% thought that there has been an impact to some extent, 8% disagreed, and 11% were uncertain or did not know.

**TABLE 8.14:** Impact of Transportation on the Attraction of Government, Public and Private Facilities (Appendix A, question number 32)

PERCEPTION	Total	Approx %
Yes	271	59
To some extent	102	22
No	37	8
Uncertain/Don't know	53	11
<b>TOTAL</b>	<b>463</b>	<b>100</b>

8.81 The above was a clear indication of the impact of the modern transportation network in drawing diverse facilities of government, and the public and private sectors, along or near the system of transportation.

#### MODES OF TRANSPORTATION AND THE PERCEPTION OF FUTURE OPPORTUNITIES

8.82 Throughout this chapter, analysis of the results of survey questionnaire regarding the socio-economic impact of transportation has been presented, supported by interviews conducted with government officials and community leaders. And to strengthen some of the social and economic impacts of transportation, results of the traffic counts were also considered and presented.

8.83 In conclusion, Table 8.15 (p.359) indicates the overall characteristics of the survey respondents with regard to their place of work, residence, reasons for selecting their place of residence, and frequency of travelling between the two cities; it also indicates their perception of their likely use of a rail system if it were built to link the cities. In Tables 8.16-8.22 (pp.360-366), the profile is analysed in more detail. They represent the relationship between the cluster groups and the mode of transportation used to get to work; to travel between the twin cities; and within the twin cities. They also represent the perceptions of the cluster groups regarding the bus system, the road network, and an assumption of rail link between the two cities. Additionally, the last table (Table



8.22, p.366) reflects the relationship between place of residence and the rail link assumption.

8.84 Based on the detailed results analysis of the socio-economic impacts of transportation that were discussed and illustrated in this chapter, a presentation regarding the recommendation for planning and transportation strategy in the study area (CCAAR) will be introduced in the next chapter.

Table 8.15:

Profile of Respondents with regard to  
Residence, Workplace, and Perceived  
Attraction of Rail Link

Variable Labels	Value Labels	Total	Percent
Place of work/school	Buraydah	213	46.0
	Unayzah	193	41.7
	Between the twin cities (GSA)	57	12.3
Location within the city	North side	102	22.0
	South side	83	17.9
	East side	105	22.7
	West side	78	16.8
	City centre	64	13.8
	Non resident of the area	31	6.7
Reason to locate in the neighbourhood	Price	344	13.1
	Provision of services	445	16.9
	Age/style 'traditional'	257	9.7
	Transportation accessibilities	416	15.8
	Work/school	322	12.4
	Neighbourhood environment	425	16.2
	Real Estate Dev. Fund	243	9.3
	Free parcel of land from government	117	4.4
	Others	57	2.2
Number of trips between the twin cities	Not at all	40	8.6
	Only when needed	191	41.3
	0-1 times per week	122	26.3
	1-3 times per week	42	9.1
	3-5 times per week	39	8.4
	More than 5 times per week	29	6.3
Assumption of rail (intercity) link between the twin cities	Yes/always use	95	20.5
	Sometimes use	135	29.2
	No/never use	118	25.5
	Use once only as a trial	100	21.6
	Uncertain/do not know	15	3.2

Table 8.16: The Relationship between the Cluster Groups and Mode of Transportation to Work  
(Appendix A, question numbers 7 and 14)

CLUSTER GROUPS	MODE OF TRANSPORTATION									
	Private Cars Total	Private Cars %	Car Pool Total	Car Pool %	Public Transport Total	Public Transport %	Limo/Taxi Total	Limo/Taxi %	Other Types Total	Other Types %
Government employees	180	92.8	9	4.6	0	0	1	0.5	4	2.1
Private sector employees	78	92.9	4	4.8	0	0	0	0	2	2.4
Own business	119	88.8	6	4.5	0	0	1	0.7	8	6.0
College students	26	51.0	18	35.3	0	0	0	0	7	13.7



Table 8.17: The Relationship between the Cluster Groups and Mode of Transportation between the Twin Cities (Appendix A, question numbers 7 and 16)

CLUSTER GROUPS	MODE OF TRANSPORTATION									
	Private Cars Total	Private Cars %	Car Pool Total	Car Pool %	Public Transport Total	Public Transport %	Limo/Taxi Total	Limo/Taxi %	Other Types Total	Other Types %
Government employees	181	93.3	10	5.2	0	0	1	0.5	2	1.0
Private sector employees	68	81.0	14	16.7	0	0	0	0	2	2.4
Own business	117	87.3	17	12.7	0	0	0	0	0	0
College students	25	49.0	26	51.0	0	0	0	0	0	0

Table 8.18: The Relationship between the Cluster Groups and Mode of Transportation within the Twin Cities (Appendix A, question numbers 7 and 17)

CLUSTER GROUPS	MODE OF TRANSPORTATION									
	Private Cars Total	Private Cars %	Car Pool Total	Car Pool %	Public Transport Total	Public Transport %	Limo/Taxi Total	Limo/Taxi %	Other Types Total	Other Types %
Government employees	186	95.9	7	3.6	0	0	0	0	1	0.5
Private sector employees	78	92.9	5	6.0	0	0	0	0	1	1.2
Own business	120	89.6	14	10.4	0	0	0	0	0	0
College students	35	68.6	14	27.5	1	2.0	1	2.0	0	0

**Table 8.19: The Relationship between the Cluster Groups and the Public Transport Services (the Bus System) (Appendix A, question numbers 7 and 19)**

CLUSTER GROUPS	PERCEPTION													
	Very Good Total	Very Good %	Good Total	Good %	Satisfactory Total	Satisfactory %	Bad Total	Bad %	Very Bad Total	Very Bad %	Expansion & Improvement Total	Expansion & Improvement %	Uncertain Total	Uncertain %
Government employees	16	8.2	45	23.2	44	22.7	11	5.7	8	4.1	31	16.0	39	20.1
Private sector employees	4	4.8	6	7.1	8	9.5	22	26.2	17	20.2	14	16.7	13	15.5
Own business	6	4.5	10	7.5	9	6.7	36	26.9	20	14.9	29	21.6	24	17.9
College students	4	7.8	4	7.8	8	15.7	6	11.8	6	11.8	13	25.5	10	19.6



Table 8.20: The Relationship between the Cluster Groups and the Present Road Network  
(Appendix A, question numbers 7 and 20)

CLUSTER GROUPS	PERCEPTION											
	Very Good Total	Very Good %	Good Total	Good %	Satisfactory Total	Satisfactory %	Bad Total	Bad %	Very Bad Total	Very Bad %	Uncertain Total	Uncertain %
Government employees	85	43.8	82	42.3	26	13.4	1	0.5	0	0	0	0
Private sector employees	39	46.4	27	32.1	12	14.3	3	3.6	0	0	3	3.6
Own business	41	30.6	42	31.3	25	18.7	9	6.7	5	3.7	12	9.0
College students	17	33.3	16	31.4	10	19.6	4	7.8	1	2.0	3	5.9

**Table 8.21: The Relationship between the Cluster Groups and the Rail Link (Intercity)  
Assumption between the Twin Cities  
(Appendix A, question numbers 7 and 21)**

CLUSTER GROUPS	PERCEPTION OF LIKELY USAGE					
	Yes/Always Total	Sometimes Total	No/Never Total	Only Once Total	Uncertain Total	%
Government employees	35	74	53	27	5	18.0
Private sector employees	25	24	16	15	4	29.8
Own business	19	25	46	38	6	14.2
College students	16	12	3	20	0	31.4
						23.5
						5.9
						39.2
						0

**Table 8.22: The Relationship between Place of Residence and Rail Link Assumption between the Twin Cities (Appendix A, question numbers 8 and 21)**

PLACE OF RESIDENCE	PERCEPTION OF LIKELY USAGE					
	Yes/Always Total	Sometimes Total	No/Never Total	Only Once Total	Uncertain Total	%
Buraydah	42	60	49	50	8	20.1
Unayzah	46	68	61	40	7	20.7
Algassim Region	7	7	7	10	0	22.6
Saudi Arabia	0	0	1	0	0	0



**CHAPTER NINE: RECOMMENDATION, PLANNING AND TRANSPORTATION STRATEGIES FOR THE CENTRAL CORE AREA**

INTRODUCTION

9.01 This chapter contains a discussion of alternative planning and transportation strategies that arise from interpreting the survey's results. These strategies could be utilised in the CCAAR depending on the overall advantages and disadvantages of each of them.

9.02 The strategies that will be discussed are interpreted from the outcomes of the survey which included citizens' perceptions regarding the existence of the various transportation modes, and the transportation network as a whole. Results of the interviews with government officials and community leaders also contributed understandings of importance, in addition to the traffic count.

9.03 Accordingly, a wide context of locally derived data was taken into consideration in the construction of a number of alternatives, so as to lead to an overall transportation strategy for the Central Core Area of Algassim Region.

PLANNING AND TRANSPORTATION ALTERNATIVES

9.04 There are four alternative emphases in transportation strategy in the study area that arise from the interpretation of the survey results. These are: a 'do-nothing' strategy incorporating the present road network; an emphasis on public transport (the bus system); an

emphasis on motorisation; and an emphasis favouring other modes of transport. e.g. limousines and taxis.

9.05 The road network in the area was established to serve people in the various zones. It also promotes social and economic activities in industrial, commercial and agricultural areas. Building a road links people and connects communities for faster and easier communication.

9.06 Public transport was introduced to carry large numbers of people from one place to another: to work, shop or visit. This is important not only within metropolitan areas, but also between cities and regions. One of the most important elements in establishing a public transport network is that it should be adequate in respect of timing of services and route selection to best serve all the people in the relevant area.

9.07 Motorisation is the third transportation alternative in the study area. There has been a considerable increase in private cars in the recent years not only in the CCAAR but in the Kingdom of Saudi Arabia as a whole. People have chosen this transport alternative to provide easy access to places of work and shopping, and for travelling where and when they wish, without any restrictions on time or route. Although not everyone can own a car, it is an easy, fast and comfortable means of transport in the CCAAR and in the absence of any other comparable mode of transport, e.g. rail



or adequate bus system, it is likely that private car ownership will continue to increase.

9.08 Other modes of transport such as limousines and taxis form the fourth alternative strategy in the CCAAR. In a medium sized area such as the CCAAR, these provide only limited services since people in the area have not adopted this mode of transport in any significant numbers.

9.09 Accordingly, each alternative will be evaluated but first an explanation of each will be given.

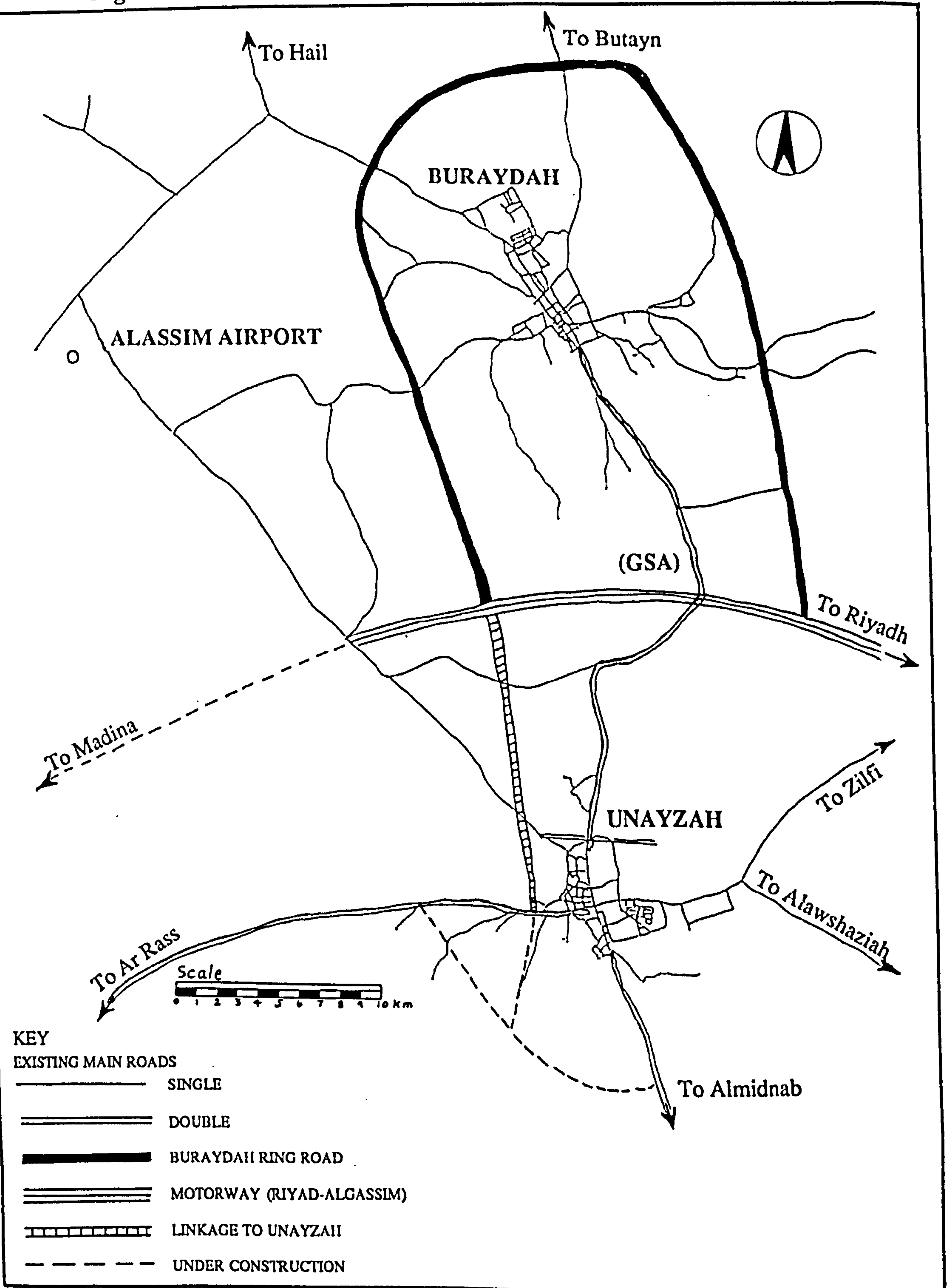
#### THE PRESENT ROAD NETWORK: A 'DO-NOTHING' STRATEGY

9.10 Throughout this research, the major network of the Kingdom as a whole has been discussed. The road network was completed during the Second Development Plan (1975-80), as a result of the huge oil revenues. Following that period, emphasis was placed on the development of the secondary and agricultural road network.

9.11 As a government regional balance growth strategies, the region of Algassim is receiving a share of the road network development (see Figure 9.01), with special emphasis on the CCAAR. Moreover, the expansion of the network continues and it is expected that during the Fifth Development Plan (1990-95), the extension of the Riyadh-Madina motorway and the Unayzah South-Western bypass should be completed.



Figure 9.01 PRESENT ROAD NETWORK OF THE C.C.A.A.R.



SOURCE: ADOPTED FROM NORCONSULT A.S., ALGASSIM COMPREHENSIVE DEVELOPMENT PLAN, 1989.

9.12 At the Kingdom level, more than 2200 kms of main roads were constructed during the Fourth Development Plan (1985-90), meeting the planned target. However, secondary asphalted and earth roads targets were not met (30% less for secondary and 64% less for earth roads). This shortfall could have an impact on the overall regional development objective of agricultural development (Fifth Plan, 1990-95).

9.13 And since there are 13 road district in the Kingdom, Algassim region has a total of 2788 kms of roads to maintain - 420 kms of primary roads, 562 kms of secondary roads and 1806 kms of agricultural roads (MOC, Technical Book 6, 1988, p.5). This total to be maintained is the third largest in the Kingdom.

9.14 As a result of the survey questionnaire with respect to citizens' perceptions regarding the present road network in the Central Core Area (see Appendix A, Question Number 20). And by providing six different options (ranging from very good, good, satisfactory, bad, very bad, and uncertain, to do not know), it appears from the results (see Table 9.01), that most of the respondents (39% and 36%) thought the network is very good and good, respectively, while only 4% and 1% believed that it is bad and very bad.

9.15 It is clear that the majority of citizens in the CCAAR seem satisfied with the present road network. Yet, Alsolai explained (Appendix C, question number 11):

Table 9.01: Perception of the Present Road Network in the Central Core Area of Algassim Region (Appendix A, Question Number 20)

PERCEPTION	TOTAL	%	APPROX %
Very good	182	39.3	39
Good	167	36.1	36
Satisfactory	73	15.8	16
Bad	17	3.7	4
Very bad	6	1.3	1
Uncertain/do not know	18	3.7	4
TOTAL	463	100.0	100

"It was difficult in the past to travel from this area to Makkah (the holy place) for example, we usually took a whole month just to travel to the holy place, and that was due to the non-existence of roads, among other difficulties like security, weather, not knowing the route. But this is not to say that we have an adequate road system, ... the area still needs more agricultural roads, widening of some of the major roads and most importantly a fast connection to Madina" (second holy place).

9.16 This view is also supported by the Director of Agriculture (Appendix B, Section D):



"... There are no doubts that the road network has brought so many positive impacts, yet there is one negative aspect to it, and that is the existence of the dirt agricultural road creates dust, especially during the summer time, which in part damages the agricultural products."

9.17 Even the general director of Algassim road district stated (Appendix B, Section B) that:

"The road network of the area is at present not adequate, what is needed is the completion of the Algassim-Madina expressway, Algassim-Hail, and modify dirt agricultural roads into asphalted."

9.18 In addition, as a result of the survey questionnaire, a comparison was made between the road network and other influential factors which affected the general shape of the Central Core Area in recent years. Within the ranking of factors affecting the changing form of the urban area, it was shown (see Table 9.02) that transportation came third in frequency (19.5%) amongst factors regarded as of highest significance. Loans provided by the Real Estate Development Fund proved to be the number one in ranking (32%) in opinions as to what factors had determined the general form of the Central Core Area.

Table 9.02: Factors determining the Changes in the General Form of the Central Core Area  
(Appendix A, question number 22)

FACTORS	RANKING								Number of Missing Cases	Total Number of Cases
	FREQUENCIES									
	1	2	3	4	5	6	7	8		
More population	100	65	91	68	38	40	31	-	30	433
More migration	45	66	45	64	63	65	75	4	36	427
Increase in family income	71	76	54	43	75	56	44	4	40	423
Real Estate Dev. Fund loans	142	83	56	63	43	31	25	-	20	443
New services by the municipality	38	70	74	55	57	52	81	-	36	427
Government, public & private facilities	22	43	50	64	70	111	73	2	28	435
Modern transport and road network	46	54	88	84	74	46	55	3	13	450
Others	-	3	-	-	1	2	4	40	413	50

9.19 Lastly, Alsalman stated (Appendix C, question numbers 16, 17):

"... Citizens of the area are more able now than ever before to travel in all directions through the use of the road network, and not only the CCAAR but the region as a whole is becoming like one city, where people can commute any time of the year, day or night, without any difficulties."

#### PUBLIC TRANSPORTATION (THE BUS SYSTEM)

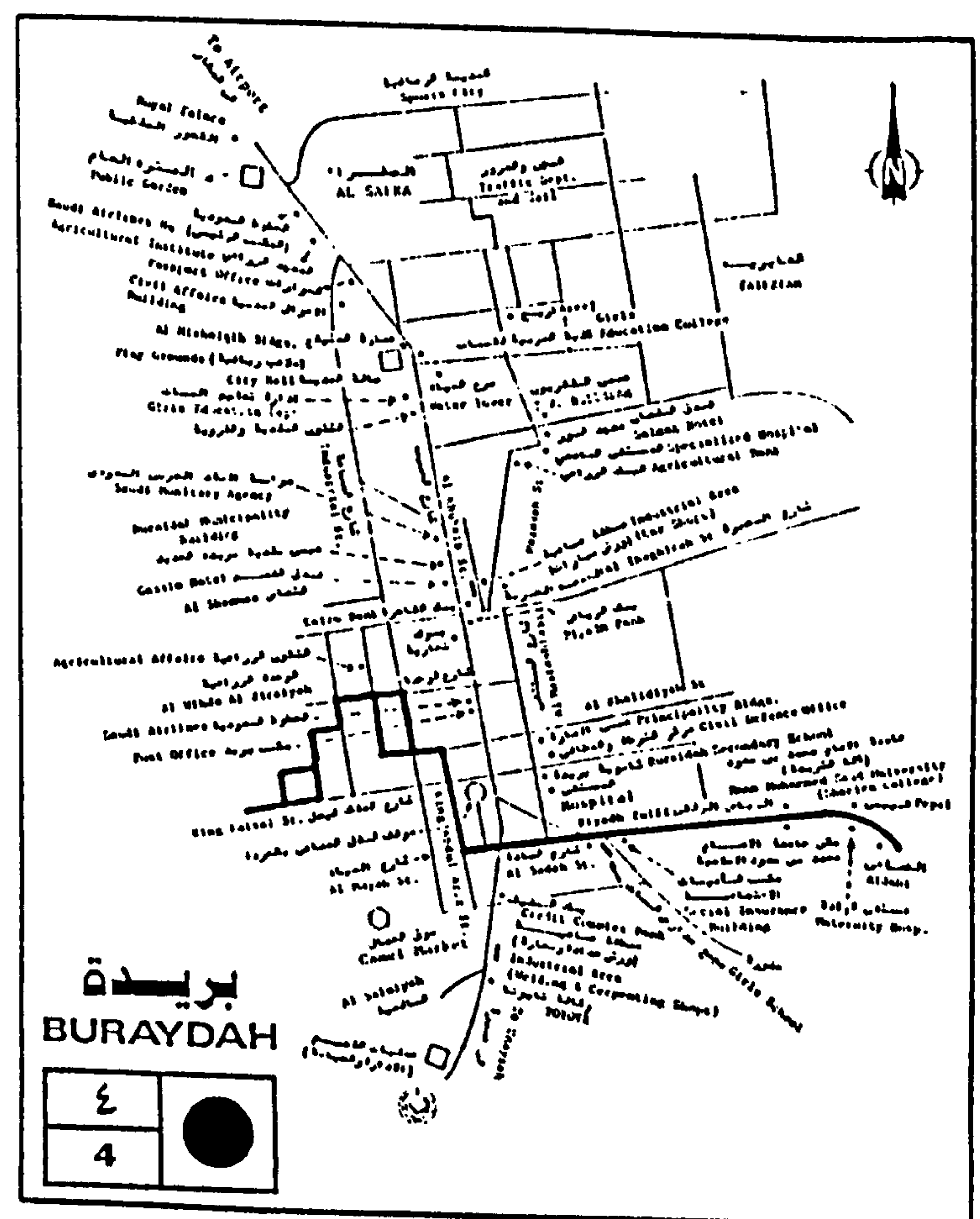
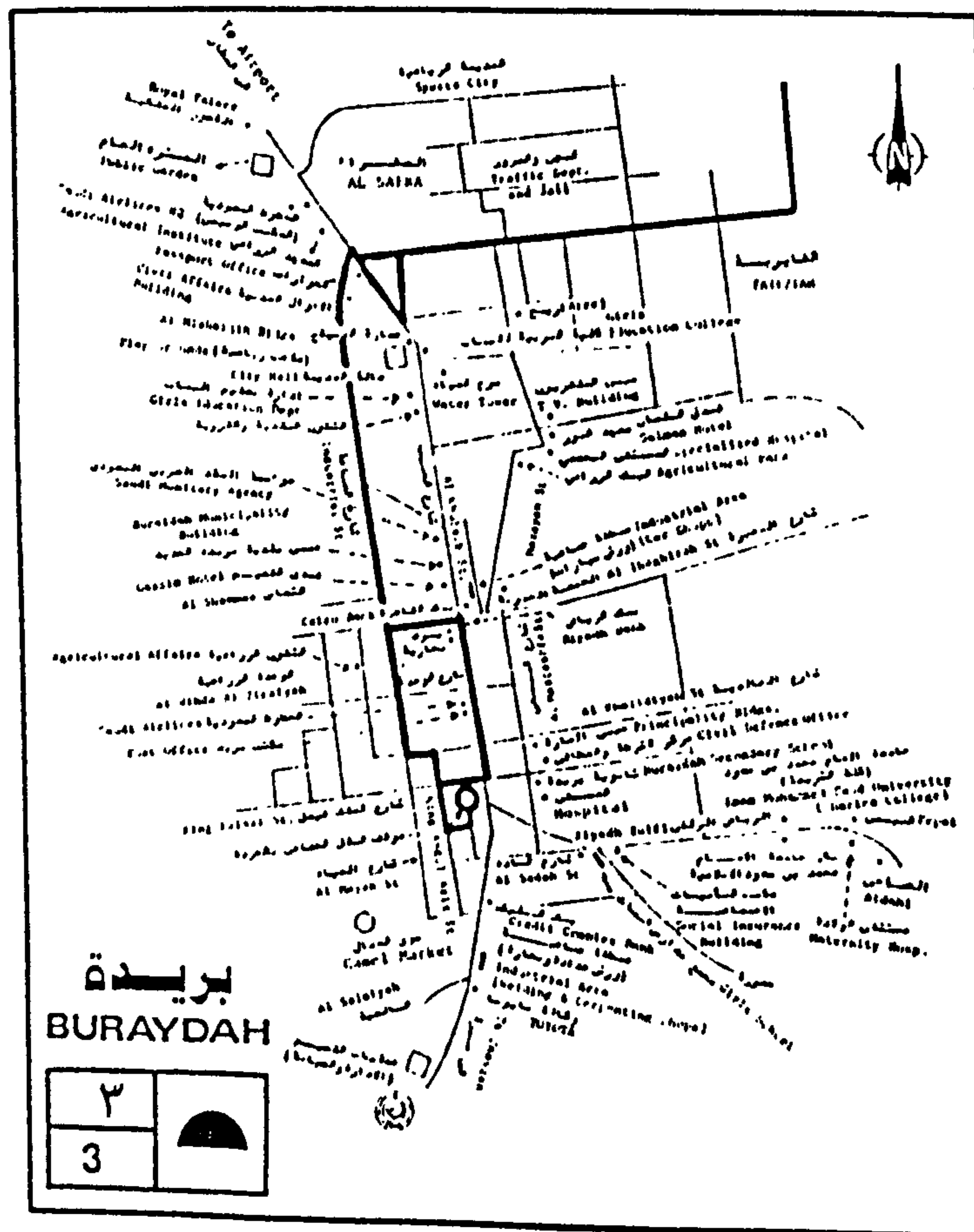
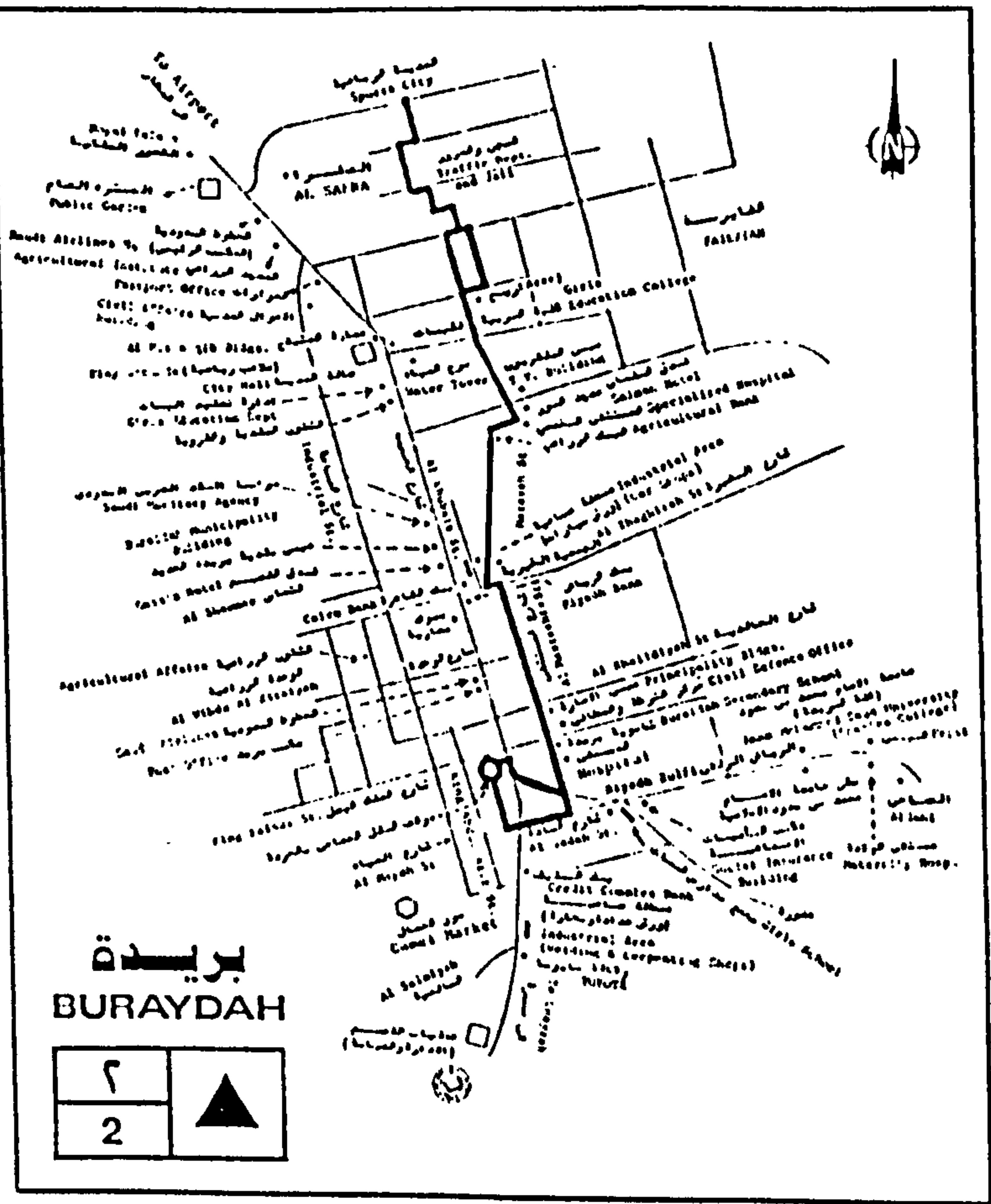
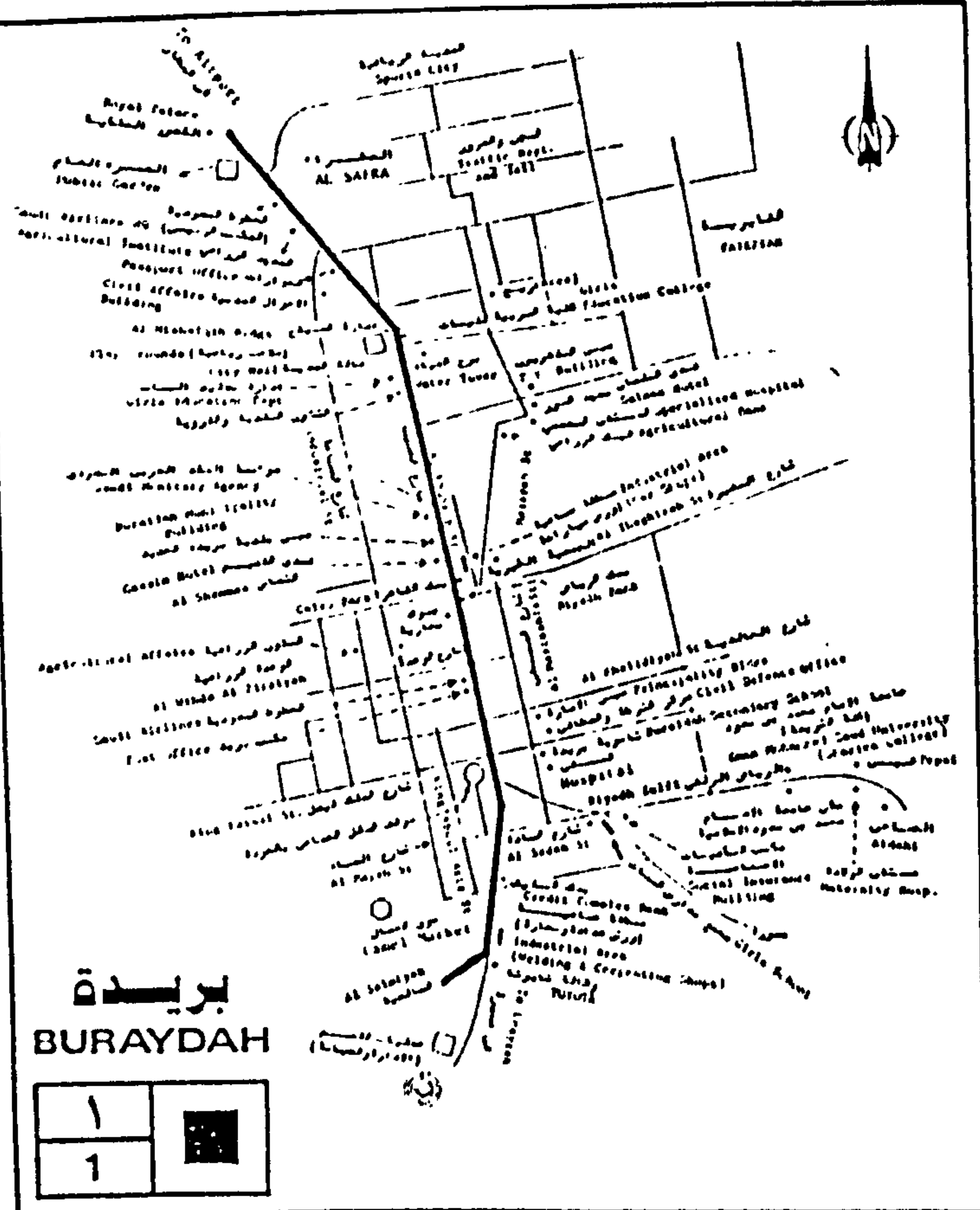
9.20 The Saudi Public Transport Company (SAPTCO) operates the bus system in the Kingdom, which is referred to as "public transportation" in Saudi Arabia. Its management and operation have been discussed through the thesis.

9.21 Within the CCAAR, there are nine routes serving the area. Six routes are served within and to and from Buraydah (see Figure 9.02), two routes are within Unayzah (see Figure 9.03) and one route serves between the twin cities. In addition, there are services to various Saudi cities and to other countries, e.g. Jordan and Egypt, which run from Buraydah in the CCAAR.

9.22 The company has been going through difficulties in attracting people to use its buses. This failure is shown in the CCAAR where on route number 1, for example (see Table 9.03), the average daily passenger total is 350 (the highest of all routes), about seven passengers for each trip (56

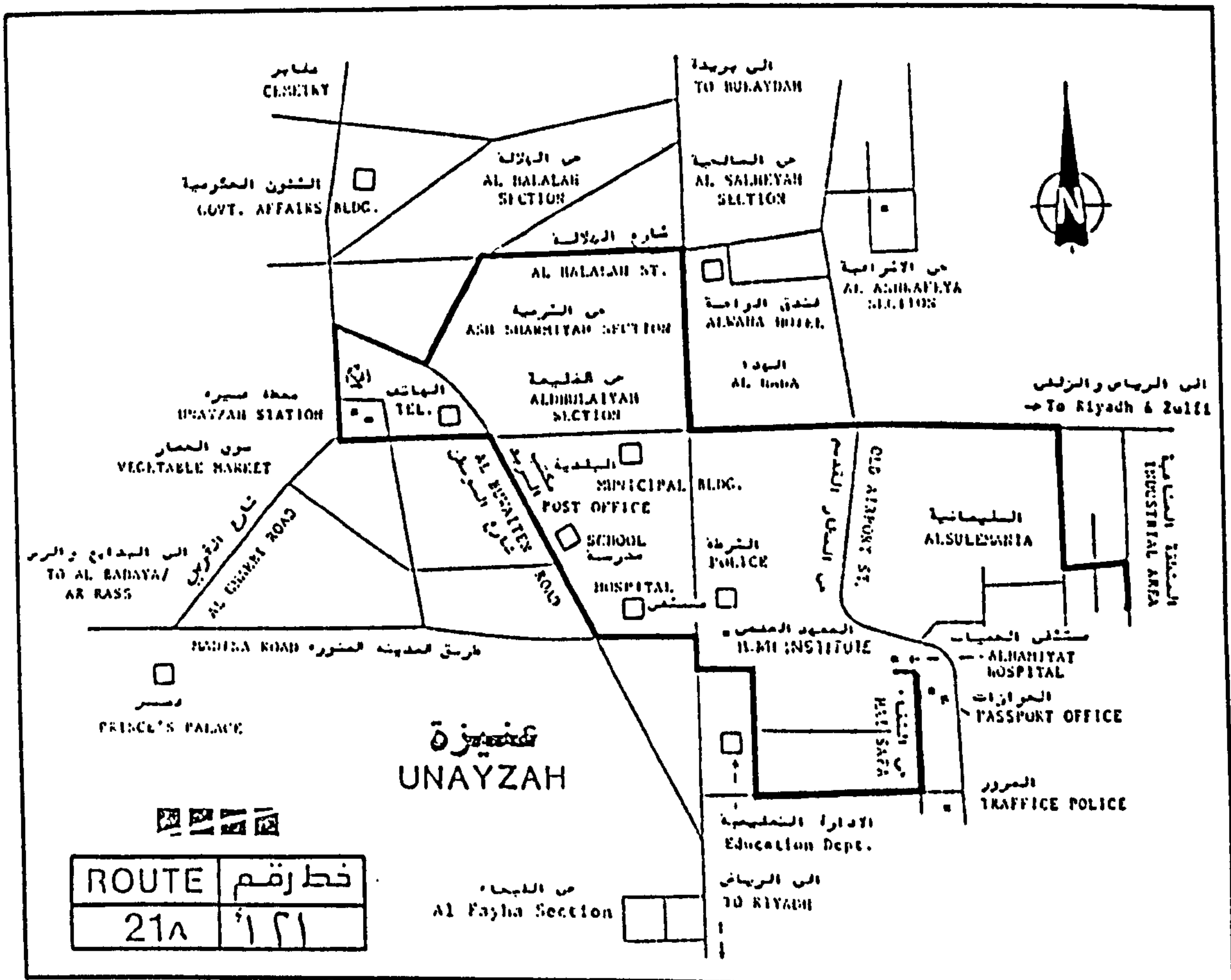
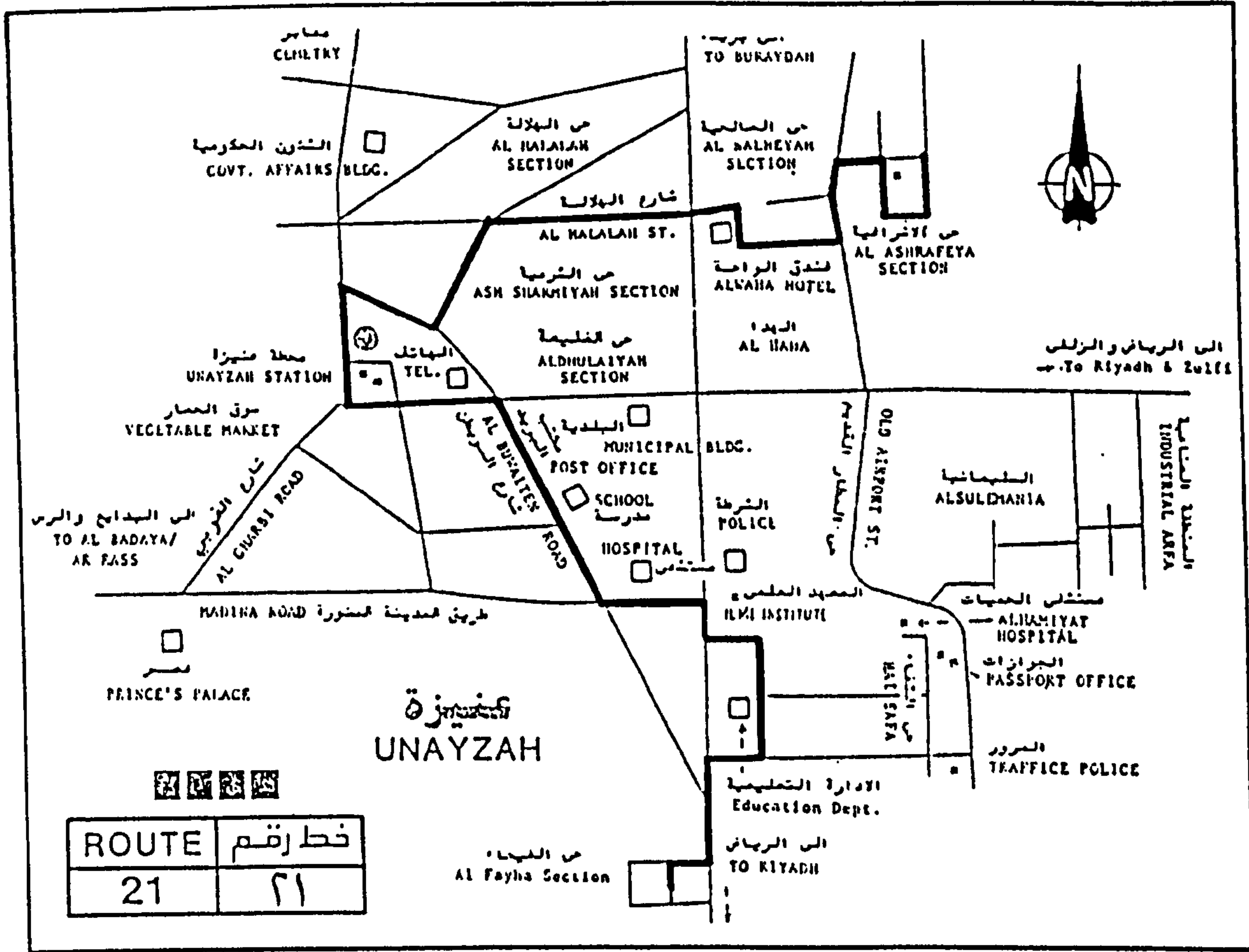


Figure 9.02 BURAYDAH INTRA-CITY ROUTE NETWORK



SOURCE: SAUDI PUBLIC TRANSPORT COMPANY, ALGASSIM LOCAL SERVICE NETWORKS, 1987, pp. 3-9.

Figure 9.03 UNAYZAH INTRA-CITY ROUTE NETWORK



SOURCE: SAUDI PUBLIC TRANSPORT COMPANY, ALGASSIM LOCAL SERVICE NETWORKS, 1987, pp. 11-15.



**Table 9.03: Average Daily Passengers on the CCAAR Public Transport Network Routes**

NO. OF ROUTE	DIRECTION	NO. OF DAILY TRIPS IN ONE DIRECTION	AVERAGE* DAILY PASSENGERS
1	Buraydah (South-North)	56	350
2	Buraydah (Centre-North)	50	225
3	Buraydah (Centre-Northeast)	56	320
4	Buraydah (East-West)	33	140
21	Unayzah (Northeast-Centre-Southwest)	20	100
21A	Unayzah (East-Centre-Southeast)	NA	NA
50	Buraydah-Algassim Airport	16	60
80	Buraydah-Unayzah	23	90
82	Buraydah-Algassim Airport-Other cities & towns in the region	8	41

Source: Saudi Public Transport Company, Algassim Region Office, July 1990

\* computed by the researcher

NA = not available



trips). But in fact, in the country as a whole, passenger volume has been declining tremendously. The numbers have dropped sharply from 54 million in 1985/86 to 40 million in 1988/89 (Fifth Plan 1990-95).

9.23 In attempting to recover some of its losses through the inter-city services, SAPTCO has been involved in the transport of pilgrims to the holy places as an inter-city service. Thus the decline of the inter-city services was not as severe as that of the intra-city services - from 2.14 million passengers in 1985/86 to 1.92 million in 1988/89 (Fifth Plan, 1990-95).

9.24 Accordingly, Albuthi stated (Appendix C, question number 12):

"... public transport in the area is not needed, firstly because most people own cars and secondly because of the non-existence of foreign labour that public transport relies on as in large cities like Riyadh and Jeddah."

Also, Albassam indicated (Appendix C, question number 12) that:

"The failure of public transport in the area is due primarily to the existence of the motor vehicle, where individuals own and can afford to buy one. The public transport authority must revise the operation of its services."

9.25 In the research survey questionnaire, the perception of citizens with respect to the present public transport services provided in the CCAAR (see Appendix A, Question Number 19) was investigated. As a result (see Table 9.04), the majority of the respondents (19%) believed that the system must be improved or expanded. This is an indication of the people's dissatisfaction with the present services provided by SAPTCO in its present condition.

**Table 9.04: Perception of the Present Public Transport Services in the Central Core Area of Algassim Region**  
(Appendix A, Question Number 19)

PERCEPTION	TOTAL	%	APPROX %
Very good	30	6.5	6
Good	65	14.0	14
Satisfactory	69	14.9	15
Bad	75	16.2	16
Very bad	51	11.0	11
Expansion and improvement required	87	18.8	19
Uncertain/do not know	86	18.6	19
TOTAL	463	100.0	100

9.26 In view of this, the director of Algassim Region public transport indicated (Appendix B, Section C):

"The decrease in the number of foreign workers plus the availability of private automobiles, in addition

to the lack of marketing and promotion of the system, therefore people are not yet persuaded to use the public transport." Moreover "... the public transport authority should allocate a bus station in every city and village in the region and increase trips, especially between the region and other regions of the Kingdom, so people can leave their automobiles behind and use the buses for an easier journey ...", as Als Salman stated (Appendix C, question number 7).

9.27 However, the Saudi individual is concerned with comfort and speed, thus public transport is considered useless and unsuccessful, and in the worst case, the Saudi citizen when working in a place would rather share a ride with his colleagues than use public transport, especially when he realises that buses are committed to specific routes and stops.

#### MOTORISATION

9.28 The Central Core Area of the region is continuously growing. The twin cities are expanding both in population and size. Due to the area's administrative and political role in the region and the completion of the road network in the area, the use of cars has become a prime necessity, not only for the family but also for individuals as well.



9.29 Most people (70%) in the CCAAR prefer to drive their own cars, because of convenience and comfort (see Appendix A, Question Number 18). Even when two or three people work in the same place, each prefers to drive his own car since there are no better alternatives. In fact, the majority of the area's residents use their own cars to drive to work (87%), to travel between the twin cities (84%), and also for multi-purpose trips such as visiting, shopping and other journeys (90%) (see Table 9.05), as the survey questionnaire results indicate.

9.30 The volume of motor vehicles has shown a significant increase in the CCAAR in recent years. This is reflected in the traffic count survey (Chapter 8). Furthermore, this increase in motor vehicles is largely due to the new road networks. Alsaman stated (Appendix C, question numbers 3 and 7):

"... when we look back to the mid-fifties, there was a minimum number of cars in the country coupled with a few asphalted roads, the number of cars began to grow as more asphalted roads were constructed. This has enabled the family that did not own a car to have a number of cars."

9.31 The growth in the number of motor vehicles is also apparent on a country-wide level. In 1971, there were only 144,768 cars licensed, by 1986 this had risen to 4,280,986. Similarly, the region of Algassim had 3,113 licensed cars in

TABLE 9.05: Type of Transportation used in the CCAAR for Variety of Journeys  
(Appendix A, Question Numbers 14, 16, 17)

TYPE OF TRANSPORTATION	JOURNEYS TO WORK Total	JOURNEYS TO WORK %	JOURNEYS WITHIN CCAAR Total	JOURNEYS WITHIN CCAAR %	JOURNEYS WITHIN CITIES Total	JOURNEYS WITHIN CITIES %
Private autos	403	87.0	391	84.4	419	90.5
Carpool (relatives, friends, etc)	37	8.0	67	14.5	40	8.6
Public transport- ation (bus system)	0	0.0	0	0.0	1	0.2
Limousine/taxi	2	0.4	1	0.2	1	0.2
Other types	21	4.5	4	0.9	2	0.4
TOTAL	463	100.0	463	100.0	463	100.0

1971 while in 1986 the total came to 197,097 (MOI, Statistical Automobiles in Saudi Arabia, 1986, p.3) (see Table 9.06).

Table 9.06 Growth of Licensed Motor Vehicles in Saudi Arabia and Algassim Region between 1971-1986

YEAR	SAUDI ARABIA (cumulative total)	ALGASSIM REGION (cumulative total)
1971	144,768	3,113
1972	180,185	3,780
1973	242,974	7,103
1974	355,022	13,740
1975	514,361	24,676
1976	774,443	39,107
1977	1,112,973	66,957
1978	1,432,909	78,386
1979	1,732,116	87,055
1980	2,069,479	96,280
1981	2,467,903	108,518
1982	3,018,811	124,583
1983	3,569,009	161,432
1984	3,919,871	175,903
1985	4,144,245	189,757
1986	4,280,986	197,097

Source: Ministry of Interior, General Directorate of Traffic, Licensed Motor Vehicles in Saudi Arabia, 1986, pp.3-4.

9.32 The rate of car ownership has increased not only in the CCAAR or Saudi Arabia as a whole. The level of car ownership in Great Britain will continue to expand as it reflects the demand for travel; this is illustrated by the steady increase in the number of people who own a car. In 1960, about 29% of the population owned a car, compared to about 45% in 1985 (Roads and Traffic in Urban Area, 1987, pp.7-12). Another indication is the increase in all types of vehicles in Great Britain. For example, in 1979, the



number of motor vehicles that were licensed was 18,616, where in 1989 this figure changed to 24,196 (Transport Statistics: Great Britain, 1979-89, p.75). This indicated the level of demand for motorisation.

#### OTHER MODES OF TRANSPORTATION

9.33 Other forms of transportation in the CCAAR include taxis and limousines. Almost no motorcycles or bicycles are used in the area. This is supported by the survey traffic count (see Tables 7.05-7.16) where no motorcycles were recorded. The number of motorcycles was not recorded at a country-wide level until 1980, when there were only 1,478 in the entire country. However, a total of 12,579 motorcycles were licensed by the end of 1986 (MOI, Statistical Automobiles in Saudi Arabia, 1986, p.3).

9.34 There are two taxi companies in the CCAAR, one in Buraydah and the other one in Unayzah. They run between the cities and villages of the region and from and to other regions. Their activity within the cities is minimal. Furthermore, they are supervised and monitored by the local traffic department.

9.35 The reasons behind the diminishing role of taxis within cities was the initiation of the modern private service 'limousines' companies which began in 1984. Limousines are under the authority of the Ministry of Communications and are subject to regulation and standard-

isation of operation by the Ministry. But what is more important is their role within the CCAAR.

9.36 There are four limousine companies within the CCAAR, two in Buraydah (the head offices), and two branches in Unayzah (MOC, 1990). A company, however, or its branches must have at least 30 cars to start operating and these have to be replaced after three years in service, according to the Ministry regulations.

9.37 These limousines provide a service within and between the twin cities, as well as to Algassim airport. However, people of the area are not used to this service. As indicated in Table 9.05, there is negligible use of this type of service, unlike in the big cities of the Kingdom (e.g. Riyadh, Jeddah) where they are used widely. Albuti stated (Appendix C, question number 11):

"... in the CCAAR, limousines are necessary to some extent to commute to the airport, but within the cities of the area, this service is almost unnecessary because of the closeness among people, and their acquaintance with one another, meaning that they normally ride with each other."

#### THE ALTERNATIVES SUMMARISED

9.38 Consequently, we have four transportation alternatives, each with a different emphasis, in future transportation developments. First, a 'do-nothing' strategy



incorporating the present road network, which appears to currently offer most people most satisfaction, due to its accessibilities, linkages and other advantages to the communities of the CCAAR. Second, an increased emphasis on public transport (the bus system and possibly a new rail link) which in most metropolitan areas normally carries more passengers than automobiles from one point to another. But keeping in mind the non-existence in the area of other forms of transportation such as trains or underground, public transport has yet to gain popularity here as in other medium sized Saudi urban areas. Third, motorisation, which is currently the primary mover of people and goods in the study area, since it is comfortable and speedy, but as a strategy, this would require progressive development of the road network. And the fourth alternative would be to extend the recent introduction of limousine services, which are not yet widely used by the residents of the area, primarily because of the area's traditional and conservative elements.

9.39 These four alternative transportation emphases have emerged from conducting the various surveys. But we cannot reach a decision as to which has most to recommend it without a careful evaluation of these alternatives, based on the criteria employed earlier in this research.

#### EVALUATION

9.40 To achieve the objective of this research, that is a recommended transportation strategy for the Central Core



Area of Algassim Region, an evaluation of the present network of transport presented earlier in this chapter must first be demonstrated.

9.41 Since the transportation strategy that will be recommended based on the evaluation results affects the communities of the CCAAR, it should assist the authorities of the CCAAR in reaching a decision regarding transportation.

#### ASSUMPTION

9.42 Before focusing on the evaluation of the present transportation strategies, it is important to review the assumption that was made in regard to the socio-economic impacts of transportation on the CCAAR.

9.43 The social impacts are that it has affected family and neighbourhood unity and has changed the life style of the citizens of the area. The economic impacts of transportation are that the network has affected the location of businesses and industries; promoted agricultural products; damaged small businesses; attracted government, public and private facilities; and promoted economic activity.

9.44 Accordingly, it was decided that the socio-economic impacts of transportation to be investigated by this study were as follows:

1. Social impacts: the effects of transportation network on family unity; disruption of neighbourhoods; change in life style, relocation of residential areas; movement of people; in addition to the effect of modernisation as a transformation of societies from traditional to modern.
  
2. Economic impacts: the effects of transportation network on relocation of businesses and industries; damage to small businesses; attraction of government, public and private facilities; promotion of economic activity; increase in land values.

#### CHECK-LIST OF CRITERIA

9.45 It was indicated in Chapter Three that the use of the Check-List of Criteria method was the most appropriate in the unique conditions of this research. Briefly, as also stated, "In its simplest form, this approach ranks alternative proposals on an ordinal basis in relation to a number of specific criteria ... with a subjective judgement on the alternative preferred according to the criteria employed" (Lichfield et al., 1975).

9.46 In this respect, the method is in two stages. First, the advantages and disadvantages of each strategy in relation to the criteria are enumerated, and second, the findings are recorded in a summary table ranking the

alternative from 1-4 (1 being the best, 4 the worst), also in relation to each criterion (Lichfield et al., 1975).

#### Advantages and Disadvantages of Strategies

9.47 By using all the data collected throughout this research (e.g. the survey questionnaire, the survey of traffic count, interviews with government officials and community leaders, and the available materials regarding the research study), for the purpose of investigating the socio-economic impacts of transportation. Thus, a list of advantages and disadvantages of each existing transportation strategy in relation to the impacts criteria was drawn up.

9.48 Before considering the possible impacts and advantages/disadvantages of each of the four strategies, the following is a list of the criteria to be employed against each strategy:

- Frequent communications
- Choice of work place
- Positive family unity
- Negative family unity
- Separation of neighbours
- Lost sense of community
- Negative neighbourhood unity
- Modern housing (villa type)
- Adoption of private automobiles
- Changes of life style
- Accessibility and linkages



- Relocation of residents
- Prime movement to work
- Prime movement, multi-purpose
- Provision of transport for women
- Adoption of modern transportation
- Relocation of businesses and industrial areas
- Initiation of new businesses
- Damage to small businesses
- Increases in land values
- Creation of market opportunities
- Sources of supply of goods
- Attracts government, public and private facilities

9.49 The surveys indicated the current road network strategy was perceived by the majority as most acceptable. However, in proceeding with the evaluation by the check-list of criteria method, the first step is to consider the advantages and disadvantages of each strategy in relation to each of the impact criteria. Tables 9.07 and 9.08 outline the conclusions for each of the strategies.

9.50 The next step in the evaluation was to systematically summarise the evaluation of the four strategies in relation to the impact criteria, as is done in Table 9.09. The advantages of the present road network are seen to be greater than the disadvantages. On the one hand, the network has assisted family unity; it has changed the life style of the citizens of the area; it has made it possible

Table 9.07: Advantages and Disadvantages of the "Do-Nothing" Road Network Strategy

TRANSPORTATION STRATEGY	ADVANTAGES	DISADVANTAGES
<p>The Road Network Strategy</p>	<ul style="list-style-type: none"> <li>. As boundaries of neighbourhoods</li> <li>. Positive contribution to the surrounding environment</li> <li>. Provision of accessibility</li> <li>. Active movement of people</li> <li>. Desired origin and destination</li> <li>. Extends the range of supply of goods</li> <li>. Enhances development</li> <li>. Initiates market opportunity</li> <li>. Influences urban form and growth</li> <li>. Changes land use patterns</li> <li>. Generates commercial and industrial uses</li> <li>. Affects the development of clusters and corridors</li> <li>. Supports the shape and size of city</li> <li>. Structural setting for development</li> <li>. Mass communications and linkages</li> <li>. Spatial distribution of economic activities</li> <li>. Redistribution of social institutions</li> <li>. Expands the range of automobiles</li> <li>. Supports agricultural products</li> <li>. Attracts government, public and private facilities</li> <li>. Changes life style</li> <li>. Assists family unity</li> <li>. Provides choices of time and travel</li> </ul>	<ul style="list-style-type: none"> <li>. Disruption of neighbourhoods</li> <li>. Division of neighbourhoods/communities</li> <li>. Encourages migration</li> <li>. More population attractiveness</li> <li>. Increases value of land</li> <li>. Creates traffic congestion</li> <li>. Relocation of businesses and industries</li> <li>. Relocation of residential areas</li> <li>. Damage to small businesses</li> <li>. Allocation of large areas of land</li> </ul>



TABLE 9.08: Advantages and Disadvantages of Public Transportation (the Bus System), Motorisation and Other Modes of Transportation Strategies

TRANSPORTATION STRATEGY	ADVANTAGES	DISADVANTAGES
Public transportation	<ul style="list-style-type: none"> <li>. Mixture of different culture within a society</li> <li>. Active movement of people</li> <li>. Low (affordable) rates</li> <li>. High volume of passengers</li> </ul>	<ul style="list-style-type: none"> <li>. Fixed timing and schedule</li> <li>. Fixed routes</li> <li>. Lack of adequate marketing</li> <li>. Competition by other modes</li> <li>. Lack of public support</li> <li>. Inability to provide services to the elderly and handicapped</li> <li>. Shortages of greater network coverages</li> <li>. Very low demand by public</li> </ul>
Motorisation	<ul style="list-style-type: none"> <li>. Variety of options to travel</li> <li>. Fast and comfortable</li> <li>. Provision of mobility to urban dwellers</li> <li>. Encourages dispersment of settlement</li> <li>. Active movement of people</li> <li>. Transport of goods and materials</li> <li>. More privacy for families &amp; women</li> </ul>	<ul style="list-style-type: none"> <li>. Traffic congestion</li> <li>. Low volume of passengers</li> <li>. High levels of accidents</li> <li>. Long term reliance on fuel</li> </ul>
Other modes (limousine, taxi)	<ul style="list-style-type: none"> <li>. Active movement of people</li> <li>. Effective as inter-city service</li> </ul>	<ul style="list-style-type: none"> <li>. Ineffective as intra-city service</li> <li>. Low volume of passengers</li> <li>. Lack of management control</li> <li>. Low demand by the majority of the public</li> <li>. Disruption of neighbourhoods</li> </ul>



Table 9.09: Check-List of Criteria, Summary of Findings

IMPACT CRITERIA	TRANSPORTATION STRATEGIES							
	Present Road Network AD	DIS	Public Transportation AD	DIS	Motorisation AD	DIS	Other Modes of Transportation AD	DIS
Frequent communication	X		X		X		X	
Choice of work place	X		X		X		X	
Positive family unity	X		X		X		X	
Negative family unity								
Separation of neighbours		X				X		
Lost sense of community		X				X		
Negative neighbourhood unity		X				X		
Modern housing	X				X			
Adoption of private automobiles	X				X			
Changes in life style	X		X		X		X	
Accessibility and linkages	X		X		X		X	
Transport services	X		X		X		X	
Relocation of residents		X				X		

Table 9.09: Continued

IMPACT CRITERIA	AD	DIS	AD	DIS	AD	DIS	AD	DIS	AD	DIS
Prime movement to work	X			X	X					X
Prime movement, multi-purpose	X			X	X					X
Provision of transport for women	X		X							
Adoption of modern transportation			X		X				X	
Relocation of businesses and industrial areas	X									
Initiation of new businesses	X									
Damage to small businesses		X						X		
Increases in land values		X						X		
Creation of market opportunities	X						X			
Sources of supply of goods	X						X			
Attracts government, public and private facilities	X									
RANKING			1		3		2		4	

AD Advantages  
DIS Disadvantages

for people to commute; it has helped transform society from traditional to modern by bringing the latest technology, e.g. televisions, refrigerators; it has made it possible to travel anywhere in the land; it has supported agricultural production by exporting local produce to other areas; it has attracted various government, public and private facilities which have grown up around the main road network; it has made it possible to exchange and trade goods from different sources from and to the area; lastly, it has changed the pattern of land use since the network has influenced the different land uses by separating the various activities.

9.51 On the other hand, the road network has brought problems for neighbourhoods since the creation of new roads can split communities and force people to move out. Building roads around the CCAAR has led to the relocation of residents around the newly built roads, leaving old residences. There has been a similar effect on small businesses and industries where owners have left inner city sites to relocate near the new road network, leaving those who could not afford to move at a disadvantage, or in some cases virtually out of business. Value of land has also increased around the road network, which is considered a disadvantage.

9.52 Since its introduction in the late 1970s, public transport has not been successful in the CCAAR, due to a number of reasons stated earlier. It is true that the



system is an active movement of people, yet not many use its services in the area. Although the bus system runs almost empty, as shown in Table 9.03, it has nevertheless changed the life style of the area's citizens and changed the traditional way of travelling as people gradually accept the idea of using buses. This is seen in the case of women in the CCAAR who use buses to travel to work and for shopping.

9.53 In evaluating the third strategy, that is motorisation, in relation to the impact criteria employed, there is no doubt that people in the area prefer to use their own cars, rather than buses or taxis. This is reflected in the greater number of advantages shown in Table 9.09 with regard to those criteria. This preference for using private cars reflects the fact that since the development of the road network, families who live far from each other have been able to maintain family unity. Thus, cars have promoted active movement of people from one place to another and changed their life style to a modern one. The expansion of the road network in the area, with good modern roads, has encouraged car ownership and cars are increasingly becoming a way of life. However, the increase in traffic has a major disadvantage of disrupting community life.

9.54 The fourth ranked type of transportation strategy is the other modes of transport which include limousines and taxis. These types have not yet been promoted effectively in the area, and are not used much by the people who rely

heavily on private cars. Also, the society in the CCAAR is relatively traditional, which also limits the use of limousines and taxis. Therefore, their advantages and disadvantages in relation to the criteria fail to achieve a high ranking in contrast to the other strategies discussed.

9.55 Although two strategies (Public Transportation and Other Modes) were performed very poorly in relation to the impacts criteria, yet they might be considered as a part of the overall network. Furthermore, a preference or selection of one strategy over others does not mean eliminating the remaining alternatives, especially since we know in this particular situation that the road network in the CCAAR is examined against far less important alternative strategies (at least from the view of the majority of people). Therefore, there is a need for a balance in transportation strategies in the study area.

#### RECOMMENDATION FOR PLANNING AND TRANSPORTATION STRATEGIES IN THE CCAAR

9.56 It is clear from the evaluation process and the analysis of the survey questionnaire and other data collected, that the road network is favoured as a transportation strategy in the study area. Moreover, there were no financial constraints in the period between 1975 and 1985 to building most of the Kingdom's motorways to link the various regions with one another.



9.57 With the decline of the country's oil revenues during the 1985-90 Plan, not only did the Kingdom witness a slow down in economic growth, but the government was also forced to spend less than it had intended (MOC, Fifth Plan: 1990-95, p.11). Since the government finances the road network, and tolls are applied to cover the cost of construction and maintenance of the network, the need for a balanced transportation strategy is essential.

#### THE PRESENT ROAD NETWORK

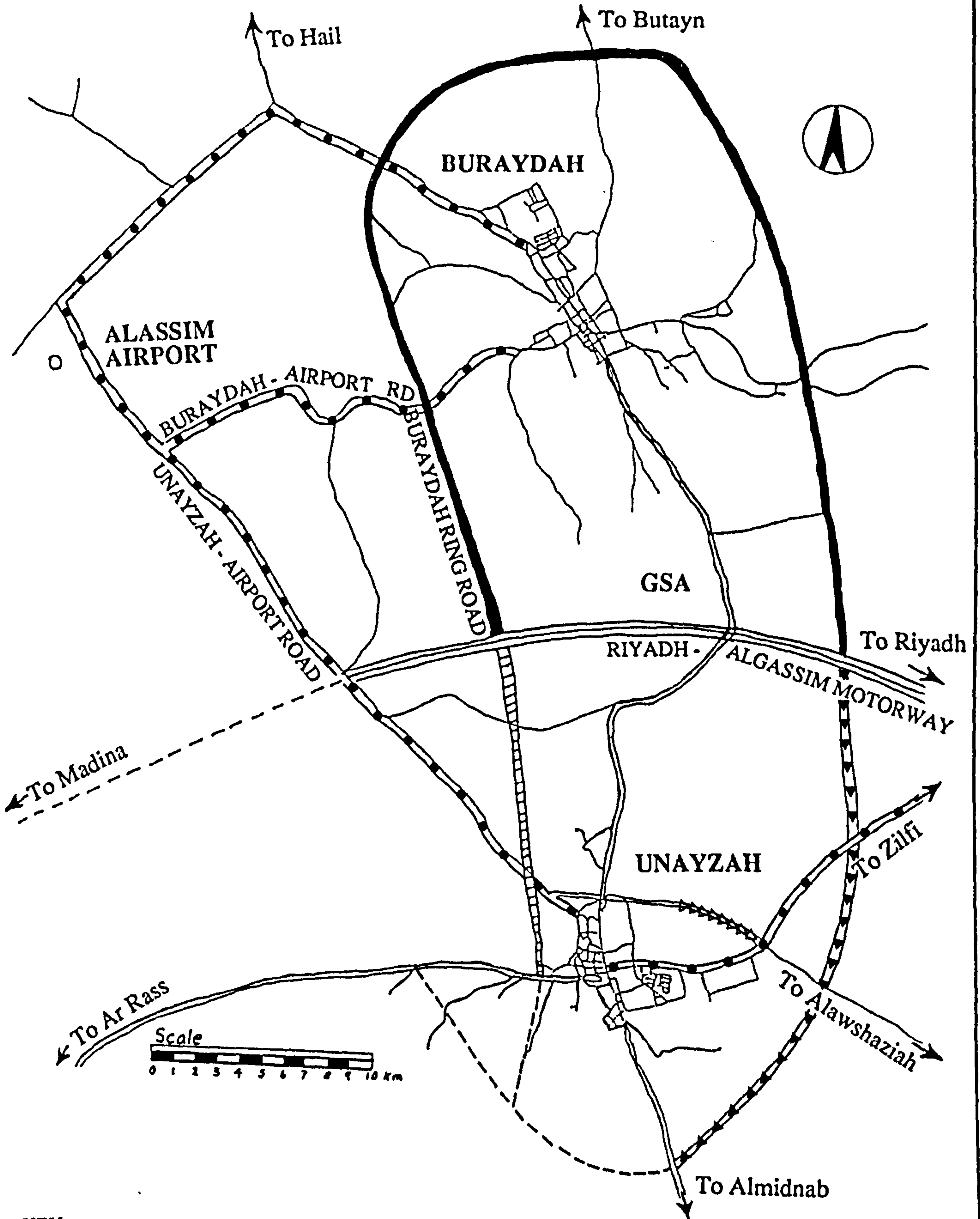
9.58 Based on the analysis of the data collected, and the results of the evaluation, the continuing expansion of the present road network in the research study area (see Figure 9.04) is highly recommended, because of a number of significant social and economic impacts:

1. To maintain a positive effect on family unity;
2. To promote businesses and industrial areas;
3. To promote the area's agricultural productivity;
4. To continue to attract government, public and private facilities;
5. To further enhance the CCAAR's economic activities;  
and
6. To accommodate the potential increase in traffic.

9.59 The recommended road network (new or improved) depends on past and present trends of the area's growth. The city of Buraydah is expanding northwards and Unayzah



Figure 9.04 THE RECOMENDED ROAD NETWORK STRATEGY FOR C.C.A.A.R.



<b>KEY</b>		
UPGRADED NETWORK		DOUBLE LANES
NEW NETWORK		RING ROAD
		DOUBLE LANES

eastwards so there should be a provision for the anticipated expansion.

9.60 The considerations of accessibility, movement of people and linkages are all accounted for and of equal importance.

### Accessibility

9.61 In order to provide maximum benefit for the Central Core Area population with regard to access within the area, only a limited number of new roads have been proposed. These are the extension of the Buraydah ring road to Unayzah and the extension of the Unayzah northern main boundary road to the east. It is important to note here that the reason behind recommending the construction of only two additional roads is primarily that these two additional roads can provide a choice of routes to the southern part of the CCAAR and give direct access to other roads leading to other towns (e.g. Zilfi, Alowshaziah), thus distributing traffic virtually in all directions.

9.62 The improvement of the existing network as illustrated in Figure 9.04 can provide better access mainly to the region's airport from both cities and the ability to carry present and future increased traffic. The upgrading of the Unayzah-Zilfi road (east) would give direct access to those from Al Rass (third largest of the region) to Zilfi and to the Riyadh-Algassim motorway.



9.63 Emphasis was placed in the proposed road network on the improvement (upgrading) of the existing network rather than adding new roads to the network, because of lower costs, and less maintenance and monitoring.

#### **Movement of People**

9.64 The movement of people is concentrated around the two centres. This is represented by the place of residence and place of work (see Table 9.10). 89% of those who reside in Buraydah work in Buraydah and 84% of those who reside in Unayzah work in Unayzah. The remainder, however, work in both cities and in the GSA. Based on the movement of people within the CCAAR, travel between the twin cities (see Appendix A, Question Number 15) and the expected increase in traffic, the proposed network should serve adequately.

9.65 In considering other important elements of the recommended expansion of the road network, linkage to other towns and to other regions was accounted for as a result of the findings.

9.66 Although the expansion of the Riyadh-Algassim motorway is presently under construction, progress is slow. It is important that this primary road should reach Madina. It not only serves as a national road connecting regions, but also connects the entire region of Algassim to the second holy place (Madina).



**TABLE 9.10: The Main Movement within the CCAAR represented by the Relationship between Place of Residence and Place of Work (Appendix A, Question Numbers 6 and 8)**

PLACE OF RESIDENCE	PLACE OF WORK			TOTAL	PERCENT
	Buraydah	Unayzah	GSA		
Buraydah	187 89.5%	6 2.9%	16 7.7%	209	45.1
Unayzah	25 11.3%	186 83.8%	11 5.0%	222	47.9
Algassim Region	1 3.2%		30 96.8%	31	6.7
Other Regions		1 100.0%		1	0.2
<b>TOTAL</b>	<b>213</b>	<b>193</b>	<b>57</b>	<b>463</b>	<b>100.0</b>

9.67 The road to the northern region of Hail is also recommended for upgrading to a dual carriageway, thus providing a link between the two regions.

9.68 In short, in the proposed continuation of the road network, all factors involved in the study have been considered. These factors are: socio-economic impacts (e.g. residential location, agricultural production); growth of the area; land use activities (will be illustrated later in this chapter); traffic and accessibility; and movement within the areas (e.g. journey to work and travel).

9.69 Accordingly, the extension and the improvement of the road network is the primary recommendation. Yet, other modes are also involved as a balance of the overall transportation strategy for the Central Core Area.

#### PUBLIC TRANSPORTATION

9.70 Public transport makes a significant contribution to society by providing a means of travelling within an area, carrying a large number of people. There are different types and sizes of buses to be used depending on the demands for such a system.

9.71 As was pointed out in several sections of this thesis, regarding the use of public transport in the CCAAR, two major factors were involved in the failure of the system. The lack of public support and incapability of

adapting schemes to encourage the use of the system by the public transport authority were the main reasons, in addition to others stated. This is not intended to be a criticism of the system, rather an attempt to encourage and promote it as part of the overall transportation network. Furthermore, the system will be efficient only if it is properly managed and controlled.

9.72 In its present state, according to the findings related to public transportation (e.g. survey questionnaire, interviews and other materials and statistics) in the CCAAR, it does not attract passengers. Although it is operational with fixed time schedules and routes, it still has not generated an increase in passengers.

9.73 Based on the findings regarding public transport in the study area, several important measures are recommended to be implemented:

1. Due to the low demand for public transport at present, the use of minibuses (15-40 seaters) rather than the current single unit buses (capacity 60-115) (Transportation and Traffic Engineering Handbook, 1982, p.181) would be preferable on the twin city routes, with consideration given to the needs of women passengers;
2. Encouraging Saudi women to use buses by the provision of fixed routes between shopping places



and residential areas, thus using secondary roads within the city in addition to existing routes;

3. Expansion of public transport to reach other towns and villages in the area (e.g. Al Gammass, Al Busir);
4. Exclusive buses for women employees are recommended to continue and to expand within the CCAAR and to other locations in the region in order to attract women's institutions to make use of public transport;
5. Improvement of the quality of services, such as the provision of special services for the elderly and handicapped, and those with severe disabilities;
6. Provision of access to all those who do not have automobiles;
7. Adequate levels of well trained staff according to local custom, thus training local Saudi operators is favourable;
8. Reliability of timing and operation of the service, in addition to good safety standards;
9. Encourage and attract Saudi employees, especially those who live in one place and work in another

within the CCAAR, to use the system by providing them with park and ride services.

9.74 These recommended measures are essential and must be adopted in the CCAAR in order to make the bus system more beneficial to all members of society. It may not perhaps attract many more of those who own automobiles but it can certainly encourage those who do not own cars and who have no access to major urban centres within the area.

9.75 In this way, the system, could have a good reputation for being efficient and reliable, and could play a major role in the transportation network in the area. Moreover, once these measures are implemented and have been shown to succeed, then other elements of improvement could be introduced to the system such as fares schemes and ticketing. However it is suggested first that public support and community willingness to use the public transportation are first promoted by adopting these measures, before any further steps are taken.

#### MOTORISATION

9.76 Because of its domination as the primary mode of transport in the Central Core Area, the motor vehicle plays a major role in transport, not only to fulfil the demands of travel to work, for shopping and other choices of destination by the people, but also and equally important to

transport goods and materials to and from and within the study area, as has been indicated.

9.77 It would be unrealistic to recommend a diminished role for the motor vehicle since it is a primary mover of people and goods around the various zones of the CCAAR. Rather than suggesting the need to reduce its function, not only because of traffic congestion and consumption of fuel, but also environmental impacts, it is recommended that people are offered alternative methods of transport and a balanced transport strategy is constructed.

9.78 With urban growth outside both cities and into the suburbs, reliance on private cars to commute becomes a necessity, since there are not better, faster and safer choices of transport mode (e.g. buses, trains).

9.79 The recommended network of roads, in addition to those under construction and the existing ones, should be able to handle the expected increase in motor vehicles in the CCAAR. Consequently, there should be a reduction in the role of motor vehicles, and specifically the private car and other modes should be encouraged, for a balance transport strategy in the area.

9.80 To accomplish such a scheme, application of different means of discouraging the use of private cars should be put into effect.



9.81 Ideally, the introduction of an improved bus system as stated above would encourage some to leave their cars behind and use the bus system for commuting to work, or going to shops, and for other journeys.

9.82 Additionally, the use of ride-sharing (van, bus, car), particularly for government employees working in the area whether in the city or within the CCAAR, could benefit employees with regard to travel cost and time. The privately owned institution (SAPTCO) would be made use of and would gain revenue. With the availability of space, provision of parking. e.g. park and ride, would be more appropriate to have, especially for those whose job site is in another area from their place of residence.

9.83 As a result of the survey questionnaire, car pooling (with relatives, friends and colleagues) was the second means of transportation in the area, following the private automobile. 8%, 14.5% and 8.6% used car pools to commute to work, travel between the twin cities, and for other journeys respectively. So, the concept of car pooling can be put into practice within the study area, providing another means of discouraging and reducing the use of private cars.

9.84 Furthermore, effective and strong police enforcement of speed restrictions for motor vehicles in the area is required, to prevent traffic accidents. In 1986 alone, 50%

of all accidents which occurred in the region were as a consequence of speeding (MOI, Motor Vehicle Statistics, 1986, p.31). Allowing only bus transport in some parts of the twin city centres where there is heavy commercial and business concentration would discourage the use of private cars and would eventually reduce traffic congestion within the city centres.

#### OTHER MODES OF TRANSPORTATION:

9.85 Limousines and taxis are the other modes of transport in the CCAAR. Because of social factors identified earlier, taxis and limousines would work best as intercity passenger transport between the twin cities, to the airport and to other towns of the region.

9.86 This is unlike the large metropolitan areas in the Kingdom, e.g. Riyadh and Jeddah, where limousines and taxis provide a convenient and fast intracity service due to the high demand. This type of transportation has not proved of interest to the residents of the study area, especially within the twin cities, as indicated from the results of the survey.

9.87 Consequently, it is recommended that taxi services should be continued as an intercity service between Buraydah, Unayzah and the GSA, and to other places in the region, e.g. Algassim airport. This would provide an efficient but limited type of service since the demand for



limousines is low in the CCAAR due to local custom; the concept of Dial-a-Ride would be desirable.

9.88 Since there are four limousine companies in the CCAAR (two in Buraydah and two in Unayzah), each with thirty small vehicles carrying a maximum of 5 passengers), Dial-a-Ride would serve the local needs by providing a 'door-to-door' service. This type of transport would serve not only the Saudi family, especially women, but more importantly, the elderly, handicapped and disabled and those who do not own private vehicles and have no access to public transport (buses).

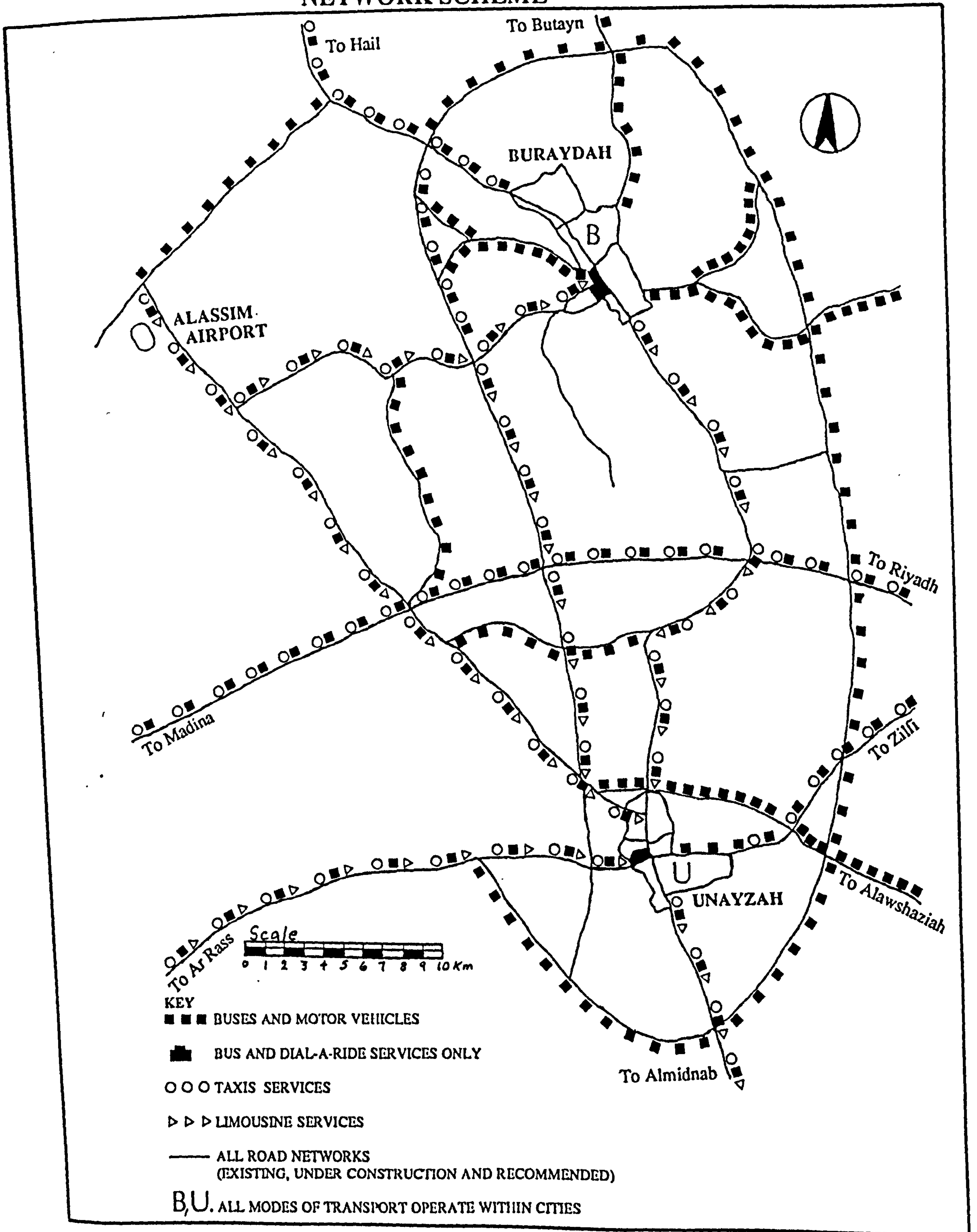
9.89 This type of service will be used for a variety of purposes, e.g. work, school and shopping. However, in order for this type of transport to achieve maximum benefit, strong and effective control and monitoring are required by the responsible authority to ensure its effectiveness. Accordingly, a recommended modes of transport network scheme which includes public transport, motor vehicles and other modes is presented on Figure 9.05.

#### LAND USE TRANSPORTATION SCHEME

9.90 Land use is extremely important to the recommended transportation strategy. It is equally important to both the individual and the community. The individual needs land for housing or commercial premises and the community



Figure 9.05 RECOMMENDED MODES OF TRANSPORTATION NETWORK SCHEME



ADOPTED FROM TURNER, C. 'THE DESIGN OF URBAN GROWTH MODELS FOR STRATEGIC LAND-USE TRANSPORTATION STUDIES' REGIONAL STUDIES, VOLUME 9, pp. 251-264, 1975.

requires land as a vital place to develop for the fulfilment of its necessities (Daghistani, 1989).

9.91 The purpose of producing a land use transportation plan is to demonstrate the relationship between the transportation network (special emphasis on the existing and proposed road network) and the land use activities, e.g. residential, industrial and agricultural (see Figure 9.06).

9.92 The plan consists of all existing land use activities in the Central Core Area including existing and recommended major road network, and maximum transit services in the area.

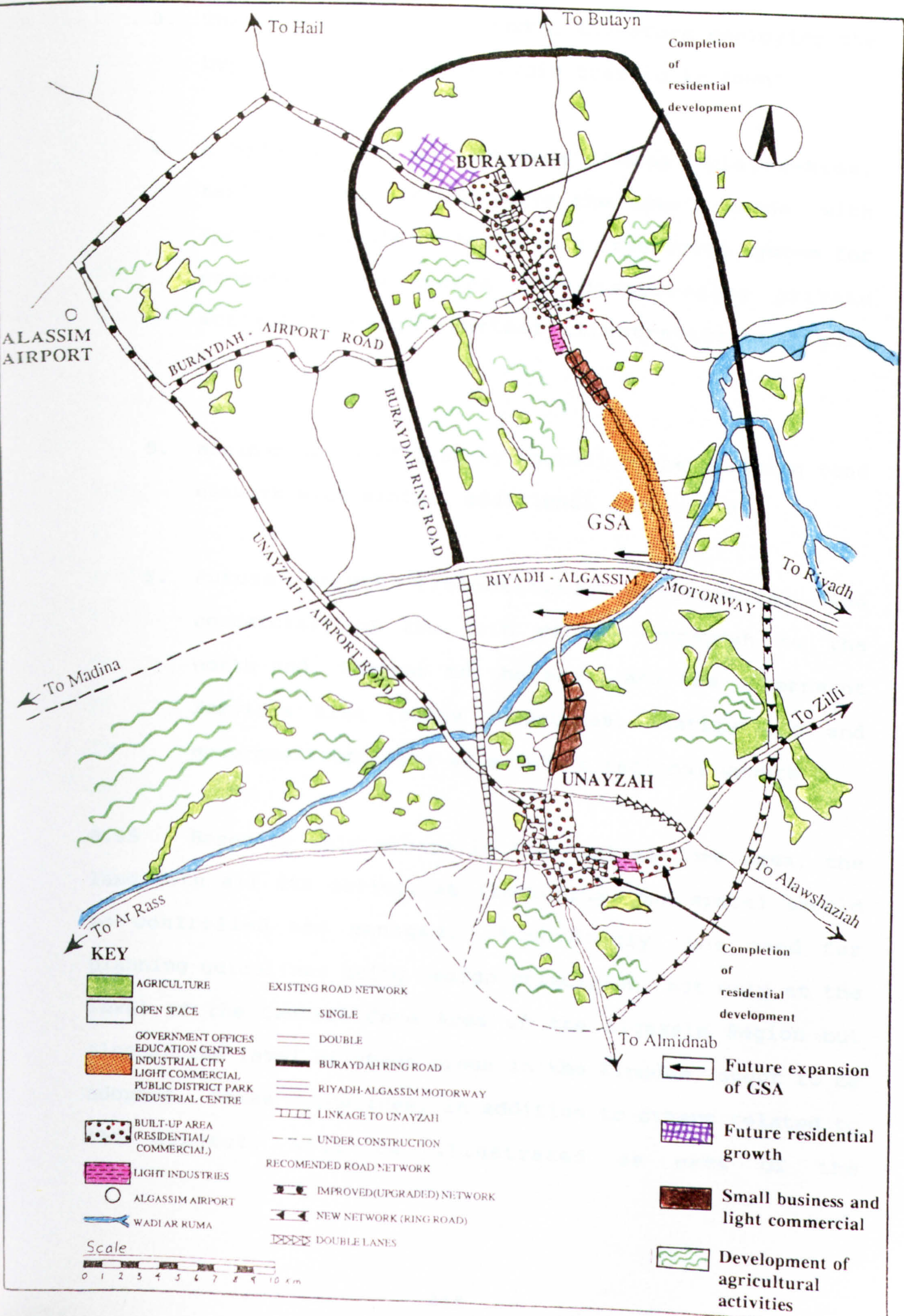
9.93 Both centres (Buraydah and Unayzah) and the Government Services Area (GSA), in addition to the region's airport, are served by the plan. In view of that, the CCAAR as an entity is accommodated by the plan, thus enhancing the area's activities by the proposed network of transportation.

9.94 The land use transportation scheme (see Figure 9.06) has considered the following essential elements:

1. All analysis results from the social and economic impact of transportation, e.g. residential location and economic activities;
2. Travel demands and patterns, thus providing access to and from the area;



**Figure 9.06 LAND-USE TRANSPORTATION SCHEME**





3. The expected traffic growth, therefore employing the bypass road network to avoid traffic in town;
4. A balanced transit service (buses, Dial-a-Ride, taxis, limousines) to serve the area's needs, with special emphasis on buses as a free route system for promoting the system and discouraging private automobile usage (further illustration on Figure 9.05;
5. Minimum usage of land by upgrading the existing road network with minimal additional roads; and
6. Future growth (residential, agricultural and commercial) of the twin cities (Buraydah to the north and Unayzah to the east) and the Government Services Area (heavy industries, institutions and government offices) as a future regional centre.

9.95 Based on this scheme in the Central Core Area, the land with all its activities (including open space) should be controlled and managed. Accordingly, the need for planning guidelines using design principles, not only at the level of the Central Core Area of the Algassim Region but also at the level of other areas in the Kingdom, ought to be adopted. These guidelines, in addition to others related to the subject, will be illustrated as part of the

recommendations for the Saudi Arabian cities in the next chapter.

9.96 Before land use guidelines are drawn up for other cities it is necessary to explore the differences between the existing (Norconsult) land use plans for the CCAAR and those which would arise from applying the principles established through this research. The Norconsult Master Plan did not cover the entire area of the CCAAR, but rather treated the two cities as two independent cities.

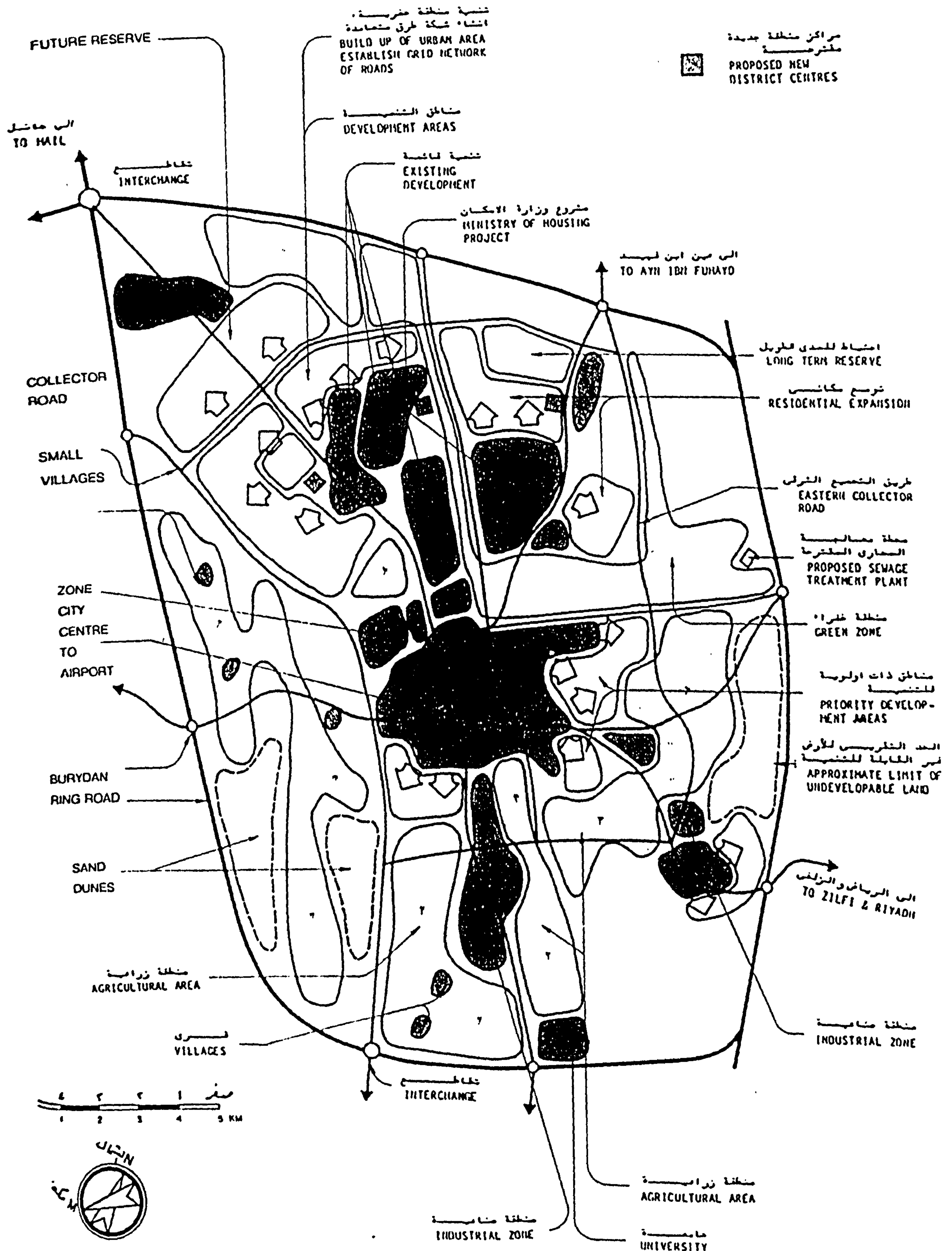
#### THE NORCONSULT MASTER PLAN

9.97 In the Master Directive Plan For Urban Centres, prepared by Norconsult in 1984 to cover the period up till the year 2005 (1425 A.H.), a 20 year plan, it was recommended in the case of Buraydah (Figure 9.07) which is part of this research study, that there be a compact grid development which would permit the city to expand and grow beyond the year 2005 (1425 A.H.). The consultants also stated that if this recommendation was to be adopted "... a significant element of centralised control ..." would be required.

9.98 I have indicated in this chapter that Saudi Arabia ought to attempt to guide the expansion and growth of its cities so as to avoid the unfortunate circumstances that took place in the 1970s and 1980s. Concentration of development should be emphasised within the existing



Figure 9.07 BURAYDAH: URBAN LAND USE CONCEPT



SOURCE: NORCONSULT A.S., REPORT 4: MASTER DIRECTIVE PLANS FOR URBAN CENTRES, 1984, VOLUME 2: BURAYDAH 1984, p.43.



structure of cities, allowing expansion at a controlled level where it is absolutely needed. Only in this way can sound planning be realised.

9.99 In the case of the city of Unayzah (Figure 9.08), the consultants in their Master Plan suggested a different development plan from that for its sister city, Buraydah. They recommended a modification of the existing structure, west and north, connected to the eastern bypass which would eventually prevent traffic from congesting the inner city.

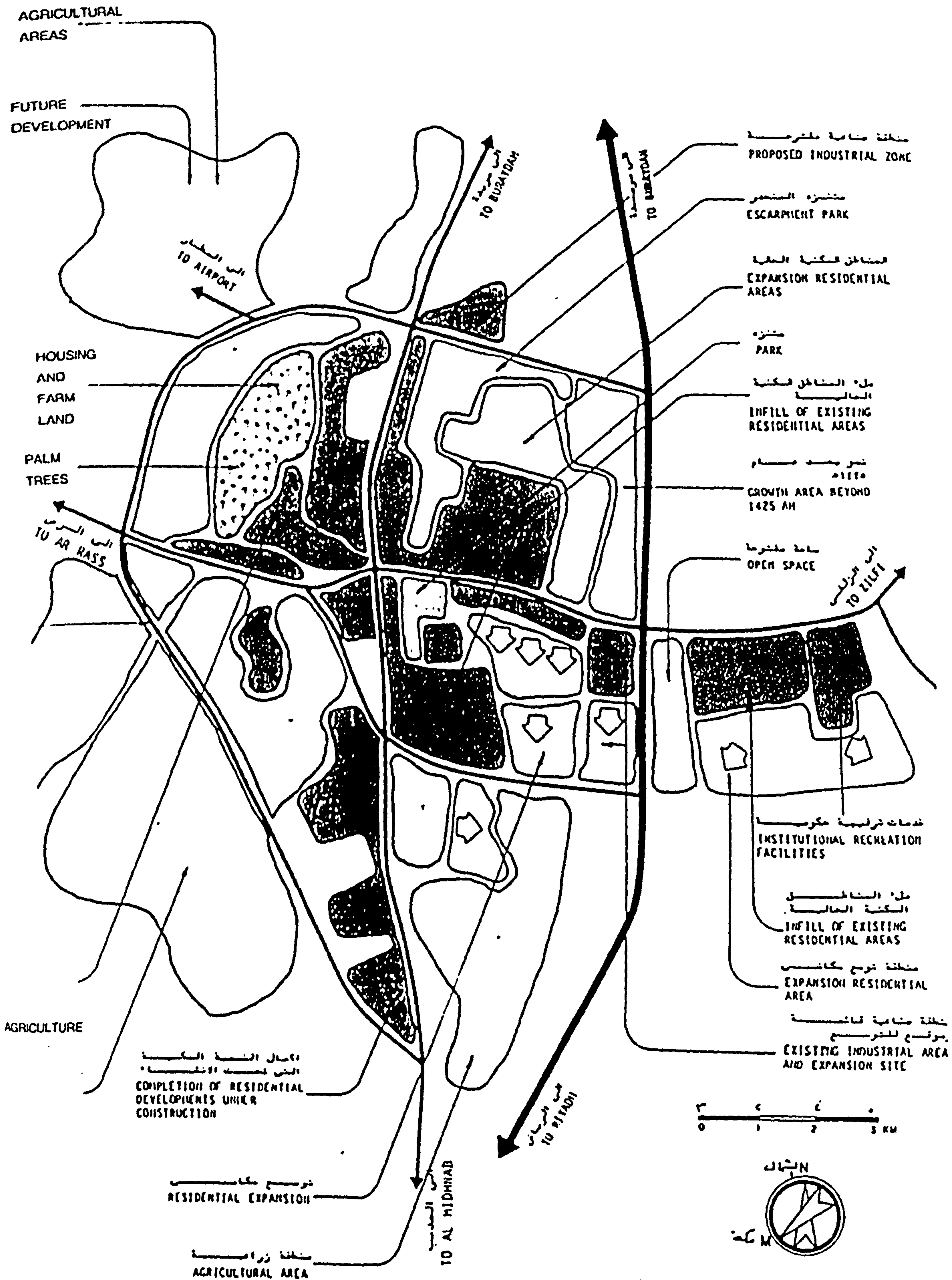
9.100 Furthermore, Norconsult proposed the following design regarding the city of Buraydah in their MDP:

- A. an outer collector system of primary roads, running in the north-south and east-west directions;
- B. three district commercial centres well beyond the proposed Buraydah ring road;
- C. a new city centre close to the existing centre; and
- D. a green belt area within the city boundary.

9.101 Similarly, the MDP of Unayzah consisted of the following proposals from the consultant:

- A. an east-west primary road to strengthen the city form away from the dominant north-south orientation;

Figure 9.08 UNAYZAH: URBAN LAND USE CONCEPT



SOURCE: NORCONSULT A.S., REPORT 4: MASTER DIRECTIVE PLANS FOR URBAN CENTRES, 1984, VOLUME 3: UNAYZAH 1984, p.37



- B. an emphasis to reinforce the present city centre by the linkage of the proposed east-west primary road, in addition to open spaces, parks and the preservation of the agricultural areas within the city boundary.

9.102 From the summary of the MDP of both cities with regard to the network of transportation and land use, a number of points can be derived:

1. The consultants have made it clear that the city of Buraydah could grow well beyond its current capacity, by proposing for example the ring road around the city, which currently exists, and the commercial district centres outside the ring road. This would create much more open space for the municipality to deal with, with the consequence of difficulties to face, as in the past.
2. The protection of Unayzah city centre and the preservation of agricultural land within its boundary - in addition to containing development within the existing and present structure - is definitely a positive sign of good and adequate planning, by controlling the growth of the city rather than accepting unnecessary expansion. At the same time, this is providing the city with directional guidance for possible future expansion when it is needed.



9.103 Whether or not Norconsult chose to recommend two different plans for the two cities on their own initiative or by that of the authority, it nevertheless remains a question of reality and practicality to have one city expand well beyond its obvious need, and the other to be modified and restructured, while both have similar characters. Although Buraydah is the capital of the region, this role still does not justify premature over-expansion of its plan.

9.104 A very important point to make is that the area between the two cities, which is called the Government Services Area (GSA), was not touched on by the consultant. This area is not only important to the Central Core Area because it accommodates the Region's Industrial City and key government branches, but it is rather important to the entire region of Algassim.

9.105 It is clearly essential to prepare master plans for cities and towns as a basis for effective planning, yet master plans are subject to change due to political or economic factors. Moreover, the Master Plans should not only consider the city as a unit, but more importantly within its surroundings, its position and its relationship to other cities and towns in the area of its location. This would result in a more comprehensive and a stronger plan for the entire area, rather than the narrow consideration of a specific city.

## COMPARATIVE ANALYSIS OF LAND USE-TRANSPORTATION SCHEMES

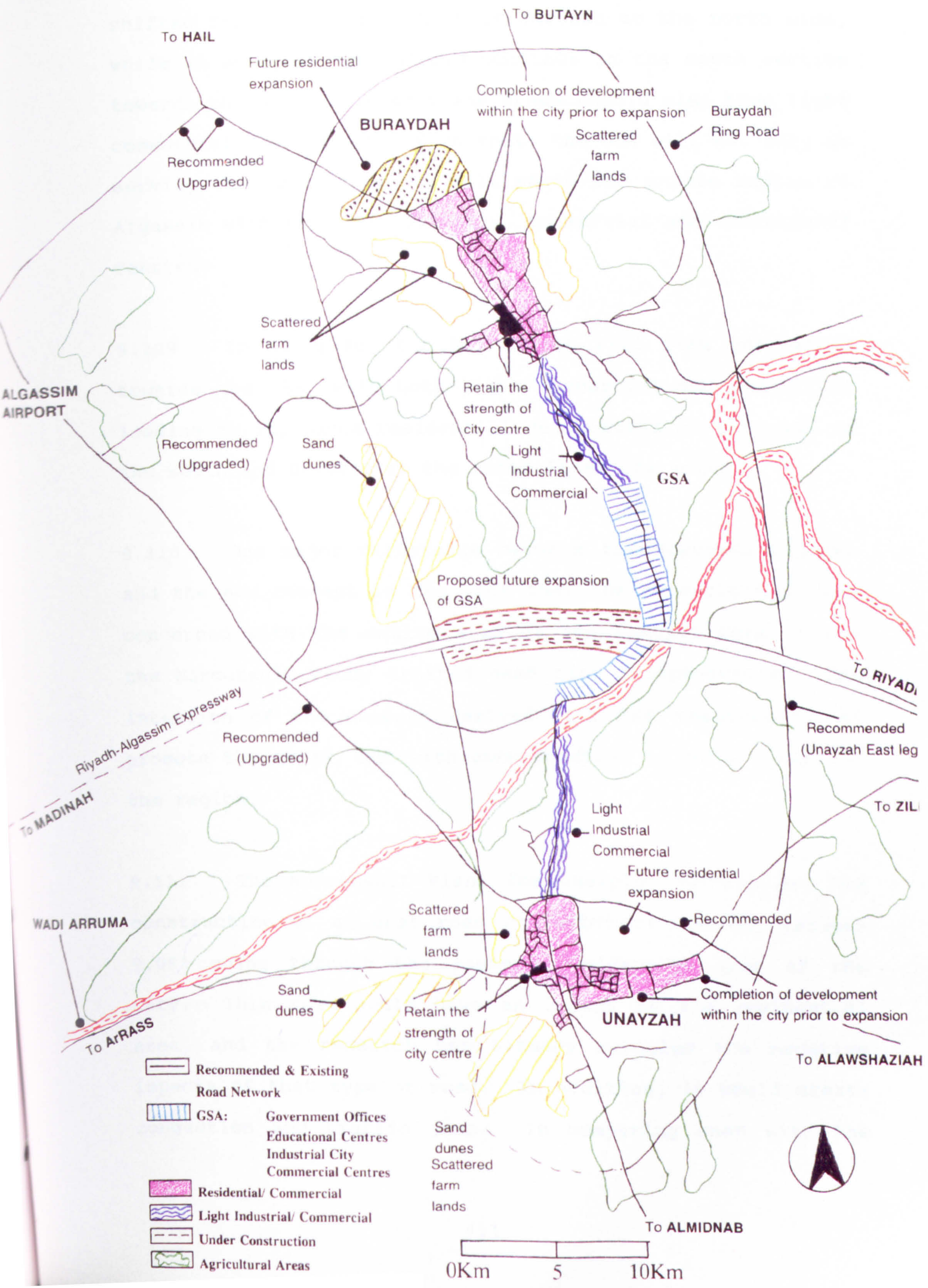
9.106 Having recommended modes of transport and a network, it is necessary to present their associated land use-transportation relationship. To illustrate the planning and design principles developed through the research, a conceptual land use-transportation scheme for the CCAAR can be compared with the plans for the two cities provided by Norconsult and shown on Figure 9.07 and Figure 9.08.

9.107 The land use-transportation concept consistent with the research regarding the CCAAR is shown in detail on Figure 9.09. The primary concern of the concept is to retain the strength of the two city centres, and to control their growth. Controlling the growth, however, means emphasising development within the cities before expanding them. Moreover, protecting the area's agricultural products and ensuring its qualities survive is another necessary concern, to be achieved partly by providing good access of transport network.

9.108 In addition, the concept envisages only a minimum number of roads to be added to the existing ones and, as indicated earlier in the network strategy section of this chapter, roads can be upgraded rather than replaced by constructing new ones due to the huge costs involved. The concept envisages that residential areas should be free of all types of industries, even light industrial units and small factories; therefore, light industries should be



**Figure 9.09 LAND-USE TRANSPORTATION CONCEPT FOR THE CENTRAL CORE AREA OF AGASSIM REGION**





shifted from the east section of Unayzah to the north side, while in Buraydah they should continue in the south section towards the GSA. Both of these areas should also have light commercial development. With that, the GSA will not only be serving the two cities but will serve the entire region of Algassim with its heavy industry, commercial and educational centres.

9.109 In doing so, the two cities will lean adequately towards the GSA, with both light commercial and industrial leading to it, since residential development of Buraydah to the south and Unayzah to the north faces obstacles.

9.110 One major difference between the Norconsult plans and the new concept is the fact that the research has been concerned with the entire area of the Central Core, while the Norconsult study treated each city independently. The intention of the concept derived from the research is to promote the CCAAR, but with consideration to other areas of the region.

9.111 The Norconsult Plan, for example, recommended the construction of an east road collector of Unayzah (Figure 9.08) going through the eastern residential area of the city. This road would have an impact on the residential area, and the research has already revealed the negative impacts of that type of road. In addition, it would create congestion and traffic jams. In comparing that with the

concept derived from the research (Figure 9.09), the recommended eastern road of Unayzah is actually a continuation of the eastern ring road of Buraydah, placed further to the east as a city bypass to serve the city and to provide a good access to those coming from both the north and the south. This would lead to free movement of traffic as the area expands.

9.112 In summary, there are a number of differences between the research concept regarding land use and transportation, and the plan drawn up by Norconsult. These differences are summarised as follows:

1. Residential expansion of both cities should only take place following the completion of development of open spaces within the boundaries of both towns, as a means of controlling and managing growth.
2. The GSA, which lies mid-way between the two cities, with its heavy industries and educational centres, should continue to be promoted to serve not only the CCAAR but rather the entire region. Thus, its future growth should be directed towards the west where it is linked with a good network of roads to the rest of the region's cities and towns.
3. To further promote the GSA, the light industrial and commercial activities of both cities should be concentrated on the south side of Buraydah and on



the north side of Unayzah. This would mean shifting the light industries of Unayzah from their present location on the east side (out of the residential community) into its north territory, and keeping the industrial business in the south side of Buraydah with expansion to the south of it.

4. The bypass motorway of Unayzah, as an extension of the east leg of Buraydah ring road, should be built away from the city to prevent future traffic within the town and to give access both to Unayzah and to those towns located south, rather than constructing the bypass through residential communities of east Unayzah.

9.113 In this respect, the recommendations provided for the study area (CCAAR) are the basis on which we can advance to the final stage of the research, applying the lessons to other medium-sized Saudi cities by presenting planning and design principles for transportation in the next and final chapter of this thesis.

## CHAPTER TEN: RECOMMENDATION, PLANNING GUIDELINES FOR SAUDI ARABIAN CITIES

### INTRODUCTION

10.01 The importance of this chapter lies in its presentation of planning and design principles of transportation network for Saudi Arabian cities, using the research study area as a basis.

10.02 An important approach to these principles is the discussion of growth control and responsibilities of various government agencies involved in Saudi Arabia.

10.03 Accordingly, it is important to present principles of planning and design involving various elements of planning with regard to the subject of this research, e.g. transportation network and accessibilities, and the planning and management of the system.

### THE NEED FOR GROWTH CONTROL

10.04 The fast growth of Saudi cities, especially the large and medium size cities, is at the expense of smaller towns, due to the location of business activities and employment opportunities. Growth control in the large and medium sized cities is needed to avoid undesirable consequences.

10.05 What took place in the 1970s with regard to city expansion throughout the Kingdom was compounded by the difficulty experienced by local authorities in coping with



the situation. A lack of planning and control forced many people to live in new communities without basic infrastructure, e.g. water and electricity.

10.06 It is our responsibility as planners to plan the future of our cities to ensure a better quality of life based on our community interests.

10.07 Many of the social and economic activities are found in one or two cities of each region. For example, Riyadh dominates activity in the Central Region. As a result, many people move to the city from other areas of the region seeking employment opportunities. As a way of solving the problems of city expansion, and the imbalance of business activity, relocation to the secondary cities would not only minimise the growth of the larger cities, but would also promote and encourage growth in the secondary cities.

10.08 The promotion of growth in the secondary cities in the country is considered one means of lessening the growth of larger cities. This is not the only method of growth control. Other means of growth control are recommended in the following sections.

#### MASTER PLANNING FOR SAUDI CITIES

10.09 Master plans prepared to guide future development of cities and act as a means of growth control cannot guarantee actual development. Master plans are commonly vulnerable to

setbacks and other obstacles. So, it is important to prepare plans, but their execution is subject to economic or other factors, such as political vicissitudes.

10.10 One of the earliest city plans in Saudi Arabia was that provided by John Philby as part of the British mission to Saudi State, in which he gave an indication of the city of Riyadh's structure in 1918 (Daghistani, 1985) shown in Figure 10.01, followed by Dickson's plan of Riyadh in 1937 (Figure 10.02). Moreover, those were not actually master plans, but rather plans of the current situation of the city at the time.

10.11 Real master plans for Saudi cities did not come about till the early 1970s, when the Master Plan was approved by the Council of Ministers in 1973 for the city of Riyadh (Al-Hussayen, 1989). The Master Plan of Riyadh was prepared by C.A. Doxiadis in 1971 (Figure 10.03) which was followed by a series of master plans for other Saudi Arabian cities.

10.12 Furthermore, due to the country's economic boom in the mid-seventies, which resulted in a fast and massive growth of Saudi cities, the authority had no choice but to revise the original master plans of cities - mostly by SCET-International-SEDES - in the late 1970s. In addition, following the Kingdom's economic setback at the beginning of



Figure 10.01 PHILBY'S PLAN OF RIADH, 1918

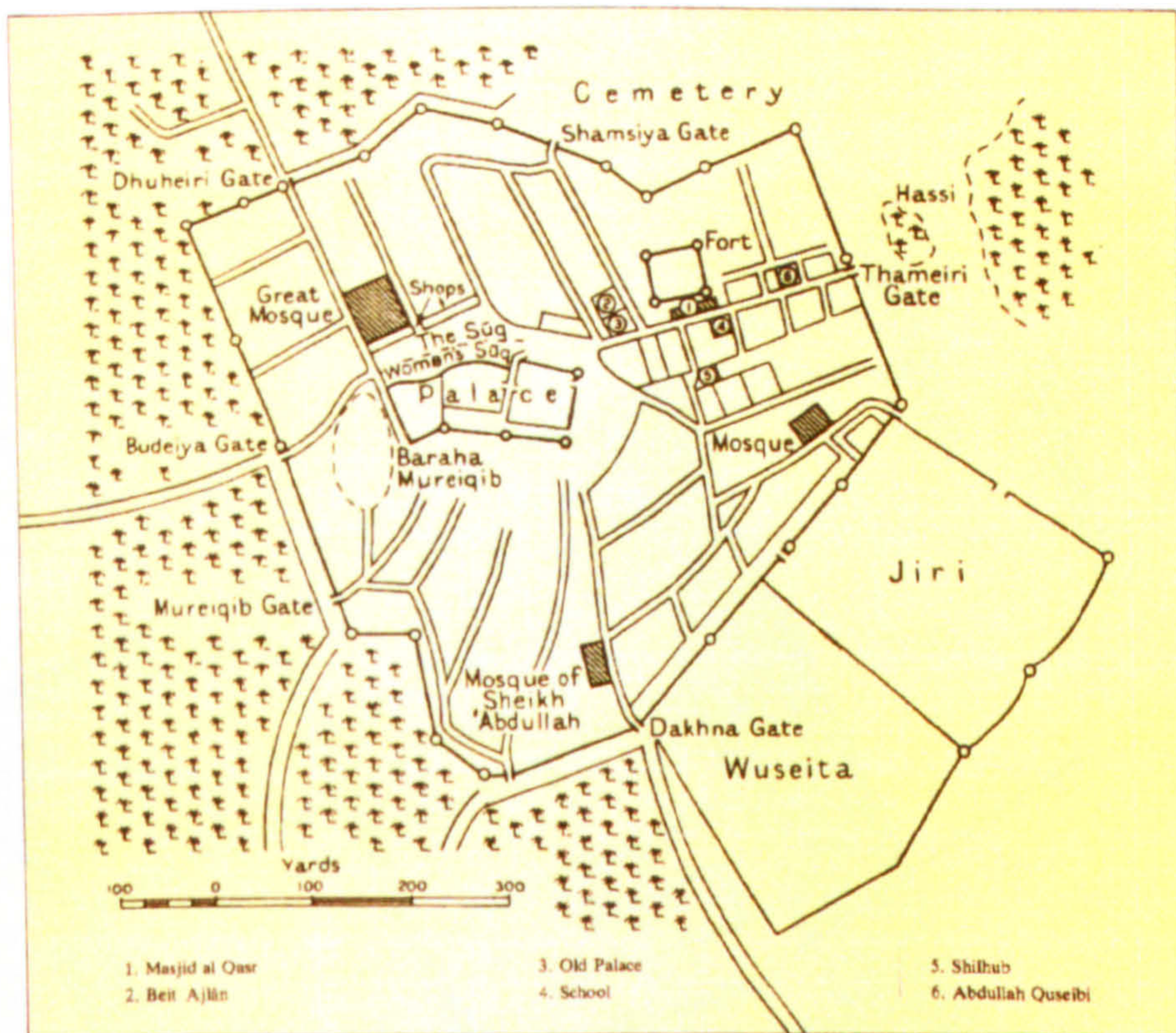
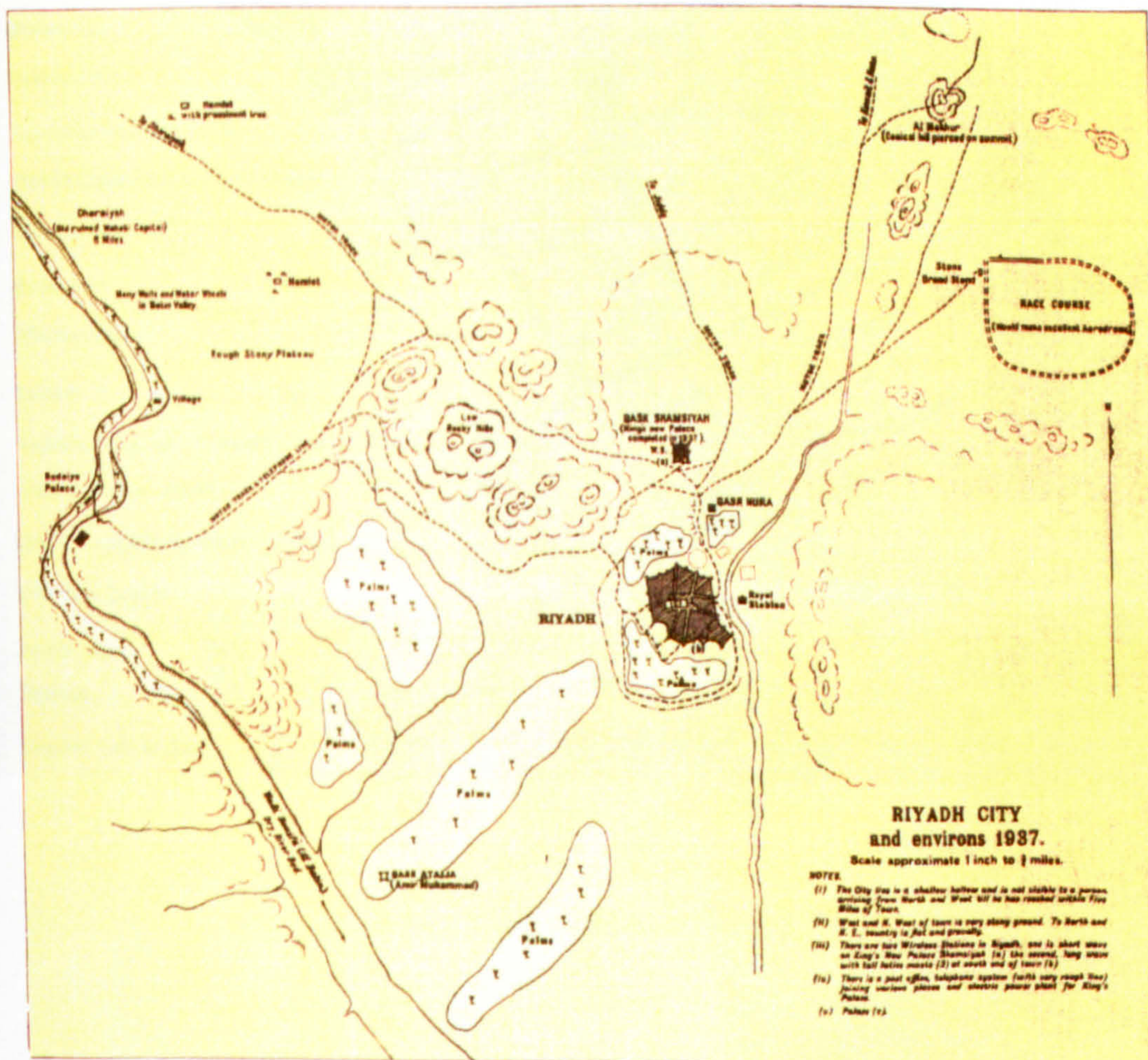


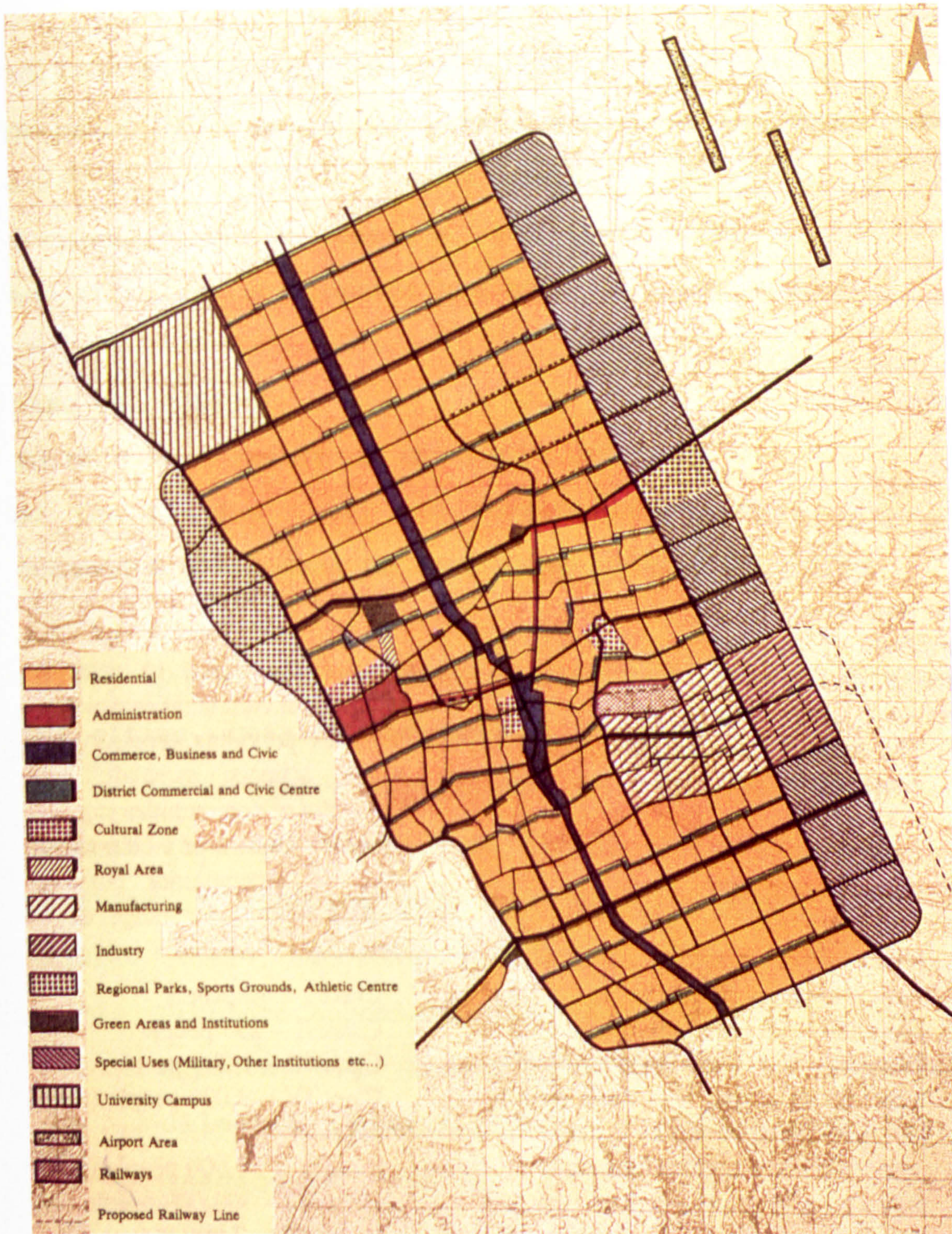
Figure 10.02 DICKSON'S PLAN OF RIYADH, 1937



SOURCE: DAGHISTANI, ABDAL-MAJEED. AR-RIYADH: URBAN DEVELOPMENT AND PLANNING RIYADH, 1985, pp. 58-59



**Figure 10.03 DOXIADIS (1971) ORIGINAL MASTER PLAN FOR RIYADH TILL THE YEAR 2000**



**SOURCE: DAGHISTANI, ABDAL MAJEED. AR-RIYADH; URBAN DEVELOPMENT AND PLANNING. RIYADH, 1985, p. 158**



the 1980s, Norconsult A.S. prepared a number of master plans for Saudi cities.

10.13 Consequently, master plans of Saudi cities have been prepared by foreign consultants and have not been totally executed due to the reasons stated. The plans have been over-ambitious in respects, and their capacity to control and stimulate development has been severely tested.

#### LAND USE CONTROL

10.14 As a result of the rapid urbanisation in many areas of the Kingdom, land use became uncontrolled. This has created a great deal of open space within the cities.

10.15 Houses are still being built on the peripheries of the cities, despite the absence of basic services. Thus, the need for strict regulations to stop the growth and to control land use has become highly important. There are problems in applying land use control measures in Saudi Arabia. These, according to Alyemeni (1986, p.399) are:

- "1. Problems associated with cultural and environmental aspects, e.g. lack of privacy, social segregation, climatic incompatibility -- which resulted from inadequate zoning regulations and building regulations.
2. Problems of uncontrolled growth, e.g. urban sprawl, the problem of agricultural land conversion.

3. Problems associated with incompatible uses of land, e.g. traffic, parking, community facilities, problems of privacy."

### Zoning Regulations

10.16 There are many types of zoning, e.g. hierarchical, specific, and exclusionary zoning. Exclusionary zoning is the type of zoning that has proved inappropriate with regard to the culture and social habits of Saudi Arabia, since it is biased toward the rich (Alyemeni, 1986).

10.17 A zoning system is essential to the planning process to protect land from misuse. It is important to apply the zoning regulation according to the area's needs. Thus, a separation of land use activities must be implemented, particularly between industrial and residential areas.

10.18 The mixture of residential and commercial activities in most Saudi cities is to be redesigned. For example, the municipalities have designated streets of 30 metres wide and over as for residential/commercial uses, and suitable for small businesses. This in itself creates difficulties with regard to social and environmental considerations such as disturbances as a result of parking and traffic.

10.19 Accordingly, the need to restrict zoning regulations only to the assigned uses by the authority would accomplish



the planning objective and would control the land at the area level. Furthermore, at the city level, the implementation of a master plan for each city would give a clear indication of future uses of the land (although these would change over time). Otherwise, master plans would be ineffective.

10.20 Norconsult A.S., for instance, prepared a master plan for most Saudi Arabian cities in 1984, under the authority of the Ministry of Municipal and Rural Affairs. These plans are to direct development up to 1425 A.H. (2005 A.D.) and in fact they act as a means of zoning and land use control for the future.

#### Control of Open Space

10.21 According to the findings of this research, land values have been affected by the introduction of a modern transportation network. The value of land has increased as a result, and speculation has resulted in many open spaces within the twin cities of the Central Core Area and also within other cities of the Kingdom.

10.22 To date, the relevant authority (the municipality) has not been successful in controlling the open spaces within Saudi Arabia's cities and towns. The existence of so much open space is not limited to the outskirts of the cities, but it can also be found in contemporary residential areas and in the main commercial streets.

10.23 During the 1980s, municipalities began fencing in the open spaces by constructing walls surrounding the open lots, especially on the main commercial streets of cities. The concept behind this was to make the streets look more attractive. But this was costly and did not achieve the objective.

10.24 At the same time, municipalities started the implementation of what is called "neighbourhood gardens" on government land located on major streets and within residential areas. However, most open spaces within cities belong to the public and private sectors and are mainly controlled by real estate agencies. The authorities were therefore unable to resolve this matter.

10.25 The demand for land continues to increase, particularly for housing purposes, and with so many open lots within the cities controlled by real estate agencies, prices remain high. People are actually forced to buy land outside the cities and on the periphery. Thus, growth is uncontrolled and open spaces within cities remain.

10.26 It is recommended that the authorities tax empty lots. Taxing open land as long as it is not built on would force private owners either to sell the land for lower prices or to put up whatever type of building was allowed by the specific zoning regulations of the area. Timing, however, would be an important element in this.



10.27 Only the authorised government agency would implement this measure. Such a move would eventually lead to the enhancement of the cities' open spaces and reduce and minimise the inadequacy of growth in the outlying areas.

#### PLANNING AND DESIGN PRINCIPLES FOR TRANSPORTATION IN MEDIUM SIZED SAUDI CITIES

10.28 The purpose of this section is to provide broad guidelines for the planning and design for transportation in medium sized Saudi cities. The road network, in particular, in the Kingdom has been divided into four hierarchical types: motorways, main, single and dirt (feeder/agricultural) roads. These roads are to serve different purposes, e.g. social and economic.

10.29 The benefits of establishing a road hierarchy are, according to Roads and Traffic in Urban Areas (1987, p.32), namely:

- "1. Activities most closely related to frontage buildings can be given more space when environmental and access functions are allowed to predominate;
2. Activities which are incompatible with traffic flow can be restricted to designated routes where traffic movement should predominate;
3. The capacity of designated traffic routes can be increased by segregating different forms of traffic and by restricting vehicular access to frontages;

4. The risk of accidents can be reduced and junction capacities increased by reducing the number of intersections and vehicular conflicts on the designated traffic routes;
5. The overall environmental impact of traffic can be reduced by concentrating flows on to fewer routes;  
and
6. The rate of return on new investment designed to improve traffic flow, save accidents and reduce environmental intrusion can be increased by concentrating traffic into a few selected corridors."

10.30 And, in order to reach a recommendation for transportation network concerning Saudi Arabian cities, it would be desirable first to review past planning in the Kingdom. Moreover, planning in the past was carried out by foreign consultants. Their influence as planners would therefore reflect on the current practice of planning in the country.

#### TRADITIONAL AND CONTEMPORARY PATTERNS

10.31 Much of the past planning in Saudi Arabian cities was carried out by foreign consultants. In fact, one of the earliest influences with regard to town planning was the



introduction of grid pattern by the Arabian American Company (ARAMCO) in eastern Saudi Arabia.

10.32 The concept of grid pattern streets was initiated by the company in 1938 when it needed housing for its employees at Dhahran camp, as a result of the increasing number of employees who moved to the area to work for the oil company. The nearby cities, Dammam (18 km to the north) and Al Khobar (10 km to the east) were faced with rapid growth. As a result, the government of the Eastern Province felt the need for such a layout in both towns. Consequently, in 1947, ARAMCO planned the layout pattern (grid pattern) in both towns at the request of the governor of the Eastern Region (Al-Olet, 1991).

10.33 A continuation of the influence of the grid pattern by the international firm shifted thereafter to other Saudi cities. In Riyadh, for example, the concept was adopted as a predominant pattern in both the old section of the city (prior to 1950s) and in the new (1950s and 1960s) Riyadh communities (see Figure 10.04 and 10.05).

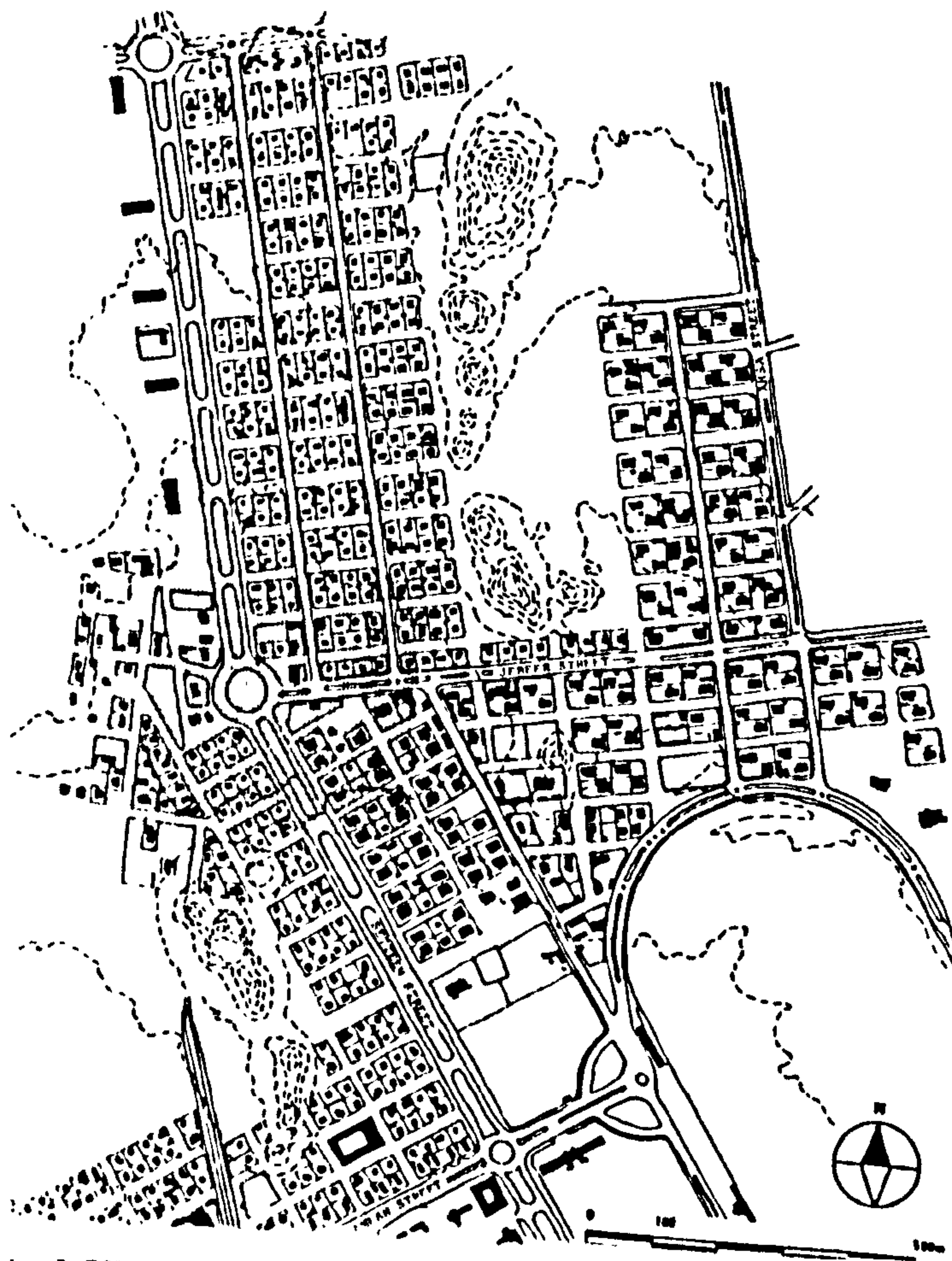
10.34 Doxiadis International, another foreign firm, has also influenced the planning and design of Saudi Arabia's transportation network. In its preparation of the Riyadh Master Plan 1971, which was approved by the Council of Ministers in 1973, it suggested that the city should expand



**Figure 10.04 GRID PATTERN, THE PREDOMINATE OF LOW INCOME AND TRADITIONAL COMMUNITY OF RIYADH (MANFOHA)**



**Figure 10.05 GRID PATTERN, THE PREDOMINATE OF HIGH INCOME AND CONTEMPORARY COMMUNITY OF RIYADH (ALMALAZ)**



SOURCE: ALHATHLOUL, et. al. URBAN LAND UTILIZATION; RIYADH, SAUDI ARABIA. EDUCATION / RESEARCH PROGRAM, USD, CAMBRIDGE, MASS. JUNE 1975, p. 19.



in a longitudinal direction towards the north west and south east (Al-Hussayn, 1989).

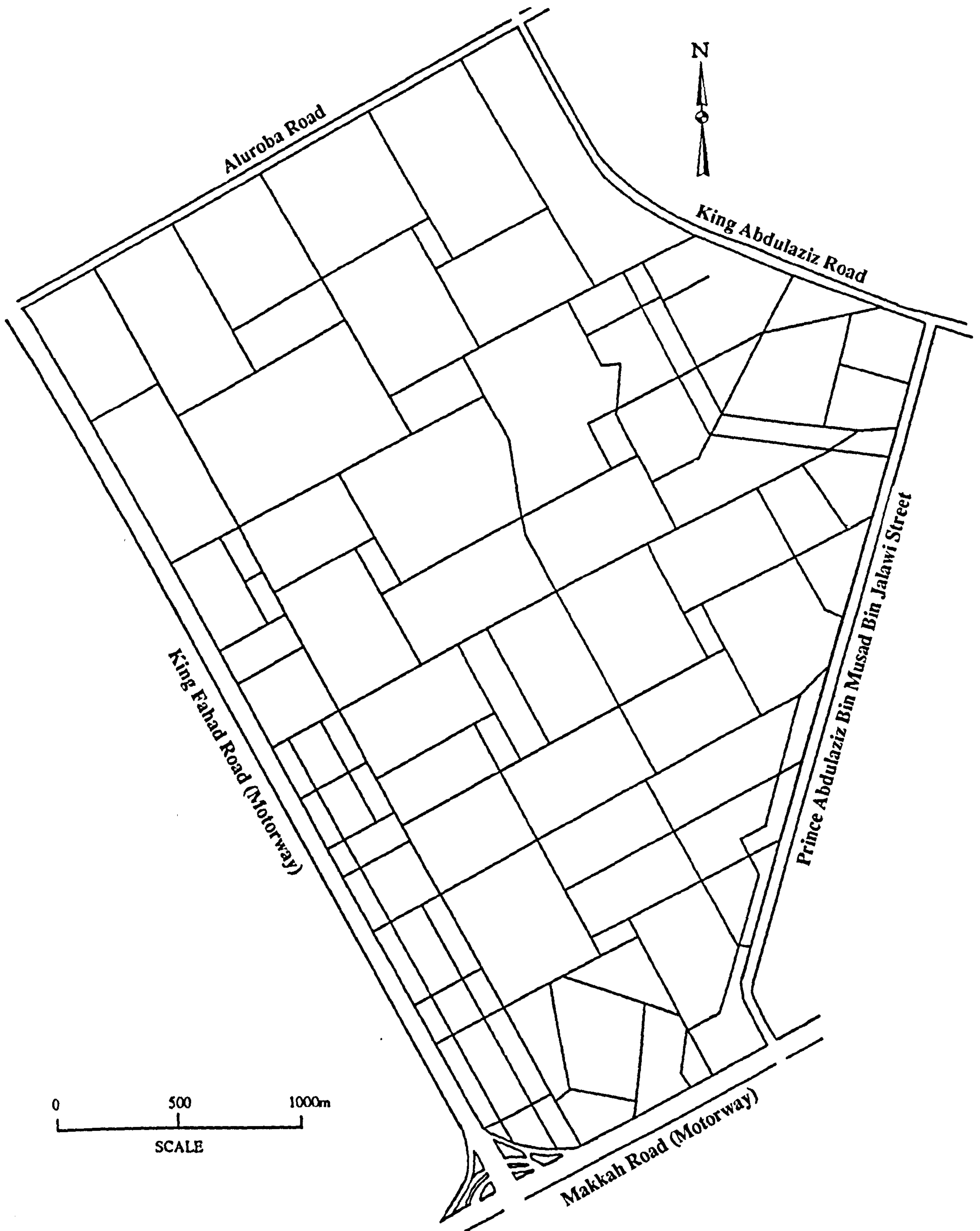
10.35 The influence of Doxiadis's Master Plan is reflected in the development of Alolya and Sulamanya communities in the north part of Riyadh (see Figure 10.06) which were expanded after 1970. However, with the utilisation of grid patterns, the municipality of Riyadh also adopted the concept of 'T' (rectangular) intersections, as shown in the layout of the streets in the residential areas of both communities.

10.36 The reason behind adopting the 'T' intersection was primarily to minimise and discourage through traffic in residential areas. But with streets as wide as 12, 15 and 20 metres (as residential pathways), and a lack of proper traffic signs, the 'T' intersections were ineffective due to the high risks of traffic accidents.

#### MIXED LAND USE PATTERNS

10.37 The fast growth in the 1970s saw most people moving from inner city areas to the outskirts of towns. At the same time, a lack of zoning created a mixture of land use activities, e.g. residential and commercial. With the approval of the local municipality, streets which are wider than 30 metres are designated for both residential and commercial use, whereas those of less than 30 metres are designated for residential use only. However, at the

**Figure 10.06 UTILIZATION OF GRID PATTERNS AND 'T' INTERSECTIONS  
IN CONTEMPORARY NORTHERN RIYADH COMMUNITIES**



SOURCE: THIS SECTION WAS ADOPTED FROM THAT OF THE OFFICIAL STREET MAP OF RIYADH, PREPARED BY DR. GAZI MAKI (KING SAUD UNIVERSITY) IN COOPERATION WITH THE MUNICIPALITY OF RIYADH, 1985



present time, commercial activities such as small shops are not restricted to traditional areas, but also exist in the small streets of the more recently built areas of Saudi towns.

## GUIDELINES FOR MINIMISING ADVERSE SOCIO-ECONOMIC IMPACTS

### SOCIAL IMPACTS

#### Family and Neighbourhood Unity

10.38 In planning and designing residential communities, the consideration of removing through traffic from residential areas is highly recommended, so as to make these areas safe and give them a sense of community belonging. Another consideration is to protect residents from traffic noise and vibration.

10.39 One of the earliest examples of this was the concept developed by Stein and Wright in 1928 and applied in Radburn, New Jersey (Figure 10.07 and 10.08). Its main principles, according to Buchanan et al. (1963, p.47) were:

- "i. The creation of a superblock free from through traffic; and
- ii. The creation of a system of pedestrian footpaths entirely separate from vehicular routes, and linking together places generating pedestrian traffic."



Figure 10.07 THE PRINCIPLE OF RADBURN PLANNING

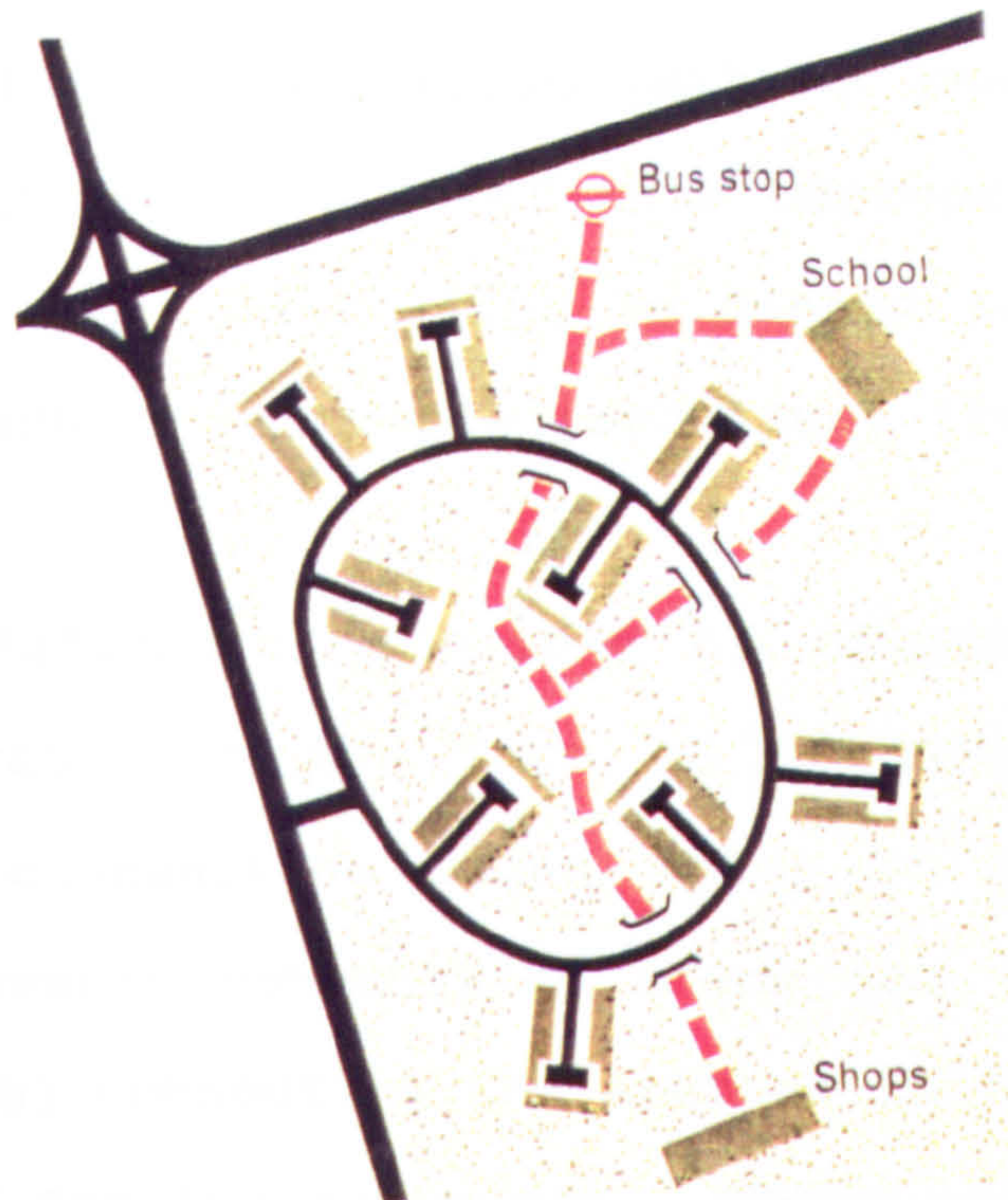







Figure 10.08 THE RADBURN PRINCIPLE IN PRACTICE. A LAYOUT FROM SHEFFIELD, ENGLAND.



-  Distributor roads
-  Access roads
-  Housing
-  Areas of pedestrian freedom
-  Main pedestrian routes

SOURCE: BUCHANAN, C. D. et. al. 1963, TRAFFIC IN TOWNS, p.47.



10.40 In practice, dwellings within a residential area would have access to a service road (cul-de-sac) on one side, and to a pedestrian path on the other. In order to achieve the principles of this concept, dense population is required and a large area is needed to design and make use of the Radburn principle (Buchanan, 1963).

10.41 Radburn's principle of planning was introduced in Saudi Arabia in the form of planned communities. These planned communities began prior to the 1960s when ARAMCO built several communities along the Tapline (Trans-Arabian Pipe Line) connecting the Arabian Gulf to the city of Sidon, Lebanon, for its employees. These communities consisted of hospitals, schools, etc (Al-Saliman, 1989).

10.42 Following that, a number of planned communities were constructed by the government for housing, industrial, administrative and military purposes. In addition, the private sectors; e.g. King Abdulaziz City for Science and Technology and Saudi Basic Industries Corporation, were involved in designing and constructing planned communities for their employees.

10.43 The planned communities built by the government and the private sector are strictly limited to the sector employees, with the exception of a few which will be discussed later in this section. No access is allowed for the general public except visitors. Some of them have

designated parking within the community and some have allocated visitor parking outside the community.

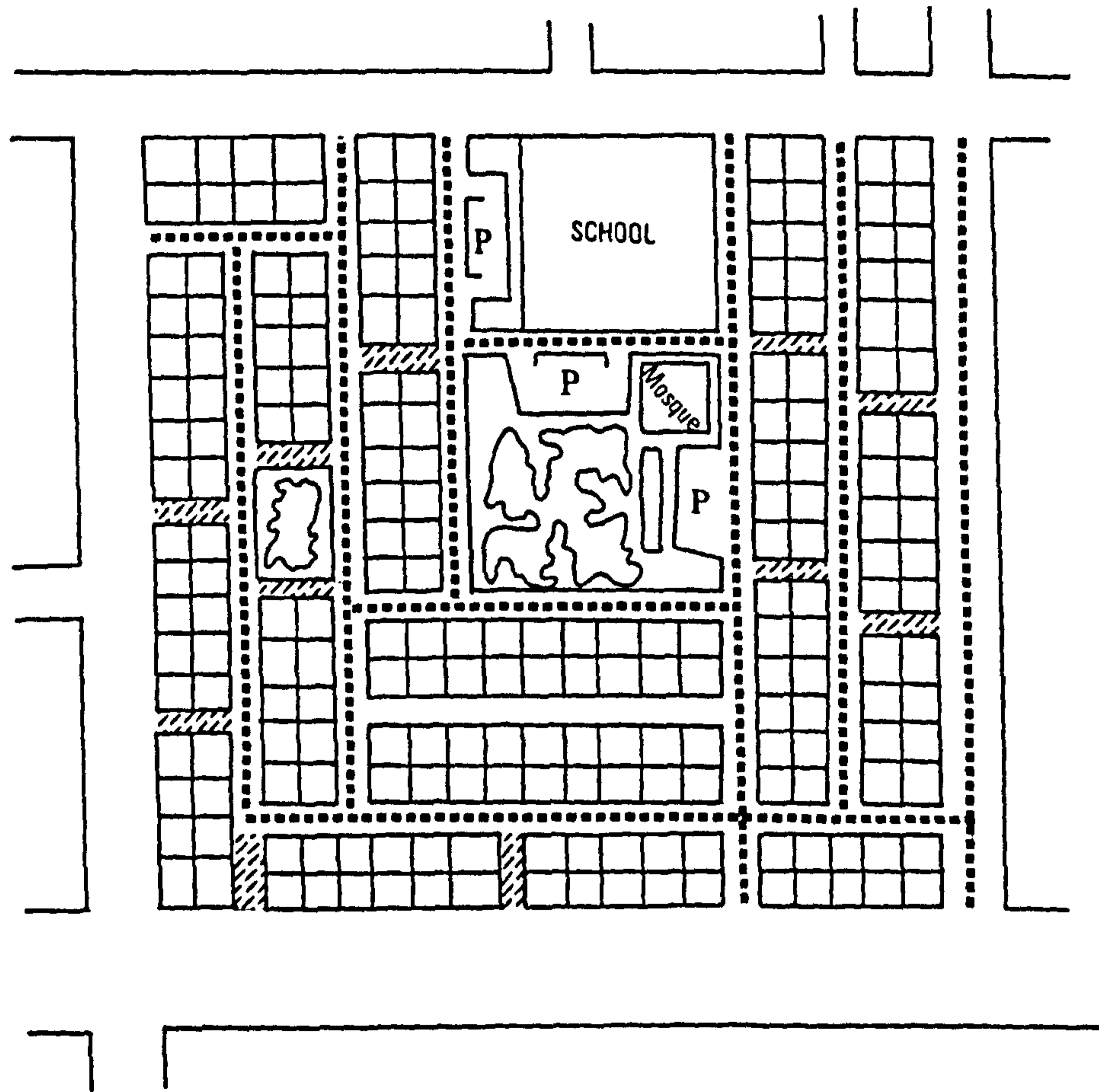
10.44 One of the planned communities built by the government for housing purposes was the low income housing in Al-Urayja sector located south-west of Riyadh (see Figure 10.09). The community which consists of 25,000 plots, 400 m<sup>2</sup> (20 x 20) for each plot, was to accommodate families of low income groups (Al-Olet, 1991). Although the planned neighbourhood contained some elements of planning design such as a community garden and parking, in addition to a mosque as a representative of the Islamic environment, it failed to control through traffic, as shown in the plan. Hence, the pedestrian access which measures 10-12 metres in width, is actually used by through traffic, in addition to the existing access.

10.45 In contrast, the diplomatic quarter (see Figure 10.10) situated on the extreme west of the Saudi capital represents a unique design in the country. The project was designed and constructed in response to the relocation of the Ministry of Foreign Affairs from Jeddah to Riyadh in 1975 (Al-Hathloul and Rahman, 1989).

10.46 The quarter is self-sufficient, containing all foreign embassies and their housing; central area (shopping, offices); recreation centre; schools (international secondary and primary); and other facilities. Moreover, the



**Figure 10.09 A TYPICAL NEIGHBORHOOD PLAN OF AL-URAYJA SECTOR (RIYADH)**



 PEDESTRIAN PATH	<b>KEY</b>	 COMMUNITY GARDEN
 PARKING		 VEHICULAR ACCESS

0                      125                      250 m

---

SCALE

SOURCE: ADOPTED FROM AL-OLET (1991)



**Figure 10.10 THE DIPLOMATIC QUARTER, AN INTEGRATED URBAN COMMUNITY**



SOURCE:

CHALIN AND FARES (1987), THE CONTEMPORARY TOWN PLANNING AND RIYADH, p. 221.



diplomatic quarter is divided into five residential units and it is expected to have 25,000 inhabitants by the year 2000.

10.47 The distinct elements of the design of the quarters lie in its application of modern planning principles as follows:

1. The segregation of traffic and residential units by linking primary distribution roads to residential units through secondary distributor roads, using roundabouts as an effective means of traffic movement;
2. Within the residential areas, the use of pedestrian paths on one side and a service road on the other was employed for the detached villas;
3. The landscaping constitutes radial greenery, gardens and open space; and
4. Other important social and religious activities were introduced in the design, e.g. mosque representing the Islamic society.

#### Changes of Life Style

10.48 As a finding of this research, the life style of the Saudi people has changed as a result of the impact of

transportation; 49% of the people thought the network had affected the life style (Appendix A, question number 27). Accordingly, transportation planning must not be separated from neighbourhood and urban planning.

10.49 The thesis has demonstrated the changes of life style by the adoption of private cars, but we should not ignore those who do not own cars. We should therefore ensure their life style by protecting them from the damaging effects of transportation projects to be carried out.

#### **Transformation of Society**

10.50 It has been illustrated in this research that Saudi society has actually changed from a traditional one to a modern type, as a result of the modern transportation system. The adoption of public transport, the bus system, by Saudi women is considered a transformation. In addition, the use of the rail network between Dammam (Eastern Province) and Riyadh by Saudi families is also considered a transformation to modernisation.

10.51 Planning for transportation in a country like Saudi Arabia must then take into account the social and cultural elements. Accordingly, we should adopt a modern network of transportation, but with careful consideration of such elements.



## Relocation of Residential Areas

10.52 It has been stated that the Radburn principle represents an ideal way of separating traffic from residential units. It provides safety and a sense of community for the residents. The diplomatic quarter has been considered as the most recent contemporary pattern of development. The need to apply the planning principles of Radburn on a larger scale in the Kingdom is recommended but most importantly with addition of the socio-cultural activities of Saudi tradition.

10.53 What has been revealed as a consequence of this research is the fact that people have relocated their residences, and their sense of neighbourhood has been lost, in association with the introduction of modern transportation. As they relocate, not only has the design of new communities not fulfilled the socio-cultural needs of the people due to the introduction of through and wide streets, but the parcels of land are too large to provide opportunities for people to see one another casually, as in the past.

10.54 What is needed is to design communities based on Saudi social values and tradition, with the application of culturally sensitive methods of modern planning. Planned communities in Saudi Arabia are only designated for some, and the ideal design of diplomatic quarters hosts only those who can afford it. Thus, in order to avoid neighbourhood

disunity, we need to apply the principles of the Radburn Plan and of the diplomatic quarter to cover all the new and upcoming areas. This way we can reconstruct our communities based on previous values, with more modern but culturally sensitive features of planning (community gardens, public and religious facilities) and non-through traffic.

10.55 Such design can be utilised in the Kingdom throughout the municipalities in physical plans for new areas, by designing for a wider range within the general public, rather than as in the present situation where housing projects are undertaken for particular groups only. This type of design can assist not only families, but also their neighbours. It would also encourage people to relocate their residence with regard to circulation of the interior road network of their particular community, which would help make the community a single unit while still attached to the rest of the town.

10.56 The adoption of the design would also reflect the life style of the people and the shift of population from traditional to modern society, but without changing the way of life. This means that Saudi society can be better helped to adapt to a modern style of living without excessively interfering with its basic cultural values.



## Active Movement of People

10.57 One of the most important elements of planning and designing a transportation network to improve mobility is the factor of accessibility. Without an adequate accessibility design, the network would fail to serve an essential objective.

10.58 Accordingly, there are two main requirements for good accessibility cited by Buchanan et al. (1963, p.39):

"First, vehicle users should be able to move from one part of a town to another - or beyond, in safety and with reasonable speed, directness, and pleasantness ... Second, on arrival in the vicinity of his destination, the driver should be able to penetrate without delay close to his final destination and to stop there without restriction."

10.59 Too much emphasis was placed at the beginning of the 1980s on the construction of ring roads around the large cities of the Kingdom, e.g. Riyadh, Jeddah and Madina, and even around the medium sized cities in the late 1980s, such as Buraydah (in the CCAAR) and Abha (in the Southwestern Region).

10.60 It is true that ring roads may force through traffic to go around cities and so reduce traffic in the cities, but where most traffic relates to a city's own activities, the ring road may contribute little to reducing local traffic

problems in the vicinity of the city centre. Saudi cities have not met the phenomenon of suburban gridlock now evident in major urban areas in the United States and Western Europe.

10.61 Accordingly, there is a need to make Saudi city centres accessible to both vehicles and pedestrians by adopting suitable planning principles. The centres must be accessible in a way that is convenient, safe and attractive. This would be in contrast to the present situation, where a lack of these elements is apparent in Saudi cities.

10.62 Journeys to city centres are normally made for the purpose of shopping or work. Once there, people would like to have the freedom to move on foot, but to separate pedestrians completely from vehicles would be too extreme, since this would force people to use the public transport system. It would be better to design central areas to accommodate both pedestrians and vehicles.

10.63 The concept of automobile restricted zones which should be adopted in Saudi Arabian city centres is not a new idea. In fact it has been implemented throughout many European cities since the middle of the 1940s (Loukissas, 1984). Some cities in Europe have converted streets entirely into pedestrian areas as in Amsterdam, Copenhagen and Stockholm (Owen, 1972).



10.64 In Glasgow, part of the two main commercial streets (Argyle Street and Sauchiehall Street) within the city centre were converted into pedestrian zones. Both are within walking distance of the underground and train stations, in addition to other public transport (buses and taxis). Furthermore, the provision of parking facilities in the city centre has added yet another advantage as shoppers use their own cars. The two streets have a 'good' atmosphere which is promoted by the use of special benches, trees, attractive lighting and a well designed pavement for pedestrians.

10.65 The advantages of conversion of some parts of the main commercial streets in Saudi city centres are:

1. To provide easy access for pedestrians (shoppers) and freedom of movement;
2. To promote the use of public transport (buses), as was recommended earlier, and to discourage the use of cars in city centres; and
3. To promote and attract people to the city centres.

10.66 As Saudi Arabian cities do not have underground or trains (except the rail link between Dammam and Riyadh), adequate parking facilities must be provided, in order to cope with the strong car orientation of the population.

This would be essential prior to the design and planning of pedestrianised zones.

10.67 It should also be recognised that there are still significant resident populations within Saudi city centres. According to the findings of this research (Table 8.04), Buraydah had 19% of its population still living in or around the city centre, and Unayzah had 11%. In addition, traditional businesses still exist within the centres of Saudi cities, which further justifies the adoption of pedestrian streets in these areas.

#### **ECONOMIC IMPACTS**

10.68 The thesis has illustrated that economic impacts of transportation may be both positive (such as the promotion of economic activity and the attraction of government, public and private facilities), and negative (such as damaging effects on small businesses). Thus, the positive impacts must be encouraged and expanded, and the negative impacts should be avoided in future planning of transportation.

#### **Location of Businesses, Industrial Areas and Government, Public and Private Facilities**

10.69 As indicated in Chapter Two of this thesis, the network of transportation has affected the location of businesses and industries in western countries. This thesis has also shown that the transportation system has influenced the location of business and industrial areas. From the



perception of people in the study area, the survey has shown that 65% thought it had influenced the location of businesses and industrial areas (see Table 8.10), and that 59% thought it had attracted government, public and private facilities (see Table 8.14).

10.70 The government of Saudi Arabia plays a significant role in the planning of transportation in Saudi cities. Thus, they are the decision makers, and it is essential for the assigned government agency to plan for the minimisation of negative economic impacts on Saudi cities. Accordingly, there is a need to reserve routes for light rail or other public transport and to locate businesses and facilities. There is also a need to locate residential areas close to major routes, so that as public transport develops, it is able to readily attract passengers.

#### **Small Businesses**

10.71 Small businesses in the study area have been damaged as a result of the introduction of the modern transportation network, as was indicated in Chapter Eight (see Table 8.11), while 36% of the respondents of the survey questionnaire indicated such damage. This damage ranges from the loss of business to decrease in profits. Such damage caused by the modern network should not be overlooked, and it should be realised that these businesses have existed for a long time and have been practised by many people in the area.

10.72 There is a need to avoid such circumstances and to preserve the existence of small businesses, even by the introduction of a modern network of transportation. Therefore, to preserve their existence, alternatives must be provided. The preservation of the city centres in the study area should compensate for damage to small businesses, and they should be located suitably to be able to continue their businesses. Another option would be to relocate them near the modern network, with special conditions and cheaper rent. This would counter the damaging effects of the network on small businesses.

#### Land Values

10.73 The value of land has increased tremendously for land close or adjacent to the modern road network. This has been shown both as a result of the survey questionnaire where 59% believed it had influenced the value of land (see Table 8.09), and by conducting interviews with community leaders and government officials. The fact remains that many real estate agencies and individual owners of such land have taken the opportunity to raise the price of land.

10.74 Accordingly, there is a need to control the value of urban land, if urban living is to be revived as recommended in the previous chapter. Control by planning has not been sufficient hitherto. It is very important for the relevant authority to control prices, otherwise the cities will keep



expanding without adequate services, and we would return to the same problems as in the 1970s.

### Promotion of Economic Activity

10.75 Since the CCAAR has long been an area where farming has been the main economic activity, it is essential to promote this aspect of the area's economy. The research has shown that the introduction of a modern road network in recent years has encouraged agricultural productivity. 81% of the survey respondents (see Figure 8.10) thought the network had supported agriculture. Accordingly, we ought to provide and expand agricultural roads in the area to enhance agricultural productivity for export to other regions, thus enhancing and strengthening the area's economic activity. This can be achieved with better co-ordination between the Ministry of Communications and the Ministry of Agriculture and Water.

10.76 When planning for the design and construction of a particular road, emphasis must be placed on protecting activities which form the economic base of many areas throughout the Kingdom, and on which the economic base of medium sized Saudi cities is often dependent to a considerable extent.

10.77 In addition, there is a need to consider location of markets and to avoid damage to the agricultural infrastructure, e.g. irrigation and water supply. The

improvement of the road network should also expand the range of supply of goods for local consumption and increase the distribution within Saudi Arabia.

#### Land Use Patterns

10.78 Due to the massive introduction of a modern transportation network in the Saudi cities in the 1970s and 1980s, cities expanded and grew in various directions, leaving big empty parcels of land scattered throughout the boundaries of almost every city in the Kingdom. This has meant many areas left without adequate services, and has also created difficulties for local authorities in coping with this expansion. Thus, the inefficiency of planning has led to high costs in servicing these scattered developments in the cities.

10.79 There is indeed a need for an adequate development plan for Saudi cities, which anticipates long-term growth. The development plan should be monitored and controlled on a short-term basis. This should lead to better control of development and growth and provide adequate planning and management for Saudi cities.

#### PLANNING AND MANAGEMENT OF THE SYSTEM

10.80 Prior to the development of a network of transportation at the stage of planning, whether it is for primary, secondary or feeder roads or for public transport,



basic principles of the objective of the planning of the system must be recognised, namely that:

1. It is to provide linkages and services to people in cities, towns and villages in the Kingdom;
2. Social and economic factors must be considered, that is the demand of people and the location of activities in a particular area or community;
3. The way in which the network is to be managed in the future is important and it must be considered whether the relevant authorities have the capability to control such a large system; and
4. The economic benefits of creating the system must be considered - is it going to generate revenue or is it just to serve the people regardless of cost? Thus, cost-benefit issues must be addressed prior to the implementation of the system.

10.81 Although most of the Kingdom's regions are linked together either by motorways or main roads, remote towns and villages still lie outwith this network and are served by either single track of dirt roads.

10.82 The government is investing a great deal of capital in building the country's road network. Therefore, there is a need for effective measures to manage the network. For

example, while the roads are being maintained by the responsible government agency (MOC), there have been violations in respect of weight of trucks using the roads, which have resulted in overloading on the roads and damage to surfaces. Although the MOC recently began using truck weigh stations on several roads, there is still a great need for effective measures to protect the road network from such misuse and damage.

10.83 Basic services and infrastructures such as water, electricity and roads must be put in place prior to the development of new areas in order to avoid reconstruction and redevelopment.

10.84 The system must be managed properly and effectively, since without this the planning and design of the system become ineffective. As a continuous process, the following are guidelines to the responsible agencies in the management of the transportation network in Saudi Arabia:

1. Improving and maximising accessibility to major social and economic activities, e.g. city centres;
2. Maintaining and improving the quality of transportation services;
3. Maximising the efficient use of the existing network;



4. Promoting desirable and decreasing undesirable social and economic impacts;
5. Reducing the amount of traffic through cities, especially through city centres;
6. Separation of traffic from residential areas and pedestrians in central areas; and
7. An effort should be made to minimise the costs of the network's improvement and expansion.

10.85 How to fulfil the planning recommendation for the transportation network in respect of Saudi Arabian cities, policies regarding the network will be illustrated in the the final section of this chapter.

#### THE ROLE OF MOMRA AND MOC

10.86 There are two main government agencies responsible for the planning and control of the transportation network. These are the Ministry of Municipal and Rural Affairs (MOMRA) and the Ministry of Communications (MOC).

10.87 According to Alyemeni (1988), MOMRA was established to ensure the following objectives:

1. To supply the best means for growth and development of Saudi Arabian towns and villages;

2. To further enhance local services and utilities; and
3. To plan for future urban growth (cited in Al-Olet, 1991).

10.88 Hence, under the Ministry, there are four major departments: first, the deputy ministry for town planning, which is responsible for physical planning; second, the deputy ministry for municipal affairs, responsible for and directing all the Kingdom's municipalities; third, the general directorate of engineering affairs; and fourth, the general directorate of rural affairs.

10.89 Municipalities throughout the Kingdom were established to provide local planning and services planning and to construct roads in the cities and towns, in addition to lighting and maintaining streets of the local municipalities. Furthermore, there are other responsibilities which are beyond the objectives of this study, e.g. building permits and building codes.

10.90 The government's Fifth Five Year Development Plan (1990-1995) stated clearly the aims of the municipalities for the next five years and beyond. Among these objectives those related to this research are:

1. The provision of essential infrastructure and services to all regions;



2. The advancement of this infrastructure, based on economic development potential; and
3. The improvement of the municipal infrastructure and services provided.

10.91 According to MOMRA, municipalities are classified into four types, type A, B, C and D (see Figure 10.11). According to Al-Yemeni (1988), type A are cities with a population of over 300,000; type B are towns with a population of over 100,000; type C are towns with a population of over 30,000; and type D are small towns with over 5,000 inhabitants (cited in Al-Olet, 1991).

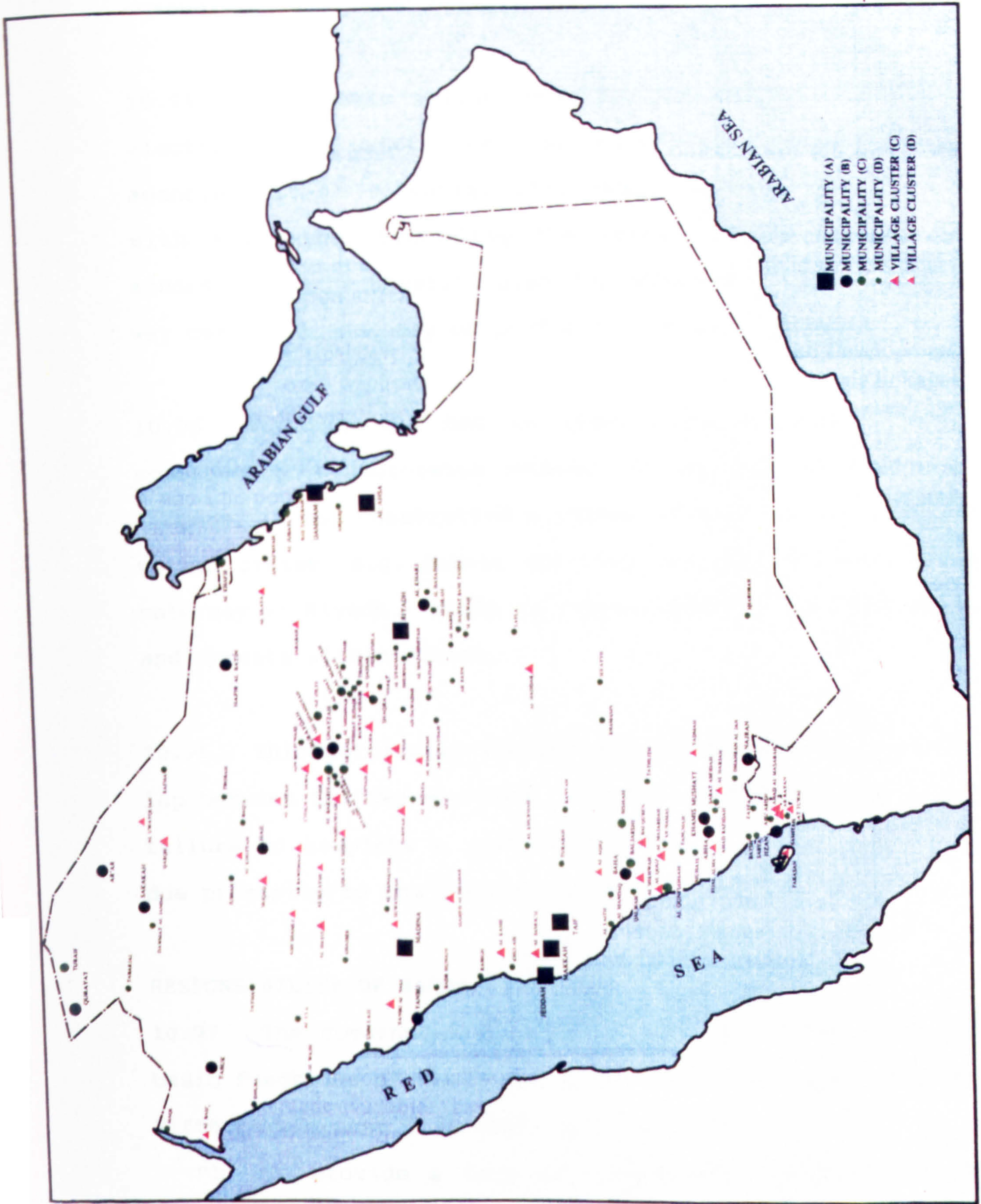
10.92 The main responsibility of the Ministry of Communications (MOC) is to link regions, cities and towns of the Kingdom; thus, planning, designing, constructing and maintaining the roads network. In addition, it supervises the public transport (buses and limousines) in the country.

#### THE IMPORTANCE OF CO-ORDINATION

10.93 There is an urgent need for co-ordination among the various government agencies involved in planning and transportation. This co-ordination is much needed now for the present and future development of cities and towns. A lack of co-ordination, coupled with the speed of growth in the 1970s and 1980s, has led to difficulties regarding the



**Figure 10.11 MUNICIPALITIES BY CLASSIFICATION OF THE MINISTRY OF MUNICIPAL AND RURAL AFFAIRS**



SOURCE: MINISTRY OF PLANNING, FIFTH DEVELOPMENT PLAN (1990-1995), p. 379.



provision of basic services to the newly developed communities scattered outside the cities.

10.94 Since basic infrastructures, e.g. roads, lighting, electricity and water, are provided by different government agencies, it is essential that these agencies co-ordinate with each other regarding the physical development and according to the physical plan for each city. Only in this way can the inadequacy of past planning be avoided.

10.95 Although the MOC is clearly responsible for the construction of motorways between regions and cities of the Kingdom, it has constructed a number of major arterial roads within cities, e.g. Makkah motorway and part of King Fahad motorway in Riyadh. MOMRA is responsible for building roads and streets within cities.

10.96 This particular responsibility has created an overlap between the two agencies, which sometimes results in the failure to complete a particular road to a city or a town due primarily to the lack of co-ordination.

#### RESPONSIBILITY OF SAUDI PLANNERS

10.97 The government of Saudi Arabia has identified four basic functions of the planning system in the country in its Fifth Development Plan (1990-1995, p.399):

- "1. To provide a long term conceptual vision to guide development;

2. To provide an organisational framework for co-ordinating the development efforts of the private sector and the government to guide and initiate structural change;
3. To direct governmental resources towards achieving the long term development objectives for the economy and towards ensuring the availability of essential public services;
4. To strengthen the on-going management of the economy through periodic reviews and by preparing for emerging conditions which could seriously affect the development process."

10.98 Since these are the functions of planning in the Kingdom, stated by the national government, the planners should utilise them to guide and direct the country's development.

10.99 Consequently, it is the planners (Saudi planners), whether employed in a government agency, in the private sector or in educational centres, who have the responsibility and the duty to manage the planning system. They play an influential role in decision making, recommending and presenting the appropriate plans based on social and cultural requirements (e.g. community needs and Islamic environment).



## Essential Guidelines for Saudi Planners

10.100 Having discussed the importance of Saudi planners, I would like to present several guidelines which I believe are of importance with regard to future planning in the Kingdom.

10.101 Firstly, most Saudi planners have graduated from universities and educational establishments in the West, e.g. the United States and the United Kingdom. Moreover, to adopt the total planning application practice of a western country and apply it to Saudi Arabia would be more than inappropriate. For example, planning for a community park would require the planners to consider the Islamic environment (privacy, family section, etc). Thus, the need to adapt planning techniques is essential, but more importantly to apply them according to Saudi society and its principles.

10.102 Secondly, the importance of planning for the future must be realised, and it is recognised that in the absence of such planning, growth and change will continue, but perhaps in an undesirable direction (Harris, 1965). It is the planners who must study Saudi communities' needs and identify the desired direction of development. Projecting future demands, identifying options for development and allocating areas of growth potential, are all important factors. Therefore, it is planners who "... should be concerned with maintaining high quality growth, as well as

with providing community services in an equitable and efficient manner" (Harris and King, 1988), cited in Ferguson, 1990.

10.103 Thirdly, future planning alternatives should not only be limited to the socio-cultural elements. Equally important when recommending a particular project or plan is the cost factor, as it should be realised that oil revenues, a major source of income for the country, are decreasing. Therefore, cost-benefit evaluation should be demonstrated.

10.104 Finally, master development plans for the cities carried out by international firms employed by government ministries should involve Saudi planners to produce an effective future plan based on principles which have been stated earlier.

10.105 The guidelines were established only to direct the planners of Saudi Arabia, recognising their crucial role in the society. Furthermore, some of these guidelines may be difficult to follow in practice, since decisions to be made are in the hands of the national government.

#### SOCIO-ECONOMIC POLICIES OF TRANSPORTATION

10.106 The objective of this final section of the recommendation chapter is to define policies concerning the social and economic impacts of the transportation network. These policies were a consequence of the research in the



study area (CCAAR) and it is recommended that they be utilised in other areas of the Kingdom.

#### SOCIAL POLICIES

10.107 Transport policies concerned with social impacts of the network should consider the following (bearing in mind the criteria impacts illustrated in Chapter Three of this thesis):

1. The network of transportation should be provided prior to the development of residential areas to ensure the necessary services to members of new communities.
2. To ensure continued family unity, the network should be expanded and improved to reach remote towns and villages.
3. Destruction of neighbourhood unity should be avoided in setting up the network of transportation, therefore the relationships among people residing in any one community, as well as their values, should be considered, particularly in a tradition society such as that of Saudi Arabia. Therefore, adoption of the Radburn Principles and of the diplomatic quarter example are recommended for implementation in the study area, as well as other areas and communities in Saudi Arabian cities.

4. The life style of the Saudi people has changed as a result of the introduction of a modern network of transportation. Thus, planning for a network of transportation should be carefully designed to suit the culture of the country, without destroying its traditional values.
5. To promote the easy movement of people, transport policy should place emphasis on providing good accessibility for people in different zones to centres of activity. Major roads should be placed away from the city in the form of by-pass to provide good accessibility without destroying communities and cutting off residential areas.
6. A shift in Saudi society from tradition to modern as a result of transportation should take into account the degree of change and how much the society should advance towards modernisation, in order that its basic principles are not lost. Consequently, adoption of transportation technology should be carefully studied by the planners before recommending it for implementation.

#### ECONOMIC POLICIES

10.108 Similarly, economic policies for the transportation network are also recommended here with respect to the criteria impacts indicated in Chapter Three:



1. Although land values have increased as a consequence of the road network, the need to control land by the relevant authority according to its specified activity would be an appropriate measure in ensuring its validity, consistent with the previously recommended land use control.
2. Since the network influences the location of businesses and industries, accessibility to these sites should be considered, so that adequate transportation can be provided to and from these sites.
3. Preservation and promotion of agricultural areas should be accounted for, and single asphalted roads and links should be provided for these areas from the major road network to protect and enhance productivity.
4. Consideration of individual small businesses should be reflected when planning for a transportation network. The small businesses in the area have been damaged as a result, thus they should be taken into account when designing a new network.
5. The modern transportation network has attracted government, public and private facilities. It would therefore be feasible for central government to encourage and promote the establishment of such

facilities throughout the Kingdom, as it has been proven in the study case.

6. The network has promoted economic activity in the CCAAR, and continuing efforts to further enhance economic activity must be made by stressing the provision of effective accessibility through various modes of transportation. This would contribute better to the economic base of the area, and advancing the market opportunities for the area.
7. The modern transportation network has provided a range of sources of supply of goods for local consumption, as it reflected on the exchange of goods not only within the CCAAR but also to the region and other regions. Improvement of the system, as was recommended earlier, would maximise the benefits of exchanging goods and production between the CCAAR and other areas of Algassim region and other regions.
8. Since the network of transportation influences land use patterns, strong urban land use planning should be adopted by the relevant authority to control development around the transportation network, especially major roads and motorways.



10.109 It is important at this point to indicate that the above mentioned policies were recommended as a result of the socio-economic impacts of transportation identified in the research study area (CCAAR) and can be utilised in other areas of Saudi Arabia, as previously stated. Furthermore, recommended guidelines for Saudi cities regarding the network of transportation as a system were illustrated throughout the discussion in this chapter. The conclusion and suggestions for further studies to be carried out in relation to this subject will follow.

## THE RESEARCH CONCLUSION

10.110 Prior to the discovery of oil in the 1930s, there were virtually no asphalted roads in the entire country of Saudi Arabia. In fact, one of the first asphalted single roads to be built was the road connecting the coastal city of Jeddah to the holy place of Makkah during the 1940s.

10.111 Saudi nationals depended heavily on camels and donkeys and on walking as their means of transport, whether between villages, towns and regions, or when making journeys to the holy places.

10.112 Roads began to be built throughout the country and cars began to increase in number during the 1960s, when the government started making use of its oil revenues. Life then began to change as asphalted roads linked regions with each other. But the massive scale and pace of change and development did not come about till the mid 1970s, when the oil boom hit the country with high revenues from oil exports. That is when the real development process started, as the government introduced a major road network and introduced public transport.

10.113 The introduction of a modern transportation network in the Kingdom has had social and economic impacts. The aim of this research was to investigate two important impacts of the network of transportation, social and economic, by selecting one of the Saudi Arabia areas, and to evolve a



transportation strategy for that area which could also be applied in other areas of the Kingdom.

10.114 In order to achieve this, an investigation of these two impacts in relation to transportation was carried out to establish a basic understanding of their effects in the western nations. This was followed by detailed discussion of past and present transportation networks, and an illustration of the criteria and method to be utilised in the study.

10.115 The research then advanced to the next and most important part of the work, the collection of data, which included the survey questionnaire, interviews and traffic count. This data was carefully analysed, and as a result of this analysis, strategies were formed and evaluated. Based on the evaluation, a recommended transportation strategy for the study area was developed.

10.116 Since the CCAAR is part of Saudi Arabia, it was essential to adopt what has been recommended and apply it in other parts of the Kingdom. This was demonstrated through the planning guidelines for Saudi Arabian cities illustrated in the last chapter of this thesis. Moreover, policies concerning the social and economic impacts of transportation, in accordance with those which the study investigated, were stated to signify the importance of

transportation policies, both to social needs and to economic growth.

10.117 In addition, the research has also recommended the need to adopt design and principles of planning derived from experience in the western nations, but implemented sensitively and not blindly without the understanding of social and cultural principles of Saudi Arabia.

10.118 One important point to raise is that of co-ordination. In order to accomplish adequate planning in the Kingdom, co-ordination among all the agencies involved in the planning process must take place in a much closer sense than before. Knowing that Saudi cities and towns are expanding and growing, the future for 'good planning' may not be on their side if its merits are not more widely understood.

#### SUGGESTIONS FOR FUTURE RESEARCH

10.119 To achieve a broader scope of study, this thesis requires complementary studies. These studies are suggested as follows:

1. Although the study was limited to a medium sized area within a region of the country, there is a need to make similar studies in other areas of the Kingdom and to compare the findings. These could be in larger metropolitan areas with a population of over a million, such as Riyadh, Jeddah or even



Dammam metropolitan area, which consists of the three triangle cities (Dammam, Dhahran and Khobar).

2. The study examined two aspects of the transportation system, social and economic impacts. There is a need for a study of other aspects of the system. Although the study touched on physical and environmental issues and provided broader guidelines, those two issues and perhaps others related to the system of transportation are important for future research.

10.120 Finally, British engineers and planners have struggled to provide well balanced modes of transport in their cities, including the fact that they have to deal with small, narrow roads in most of the towns. Greater success can be achieved in Saudi Arabia with its wide and modern roads provided that there is adequate planning, implementation and management, based on social needs and economic considerations.

APPENDIX A: THE SURVEY QUESTIONNAIRE

Special note and instruction:

Attached is a questionnaire prepared for the investigation of "The Socio-Economic Impacts of Transportation on the Central Core Area of the Algassim Region". An analysis of your answers to the questions will assist me in arriving at a number of alternatives and strategies regarding transportation in this area.

The information gleaned from the answers to these questions will be used solely in the preparation of my Ph.D. Thesis. I would, therefore, very much appreciate it if you will kindly answer all the questions in full.

Thank you for your assistance and co-operation.



## QUESTIONNAIRE ON

"The Socio-Economic Impacts of Transportation on the Central Core Area of the Alqassim Region - Saudi Arabia"

Please check the appropriate box [ ]

### A. PERSONAL INFORMATION

	Total	Percent
1. Age		
[ ] Less than 20 years	45	9.7
[ ] 21 - 30	136	29.4
[ ] 31 - 40	180	38.8
[ ] 41 - 50	78	16.8
[ ] 51 - 60	19	4.1
[ ] Over 60 years	5	1.1
2. Marital Status		
[ ] Married	327	70.6
[ ] Single/never married	125	27.0
[ ] Widowed	3	0.6
[ ] Divorced	8	1.7
3. Last Academic Degree		
[ ] No formal schooling	9	1.9
[ ] Ability to read and write	61	13.2
[ ] Elementary school education	39	8.4
[ ] Secondary school education or equivalent	213	46.0
[ ] University degree	134	28.9
[ ] Post graduate	7	1.5

	<b>Total</b>	<b>Percent</b>
<b>4. Annual Income</b>		
[ ] Less than SR. 50,000	121	26.1
[ ] SR. 51,000 - 100,000	201	43.4
[ ] SR. 101,000 - 150,000	98	21.2
[ ] SR. 151,000 - 200,000	36	7.8
[ ] Over SR. 200,000	7	1.5
<b>5. Place of Birth</b>		
[ ] Buraydah	128	27.6
[ ] Unayzah	161	34.8
[ ] Algassim Region	108	23.3
[ ] Saudi Arabia	66	14.3
<b>6. Place of Work/School</b>		
[ ] Buraydah	213	46.0
[ ] Unayzah	193	41.7
[ ] Between the two cities	57	12.3
<b>7. Type of Work</b>		
[ ] Government employee	194	41.9
[ ] Private sector employee	84	18.1
[ ] Own business	134	28.9
[ ] College student	51	11.0
<b>B. <u>RESIDENTIAL INFORMATION</u></b>		
<b>8. Place of Residence</b>		
[ ] Buraydah	209	45.1
[ ] Unayzah	222	47.9
[ ] Algassim Region (please specify: )	31	6.7
[ ] Saudi Arabia	1	0.2



	Total	Percent
9. If you are a resident of Buraydah or Unayzah, in which of the following areas do you live:		
<input type="checkbox"/> North side	102	22.0
<input type="checkbox"/> South side	83	17.9
<input type="checkbox"/> East side	105	22.7
<input type="checkbox"/> West side	78	16.8
<input type="checkbox"/> In or around the city centre	64	13.8
<input type="checkbox"/> Not a resident of either city	31	6.7
10. Length of time in your present dwelling:		
<input type="checkbox"/> Less than one year	36	7.8
<input type="checkbox"/> 1 - 5 years	159	34.3
<input type="checkbox"/> 5 - 10 years	155	33.5
<input type="checkbox"/> 10 - 15 years	79	17.1
<input type="checkbox"/> More than 15 years	34	7.3
11. Reason(s) to locate in the neighbourhood:		
<input type="checkbox"/> Price	344	13.1
<input type="checkbox"/> Provision of services	445	16.9
<input type="checkbox"/> Age/style "traditional"	257	9.7
<input type="checkbox"/> Transportation accessibilities	416	15.8
<input type="checkbox"/> Close to work/school	322	12.4
<input type="checkbox"/> Neighbourhood environment	425	16.2
<input type="checkbox"/> Real Estate Fund	243	9.3
<input type="checkbox"/> A free parcel of land from the government	117	4.4
<input type="checkbox"/> Others (please state: )	57	2.2
12. Type of Residence:		
<input type="checkbox"/> Modern house (villa type)	408	88.1
<input type="checkbox"/> Old mud house	12	2.6
<input type="checkbox"/> Flat (apartment)	26	5.6
<input type="checkbox"/> Other types (please specify: )	17	3.7

	Total	Percent
13. Means of financing your dwelling:		
<input type="checkbox"/> Own expense	172	37.1
<input type="checkbox"/> The Real Estate Fund	232	50.1
<input type="checkbox"/> Bank/private loan	3	0.6
<input type="checkbox"/> Other means (please specify: )	56	12.1

C. TRANSPORTATION

14. Type of transportation you use to commute to work/ school:		
<input type="checkbox"/> Private automobile	403	87.0
<input type="checkbox"/> Carpool (relatives, friends, colleagues, etc)	37	8.0
<input type="checkbox"/> Public transportation	0	0.0
<input type="checkbox"/> Limousine/taxi	2	0.4
<input type="checkbox"/> Others (please specify: )	21	4.5
15. How often do you travel between Buraydah and Unayzah?		
<input type="checkbox"/> Not at all	40	8.6
<input type="checkbox"/> Only when needed	191	41.3
<input type="checkbox"/> 0 - 1 times per week	122	26.3
<input type="checkbox"/> 1 - 3 times per week	42	9.1
<input type="checkbox"/> 3 - 5 times per week	39	8.4
<input type="checkbox"/> More than 5 times per week	29	6.3
16. Type of transportation you use between the twin cities:		
<input type="checkbox"/> Private automobile	391	84.4
<input type="checkbox"/> Carpool (relatives, friends, colleagues, etc)	67	14.5
<input type="checkbox"/> Public transportation	0	0.0
<input type="checkbox"/> Limousine/taxi	1	0.2
<input type="checkbox"/> Others (please specify: )	4	0.9



	Total	Percent
17. Type of transportation you use within the city of Buraydah or the city of Unayzah for the purpose of shopping, visiting, etc:		
<input type="checkbox"/> Private automobile	419	90.5
<input type="checkbox"/> Carpool (relatives, friends, colleagues, etc)	40	8.6
<input type="checkbox"/> Public transportation	1	0.2
<input type="checkbox"/> Limousine/taxi	1	0.2
<input type="checkbox"/> Others (please specify: )	2	0.4
18. Reason for selecting this mode of transportation:		
<input type="checkbox"/> Comfortable and fast	328	70.8
<input type="checkbox"/> Cheaper	75	16.2
<input type="checkbox"/> Public transport service is not adequate	35	7.6
<input type="checkbox"/> Others (please specify: )	25	5.4
19. Current public transport services in the Central Core Area are:		
<input type="checkbox"/> Very good	30	6.5
<input type="checkbox"/> Good	65	14.0
<input type="checkbox"/> Satisfactory	69	14.9
<input type="checkbox"/> Bad	75	16.2
<input type="checkbox"/> Very bad	51	11.0
<input type="checkbox"/> Expansion and improvement of services are needed	87	18.8
<input type="checkbox"/> Uncertain/don't know	86	18.6
20. The present road network in the Central Core Area is:		
<input type="checkbox"/> Very good	182	39.3
<input type="checkbox"/> Good	167	36.1
<input type="checkbox"/> Satisfactory	73	15.8
<input type="checkbox"/> Bad	17	3.7
<input type="checkbox"/> Very bad	6	1.3
<input type="checkbox"/> Uncertain/don't know	18	3.8

	Total	Percent
21. Assuming the implementation of railroad services between Unayzah and Buraydah, thus providing alternative public transport between the two cities, would you use this mode of transport for your work, shopping, visiting, etc?		
[ ] Yes/always	95	20.5
[ ] Sometimes	135	29.2
[ ] No/never	118	25.5
[ ] Only once to see how it works	100	21.6
[ ] Uncertain/don't know	15	3.2

#### D. SOCIAL IMPACTS

22. What do you think are the reasons for the recent dramatic changes in the general shape of the Central Core Area? (Please arrange the following reasons in 1 to 8 order according to the importance you assign to them, with 1 as the most important and 8 as the least important.)

[ ] More population	433	14.0
[ ] More migration	427	13.8
[ ] Increase in family income thus enabling more relocation outside the City Core Area	423	13.7
[ ] Loan opportunities with the Real Estate Fund	443	14.4
[ ] New services provided by the municipality attracted new development	427	13.8
[ ] Government, public and private facilities	435	14.1
[ ] Modern transport services and new road network	450	14.6
[ ] Others (please specify: )	50	1.6



Total      Percent

23. Do you think that the present modern transportation network has influenced the location of residential areas?

<input type="checkbox"/> Yes	257	55.5
<input type="checkbox"/> To some extent	130	28.1
<input type="checkbox"/> No	60	12.9
<input type="checkbox"/> Uncertain/don't know	16	3.5

24. Do you think that the establishment of modern transportation facilities in this area has had a positive effect in maintaining family unity?

<input type="checkbox"/> Yes	318	68.7
<input type="checkbox"/> To some extent	103	22.2
<input type="checkbox"/> No	20	4.3
<input type="checkbox"/> Uncertain/don't know	22	4.8

25. Do you think that the present modern transportation network in the area has a damaging effect on family unity?

<input type="checkbox"/> Yes	47	10.2
<input type="checkbox"/> To some extent	87	18.8
<input type="checkbox"/> No	289	62.4
<input type="checkbox"/> Uncertain/don't know	40	8.6

26. Do you think that neighbourhood unity has suffered because of the establishment of the present modern transportation network?

<input type="checkbox"/> Yes	184	39.7
<input type="checkbox"/> To some extent	122	26.3
<input type="checkbox"/> No	122	26.3
<input type="checkbox"/> Uncertain/don't know	35	7.6

	Total	Percent
27. Do you think that the present modern transportation network in this area has changed the life style of the citizens of the area?		
[ ] Yes	227	49.0
[ ] To some extent	128	27.6
[ ] No	63	13.6
[ ] Uncertain/don't know	45	9.7

E. ECONOMIC IMPACTS

DO YOU THINK THAT THE PRESENT MODERN TRANSPORTATION SYSTEM IN THIS AREA HAS:

28. Increased land values outside the twin cities?		
[ ] Yes	273	58.9
[ ] To some extent	86	18.6
[ ] No	16	3.5
[ ] Uncertain/don't know	88	19.0
29. Influenced the location of business sites and industrial areas?		
[ ] Yes	300	64.8
[ ] To some extent	81	17.5
[ ] No	27	5.8
[ ] Uncertain/don't know	55	11.9
30. Promoted agricultural products?		
[ ] Yes	375	81.0
[ ] To some extent	37	8.0
[ ] No	15	3.2
[ ] Uncertain/don't know	36	7.8



	Total	Percent
31. Damaged small businesses?		
<input type="checkbox"/> Yes	170	36.7
<input type="checkbox"/> To some extent	105	22.7
<input type="checkbox"/> No	101	21.8
<input type="checkbox"/> Uncertain/don't know	87	18.8
32. Attracted government, public and private facilities?		
<input type="checkbox"/> Yes	271	58.5
<input type="checkbox"/> To some extent	102	22.0
<input type="checkbox"/> No	37	8.0
<input type="checkbox"/> Uncertain/don't know	53	11.4
33. Promoted economic activities in the area?		
<input type="checkbox"/> Yes	319	68.8
<input type="checkbox"/> To some extent	72	15.6
<input type="checkbox"/> No	22	4.8
<input type="checkbox"/> Uncertain/don't know	50	10.8

THANK YOU VERY MUCH FOR YOUR KIND CO-OPERATION

If you have any further comments, recommendations or suggestions which will benefit the researcher, please outline them below.

APPENDIX B: INTERVIEWS WITH GOVERNMENT OFFICIALS

A. GENERAL QUESTIONS TO ALL GOVERNMENT OFFICIALS:

Has transportation, including all types of roads and public transport:

1. Changed the life style of the citizens in the area?
2. Destroyed neighbourhood communities?
3. Maintained family unity?
4. Damaged family and community unity?
5. Promoted commerce?
6. Promoted industry?
7. Promoted agricultural production?
8. Increased land values outside the urban area?
9. What are the reasons behind the increase of population in the Central Core Area?
10. Do you think that without the present expressway and main road in the area, an industrial city, universities and other important facilities would exist?
11. Would land prices be at the same level?
12. Is the public transport available in the area, namely the bus system and taxis, adequate in your opinion?



13. If a recommendation to construct a railroad to connect the twin cities in the Central Core Area with a possibility of linkage to the region's airport was made, would you vote for such a project after an efficient study of such a project?
14. What are the reasons for citizens' reluctance to use the bus system?
15. What are the positive and negative economic impacts of transportation, if any?
16. What are the positive and negative social impacts of transportation, if any?
17. Do you have any suggestions or recommendations that you would like to make?

B. GENERAL DIRECTOR OF ALGASSIM ROAD DISTRICT:

1. Are the present roads in the area adequate?
2. Is there any necessity to open new roads and/or open new lanes?
3. Since the area as a whole is predominantly agricultural, is there any plan to add more agricultural roads so as to encourage agricultural production?

C. DIRECTOR OF SAUDI PUBLIC TRANSPORT COMPANY (SAPTCO):

1. What are the reasons for the decreased number of passengers?
2. Has the existence of taxis and limousines contributed to the decrease in passenger numbers?

3. What are the reasons for the reduction in the company's annual revenue?
4. Do you have a plan for increasing the number of bus routes in the area?
5. Do you have a plan to encourage the public to use the buses?
6. Are there any plans to introduce new services for women, the elderly and the handicapped?

D. DIRECTOR OF UNAYZAH AGRICULTURAL DISTRICT:

1. What are the impacts of transportation on agricultural growth in this area?
2. Are there any negative impacts of transportation on agricultural growth in this area?
3. Did the opening of roads in this area prompt the citizens to increase the green areas?
4. Without transportation technologies, would the local agricultural production survive, and if so, would it maintain its present level?

E. DIRECTOR OF INDUSTRIAL CITY

1. How did transportation assist industrial growth?
2. Are there any negative impacts on the growth of industry in the area?



3. What are the reasons behind constructing the region's industrial city between Buraydah and Unayzah?
4. Would the construction of the new main road between Buraydah and Unayzah, and the cross of the Riyadh-Algassim expressway, have any influence on the present location of the industrial city.

F. DIRECTOR OF THE SAUDI REAL ESTATE FUND

1. Are the interest free loans offered by the Fund to the public only to build private residences when the roads have actually been constructed?

G. DIRECTOR GENERAL OF ALGASSIM TRAFFIC DEPARTMENT

1. Has the number of accidents declined since the introduction of highways and expressways?
2. Is the present road network in the Central Core Area adequate? If not, should it be expanded or should new roads be built?

H. DIRECTOR OF PHYSICAL PLANNING (General Directorate of Municipal and Rural Affairs)

1. Are the newly developed residential areas in the Central Core area influenced primarily by the construction of the transportation system?
2. Prior to the construction of houses in an area, what are the priority facilities that should be provided (i.e. roads, electricity)?

3. Has transportation assisted the physical development, and if so, has the physical development forced the establishment of a transportation network?
  
4. In recent years, a large number of people vacated their old houses in or around city centres as a result of the expansion of the area. What have the municipalities done with respect to the vacated areas?



## APPENDIX C: INTERVIEWS WITH COMMUNITY LEADERS

Questions used at the interview with community leaders:

1. What were the types of transportation used in the area before the introduction of automobiles?
2. What was the role of this area in the past as a result of its location in the transportation sector?
3. How did this area grow as a result of transportation?
4. Does this area still maintain a significant location?
5. Has the transportation network assisted the physical development of the area?
6. Has the transportation network assisted the growth of agriculture, industry and commerce?
7. Has the transportation network changed the life style of the citizens?
8. Have neighbourhood communities been destroyed because of the network?
9. Has the transportation network assisted family and neighbourhood unity?
10. Have land values increased as a result of the modern transportation and highway network?
11. Is the present transport system adequate?
12. Does the area require transportation facilities in addition to those that already exist?

13. If the transportation network has changed the life style of the area, destroyed neighbourhood unity, and had other impacts, what do you want to see done about it, and what are your assessments of the situation?
14. Why do some people still live in their old dwellings?
15. Why have some people left their old dwellings?
16. In your opinion, what are the positive and negative social impacts of transportation?
17. In your opinion, what are the positive and negative economic impacts of transportation?
18. Do you have any suggestions or recommendations to add?



APPENDIX D: GOVERNMENT BRANCHES COVERED BY THE SURVEY  
QUESTIONNAIRE

1. BURAYDAH

Ministry of Housing and Social Work  
Ministry of Finance and National Economy  
Algassim Traffic Department  
Buraydah Municipality  
Director of Algassim Health Affairs  
Saudi Arabian Airlines Office  
Algassim Civil Services Bureau  
National Guard  
Real Estate Fund  
Saudi Arabian Monetary Agency

2. UNAYZAH

Saudi Telecom  
Post Office  
Ministry of Commerce  
Traffic Department  
Agriculture and Water Directorate  
Unayzah Court  
Social Services Centre  
Education Department  
Unayzah Municipality  
Girls' Education Department

3. GOVERNMENT SERVICES AREA (GSA)

Saudi Consolidated Electrical Company  
Algassim Roads Department  
Algassim Police Training Centre  
The Industrial City  
Saudi Telecom Centre of Algassim

APPENDIX E: STATISTICAL NOTES

$$n_p = \frac{z^2 \alpha/2 pq}{e^2} \quad (1)$$

$z$  (from the Table)

$\alpha = 1 - C$  (confidence coefficient)

$q = 1 - p$

$e =$  the error

A marginal error to within  $\pm 0.04$  ( $e = 0.04$ ) is used and a confidence coefficient of  $C = 0.95$  (95%). And, by estimating  $p = 0.5$ , consequently:

$$e = 0.04$$

$$p = 0.05$$

$$q = 1 - 0.05 = 0.05$$

$$C = 0.95$$

$$\begin{aligned} \alpha &= 1 - C \\ &= 1 - 0.95 \\ &= 0.05 \end{aligned}$$

$$\begin{aligned} \alpha/2 &= 0.05/2 \\ &= 0.025 \end{aligned}$$

$$Z_{\alpha/2} = Z_{0.025} = 1.96 \quad (\text{from the Table})$$

By applying formula (1):

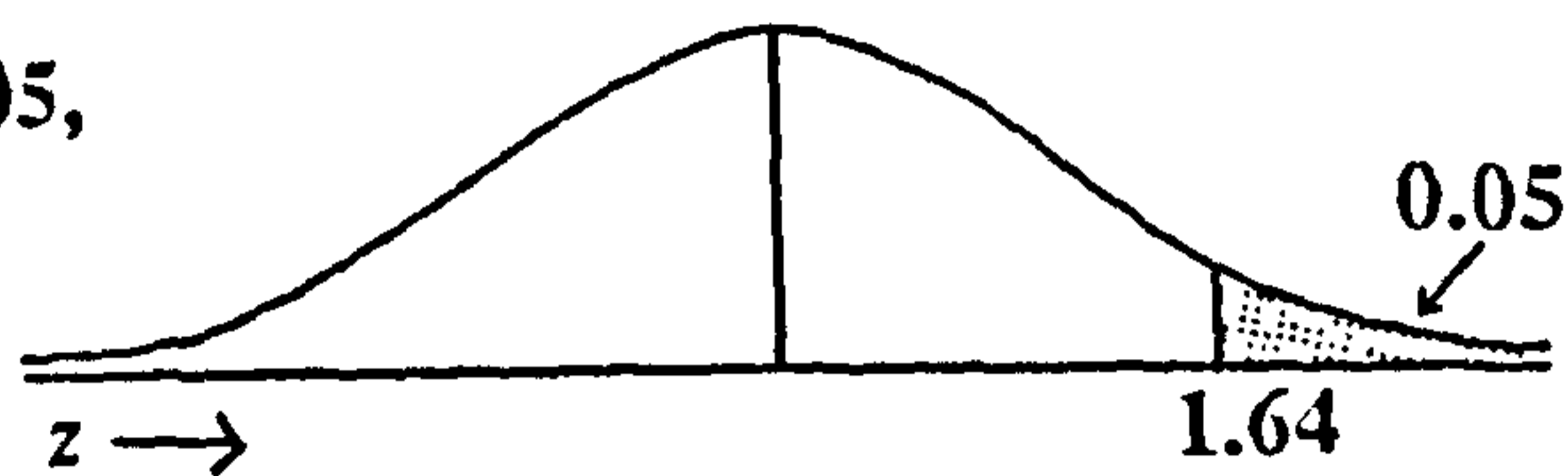
$$\begin{aligned} n_p &= \frac{z^2 \alpha/2 pq}{e^2} = \frac{(1.96)^2 (0.5) (0.5)}{(0.04)^2} \\ &= \frac{(3.8416) (0.25)}{0.0016} = \frac{0.9604}{0.0016} = 600.25 \approx 601 \end{aligned}$$

so a sample size of about 601 will be required.

Source: Bowen and Starr, Basic Statistics for Business and Economy, 1982, p.324



Example:  
 If tail area = 0.05,  
 then  $z = 1.64$

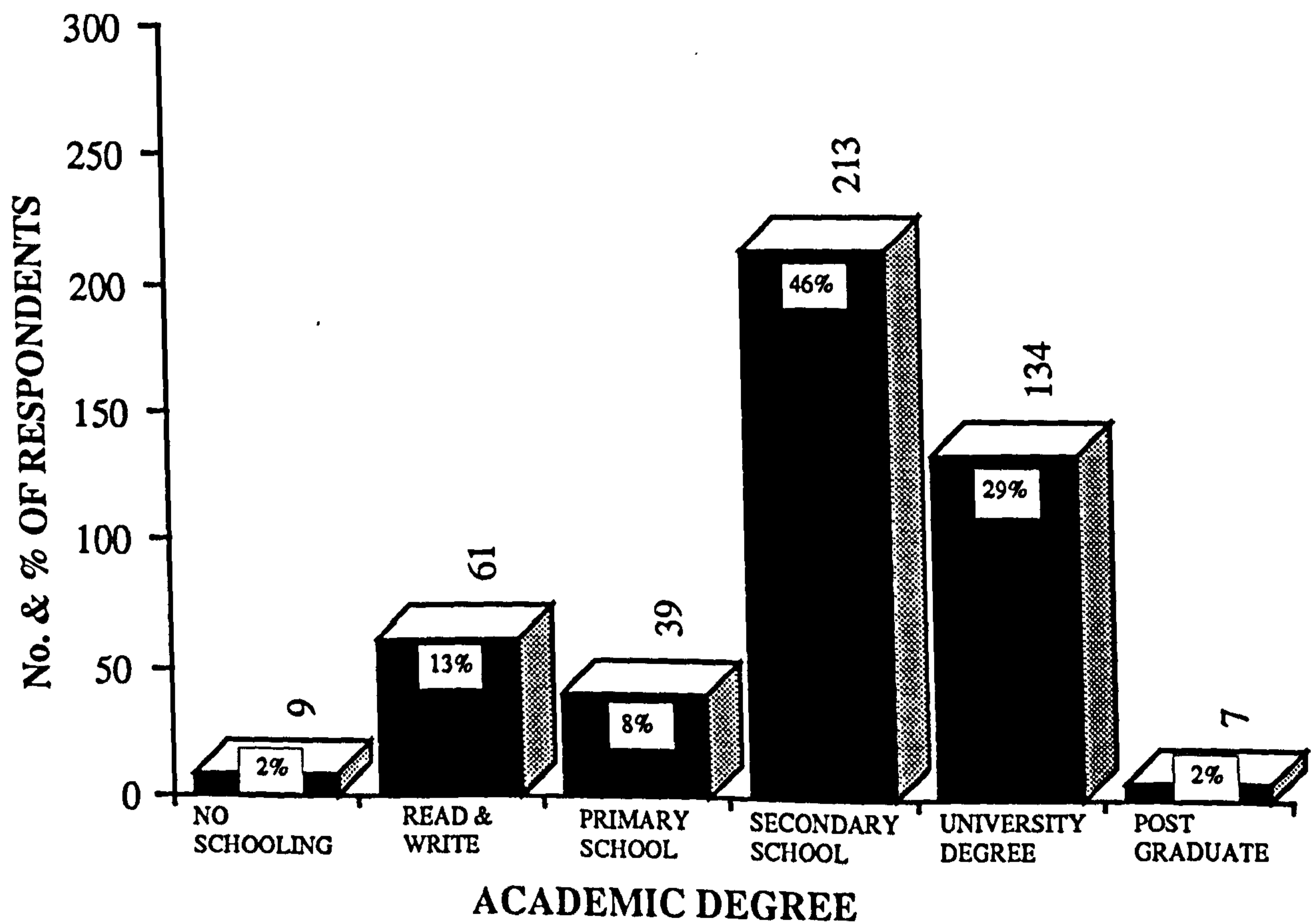
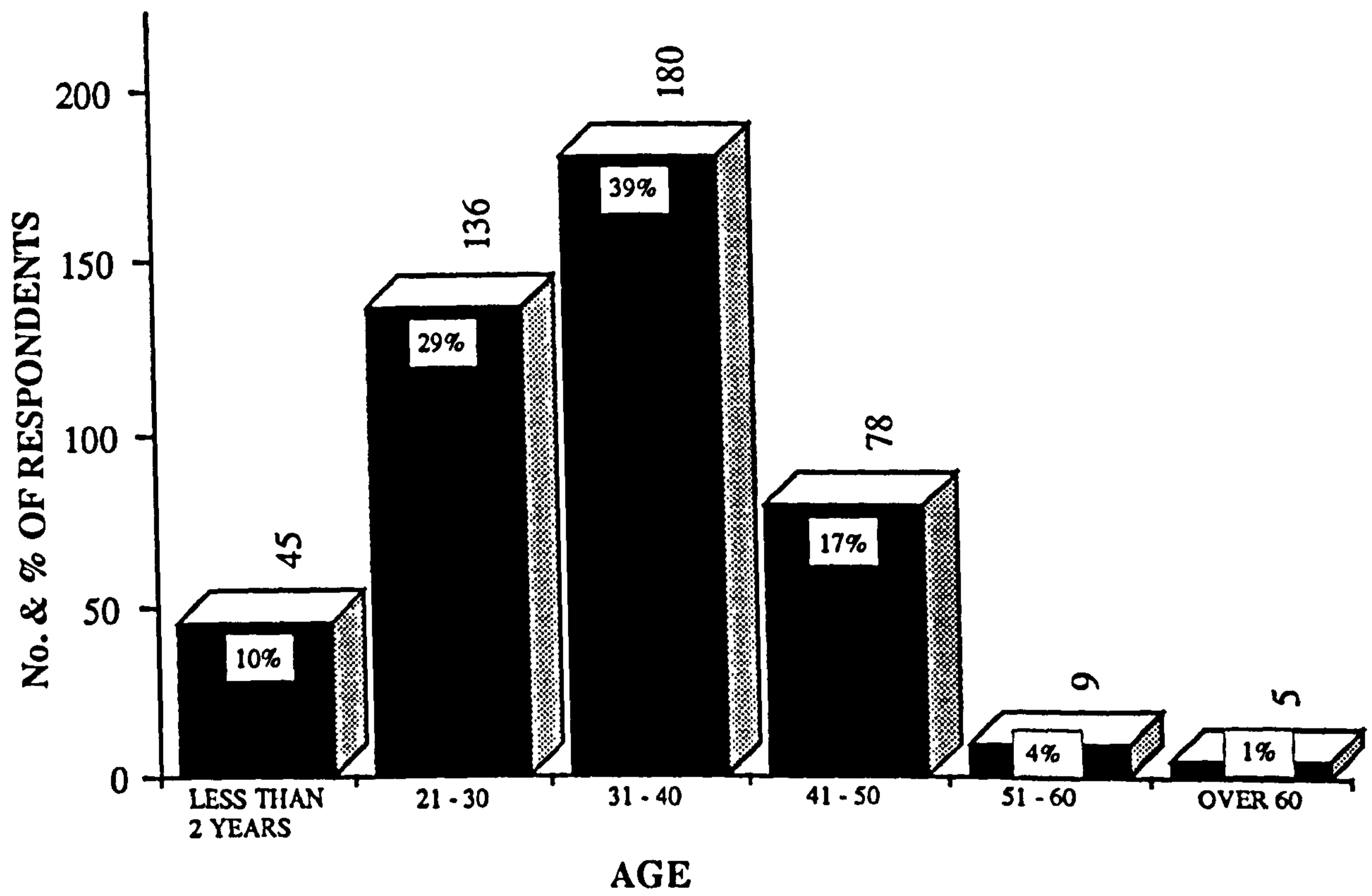


**z FOR ONE - TAIL AREAS UNDER THE NORMAL CURVE**  
 (Locate tail area in margins ; take  $z$  from body of table)

AREA	0.000	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009
0.00		3.09	2.88	2.75	2.65	2.58	2.51	2.46	2.41	2.37
0.01	2.33	2.29	2.26	2.23	2.20	2.17	2.14	2.12	2.10	2.07
0.02	2.05	2.03	2.01	2.00	1.98	1.96	1.94	1.93	1.91	1.90
0.03	1.88	1.87	1.85	1.84	1.83	1.81	1.80	1.79	1.77	1.76
0.04	1.75	1.74	1.73	1.72	1.71	1.70	1.68	1.67	1.66	1.65
0.05	1.64	1.64	1.63	1.62	1.61	1.60	1.59	1.58	1.57	1.56
0.06	1.55	1.55	1.54	1.53	1.52	1.51	1.51	1.50	1.49	1.48
0.07	1.48	1.47	1.46	1.45	1.45	1.44	1.43	1.43	1.42	1.41
0.08	1.41	1.40	1.39	1.39	1.38	1.37	1.37	1.36	1.35	1.35
0.09	1.34	1.33	1.33	1.32	1.32	1.31	1.30	1.30	1.29	1.29
0.10	1.28	1.28	1.27	1.26	1.26	1.25	1.25	1.24	1.24	1.23

Source: BOWEN AND STAR, BASIC STATISTICS FOR BUSINESS AND ECONOMICS, NEW YORK, MCGRAW-HILL BOOK COMPANY, 1982, p.710.

# Appendix F AGE AND ACADEMIC DEGREE OF THE RESPONDENTS OF THE SURVEY QUESTIONNAIRE





## APPENDIX G: GLOSSARY OF TERMS AND ABBREVIATIONS

A.D.	Anno Domini (dates in the Gregorian solar year)
ADL	Average daily traffic
A.H.	Anno Hijra (dates in the Hijra lunar year)
Allah	God
Amir	Governor
ARAMCO	Arabian American Oil Company
Asir	A region located within the Southwestern Region
Bedouins	Nomadic population
CCAAR	Central Core Area of Algassim Region
C.E.	Christian era
cm	Centimetre (cm = 0.3937 inch)
GCC	Gulf Co-operation Council
GDP	Gross Domestic Product
GSA	Government Services Area
ha	Hectare
Hadith	Statements attributed to the Prophet Muhammed
Hajj	Pilgrim to Makkah
Hanbali	In the School of Law named after the great juristheologian, Ahmed Ibn Hanbal, who dies in 855 C.E.
Hijrah	Small settlement or hamlet
IRF	International Road Federation
km	Kilometre (km = 0.6214 mile)
m	Metre (m = 3.2808 feet)
m <sup>2</sup>	Square metre
Madinah	The second holiest city
Mahram	Denotes a relationship either by marriage or close blood ties
Makkah	The holiest city of Islam and the place of the Holiest Shrine of Muslims (the Kaabah)
MOA	Ministry of Agriculture
MOC	Ministry of Communications
MOI	Ministry of the Interior
MOMRA	Ministry of Municipal and Rural Affairs

MOP	Ministry of Planning
Najd	
Plateau	Located in the central part of Saudi Arabia (consists of plains which extend about 1,448 km to the Iraqi and Jordanian borders)
Quran	The Holy Book of the Islamic religion
Ramadan	The Fasting Month for Moslems
Riyal	Currency of Saudi Arabia
SAAB	Saudi Arabian Agricultural Bank
SABIC	Saudi Arabian Basic Industries Corporation
SAMA	Saudi Arabian Monetary Agency
SAPTCO	Saudi Arabian Public Transport Company
SGRRO	Saudi Government Railroad Organisation
Shariah	Structure of Islamic Law or God's Divine Law
Shieks	Head of a tribe or a religious leader
SR	Saudi Riyal
SRDF	Saudi Real Estate Development Fund
Sunnah	Practice of the Prophet
Tihamah	A coastal plain along the Red Sea in the extreme west of the Kingdom
Zakah	The giving of fixed alms



APPENDIX H.1. EXAMPLE OF TRADITIONAL AND CONTEMPORARY ROADS



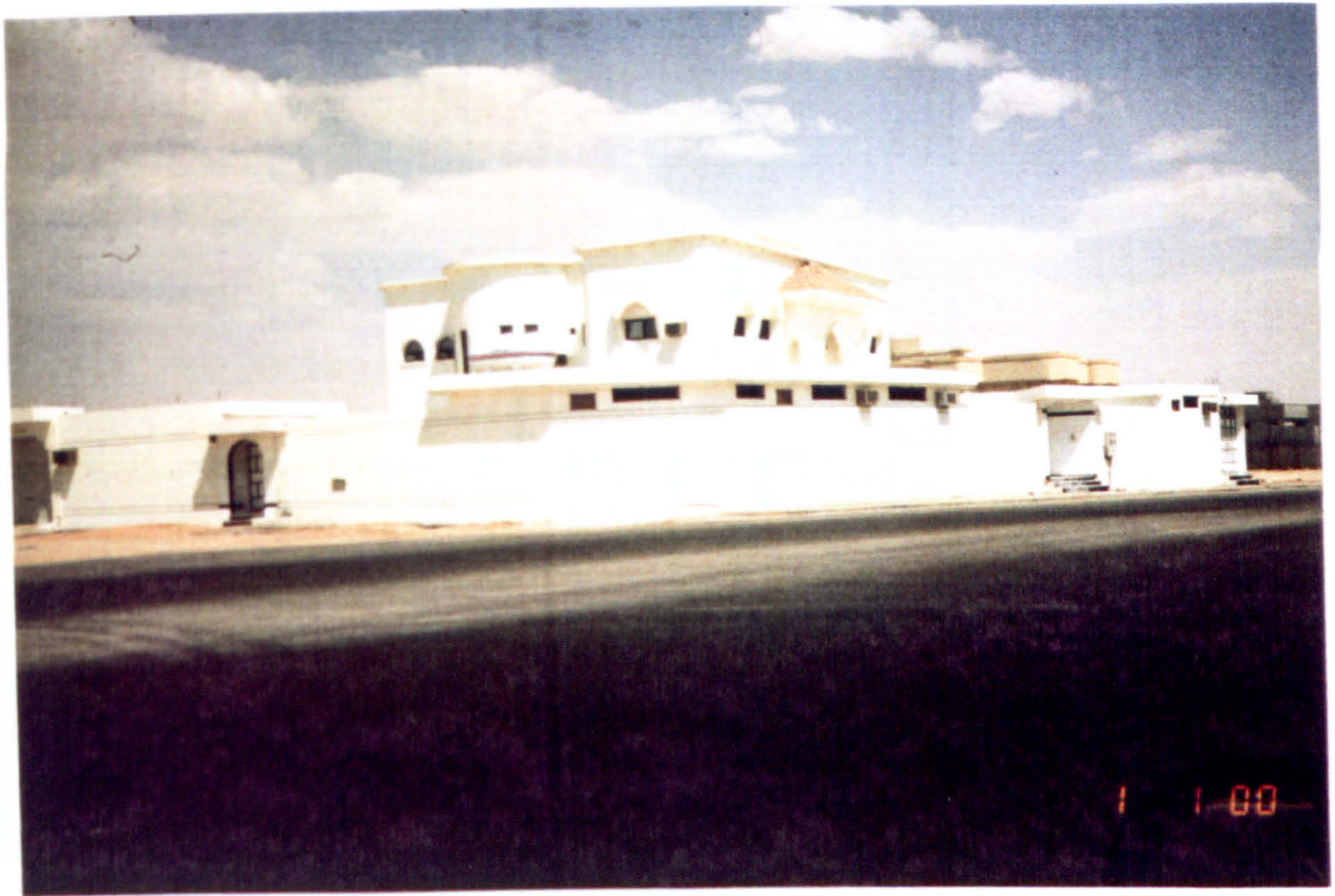
TRADITIONAL ROAD



CONTEMPORARY ROAD



APPENDIX H.2. EXAMPLE OF CONTEMPORARY AND TRADITIONAL TYPES OF HOUSING



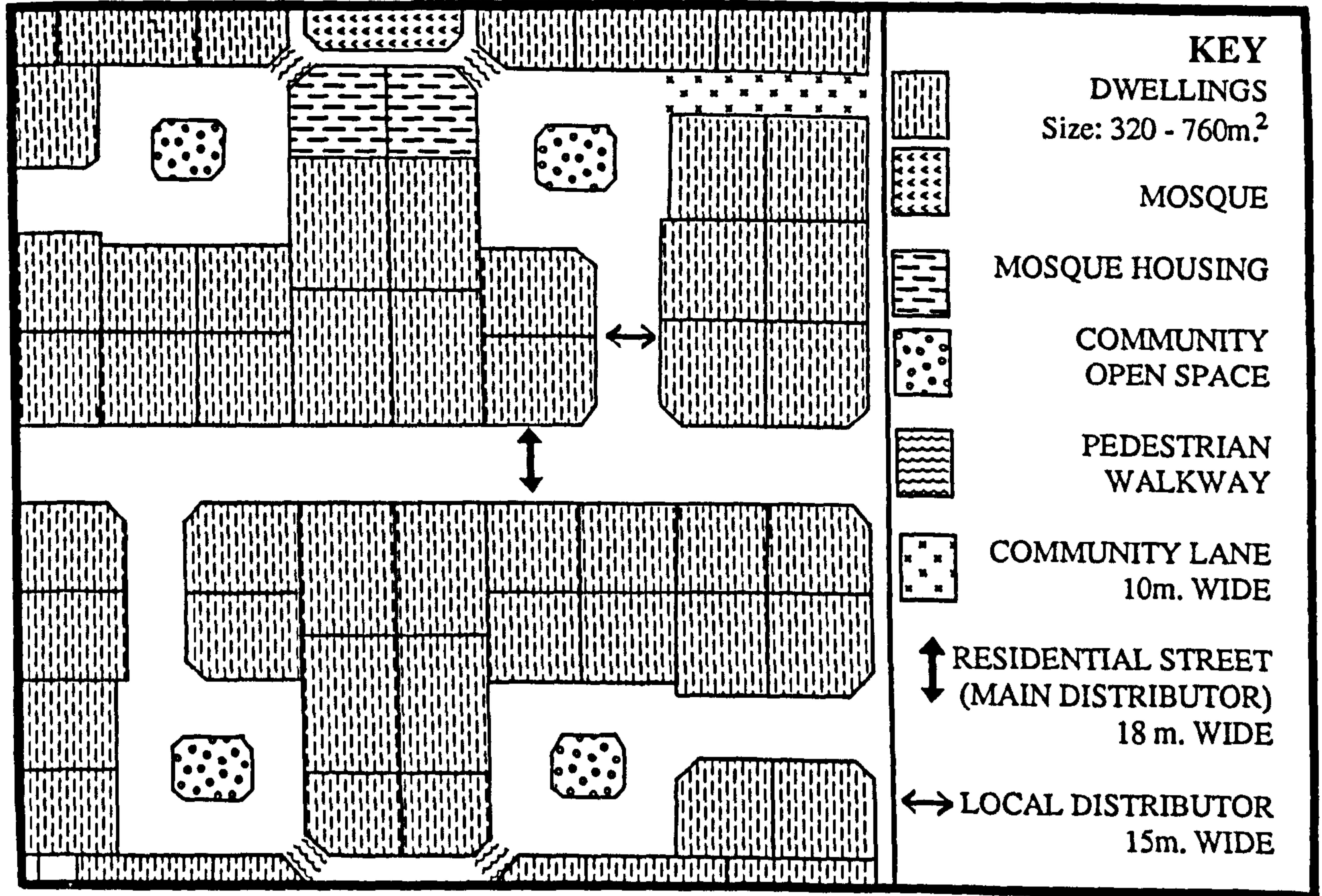
CONTEMPORARY HOUSING (VILLA)



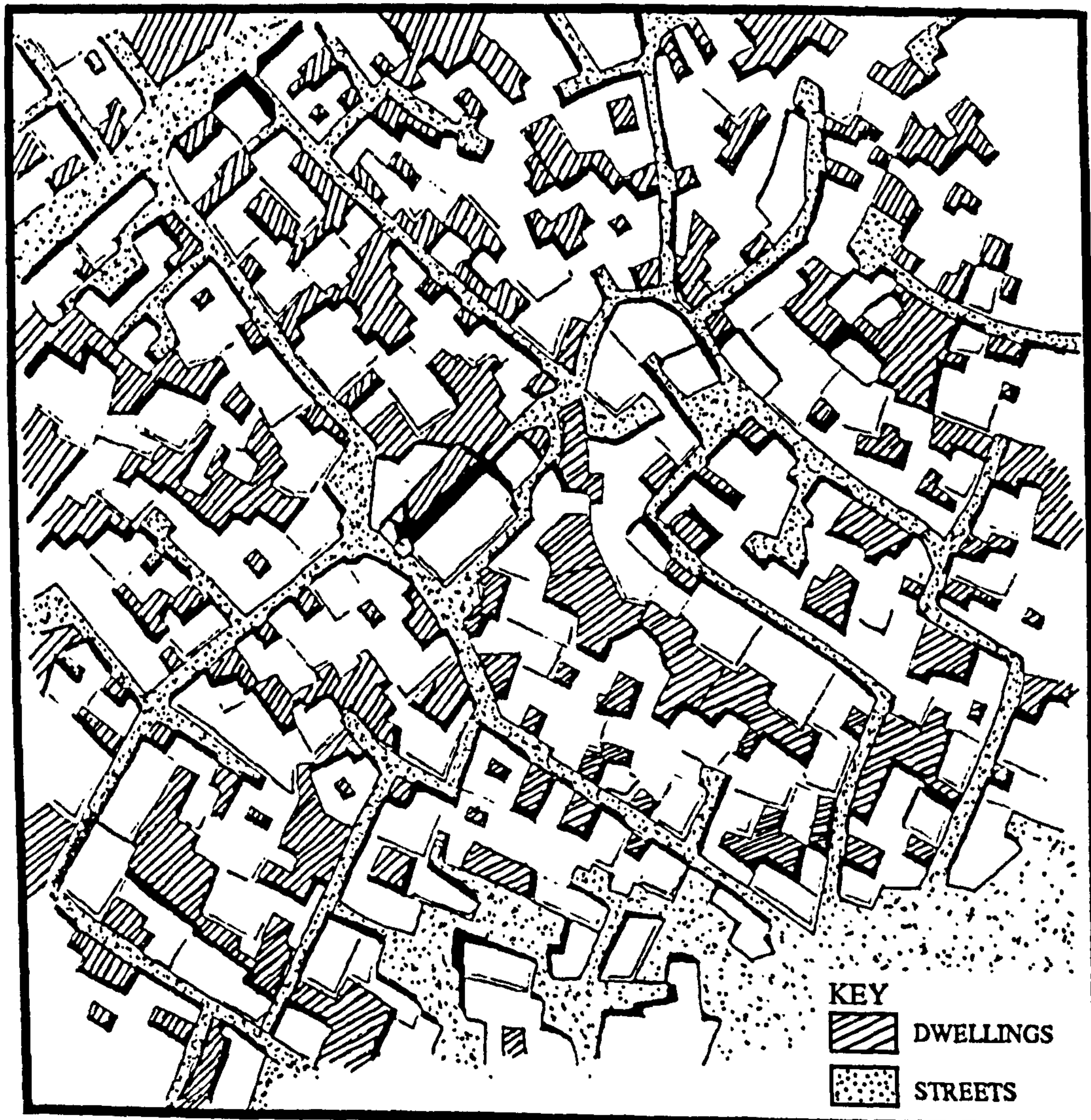
TRADITIONAL HOUSING (MUD)



# APPENDIX I. CONTEMPORARY AND TRADITIONAL URBAN PATTERNS



Source: UNAYZAH MUNICIPALITY, JULY, 1990 UNAYZAH: CONTEMPORARY URBAN PATTERN



Source: DOXAIDES ASSOCIATES, CENTRAL REGION MASTER PLANS 1973: UNAYZAH, EXISTING CONDITIONS, REPORT 5, p.119.

UNAYZAH: TRADITIONAL URBAN PATTERN



# Appendix J. EXAMPLE OF THE FRAMEWORK APPROACH FOR THE ASSESSMENT OF TRUNK ROAD SCHEMES (Westfordly By-Pass)

Group	Interest	Units	Scheme alternatives				
			Red	Green	Blue	'Do nothing'	
<b>1.0 Road users directly affected</b>							
1.1 All road users	Reduction in casualties: fatal serious slight	Number	3	4	2	— <sup>1</sup>	
		Number	15	20	11	—	
		Number	30	26	15	—	
	Value of accident savings £m (NPV)	0.8	0.59	0.59	—		
	Comfort and convenience	Rank	2	1	4	3	
	Attractiveness of view from road	Rank	3	4	1	2	
1.2 Car drivers/passengers (working time)	Time savings	£m (NPV)	1.94	1.7	1.7	—	
	Vehicle operating costs	£m (NPV)	-0.21	-0.14	+0.13	—	
1.3 Car drivers/passengers (to and from work and leisure time)	Time savings	£m (NPV)	1.83	1.66	1.67	—	
	Vehicle operating costs	£m (NPV)	-0.21	-0.08	+0.19	—	
1.4 Heavy goods vehicle operators	Time savings	£m (NPV)	0.91	0.43	0.09	—	
	Vehicle operating costs	£m (NPV)	-0.08	-0.03	+0.01	—	
1.5 Light goods vehicle operators	Time savings	£m (NPV)	1.0	0.93	0.88	—	
	Vehicle operating costs	£m (NPV)	-0.08	-0.03	+0.06	—	
1.6 Bus operators and users	Time savings	£m (NPV)	0.59	0.58	0.58	—	
	Vehicle operating costs	£m (NPV)	-0.02	-0.07	+0.07	—	
1.7 Pedestrians	Time savings	£m (NPV)	1.03	0.41	0.5	—	
	Amenity	Rank	4	1	2	3	
<b>2.0 Non-road users directly affected</b>							
2.1 Owners/occupiers of residential property	Demolition	Number of properties demolished	—	—	—	—	
	Noise increase	Number of properties subject to increases of:	+10-20 dB(A)L <sub>10</sub>	96	64	9	—
			+5-10 dB(A)L <sub>10</sub>	180	116	102	—
	Noise decrease	Number of properties subject to decrease of:	>5 dB(A)L <sub>10</sub>	1,450	1,682	1,276	—
	Visual intrusion	Number of properties subject to:	severe	30	12	3	—
			significant	183	139	9	—
slight			399	351	17	—	
Disruption during construction	Rank	4	2	3	1		
2.2 Owners/occupiers of shops and businesses	Demolition	Number of properties demolished	—	—	—	—	
	Noise increase	Number of properties subject to +5dB(A)L <sub>10</sub>	1	1	—	—	
	Noise decrease	Number of properties subject to -5 dB(A)L <sub>10</sub>	70	96	85	—	

1. — indicates no effect for the scheme option.

Source: REPORT OF THE ADVISORY COMMITTEE ON TRUNK ROAD ASSESSMENT,  
LONDON, HMSO, OCTOBER 1977, pp. 97-100.



# Appendix J. Cont.

Group	Interest	Units	Scheme alternatives				
			Red	Green	Blue	'Do nothing'	
2.2 (contd)	Visual intrusion	Number of properties subject to: severe significant slight	— — 1	— — 1	— — —	— — —	
	Disruption during construction	Rank	3	4	2	1	
2.3 Owners/occupiers of industrial and commercial property	Demolition	Number of properties demolished	—	—	—	—	
	Noise increase	Number of properties subject to +5 dB(A)L <sub>10</sub>	—	—	—	—	
	Noise decrease	Number of properties subject to -5 dB(A)L <sub>10</sub>	1	—	—	—	
	Visual intrusion	Number of properties subject to: severe significant slight	— — 1	— — —	— — —	— — —	
	Disruption during construction	Rank	4	2	3	1	
2.4 Occupiers/users of public buildings: a. Schools	Demolition	Number of properties demolished	—	—	—	—	
	Noise increase	Number of pupils subject to + < 5 dB(A)L <sub>10</sub>	150	—	—	—	
	Noise decrease	Number of pupils subject to - > 5 dB(A)L <sub>10</sub>	97	97	52	—	
	Visual intrusion	Number of pupils affected	150	—	—	—	
	Disruption during construction	Rank	4	2	3	1	
	b. Churches	Demolition	Number of properties demolished	—	—	—	—
		Noise increase	Number of properties subject to + < 5 dB(A)L <sub>10</sub>	—	—	—	—
		Noise decrease	Number of properties subject to - > 5 dB(A)L <sub>10</sub>	1	1	—	—
		Visual intrusion	Number of properties affected	1	1	—	—
		Disruption during construction	Rank	3	4	2	1
2.5 Users of public open space	Landtake	Hectares taken	—	—	—	—	
	Noise increase	Number of people subject to + < 5 dB(A)L <sub>10</sub>	350	—	—	—	
	Noise decrease	Number of people subject to - > 5 dB(A)L <sub>10</sub>	—	50	185	—	

## Appendix J. Cont.

Group	Interest	Units	Scheme alternatives			
			Red	Green	Blue	'Do nothing'
2.5 (contd)	Visual intrusion	Number of people affected	350	—	—	—
	Disruption during construction	Rank	4	3	2	1
2.6 Farmers	Landtake	Hectares taken: Grade II	—	—	24	—
		Grade III	18	26	17	—
	Severance	Number of farms affected	3	3	8	—
	Noise increase	Number of farms subject to + < 5 dB(A) $L_{10}$	—	1	3	—
	Noise decrease	Number of farms subject to - > 5 dB(A) $L_{10}$	1	—	—	—
	Visual intrusion	Number of farms affected	—	1	3	—
	Disruption during construction	Rank	2	3	4	1
3.0 Those concerned with intrinsic value of area						
3.1 Landscape/townscape value	General assessment	Rank	2	1	3	4
	Items specific to the scheme: National Parks Areas of Outstanding Natural beauty Heritage Coasts Country Parks National Trust land Conservation Areas Other items	Description of effect				
3.2 Value of historic buildings	Ancient Monuments	Description of effect	Part of castle moat to be used as carriage-way			
	Listed Buildings: Grade 1 Grade 2					
	Other structure of character					
3.3 Ecological value	General assessment	Rank	3	1	4	2
	Sites of Special Scientific Interest Nature Reserves	Description of effect				
3.4 Archaeological and historic value	General assessment	Rank	1	3	4	2
	Interest of specific sites	Description of effect				
4.0 Those indirectly affected						
4.1 Effect on resources	Sterilisation of mineral deposits	Description of effect				
4.2 Land use planning effects	Job opportunities	Number of jobs gained	—	—	—	—
		Number of jobs lost	3	—	—	—



## Appendix J. Cont.

Group	Interest	Units	Scheme alternatives			
			Red	Green	Blue	'Do nothing'
4.2 (contd)	View of county council	Rank	1	3	2	4
	View of district councils	Rank	2	1	4	3
	View of parish councils	Rank	2	1	4	3
	View of statutory objectors	Rank	1	3	2	4
4.3 Other transport operators and users	Rail	} Description of effect				
	Air					
	Waterways					
4.4 Other factors specific to the scheme		Description of effect				
5.0 Financial authority						
	Construction cost	£m (NPV)	6.2	4.9	4.1	—
	Land cost	£m (NPV)	1.0	1.0	1.0	—
	Compensation cost	£m (NPV)	0.5	—	—	—
	Maintenance cost	£ (NPV)	28,400	28,500	43,500	—
	Total cost	£m (NPV)	7.7284	5.9285	5.1435	—
	Total gross benefits	£m (NPV)	7.5	5.95	6.83	—
	Difference between discounted cost and sum of discounted benefits quantified in monetary terms	£m (NPV)	-0.2284	0.0215	1.6865	—

APPENDIX K: PREPARATION AND CODING OF THE SURVEY  
QUESTIONNAIRE

variable labels

v1 'age'  
v2 'marital status'  
v3 'last academic degree'  
v4 'annual income'  
v5 'place of birth'  
v6 'place of work or school'  
v7 'type of work'  
v8 'place of residence'  
v9 'location within buraydah or unayzah'  
v10 'length of time present dwelling'  
v11 'price'  
v12 'provision of services'  
v13 'age or style'  
v14 'transportation accessibilities'  
v15 'close to work or school'  
v16 'neighborhood environment'  
v17 'real estate fund'  
v18 'free land by government'  
v19 'others'  
v20 'type of residenc'  
v21 'means of financing dwelling'  
v22 'type of transportation to work'  
v23 'travel between buraydah and unayzah'  
v24 'type of trans between the twin cities'  
v25 'type of trans within BUR or UNZ'  
v26 'reason of selecting this mode of trans'  
v27 'public transport services in CCAAR'  
v28 'road network in CCAAR'  
v29 'railroad alternative BET BUR and UNZ'  
v30 'more population'  
v31 'more migration'  
v32 'increase in family income'  
v33 'loan opp with the real estate fund'  
v34 'new services by municipality'  
v35 'GOV PUB and PRIV facilities'  
v36 'modern trans and road network'  
v37 'others'  
v38 'influenced location of residal area'  
v39 'positive effect on family unity'  
v40 'damaging effect on family unity'  
v41 'neighbourhood unity suffered'  
v42 'change life style'  
v43 'increased land values'  
v44 'influe location of BUSI and INDUS areas'  
v45 'promoted agricultural products'  
v46 'damaged small businesses'  
v47 'attracted GOV PUB and PRIV facilities'  
v48 'promoted economic activities'



value labels

v1 1 'less than 20 yrs' 2 '21-30' 3 '31-40' 4 '41-50' 5 '51-60'  
 6 '60 over' /  
 v2 1 'married' 2 'single' 3 'widowed' 4 'divorced' /  
 v3 1 'no schooling' 2 'read and write' 3 'elem ed' 4 'sec sch'  
 5 'U D' 6 'MA' /  
 v4 1 'less than 50000' 2 '51-100' 3 '101-150' 4 '151-200'  
 5 'over 200' /  
 v5 1 'BUR' 2 'UNZ' 3 'AR' 4 'SA' /  
 v6 1 'BUR' 2 'UNZ' 3 'BTTC' /  
 v7 1 'GOV' 2 'PRIV' 3 'OWN' 4 'STUDENT' /  
 v8 1 'BUR' 2 'UNZ' 3 'AR' 4 'OTHER REGION' /  
 v9 1 'NS' 2 'SS' 3 'ES' 4 'WS' 5 'CC' 6 'NOT A RESIDENT' /  
 v10 1 'less than 1 yr' 2 '1-5 yrs' 3 '5-10 yrs' 4 '10-15 yrs'  
 5 'over 15 yrs' /  
 v20 1 'modern house' 2 'old mud house' 3 'flat(apt)'  
 4 'other type' /  
 v21 1 'own expense' 2 'real estate fund' 3 'bank or priv loan'  
 4 'other means' /  
 v22 1 'PRIV AUTO' 2 'CARPOOL' 3 'PUBLIC TRANS' 4 'LIMOS or TAXI'  
 5 'OTHER TYPE' /  
 v23 1 'not at all' 2 'only when needed' 3 '0-1 per week'  
 4 '1-3 per week' 5 '3-5 per week' 6 'over 5 per week' /  
 v24 1 'PRIV AUTO' 2 'CARPOOL' 3 'PUBLIC TRANS' 4 'LIMOS or TAXI'  
 5 'OTHER TYPE' /  
 v25 1 'PRIV AUTO' 2 'CARPOOL' 3 'PUBLIC TRANS' 4 'LIMOS or TAXI'  
 5 'OTHER TYPE' /  
 v26 1 'COMF and FAST' 2 'CHEAPER' 3 'PUBLIC TRANS NOT ADQ'  
 4 'OTHER REASONS' /  
 v27 1 'VERY GOOD' 2 'GOOD' 3 'SATISFACTORY' 4 'BAD' 5 'VERY BAD'  
 6 'EXP and IMP needed' 7 'UNCERTAIN DONT KNOW' /  
 v28 1 'VERY GOOD' 2 'GOOD' 3 'SATISFACTORY' 4 'BAD' 5 'VERY BAD'  
 6 'UNCERTAIN DONT KNOW' /  
 v29 1 'YES' 2 'SOMETIMES' 3 'NO' 4 'ONLY ONCE'  
 5 'UNCERTAIN DONT KNOW' /  
 v38 TO v48 1 'YES' 2 'TO SOME EXTENT' 3 'NO' 4 'UNCERTAIN DONT KNOW'

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