11.2.3 Present Situation of the Study Area

a. Exchange

11.040 The total line capacity of telephone exchanges in the Irbid Governorate is approximately 5,000. 40 percent of this capacity is in the Irbid Municipality which has a 4,000 line automatic local exchange. A new 5,000 line exchange will be installed in early 1979 and the old 4,000 line SXS (Step by Step Exchange) will be directly connected to the new exchange. Limited DDD facilities are available via the DDD exchange in Amman and operator services are given via a local switchboard with 8 toll positions.

11.041 The Irbid Governorate has the largest concentration of manual exchanges in the Country. There are more than 200 manual boards in the area (including those with less than 10 lines). The principal manual exchanges are at Ramtha (400 lines) where the installation of a new automatic exchange was planned for 1977. Mafraq has 400 lines, Jerash 300 lines and Ajlun 200 lines. The interconnection of exchanges in the Irbid Governorate is shown on Figure 11.5, but in addition to the links shown, the following exchanges have direct circuits to Amman: Ajlun, Ramtha, H4, Jerash, Mafraq and Irbid.

b. Transmission Facilities

11.042 Transmission facilities for Jordan consist of an open-wire network, microwave systems and cable systems. The open-wired system and the microwave transmission systems are shown on Figures 11.6 and 11.7 respectively. The open-wire system is extensive, covering most of the populated areas of Jordan and providing telephone communications. Coaxial cable systems exist from Amman to Damascus and Baghdad and are used jointly with the Jordanian military authorities. Irbid is connected with major cities through a microwave system which provides multichannel trunking facilities.

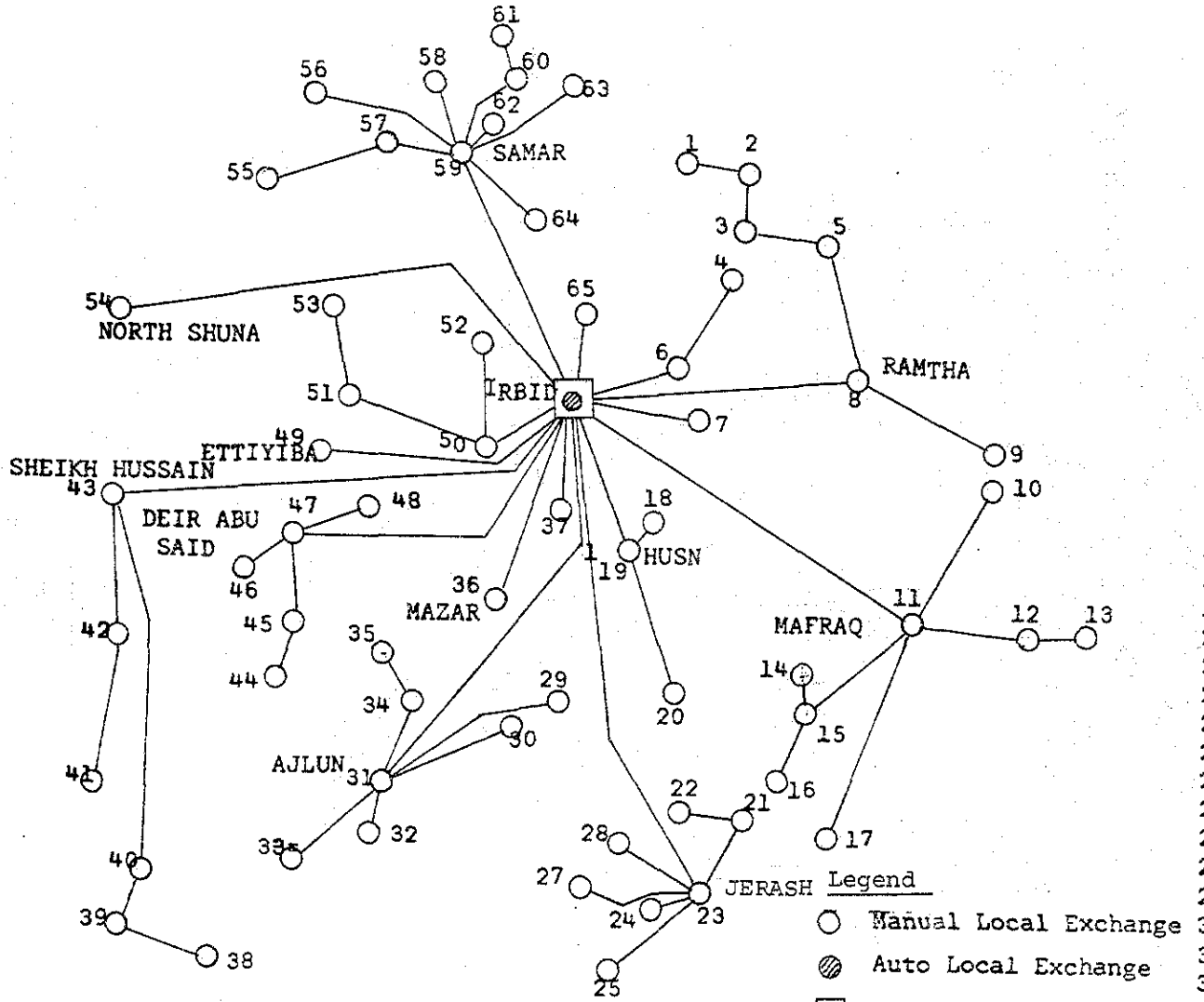
c. Outside-Plant Network

11.043 The Irbid outside-plant network, within the business district, consists primarily of (1) small sized feeder cables installed in an underground conduit system, (2) aerial cables attached to buildings, (3) fixed-count wall-mounted terminals and (4) excessive drop wire runs. In the residential district, service is provided by (1) small feeder cables placed in an underground conduit system, (2) pole mounted aerial cable, (3) minor quantities of direct buried cable, (4) fixed-count terminals and (5) extensive drop wire runs.

d. Telex Service

11.044 The present National network provides a fully automatic Telex service and the present capacity of the system is:

Figure 11.5 Existing Routing Plan, Irbid Governorate, 1976



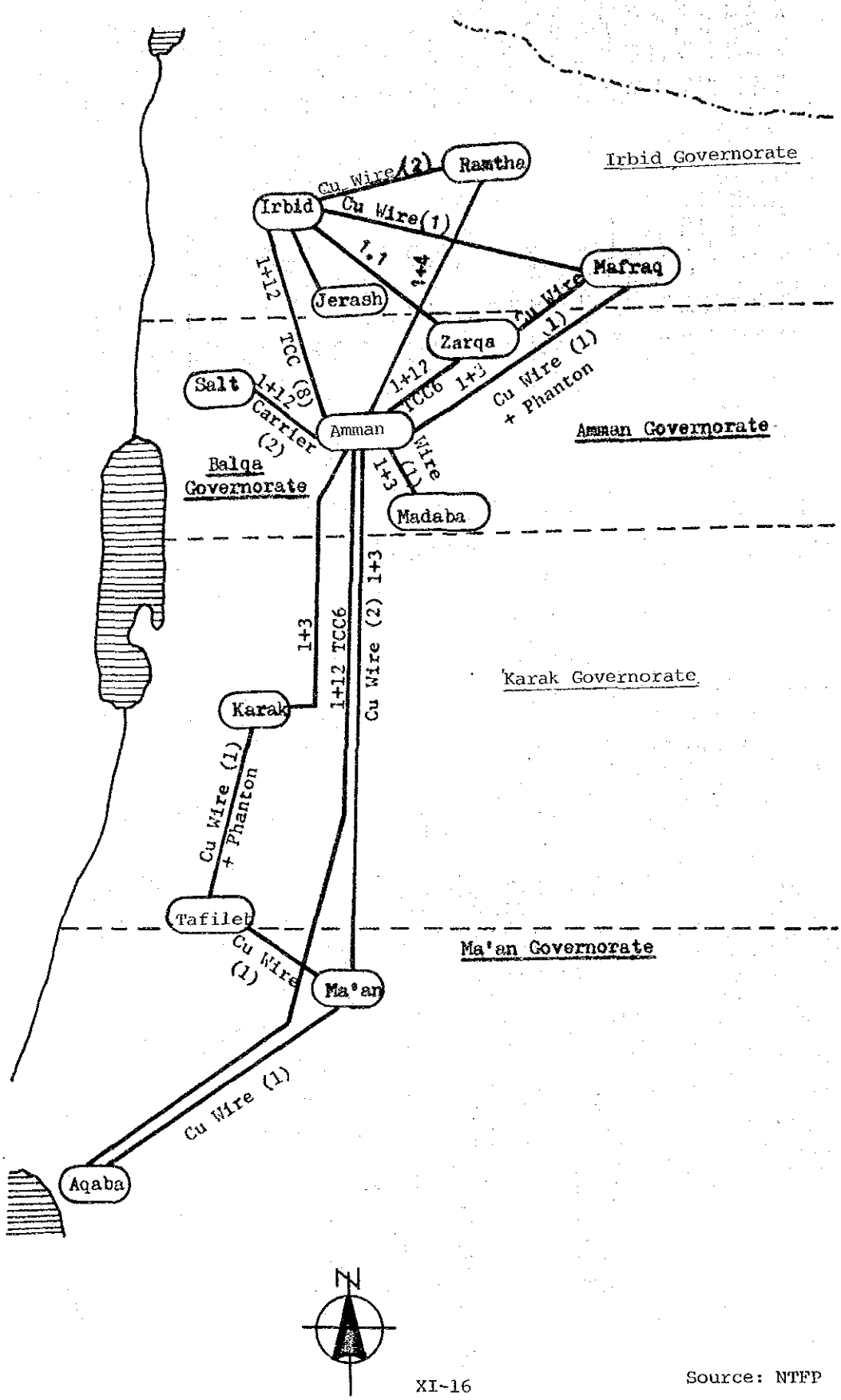
Legend

- Manual Local Exchange
- Auto Local Exchange
- Auto Exchange with MBd

Source: NTFP

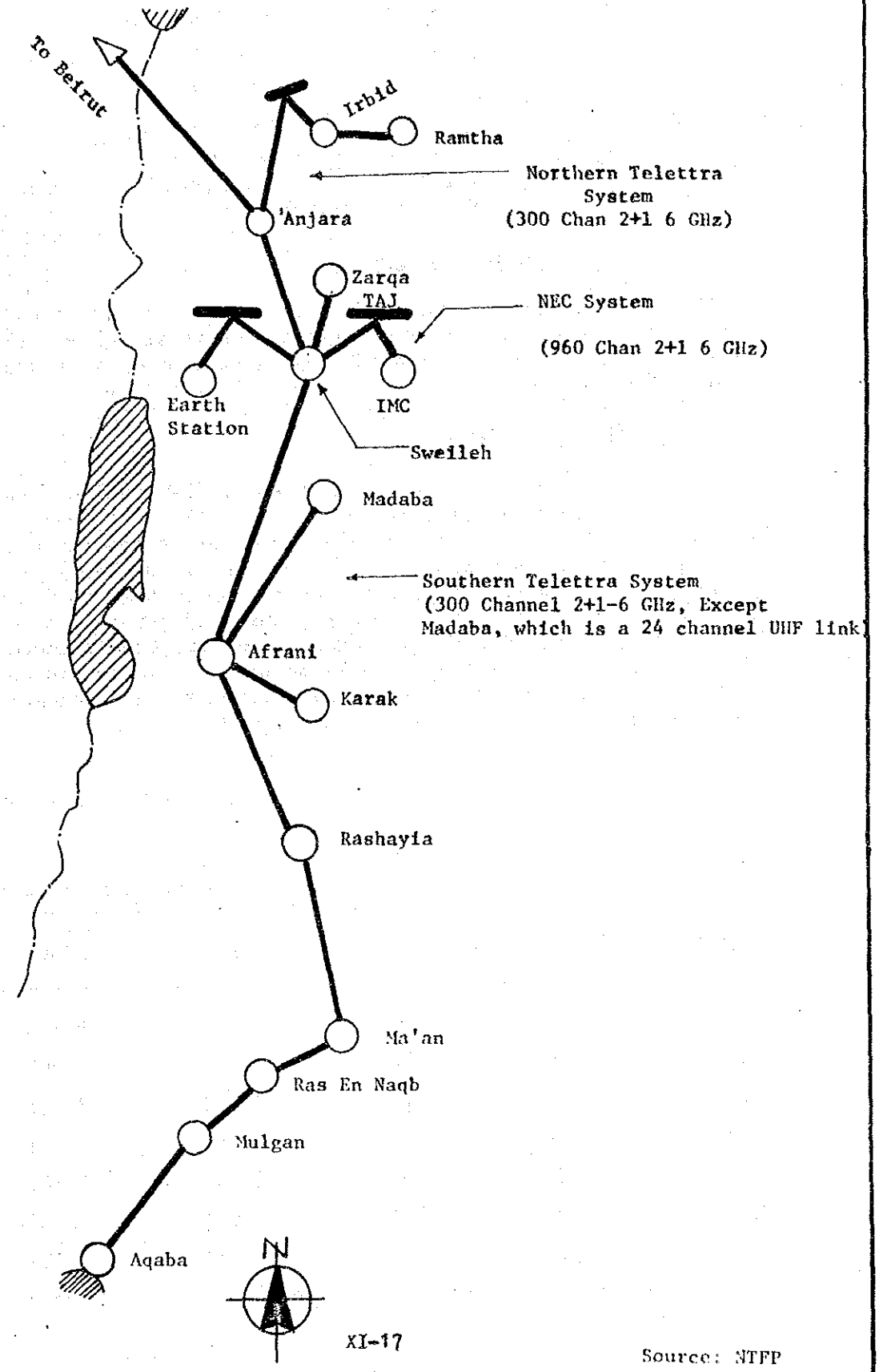
1 Dhuneiba
2 Amrwa
3 Esh Shajara
4 El Mughayir
5 Et Turra
6 Bishra
7 Hawara
8 Er Ramtha
9 Hausha
10 Sama
11 Mafraq
12 H4
13 H5
14 El Manshiya
15 Rihaba
16 El Madwap
17 Bal'ama
18 Es Sarih
19 Husn
20 En Nueiyima
21 Qafqafa
22 Kufr Khal
23 Jerash
24 Jerash Camp
25 El Majdal
26 El Kitta
27 Sakib
28 Suf
29 Sakra
30 Ibbin
31 Ajlun
32 'Anjara
33 Kufrinja
34 Ishtafina
35 Arjan
36 Mazar
37 Aidun
38 El Balawne
39 El Fakir
40 Kureiyima
41 Wadi Elyabis
42 Mashari
43 Sheikh Hussein
44 Kufr 'A-wan
45 Kufr Rakib
46 Juffein
47 Deir Abu Said
48 Sammu'
49 Et Taiyiba
50 Kufr Yuba
51 Oumeim
52 Saum
53 Kufr Asad
54 North Shuna
55 Um Qeis
56 Mukheiba
57 Malka
58 Shama
59 Samar
60 Yubla
61 Er Rafid
62 Kufr Saum
63 Harta
64 Sam Er Rusan
65 Beit Ras

Figure 11.6 Transmission Facilities Open Wire System, Regional Trunks



Source: NTFP

Figure 11.7 Existing Microwave Transmission Systems



XI-17

Source: NTFP

Amman	500 lines
Irbid	20 "
Zarqa	20 "
Aqaba	20 "
Total	560 lines

e. Telegraph Service

11.045 The public telegraph service in Jordan is quite extensive, although only the principal Municipalities have installed telegraph equipment. In the Governorate of Irbid 40 municipalities can call in telegrams to Irbid.

11.2.4 Demand Projection

11.046 Demand projection and the existing/planned line-capacity of the Irbid Exchanges are shown on Figure 11.8. And Demand projections in major cities in the Irbid Governorate are shown in Table 11.2. At the end of the Development Program (1985) proposed in the NTFP, the telephone penetration factor in the Irbid Municipality becomes approximately 20 percent, while 15 percent for other cities, and 10 percent for rural areas. The proposed Yarmouk University will require considerable telephones, which can be solved by installing PABX (Private Automatic Branch Exchange) fed to a main line to Irbid or Ramtha exchanges.

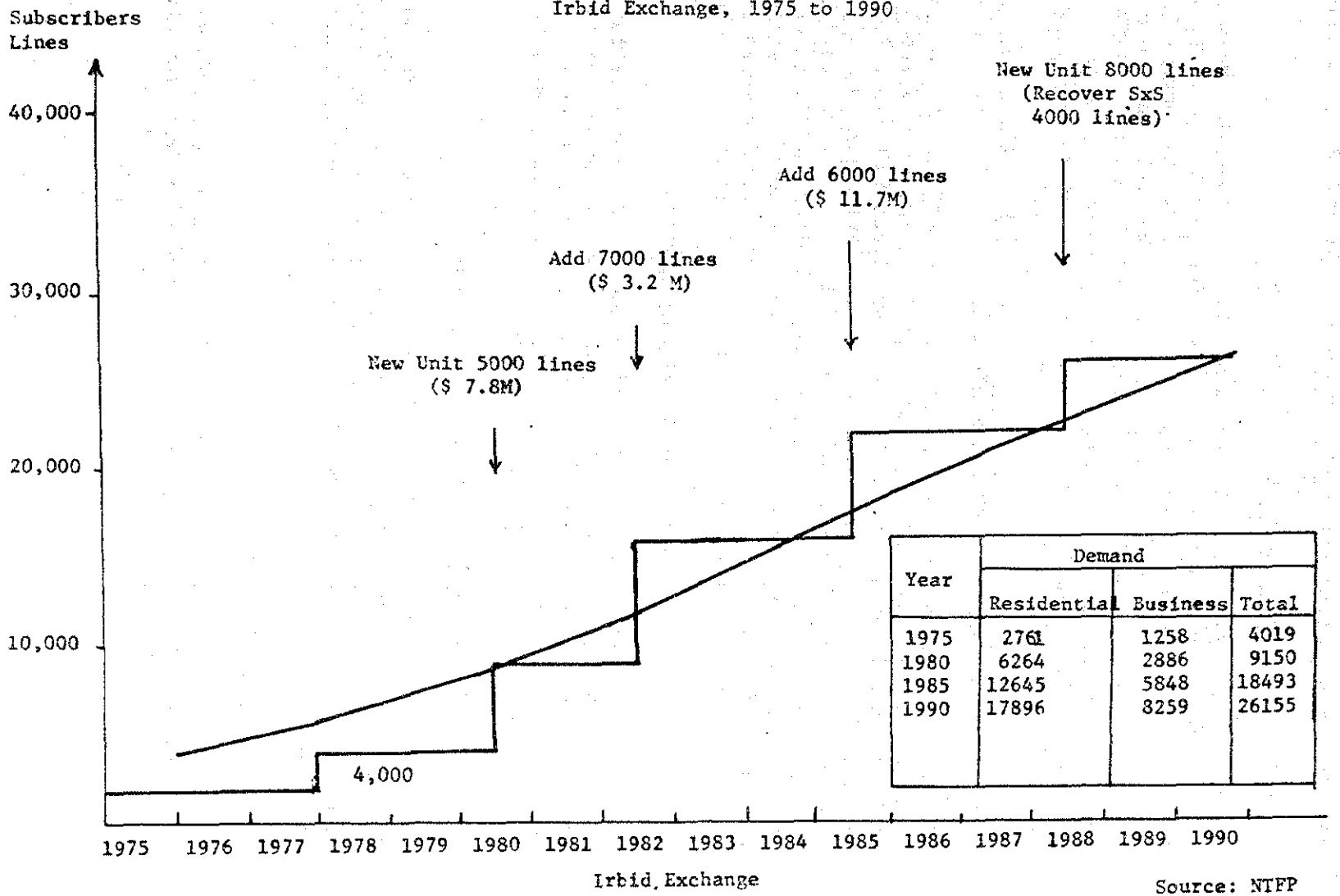
Table 11.2 Demand Projections in Major Cities, Irbid Governorate, 1975 to 1990

(Unit: Subscribers'Line)

Cities	1975	1980	1985	1990
Irbid	4,019	9,150	18,493	26,155
Husn	160	369	632	963
Ramtha	730	1,648	2,888	4,176
Mafraq	512	874	1,448	2,177
Jerash	553	880	1,433	2,327
Ajlun	402	608	834	1,239
North Suna	327	470	677	971

Source: NTFP

Figure 11.8 Demand Forecast & Installed Line Capacity in Irbid Exchange, 1975 to 1990



Year	Demand		
	Residential	Business	Total
1975	2761	1258	4019
1980	6264	2886	9150
1985	12645	5848	18493
1990	17896	8259	26155

Source: NTFP

11.2.5 Projects Proposed in the NTFP

a. Extension Works in Irbid City

11.047 There are now 4,000 subscriber lines in the Irbid Municipality, and a new additional 5,000 lines exchange (FTX: Fetex Exchange: a name of a machine) is being constructed. This new exchange will be expanded step by step to reach 22,000 lines by 1985 when the demand in the area would exceed more than 18,000, and the existing exchange system (SXS: Step by Step Exchange) will be absorbed in the new exchange in 1985. This expansion and improvement works during 1981-85 would cost about JD 4.5 million (see Figure 11.8).

b. System Expansion of Major Towns

11.048 The project aims at meeting the demands in Ramtha, Mafraq, Jerash, Ajlun and Husn by 1985. The additional increase of subscribers lines in each town by 1985 are 4,400 lines in Ramtha, 2,000 lines in Mafraq, 2,000 lines in Jerash, 1,100 lines in Ajlun and 600 lines in Husn. The estimated costs of the these works would be JD 4 million. In addition to this, interconnection facilities of these towns with Irbid through microwave or cable would cost about JD 1 million. Therefore the total cost for the expansion works in major towns from 1981 to 1985 amounts to JD 5 million.

c. Irbid - Amman Route Extension Project

11.049 At present, 253 channels of microwave are available for Amman to Irbid and Damascus. The project will provide an additional 960 channels that can meet the demand for 10 years to come. The project cost is estimated at about JD 0.5 million, and it will be constructed in 1981 through 1982.

d. Rural Telecommunication Project

11.050 The project aims at supplying telephone services to 188 villages in the Irbid Governorate. The expected number of subscribers are estimated to be 7,200 lines and the total cost during the construction period of 1983 to 1985 would be approximately JD 4.2 million.

11.2.6 Investment Program

11.051 On the basis of the National Telecommunication, Fundamental Plan, an investment program during the next Five Year Plan with regard to the Study Area is proposed as shown in Table 11.3.

Table 11.3 Investment Program, 1981 to 1985

(Unit: JD Million)

Project	1981	1982	1983	1984	1985
Extension Works in Irbid City	1.0	1.0	1.0	1.5	
System Expansion of Major Towns	1.0	1.0	1.0	1.0	1.0
Irbid-Amman Route Extension	0.2	0.3			
Rural Telecommunication			1.0	2.2	1.0

Source: Study Team.

CHAPTER XII

URBAN PLANNING
AND
COMMUNITY FACILITIES

CHAPTER XII

URBAN PLANNING AND COMMUNITY FACILITIES

12.1 Introduction

12.1.1 Subjects

12.001 This chapter analyzes the urban development and the community facilities. The urban development covers (1) various aspects of the urbanization for the Irbid Municipality with particular attention to space requirement for the future urbanization, and (2) housing and housing site preparation for the Irbid Municipality and the Yarmouk complex area. The community facilities cover (1) educational facilities for the Study Area, (2) health facilities for the Study Area, and (3) other community facilities whenever they seem relevant.

12.002 As for the housing sector, this chapter will concentrate on housing problems at Irbid and the Yarmouk complex area and on housing site preparation for those areas, while Chapter VIII of Part II concentrates on the housing demand and supply for the entire Study Area and does not deeply discuss the housing site preparation although there are some discussions.

12.003 With respect to the education sector, this chapter mainly discusses the general education, while Chapter IV of Part II mainly discusses the vocational education and training. With regard to the land use sector, this chapter discusses various aspects of the urbanization except for land use regulation, whereas Chapter XIII of Part II discusses exclusively about land use planning and land use regulation both for the entire Study Area and for the greater Irbid area.

12.1.2 Urban Development Study

12.004 In order to solve urban problems and prepare for the future urbanization, studies must be made and solutions must be sought in terms of social, economic and physical aspects including such fields as educational policy, taxation policy or legislative policy. But, in this particular chapter, we confine our efforts within the physical aspects of the urbanization.

12.005 Urban development is studied only for the Irbid area, since (1) Irbid is the largest municipality in the Study Area and the second largest in the East Bank, (2) it is the center of the Irbid Governorate in all aspects, (3) it is growing rapidly and requires planning consideration, (4) other municipalities in the Area are not so significant as Irbid in terms of population and function, and (5) it is recommended for the urban study by officials of the Government.

12.006 Weakness of this chapter lies in insufficient data, partly because the Study was done in a short period of time and partly because the data and maps are not sufficiently available or adequate. Despite this, many attempts were made to investigate those subjects which are thought necessary.

12.2 Present Situation

12.2.1 Urban Development of Irbid

12.007 Figure 12.1 shows locations of major municipalities in the Study Area. There are five major urban centers in the Area:- Irbid, Ramtha, Mafraq, Jerash and Ajlun. Except for Irbid their populations in 1975 were very small. Irbid had a population of 128,000 and the others between 5,000 and 24,000.

a. Urban Problems

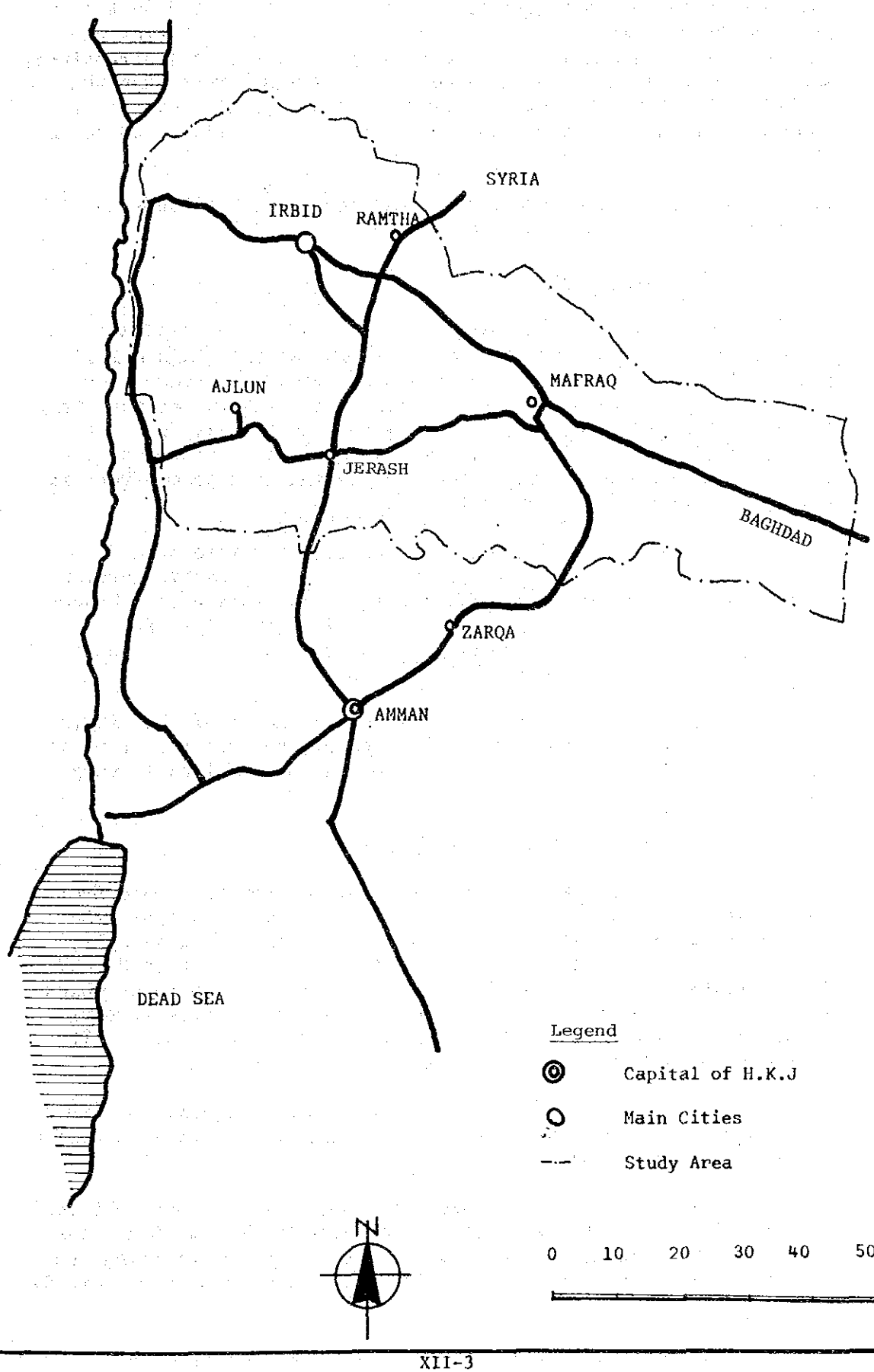
12.008 Urban problems are common in most countries of the World. They are primarily due to the rapid increase of the urban population. Natural population growth, and migration from rural areas into cities account for this increase. This population increase together with the lack of urban planning causes many problems: uncontrolled growth of urban area, mixture of land use, lack of public services including roads, water, electricity, telecommunication, etc., and increase of urban disasters such as traffic accidents. Unfortunately, it is evident that these phenomena will take place in Irbid in the near future, and some of them do exist already.

b. History

12.009 We would like to briefly describe the city of Irbid, using a booklet published by the Municipality in 1973. Hereinafter the "city" means the built-up area of the Irbid Municipality. The existence of the town of Irbid is recorded in B.C. 2300, which is evidence of a very old human settlement. It was called "Arebella" in A.D. 636. Islam governed this area. In 1820, Mr. Johnson, an American traveller, came to Irbid and mentioned its name in his document, but no detail about the town was given.

12.010 Irbid became the centre of Ajlun district in 1910, but the place was made up of just a small village around a small hill(Tell) which exists in central part of the city even now. According to a

Figure 12.1 Guide Map of Cities in Study Area



map made in 1914 (see Figure 12.2) the town concentrated to the north of Baghdad street near the Tell, and its built up area was estimated to be about 10 ha. The town spread out to all directions, and in 1936 built up area was almost three times larger than that of 1924. In 1960 Irbid was not very big compared with cities as Ramtha. Its built up area was estimated to be nearly 1,000 ha in 1967.

12.011 At present however, Irbid has 146,000 inhabitants and is the largest city in the northern Jordan.

c. City Center

12.012 The centre of the city is still between the Tell and Baghdad street. Both sides of Wasfi Tell street (see Figure 12.2 and 12.3) are forming a modern business district. Although there has been many developments and changes in the outskirts of the city, the central part of the city, which is the oldest part, has not been changed much in the past 10 years. Still this district functions as a centre of the city. People and cars concentrate in this part, along the narrow, curved road.

12.013 A one way traffic system is adopted for this area presently in order to avoid congestion. It is necessary, however, to find several effective traffic solutions for this part. Otherwise this heart of the city will not function normally. For example, El Hashimi Street needs to be widened to have adequate capacity and to be extended to the west of the city.

12.014 It might be necessary to renew this heart of the city, but it seems to be impossible at this moment, because this part of Irbid is the densist built-up area and its cost of land is very expensive.

d. Urbanized Area and Density

12.015 The latest city map available at our hand was made from aero-photos taken in 1967, which is more than 10 years ago. The city of Irbid has already been changed since then. For example, the number of inhabitants which was estimated to have been 80,000 is now estimated to be 146,000, and there are many new roads which we cannot find on the map. Fortunately, we will be able to have a map made from aero-photo taken in 1976 in the near future. It should help us to know the physical size of Irbid.

12.016 According to the existing map, the Municipality of Irbid had a municipal area of about 1,000 ha, and more than a half of the area was farm land.

12.017 As for the density, based on the above city area obtained from the 1967 map, the gross population density for built-up area was about 200 persons per ha. It is rather high, considering the fact that almost all buildings in the city were one or two storied.

Figure 12.2 Change of Built up Area and Main Street in Center

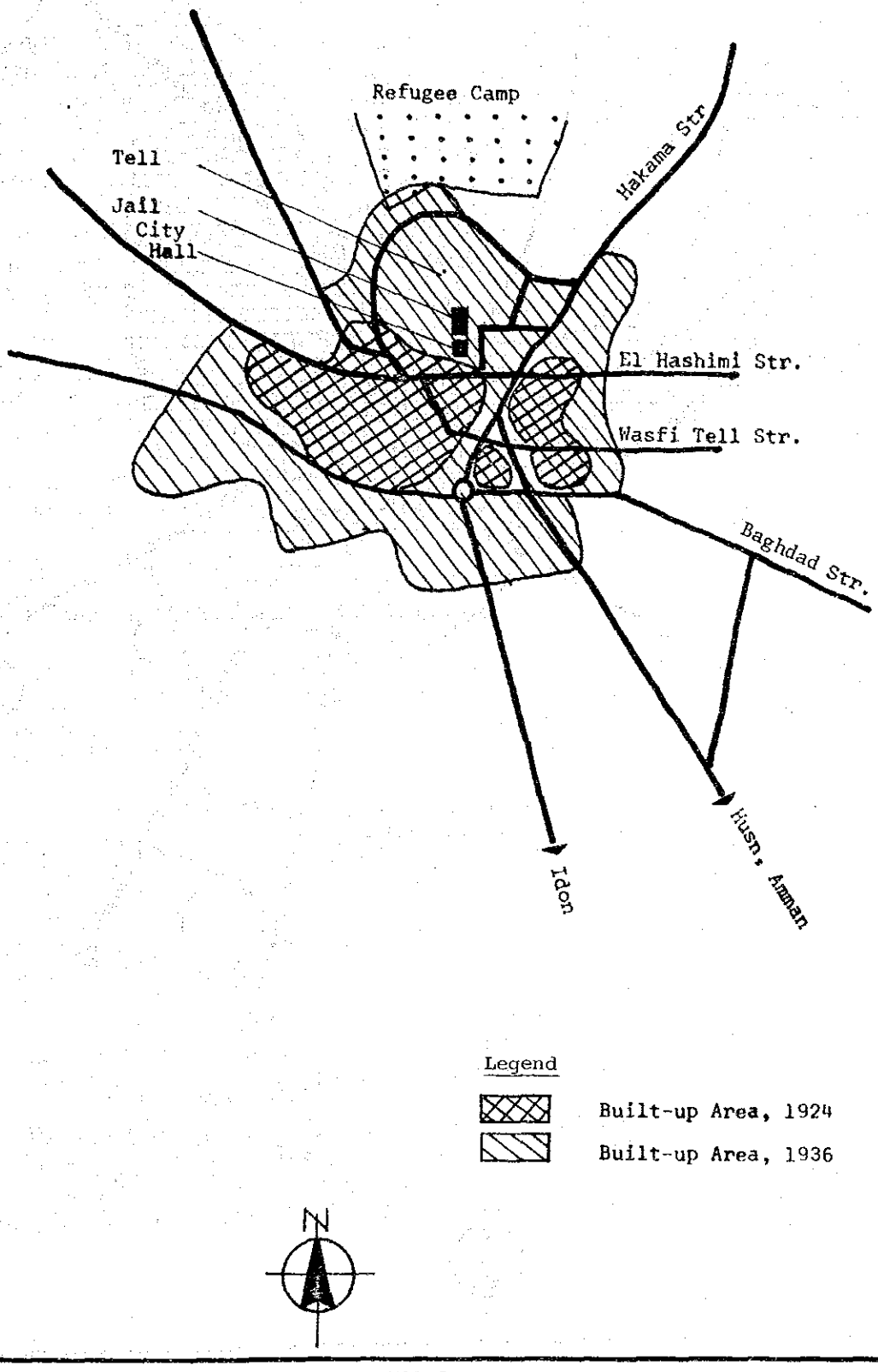
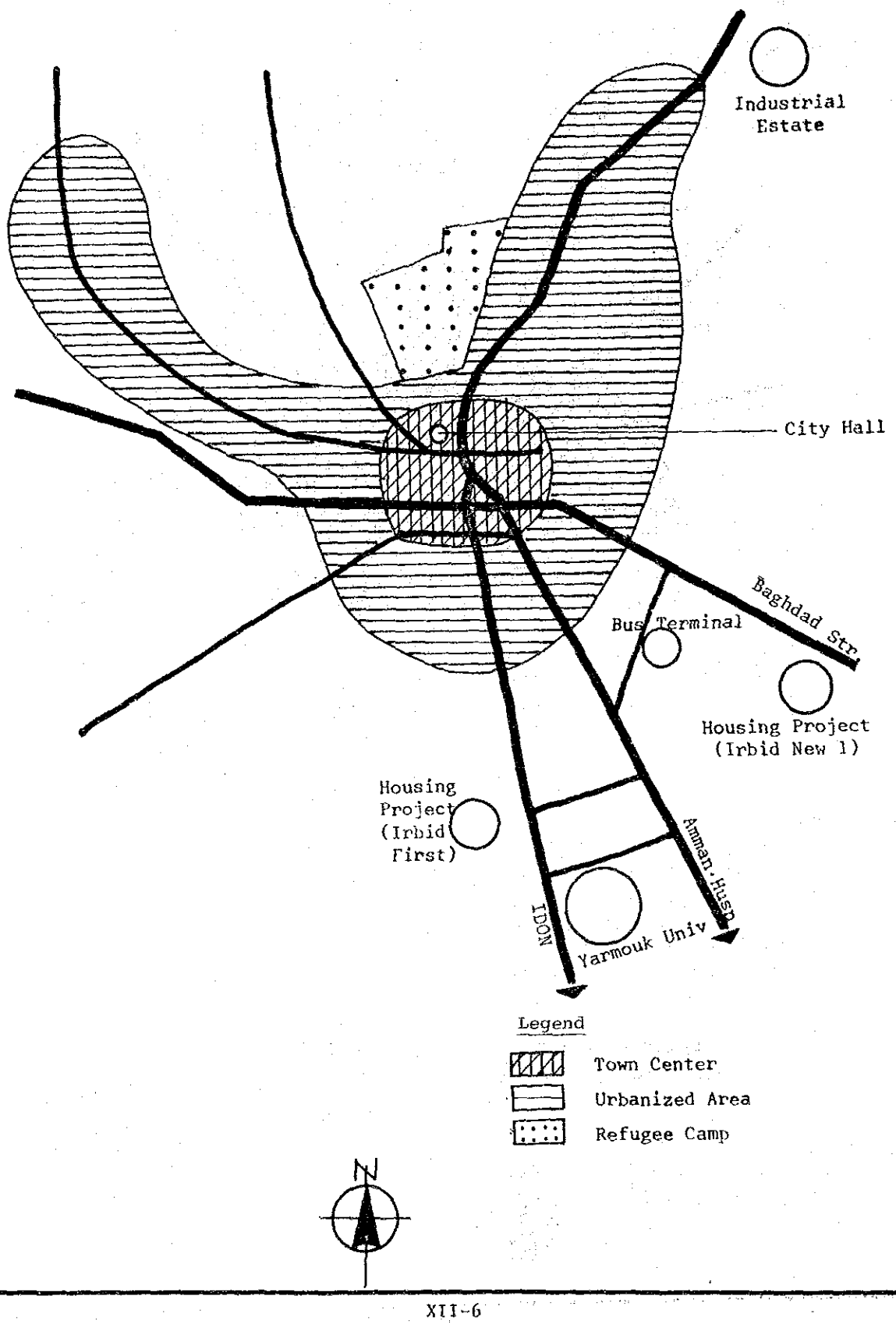


Figure 12.3 Conceptual Map of the City of Irbid, at Present



12.018 There were 45,000 residents in the Municipality of Irbid in 1961, and it had 128,000 residents in 1973, attaining 257 percent growth within 12 years.

e. Uncontrolled Urban Growth

12.019 The urban area in Irbid is spreading rapidly toward the north, east and south. People traditionally have wished to have their own houses, but it is very hard to find land of satisfactory prices. Thus urban area grows to the outside of the city, even though there are many vacant spaces within the urban area. For example, from the interview with the owner of a ball-point pen factory in Irbid, we found out that they had bought the land for their factory 5 years ago. Its cost was JD 600 and now the same land would cost about JD 10,000, which means that the land price has gone up by 17 times since 5 years ago.

12.020 The city center occupies only several hectares, but there are many small shops and small factories mixed together. In addition many people are living there. Even though there are many shops, a linear shopping district is not clearly formed yet.

12.021 There is a Master Plan of the city of Irbid, but it is rather old and seems to be necessary to be revised. There are also land use regulations and building regulations, but they work insufficiently for present Irbid.

f. Lack of Public Services

12.022 Due to the lack of adequate urban planning and the rapid expansion of the low density urban areas, public services in Irbid are not satisfactory. Roads need to be widened and paved, and water and electric services must be improved.

12.023 As for open spaces, there is no public open space and recreational space in the built-up area with high population density. The urbanization seems to have taken place before necessary plan and action were taken for securing public open spaces. Exception is the peripheral areas, where farm land can work as open spaces, but this will soon disappear if there is no public action taken.

12.024 Sports facilities are inadequate, and children's playgrounds are rarely seen. In the central part of the city, children play on the roadsides where many cars pass by.

12.025 Educational facilities in the city are also poorly planned. There are many cases where private buildings are used for elementary or secondary schools. Playgrounds are insufficient, and double or triple shift teaching system is sometimes adopted.

g. Urban Traffic

12.026 Sharp increase in the number of motor vehicles occurred at the same time as the rapid development of the city. The city center has narrow streets, and principal roads gather in the city center. Thus, even traffics not directly related to Irbid have to pass through the center. The result is the congestion and unsafety of pedestrians. Immediate actions for the safety of pedestrians as well as efficiency in traffic flows are wanted.

h. Industrial Area

12.027 There is an industrial estate in the northern part of Irbid, far enough from the congested area, and several factories are operating and some factories are being built. The industrial estate occupies 13 ha and further expansion of the industrial estate to the north is being planned. Two factories at the industrial estate are interviewed by our Team. One of the two factories is the first ball-point pen factory in the Middle East. 42 persons are employed in this factory, built on the lot of 1 ha. The other is manufacturing tubes for electric wiring. The area of the lot is 1,500 m^2 and there are 13 employees. This factory already has a plan for expansion by building another factory a little smaller than the existing one on a different lot in the vicinity.

12.028 According to the Industrial Census of 1974, there were about 1,500 industrial workers in the Irbid "township", although this number is very small considering the population of the "township". A "township" is made up of a city and several villages around the city. There were 11 factories with more than 5 workers in 1975, and the total number of workers in these factories was 72, indicating 6.5 workers per factory.

12.029 This tendency, that only a few workers are employed in each factory, has not changed. There are more than 300 factories in Irbid as of 1978, but most of them are still small, according to the Irbid Chamber of Commerce, only 33 of them have more than 5 workers.

i. Commercial District and Business District

12.030 The business district of Irbid stretches itself in a linear shape along the principal road, starting around the centre of the city. Even though it spreads into the side streets in certain places, it is still not possible for the business facilities to occupy the entire street, being far from a typical linear business area where side roads are for different uses. In this sense, what is usually called a Central Business District (CBD) does not exist in Irbid. In terms of population, however, it is estimated that Irbid has more than 200,000, including the surrouning areas, and thus its potentiality to create the CBD is high. Establishment of CBD through gradual conversion of land use of the central district seems quite probable.

12.031 Commercial facilities gather on the street sides around the intersection of two National roads, one to Mafraq and the other to Amman. Particularly in the square shaped area with one side of 300 m on the north of the intersection, it forms a commercial centre. The commercial facilities selling urban products has not developed to specialize the entire district for such purpose, and they coexist with the commercial facilities selling rural products such as vegetables.

12.032 Besides the fact that commercial facilities selling rural products lie scattered around the principal roads, local farmers are selling vegetables and fruits on the sides of the suburban roads.

12.2.2 Housing at Irbid

12.033 Very few data is available about the housing stock in the city of Irbid. Based on the data on new construction, the housing stock in the Irbid Mutserfieh is discussed in Chapter VIII of Part II. This section will discuss (1) the activities of the Housing Corporation at Irbid and (2) development cost of housing and housing sites in the area.

a. Activity of the Housing Corporation at Irbid

12.034 We have visited several housing project sites by the Housing Corporation, three in the suburbs of Amman and two in the suburbs of Irbid. All of them were of a small scale with less than 1,000 houses each. The basis data of these 5 projects along with other projects by the H.C. are presented in Table 12.1. The two in Irbid are the Irbid First and the Irbid New One.

i. The Irbid First

12.035 This is the first project by the H.C. in the Study Area, built in 1970 to 1971, located between Irbid and Idon. This is for low-income groups with 98 units. Housing types are one-story rowhouses. There are three types of units: $73m^2$, $73m^2$ and $53m^2$. Three households one from each type are visited, and they have family members of 13, 13 and 10. All three had moved from small rental houses in Irbid to this project. Their main motive was to purchase their own housing. This strong desire to own a house with a land is said to be very common among people. It is a kind of tradition in the Country to own a house with a land, even though the land might be small. But, generally speaking, it is obvious that multi-storied apartment houses can accommodate more households than the rowhouses. And, the low-income housing will and have to move toward this direction, particularly at the places where land cost is high.

ii. The Irbid New One

12.036 This is a middle-income housing project, located to the southeast of Irbid near the highway to Husn, and being under

Table 12.1 Basic Indicators of Housing Projects by the Housing Corporation, 1978

Name of Project (Year of Const.)	Income Group	Area of Site(ha)	No. of houses	House-type (Stories)	Floor area per unit (m^2)	Lot area per unit (m^2)	Const. cost at contract (JD/unit)	Cost per m^2	Down payment	Monthly payment	Family size Parent + Children + other (number of rooms)
Al-Quassmeh (1970-1972)	Low		167	One Storey A	83	147	?	?	?	?	2+6 = 8 (4)
				Row-house B	174	144	1,600 JD	22JD	163 JD	9 JD	2+7+2 = 11 (4)
				C	Smaller than B	?	?	?	?	?	(3)
Irbid First	Low		98	One Storey Row house I	73	100	1,658	19	165	9	2+11 = 13
				II	53	75	1,253	19	125	7	2+2 = 4
				III	53	61	1,176	19	117	6.6	2+8 = 10
Al-Hashimi (1974-1976)	Low		?	Flat (3)	?	n.a.	?	?	?	?	2+7 = 9 2+6 = 8
Marka (Stage I under construction)	Low	12.7	708	Flat (3)	73	n.a.	3,500	40	350	12-15	estimated to be 6
(Stage II to be constructed)	Low	11.0	294	Flat	↑	n.a.	↑	↑	↑	↑	↑

(To Continue)

Table 12.1 (Continued)

Name of Project (year of Const:)	Income Group	Area of Site(ha)	No. of houses	House-type (Stories)	Floor area per unit (m^2)	Lot area per Unit (m^2)	Const: cost at contract (JD/Unit)	Cost per m^2	Down pay-ment	Monthly payment	Family size Parent+Child-ren+other (number of rooms)
Marj Al-Hamman (Partially under-Construction)	Middle (For teachers)		114	Flat	120		7,000	58	600	35	2+3 = 5 average will be 6 (5)
Irbid New (Partially under construction)	Middle (For teachers)	2	90	Flat (3)	115		6,200	33	620	55	For teacher 2+3 = 5 (5) For girl students (5) 12
Al-Hussein (1970)	Middle		240	Flat (3)	?		?	?	?	?	?
	Higher		300	Flat (3)	174		5,086		510	29	2+2.5 =4.5
Private House (under constr-uction)	High		1	detouched house	(250?)	750	?	100	?	?	?

(To Continue)

Table 12.1 (Continued)

Name of Project Year of Construction	Occupation of House-type	Family-JD/month Income	Water Consumption per family	Electricity Consumption per Family
Al-Quassmeh	Public Officer	?	?	?
(1970-1972)	?	?	?	?
	?	?	?	?
Irbid first	Butcher		167 l/day	72 Kwh/month
(1970-1971)	High School Teacher	80	270 l/day	80 Kwh/month
	Public Officer		400 l/day	100 Kwh/month
Al-Hashimi	Military Officer	60	460 l/day	100-110 Kwh month
(1974-1976)				
Marqa		Estimated to be 60-80	Estimated to be 30-40 l/day	
(Under construction)				
Marj Al-Hamman	Teacher	120	400 l/day	?
(Partially under construction)				
Irbid new	Univ.teacher	?	1000 l/day	4 kwh/day
(Partially under Construction)			?	?
Al-Hussein	?	200	?	?
(1970)	lower	300	?	?
Private House (Under construction)	?	?		

(To Continue)

Table 12.1 (Continued)

Name of Project Year of Construction	Heating Source: Cooking	Heating Source: Hot Water	Heating Source: Heating	Car	Others
Al-Quassmeh (1970-1972)	Propane	Kerosene	Oil Stove	About 50 cars in whole project.	Many houses are changed inside by owners. They built additional room by themswlves
Irbid first (1970-1971)	↑	↑	↑	About 8 cars in whole project.	Trees grow, and their leaves cover their houses
Al-Hashimi (1974-1976)	?	↑	↑	?	
Marka (Under construction)	?	Kerosene	?		Pre-cast concrete panel construction is used here to build Apartment houses. Primary school will be built in the site in the future
Marj Al-Hamman (Partially under construction)	Propane	Kerosene	Oil Stove	One car parking lot per family	There will be primary, preparatory and high school in this project. Kindergarten also will be built.
Irbid new (Partially Under Construction)	↑	Electricity and Solar Energy	Electricity and Solar Engery	↑	Univ. asked to put electric and solar equipment for hot water supply and heating additionally.Also all houses are furnished by Univ.
Al-Hussain (1970)	? City gas	? Kerosene	? ?	?	
Private House (Under Construction)	?	?	?	?	Land cost was 10 JD/m^2 4 years ago,now estimated 20 JD/m^2

Source: Collected by the Study Team through interviews.

construction. This has 15 three-storied apartment buildings, each of which has 6 units, totaling 90 units. This is for students and faculty members of the existing Yarmouk University. This project uses solar energy and electricity as the heating source.

iii. Parking Space

12.037 Estimation of the parking space is one of the problems in housing development. In the Irbid First, there are 8 cars for 98 families, while in a project near Amman, there are 50 for 167 at present. According to the H.C. officials, they assume one car per three families or one per 20 persons at present.

iv. The Five-Year Plan by the Housing Corporation

12.038 In the current Five Year Plan by the Housing Corporation, three projects are planned for the Irbid city area. The first is the Irbid New One. The second is the 200 unit project to cope with the population increase probably for the faculty members of the Yarmouk University. The third is the 200 unit project for the workers for industrial development.

b. Housing Cost and Site Preparation Cost

i. Housing Cost of the Housing Corporation Project

12.039 A standard 3 storied house of 83m^2 for middle income group would cost 45 JD/m^2 in Irbid without the land cost in 1978, which is about 20 percent lower than that in Amman. The ratio of the labour cost to the material cost is about 35 to 65, and the cost for imported materials is estimated to be about 5% of the total construction expenses. According to the interviews with site inspectors and constructing engineers, approximately 80% of the construction materials for housing in the Irbid Municipality are produced around the city.

12.040 The construction cost alone is about 40 JD/m^2 in Amman for a house of 50 JD/m^2, assuming that the infrastructure cost would be 10 JD/m^2 of the floor area in 1978. (The cost for a house with stone tiles on the outer surface would rise by about 10 JD/m^2.) Based on this Amman data, the construction cost alone in Irbid, would be estimated to be about 30 JD/m^2.

ii. Site Preparation Cost

12.041 The Housing Corporation often uses Government owned land for its housing development, then the financial cost of the land is zero. There is, however, an example of land cost. In the western area of Amman, a private housing site in the residential area recently cost 17 JD/m^2.

12.042 As for the site preparation cost, a site preparation for housing on a privately owned land would cost about 5 to 10 JD/m^2 in Irbid, and 7 to 25 JD/m^2 in Amman.

12.043 According to the H.C., the average cost for site preparation, i.e., infrastructure and community facilities preparation (which includes road around the housing lots, water supply and drainage, children's playground, police office, elementary school, etc.) is approximately 1,000 JD per unit at present.

12.044 According to Human Settlement in Jordan published in December 1975 by the H.C., the cost for infrastructure and community facilities preparation per unit for large-scale housing project was estimated to be 550 JD/Unit. The details are as follows:

Item	Unit Cost (JD/Unit)	Detail
Street	75	75 m^2/unit, 1 JD/m^2
Water Supply	60	40m /unit, 1.5 JD/m
Sewage, Septic Tank & Loss Poll	200	
School	100	Student: 27% of Population, Family size: 6, 1.57m^2/student, 40 JD/m^2
Market	30	1m^2/6 persons, 30 JD/m^2
Local Gov. Building	70	Police, Post Office, Council, Clinic and Library. Land are: 400 m^2/100 unit, Building floor area:200m^2/100 unit, 35JD/floor area m^2 (including land cost),
Recreational	20	
Total	555	

But, according to the recent data, this cost has been raised to almost double, and now it is estimated to be about 900 JD/unit in 1977.

12.045 Another source says that a public housing built at 100 JD/m^2(floor area) is about the average in the suburbs of Amman recently. And this unit cost seems to include all the costs of land, site preparation and construction.

12.2.3 Community Facilities

a. Educational Facilities

i. Jordan in General

12.046 The educational level of Jordan is relatively high among the Arab nations. According to the Statistical Yearbook (1976-1977), there were 2,432 schools including 775 in the Irbid Governorate and 618,673 students at the end of 1977, showing a 7.1% increase compared with the end of 1976. The number of teachers had risen by 8.5%, and it was 21,514 in 1977, 1,919 of the total number of schools are public, and the students in those schools account for 68.7% of the total number of students. A large number of children are receiving compulsory education, and the rate of attendance to elementary and preparatory schools is nearly 90%. Many of schools rent places for education. Rented schools account for 56% with girls' schools which is higher than that with boys' schools.

12.047 The educational system is presented on Figure 12.4. Tables 12.2 and 12.3 show school attendance ratio by age (6 to 22), sex, and educational level in 1977. Two numbers suggest maximum and minimum ratios of children in that age bracket and receiving education.

Table 12.2 Rate of School Attendance, East Bank, 1977

Age	Male	Female	
6-11	82-95.1%	78-89%	Elementary School
12-14	78-84 %	63-78%	Preparatory School
15-17	54-67 %	39-50%	Secondary School
18-22	6-34 %	1-23%	University

12.048 In Jordan as well as in the Arab countries, it is common for boys and girls to go different schools until university. Male teachers teach in boys' schools and female teachers in girls'. Teaching is therefore one of the most important occupations for women.

ii. Kindergartens and Nursery Schools

12.049 There are 143 kindergartens in the country in 1977. A little more than 100 of them are found in Amman, Zarqa and Balqa. There are 13 in the Irbid Municipality, and 22 in the entire Irbid Governorate. They are not common yet, and the attendance rate is rather low (5.3%). For example, there is a plan to establish a kindergarten in Marj Al-Hamam, one of the projects in Amman by the Housing Corporation, but because of the small number of children and the objections from the neighbours anticipating the noise, it

Figure 12.4 Educational System, Jordan, 1978

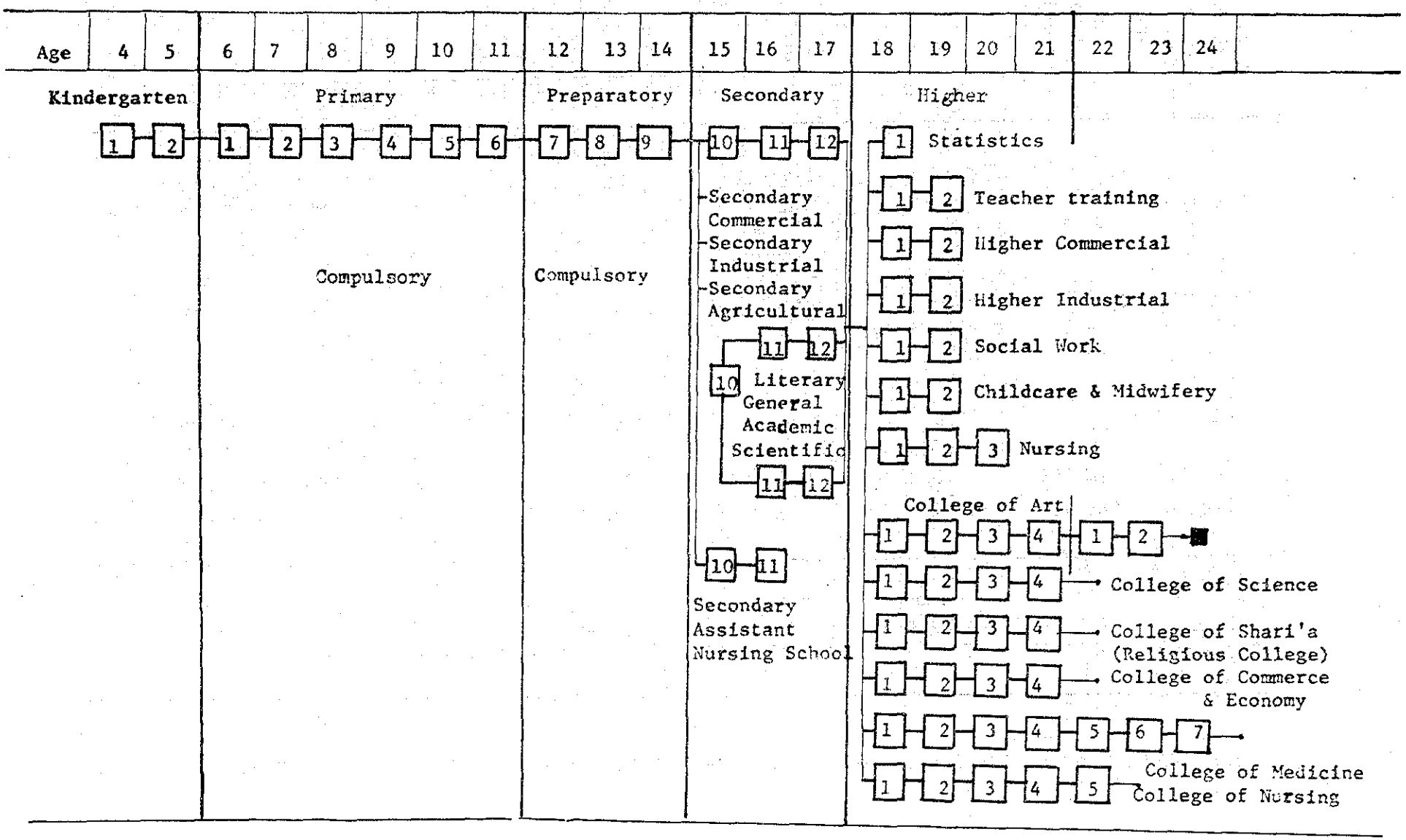


Table 12.3 Rate of Attendance, and Number of Students by Educational Level and Sex, East Bank, 1977

		Kindergarten	Elementary School	Preparatory School	Total of Compulsory Education	Secondry School	Beyond High School
Overall	No of students	14,319	366,827	135,472	502,299	74,993	20,223
	Total Population	221,989	412,502	176,516	589,018	140,863	156,292
	Rate of Attendance (%)	6.5	88.9	76.7	85.3	53.2	12.9
Male	Rate of Attendance (%)	7.0	92.1	81.1	89.0	61.5	16.9
Female	Rate of Attendance (%)	5.9	85.5	71.3	81.3	44.6	9.1

Source: The Statistical Educational Yearbook, 1976 - 1977.

has not been actualized. The future of kindergarten is not made clear in the Educational Five Year Plan (1979 to 1983), but it is expected to become widespread, and to become more popular even in the rural communities. At present, there is no public kindergarten.

12.050 Nursery schools are even less popular. There are only several private nursery schools in Amman, but they are expected to become popular.

iii. Elementary Schools

12.051 There are 1,123 elementary schools in the Country, and the number of students totals 402,401. 319 of those schools are in the Irbid Governorate, and there are 115,876 students. Rented schools amount to about 70% of the schools in the entire Country.

12.052 The rate of receiving elementary school education is quite high. Especially in the cities, the rate is close to 100%. Compulsory education is up to preparatory school level and the scale of both elementary and preparatory schools vary considering the distance from childrens' homes. But most of them are very small. Because of the insufficient number of schools, a double shift system is sometimes adopted. In some cases, a school is used as an elementary school in the morning and as a preparatory or a high school in the afternoon.

12.053 The number of students per classroom is usually between 35 to 40, and the average of the country is 35.2. The standard size of a classroom including that of a preparatory school or high school is $48m^2$ (6mx8m). Because of the significant difference in children's growth stage by age, to arrange a lower elementary school for grades 1 to 4 is being considered.

12.054 As previously stated, schools are generally very small, and many of them use ordinary buildings which are not designed specifically for school use. The fact that the school sites are small and have only few classrooms are often found in the Arab countries. The Ministry of Education is aiming at arranging 0.8 ha lot for schools in urban areas, and 1.0 ha in rural areas with less than 24 classes, as a general standard.

iv. Preparatory Schools

12.055 There are 859 preparatory schools in Jordan and 335 of them are located in the Irbid Governorate. The number of students are 124,982. The standard of school buildings is same as that of elementary schools. While one teacher per class is common in elementary schools, it is between one and three for preparatory schools.

v. Secondary Schools

12.056 The number of secondary schools totals 259 in this country. 150 of them are for male students, 97 are for female students, and 12 are for both. There are 53,171 students in total. In the Irbid Governorate, there are 99 secondary schools and 14,120 students. The percentage of rented schools is 31% in the Country.

12.057 The rate of attendance of male and female children are both quite high, and they are 61% and 45% in 1976 respectively. The overall rate is also quite high, and it is expected to rise even higher. The average number of teachers is 1.6 per class, and the standard area for a school is about 3.0 ha, showing that adequate space for exercise is secured, and gymnasiums will be provided. The average number of students in one class is currently 23.7.

12.058 Educational background of a secondary school level is not necessarily advantageous in Jordan recently, and hence many youths desire to receive higher education.

12.059 For areas with small population to organize a "central secondary school" for several villages is being discussed. A bus system or boarding facilities would be arranged for those coming from afar, and a public financial aid for those systems is considered.

vi. Secondary Vocational Schools

12.060 There are 14 vocational schools in whole Country. They are 6 commerce, 2 agriculture, 3 industry, 1 women education and 2 nursing schools. The total number of students is 7,647. Commercial schools have 3,692 students and industrial schools 2,752. About 28% of the students are female. 2 schools are rental.

vii. Other Schools

12.061 There are 6 schools for the handicapped and orphans in Jordan. They have 538 students. There is one school for the blind, which has 78 students, and 2 schools for the deaf and the dumb with 222 students. There is a vocational training school for the handicapped, an orphanage school and a maladjusted children's school.

viii. University and Other Higher Education

12.062 There are 11 teachers training institutes in Jordan, and 6 of them are for male. There are 7,006 students, out of which 4,283 are male. There are many other higher education facilities such as commercial institutes, and nursing, midwifery and medical profession institutes.

12.063 About 6,000 students go to the University of Jordan in Amman, and 2,000 to the temporary facility for the Yarmouk University in the Irbid Municipality. The total number of university students is about 9,000. Approximately 45,000 students are studying at universities abroad, and even if the Yarmouk University admits 21,000 students, the size of university services is not sufficient. It therefore seems necessary to construct the third university in the south of Jordan.

ix. Yarmouk University

12.064 The Yarmouk University was organized in the Irbid Governorate, the second largest governorate after Amman, in order to decrease the problem of university shortage. Its final scale is supposed to be larger than that of the present University of Jordan, it is expected to become one of the major educational and cultural centres in the north. A temporary campus for the departments of science and arts has already been established to the south of the Irbid Municipality. The number of students at present is approximately 2,000, but it is expected to increase to approximately 3,000 by the end of 1978.

12.065 The full scale construction of the campus at its permanent site is not yet in progress. But there is a plan for the new site, which is as follows: It is located near the intersection of two arterial roads approximately 14 km to the east of the Irbid Municipality (see Figure 12.5). It occupies about 10 km^2 along the principal road from Ramtha to Amman. The site measures 1.5 km from east to west and 7 km from north to south. The construction work for the first part of the University, which is an Industrial Center, is soon to start.

12.066 The final scale of this University is to include 30,000 persons (21,000 students and 9,000 faculty members). An industrial centre is planned to be built on a 35 ha lot in the Yarmouk University. Furniture and material for constructing the University will be manufactured here, and it will also be used for the practical training of the students. It is planned to include a sport centre with a stadium (with 40,000 seats, indoor and/or outdoor swimming pools, etc.) and a medical centre with 600 beds. A bus service to and from Irbid is also considered. Boarding facilities for about 50 percent of both (1) the students, and (2) faculty members, staff members, and their families are planned to be built on the campus. 1/

12.067 According to a pamphlet published by the University, the construction of the University is planned to be completed in three stages, each of which is comprised of 10 years. But according to the president of the University, the entire University is planned to be completed within 10 years from now, being expected to be completed around 1990.

1/ See next page.

1/ The Education and Higher Education Committee for the Irbid Region Planning Study of the Jordan Government has the following opinion on Yarmouk Univeristy:

According to the academic expansion plan of Yarmouk University, the University will comprise in its permanent campus the four following Faculties: Sciences and Arts; Engineering; Medical Sciences; and Agriculture and Veterinary Medicine; as well as a Computer Center.

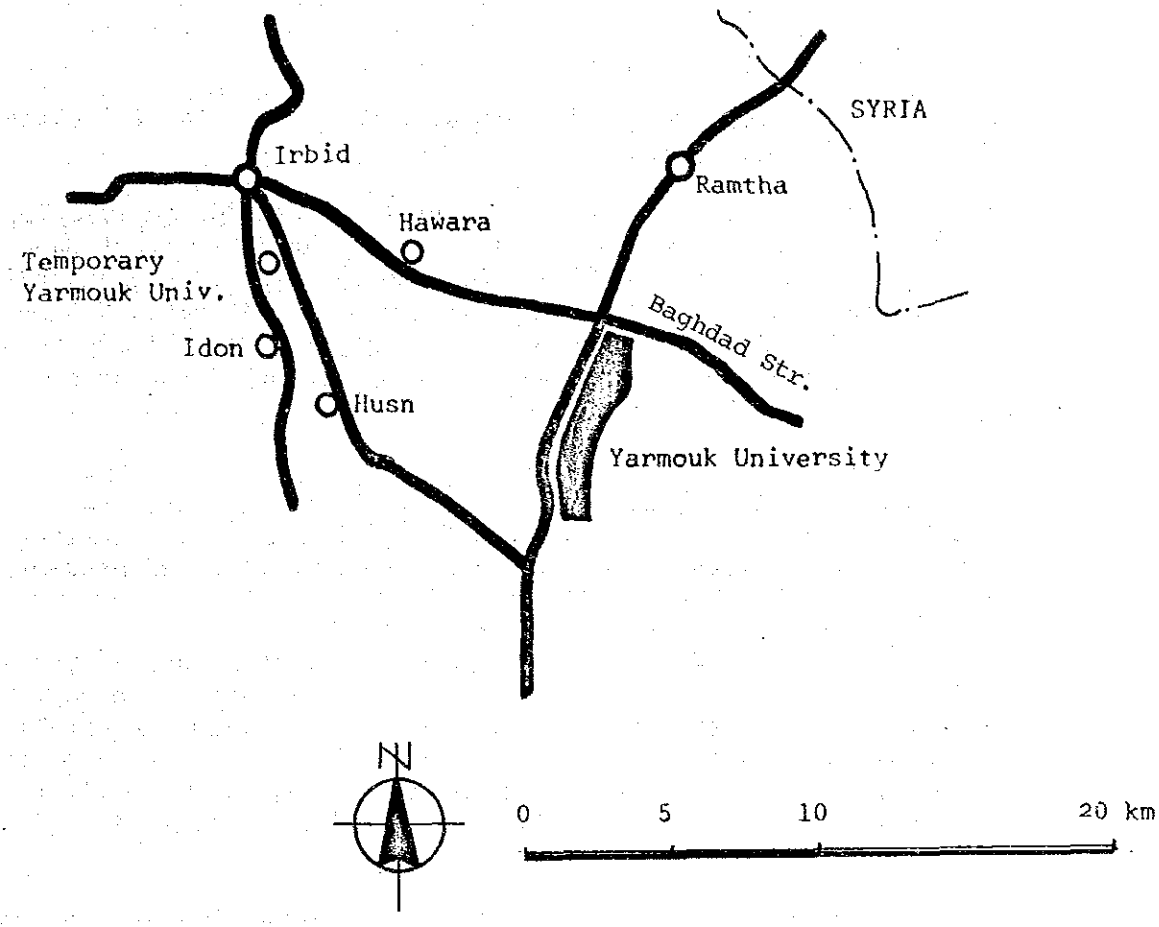
When fully developed, the University is expected to admit 4,000-5,000 students a year. The construction of the Faculties of Engineering, Sciences and Arts and Medical Sciences in the permanent campus is expected to be completed by 1985 and that of the Faculty of Agriculture and Veterinary Medicine by 1988.

Yarmouk University admitted in the present academic year (1978-1979) 389 men and women students from among school leavers from the various areas of Irbid Region holding the Secondary Certificate, i.e. 56 percent of all students admitted into it in the same year. The University of Jordan also admitted 533 students from the Irbid Region i.e., 20 percent of all those admitted to it in the same year. If these percentages are to become fixed, Yarmouk University and University of Jordan are expected to admit 800 and 600 students respectively in 1980/81, making a total of 1,400 men and women students from the Region. When comparing this number with the number of those from the Region who will be seeking university education in the same year (2000 men and women students, according to Appendix E), we realize that 600 students would not be able to complete their studies inside Jordan because of the shortage of places.

This situation will continue as time goes on to 1985. Yarmouk University is expected to admit 2,500 students from Irbid Region. While the University of Jordan will be expected to admit 800 students from the Region in the same year, making a total of 3,300 men and women students. When comparing this number with that of those from the Region seeking university education in the same year (3,800 students) we find that about 500 students from the region will be deprived of university education because of the shortage of places for them or will resort to study abroad.

In view of all that, the committee is of the opinion that the scheme for evening studies which Yarmouk University intends to carry out can provide the opportunity of university education for these extra numbers of students, at the same time eliminating the need for study and securing university degrees as external (non attending) students from universities which allow that.

Figure 12.5 Location of Yarmouk University



12.068 The number of students studying in the present campus is expected to reach 5,000 within several years. Along with the increase of the number of students, the campus of approximately 70 ha at present will be enlarged to about 150 ha, which is the final size of this temporary campus. The University will move to the permanent campus during the third stage, and the facilities on the temporary campus will be left to be used by the two-year community college attached to the Yarmouk University.

12.069 The construction cost is estimated to be about JD 100 million at 1976 prices.

x. The Study Area

12.070 The Study Area is divided into five educational districts: Irbid, Jerash, Ajlun, Ramtha and Mafraq.

12.071 Compulsory and secondary schools totals 807 in 1977/78, 723 of them are under the administration of the Ministry of Education and 144.804 students (79,118 boys, 65,686 girls) are attending at these schools. In addition, there are 53 UNRWA(United Nations Relief and Work Agency) schools with 25,385 students (13,705 boys and 11,620 girls), and 31 private schools with 6.049 students (3,186 boys and 2,861 girls).

12.072 There is an industrial secondary school (with 520 students, a vocational training centre with 184 students, two commercial schools with 441 boy and 252 girl students, a nursing section with 69 students and two sewing centres with 122 students in the Irbid educational district.

12.073 There are a teachers training centre in Hawara (607 boy students), a commercial secondary school in the Jerash Municipality (56 boys), a vocational training centre in the Jerash Municipality (56 boys), a vocational training centre in the Mafraq Municipality (54 boys), a sewing centre in the Mafraq Municipality (18 girls) and a women teacher training institute in the Ajlun Municipality (756 students).

12.074 The Ministry of Education is not responsible for educating the Bedouins. Instead, the Army has taken over the duty, and offer education moving by car along with the Bedouins.

b. Health Facilities

12.075 Health services aim at maintaining and improving the people's health through controlling diseases and epidemics, and providing treatment services.

12.076 They have two functions. The first is to provide preventive hygiene services, including (1) maternity and child care, (2) student health care, (3) protection from environmental pollution,

(4) health education, etc., which are done by "health centres." The second is to provide (1) curative treatment services and (2) emergency services, which are done by general hospitals and specialized hospitals and facilities. According to the statistics on medical services in Jordan, the health system in Jordan has improved remarkably in these few years. According to the part of M.O.H. in the Five-Year Plan by N.P.C., in 1975, there are 189 village clinics, 28 health centres, 39 maternity and children care centres, 6 tuberculosis clinics and 4 malaria eradication centres. Nevertheless, the accomodation capacity of the hospitals has kept up with population growth. But the medical services have not yet covered the distant areas away from the hospitals.

12.077 General health conditions according to the statistics in the Annual Report by the Ministry of Health in 1976, there are 11 Governmental hospitals and 18 private hospitals in Jordan. Altogether they have 1,998 beds, attaining approximately 1 bed per 1,000 population in 1975 according to the current Five-Year Plan document. Usually in developed countries, there are nine beds per 1,000 population. There are 366 clinics, of which 332 are Governmental. There are 818 Government physicians, 389 private sector physicians and 29 UNRWA physicians, 244 dentists (100 Government dentists), 215 midwives (193 Government), 718 nurses, 368 pharmacists working in those hospitals and clinics. About 25 percent of the doctors are working in private facilities. Generally speaking, these statistics indicate that the present health services in Jordan is very well. We can show typical international comparison in Table 12.4.

Table 12.4 Number of Health & Medical Persons per Each 10,000 **Population in 1974.**

	Physician	Dentist	Midwife	Nurse
Jordan	4.1	0.7	1.8	9.8
U.S.S.R.	29.7	4.0	n.a.	47.0
U.S.A.	16.5	5.1	6.3	63.7
U.Kingdom	13.1	2.9	2.8	35.7
France	14.7	4.8	5.7	53.6
Germany	19.4	5.1	4.5	35.9
Japan 1/	11.5	3.6	6.6	30.2
Egypt 1/	4.3	0.7	2.0	2.2

Note: 1/ Data were in 1973.

The Ministry of Health is trying to set up a health centre network in rural areas. It has actually already started, with three

types according their size. In this network, one health centre has many activities such as (1) the health advisory service for the people, (2) checking of the health situations of their districts, (3) first aid, (4) extending of health and hygienic knowledges to the people by using various booklets, posters, films, and etc. At the village level, there are several health stations with nurses, which are branch levels of a health center.

12.078 The typical diseases in Jordan are reported by the Ministry of Health. The highest death rate are caused by cardiovascular, pneumonia, and gastrointestinal disease. There are also many cases of mumps and measles.

12.079 Health facilities in the Irbid Governorate are relatively poor compared to Amman region in terms of numbers (see Table 12.5).

Table 12.5 Comparison of Health Facilities

	Whole Jordan	Amman Gov.	Northern Gov.
Population (Persons)	2,018,407	1,138,860	581,521
Population Share(percent)	100	56	29
No. of Hospital	25	15	4
No. of Beds in Hospital	1,998	1,214	428
No. of Clinics	366	99	108

Source: Annual Report 1970-1976, the Ministry of Health.

It is also reported that Irbid region is characterized by many tuberculosis cases. There were 309 tuberculosis patients in the whole Country, of which 185 were in the Irbid Governorate.

c. Recreational Facilities

12.080 The following points can be noted regarding the recreational facilities. Kinds of popular recreation in Jordan are summarized as in the following:

Target Population	Indor				
	T.V.	Visiting	Family Circle	Hobby	Others
Pre-school Children			✓		✓
Elementary/ Preparatory School Children	✓		✓		
Youth (Male)	✓	✓	✓		
Youth (Female)	✓	✓	✓		
Adult	✓	✓	✓		

Target Population	Outdoor				
	Sports	Picnic Drive	Tearoom Club	Movies	Others
Pre-school Children		✓			✓
Elementary/ Preparatory School Children	✓	✓			
Youth (Male)	✓	✓	✓	✓	
Youth (Female)		✓			
Adult	(✓)	✓		(✓)	

Televisions have been wide spread as a main indoor recreation. Watching television is increasing in taking up a large portion of one's spare time. Due to this tendency, going to the movies is decreasing.

12.081 In regard to women including housewives, one of the most popular forms of recreation is to visit each other and to have conversations. Unlike the male youth, having tea in teahouses is not seen. Sports are important recreation. Football is the most popular, but tennis, swimming, pingpong, handball, basketball, etc. are limited to very few number of students. Golf is rarely played. This fact implies the lack of sports facilities. It might be needed to provide more of them. Due to the wide spread

possession of cars, going for a picnic by car is becoming popular. The number of cars per family is few in the entire Country, but in Amman or municipalities in the north about one in every three families owns a car. On holidays, many families enjoying picnics are seen in the shade of trees near the cities or in woodlands such as Dibbin National Park. Those places are very crowded and rearrangement and improvement of facilities are necessary.

12.082 For children, who have much spare time, recreational facilities play an important role.As previously stated, however, school playgrounds are insufficient, and there is no adequate facilities for children's playing purposes. Children are often seen playing on narrow roads of residential districts, rotating loops, riding bicycles, and baby-sitting seemed to be common among them. In rural areas, many children were seen working for housekeeping, for example, watching sheep, or carrying water. There are some housing projects by the Housing Corporation that include playgrounds for children in them, but it is not common yet. Even though the importance of children's playgrounds is recognized, spaces for children's recreation is not generally arranged to bring down the unit cost. Improvement of this situation is strongly hoped.

12.3 Evaluation of Present Situation

12.3.1 Urban Environment

12.083 Urban development and community facilities provision are vital in achieving better living environment for citizens. There are 4 elements in order to evaluate living environment of the city. They are: safety, health, convenience-and-efficiency and amenity.

12.084 We can check the present situation by using these criteria. As for safety, car traffic has been causing serious problems in the Irbid City. The most noticeable is the fact that the pedestrians are not safe.

12.085 With respect to health, the Irbid city cannot be said to be good. Houses gather in the central part of Irbid, and this causes the lack of open space for children, and the lack of adequate sunshine into the rooms during wintertime. Sport facilities, water supply and hygienic conditions are unsatisfactory. These findings help us to conclude that the present health condition is inadequate.

12.086 There exist the lack of public services such as road service, drainage, water supply, telecommunications, etc., especially on the city fringe. The environment of the city needs to be more convenient and efficient.

12.087 Irbid is spreading itself in many directions because of the uncontrolled urban growth. Even though one may think that the population density of the entire city is low, the actual situation, however, is the opposite. Due to the fact that most of the families

are large, and thus the population density per room is very high (about 6 persons per room), the overall population density is rather high, even though the building density is not so high. This explains the fact that the total area of the city of Irbid is relatively small.

12.088 Amenity in the Irbid city is unsatisfactory. People like Irbid because of its climate, lower cost of living than Amman, and warm hospitality of the residents. Even though these factors are necessary for human life, physical amenity should not be ignored, and thus beautiful streets, green trees, cultural and social facilities and public open spaces for recreation are necessary elements which are lacking in the city at present.

12.089 To cope with these unsatisfactory conditions of the city, master plan preparation, its implementation by using effective measures, and urban development projects by public undertaking seems to be essential.

12.3.2 Housing at Irbid

12.090 The population of Irbid has increased by approximately 34,000 during the five years between 1973 and 1978. Assuming that the number of persons per family is 6.5, this population increase implies that the housing demand generated during this period was about 5,000. If we add the demand for re-building, and that caused by nuclearization of family, the number would have been close to 6,000. According to the distribution of income for the Irbid Governorate and for the entire Country, it seems that about 50 percent of this housing need is for the low income group. It is thus estimated that the housing demand for the low income group reached 3,000.

12.091 On the other hand the Housing Corporation, which is the only organization for supplying public housing, has constructed only 98 units for the low income group. It may therefore be concluded that the problem of insufficient housing for families with low income is increasingly serious.

12.092 Moreover, by the construction of the temporary campus for the Yarmouk University, additional housing needs are produced. There are currently 2,000 students and many faculty and staff members. Even though housing has been prepared for a large number of these people, it is still far from being able to accommodate all.

12.3.3 Community Facilities in the Study Area

a. Educational Facilities

12.093 According to the School-Construction Plan for the Irbid Governorate by the Ministry of Education, 1977, educational

services in the Irbid Governorate are the following problems:

(1) Shortage of the school buildings relative to the student number. Within the entire educational institutions, there are 561 schools with 144,784 students under the Ministry of Education. Out of the 561 schools, 126 schools with 45,408 students are in cities, and the rest are in rural areas.

(2) High percentage of the Rented Schools. The percentage of the rented schools in cities is 74.6 percent and that in rural areas is 27.1 percent. The problem of the rented schools is more deep in cities. The problems of the rural schools are a shortage of classrooms and inadequate educational facilities.

(3) Problems in the secondary education in rural areas. The number of students who complete the compulsory level education in the rural area has increased. Since the general poverty of the rural area make them hard to attend distant city schools, and since there is a shortage of secondary schools in cities, the Ministry of Education has decided to open some new secondary schools in the rural areas. However, there are some problems related to this. There are difficulties in (1) supplying teachers and (2) setting up science sections in the secondary schools because the preparatory schools in villages are oriented to humanities.

12.094 The Ministry of Education proposed to develop and expand school facilities through the school Construction Plan for the Irbid Governorate. Since the Plan excludes the Ghor Mutserfieh, the area covered by the Plan is almost identical to the Study Area. The amount for the educational facility development is estimated to be JD 12 million for the 5 year-period from 1978/79 to 1982/83. Because the projects proposed by this Plan are well prepared, we simply adopt them as recommended projects for the same period for the Study Area.

b. Health Facilities

12.095 Generally speaking, health facilities in Jordan are not satisfactory, even though they have improved in the past few years. There is a lack of facilities, both for preventive and curative, and also there is a shortage of health medical personnels. According to the Five Year-Plan started in 1976, the Government of Jordan is trying to solve these problems, although it is very difficult to expect a sudden improvement in these fields.

12.096 In our Study Area, construction of a new hospital in the Medical Department of the Yarmouk University has already been approved. This hospital will have 600 beds, and the number of the hospital beds

in the region will increase from 376 beds in 1976 to at least 976 beds in 1985. With the opening of the University hospital, the number of population per hospital bed will also decrease from, 1,600 to 770, even though the population increases from 581,000 in 1976 to 750,000 in 1985.

12.097 Beside this project, we need a more developed health service network in the Study Area, through the construction of clinics, health centres, and medical training centres, and the creation of qualified doctors, technicians and assistants.

c. Others

12.098 Open space for recreation, especially that for sports and relaxation is necessary in each city of the Study Area. It is also noticeable in the Study Area that there is no cultural facility, assembly hall, theatre, museum or public library.

12.099 Considering the fact that Study Area has a population of 600,000 as of 1978, these facilities are obviously necessary. They could be located in the city of Irbid, which is functioning as the centre of this Area. One may also suggest branch service centres of the above mentioned facilities in Ajlun, Jerash, or Mafraq. Restoration works of the ruins at Jerash and at Um Qeis must not be limited to tourism purposes, but may also be utilized for cultural activities, such as festivals for the local residents, or theatrical performances.

12.4 Projection of Needs and Overall Framework

12.4.1 Urban Land Requirement for Irbid City

a. Population of the City of Irbid

12.100 As discussed in the Present Situation, the population of Irbid has increased remarkably, and it reached 128,000 in 1975. The present population is presumed to be around 150,000, and estimated population is 160,000 in 1980, 199,000 in 1985, and 358,000 in 2000. According to this figure, the population in 2000 would be three times as that of 1975. Since A Census of the population will be undertaken next year for the entire Country, a more accurate estimation can be done in 1980 or 1981.

12.101 We nevertheless have attempted to estimate the population growth at present by assuming that the population of the city of Irbid was 128,000 in 1975.

b. Land Requirement in Irbid Municipality

12.102 Through this section, we would like to estimate and propose the adequate space requirement for the city of Irbid. Urban land space is required for (1) housing site, (2) roads, (3) commercial, (4) educational, (5) social, (6) cultural administrative, and

(7) recreational space including public open space, park and green belt, etc. The need for sufficient housing space is the most important. Educational, social, cultural and administrative spaces would be generally much smaller, compared with housing space. Proportion of commercial space would depend on the character and the size of the city.

12.103 The Irbid city is currently characterized as an administrative center for its region, and at the same time, as a commercial centre of the study area. Commercial facilities in the city is supported by the residents in Irbid city and in northern part of Irbid Governorate. We think southern part of the Irbid Governorate is serviced by Amman. It is not presently possible to decide the service area of commercial activities of Irbid, even though it is necessary to study about this in future. But we could estimate that more than half of the population of the Governorate is receiving commercial service from the city of Irbid. As already mentioned, there is no clear central business district in the city so far, but it is no doubt that the city will have CBD in the future. This is because of the increase of consumption due to the rise of living standards, and the growth of the population in the territory of service. We can nonetheless imagine that the pure commercial area will not exceed several hectares until 1985.

12.104 The size of recreational space areas vary considerably from city to city, but the space seems to be insufficient in Jordan, and Irbid is not an exception to this generalization.

12.105 What we should consider, first of all, is the requirements for industrial spaces in the city. At present, there is no definite industrial district in the Irbid city, except for the industrial estate in the north. Many shops and houses combined with factories scatter in the city. Presently, it is very difficult to estimate future demand for industries. It is nevertheless obvious that urban service industries, such as construction material, food and beverages, textile, clothing, and printing and publishing industries, will develop along with the growth of population and living standard.

12.106 Land required per worker can be estimated as $100m^2$ not including roads, green belts, and limited possibilities of expansion for factories. This estimation was obtained from the Development of Industrial Estates in Jordan published by W.D.Scott & Co. Ltd., April 1976, and our analyses of two factories in the industrial estate in the northern part of Irbid (hereinafter the northern industrial estate).

c. Urban Land Use Ratio by Residential Use and Other Community Facilities Including Public Service

i. Urban Land Use Ratios

12.107 Table 12.6 presents the data of the Housing Corporation's

Table 12.6 Density Study on Housing Corporation's Projects

Name of Project (Income Group)	No. of Units (Storey) A	Floor Area per Unit (m^2) B/A	Total building floor area(ha) C	Total Area (ha) C	A/C 1/ units/ha (Ax6/C)	B/C % unit	C/A m^2/unit (C/Ax6)
Ramtha/Irbid (Middle Income)	44 (1)	96.13 (95.5)	0.42	1.79	25 (150)	24	407 (68)
Marj El-Hamam (M.I.) 2/	114 (3)	119.3 (119)	1.36	3.11	36.7 (22.0)	44	273 (46)
Al-Hussein Phase II (M.I.)	240 (3)	122-84 (95)	2.28	4.94	48.6 (292)	46	206 (34)
Irbid New (M.I.)	90 (3)	122 (122)	1.10	3.03	29.7 (178)	36	337 (56)
Al-Hussein Phase I (higher income)	188 (3)	174-125 (138)	2.59	4.70	40 (240)	55	250 (42)

(To continue)

Table 12.6 (Continued)

Name of Project	No. of Units (Story) A	Floor Area per unit(m^2) B/A	Total building floor area(ha) C	Total Area (ha) C	A/C 1/ units/ha (Ax6/C)	B/C % unit	C/A m^2/ (C/Ax6)
Marqa (Low income)	1.002 (3)	75	?	32.7	30.6 (184)		305 (51)
Al-Quasmeh (L. I.) 3/	166 (1)	85-57 (64)	1.06	1.78	93.3 (560)	60	107 (18)
Al-Hashimi (L. I.)	300 (3)	75 (75)	2.25	4.0	75.0 (450)	56	133 (22)
Irbid First	98 (1)	73-53 (67m2/unit)	0.66	2.35	41.7 (250)	28	240 (40)
Irbid city (1967)	Population 80,000		400	1,000	(80/ha)	40	(125)

Notes: 1/ The average number of persons in each family is 6.

2/ M.I.: Middle Income.

3/ L.I.: Low Income.

Projects. The gross density is between 150 to 560 persons per ha. On the other hand, population density of built-up area of Irbid in 1967 is roughly estimated to be 200 persons per ha, as explained in the introduction of this sector.

12.108 Housing Corporation's projects have residential area, children's play grounds, roads, sewage plants, parking lots and open spaces. Some of them also have shops and educational facilities. Generally, however, small projects only have residential areas, roads, and some open spaces. Furthermore, density also changes by housing types and income groups. Roughly speaking, density is lower in projects of larger scale than those of small scale, and people in the upper brackets of income live in the former.

12.109 We, however, think that the future population density of Irbid will be lower than the number shown in the table for 1976.

12.110 This data shows that population density of the built-up area of Irbid in 1967 is higher than that of the Marqa project for low income group only, where all buildings are of 3 stories. Using few data, it may not be possible to come up with an accurate number for desirable population density of Irbid, but it is nevertheless helpful as a basis for estimation.

12.111 In the following , we will use the urban land use ratio common among many countries, in calculating the density for Irbid. If we decide to give 20 percent of the area of the entire city for recreational use, we could divide land uses 20 percent for road, 45 percent for residential and the rest 15 percent for the other community facilities such as educational, commercial, religions, social, administrative, and light industry for daily citizen life. These are the urban land use ratios to be used. These ratios will change depending on the case, but except for recreational space, they are the average figures in planned new towns all over the world.

12.112 Recreational space varies largely from one city to another. Some cities have a huge forest and some have almost no recreational space. We will discuss about recreational space in Irbid later in this report.

ii. Population Density in Residential Areas
Housing Site

12.113 According to the land use regulation in Jordan, there are four classes for housing land use. A housing site should have at least 1,000 m^2 in order to be categorized as class A, 750 m^2 for B, 500 m^2 for C and 250 m^2 for D. It has been long since this regulation was established, and unfortunately, it may not be applied to the present situation.

(a) Floor Area

12.114 We proposed that the average and not minimum space per family of each class should be as follows:

A	B	C	D
$500m^2$	$375m^2$	$250m^2$	$125m^2$

The minimum space per family should be $100m^2$. Space per family below $100m^2$ should not be permitted, even planned housing project such as the Housing Corporation's low income housing. We would use these figures in calculating density for different housing classes for future.

(b) Gross Population Density of the City of Irbid

12.115 We assume that class C and D are suitable for low income group in the city of Irbid. According to the income distribution data, families with low income, or income less than JD 500 per year, accounted for 53 percent of the overall number of families in Irbid in 1973.

12.116 Under the assumption that the ratio of 1973 is still useful, we can extimate net residential population density per ha as follows:

Low income families lot = $\frac{125 + 250}{2} = 185m^2$/ family

Middle income or more = = $375m^2$/ family

No. of low income families against others = 35 : 47

Average house lot = $\frac{53 \times 185 + 47 \times 375}{100} = 274m^2$/family

12.117 If we assume that there are 6 persons in each family, the population density for residential area would be 219 persons/ha. Thus we could estimate 2/ gross urban density of Irbid at 98.5 person/ha about 100 person/ha in the future. This density is adequate as compared to other countries in the world.

12.118 There are some more families which will live in commercial or other areas, but since our estimate is on a rough basis, we assume that the difference would fall in the projected range when the density for future urban land use requirement is calculated.

iii. Urban Land Requirement for Irbid City

12.119 If we assume that the built up area of Irbid in 1967 as 400 ha and the population as 80,000, we could estimate future land use requirement by Table 12.7,

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2/ $219 \times \frac{45}{100} = 98.5$

Table 12.7 Land Requirement in the Municipality of Irbid in Future

		1967	1975	1980
Population		80,000	128,000	160,000
Built-up Area in 1967 (ha)		400 1/	400	400
Population Growth From 1967		———	48,000	80,000
Land requirement for Growth Population (ha)		———	(480)	800
Land Use	Residential use	———	———	360
	Community use 2/	———	———	120
	Recreational & Open Space	———	———	160
	Road, Pedestrian 3/	———	———	160
Total built-up area for the city of Irbid(ha)		400	880	1,200
Gross population density for built up area in the city of Irbid (Person/ha)		200	145	133

(To Continue)

Table 12.7 (Continued)

		1985	1990	2000
Population		199,000	242,000	358,000
Built-up area in 1967 (ha)		400	400	400
Population Growth From 1967		119,000	162,000	298,000
Land requirement for Growth Population(ha)		1,190	1,620	2,780
Land Use	Residential use	536	729	1,251
	Community use 2/	170	243	417
	Recreational & Open Space	238	342	565
	Road, Pedestrian 3/	238	342	565
Total built-up area for the city of Irbid(ha)		1,590	2,020	3,180
Gross Population density for built up area in the city of Irbid (Person/ha)		125	120	113

Notes: 1/ Roughly measured by the map, copied in 1967 by an aero-photo.

2/ It does not include industrial area, except for the area used by light industry for daily citizen's life.

3/ It includes all roads, parting areas for buildings are included in the area for each building.

12.120 The demand for industrial land cannot be estimated at present, but some more area may be added to the figure in the table.

iv. Recreational space

12.121 Recreational space including parks, sports centers, public green space, plaza, etc. are very important for urban environment. For cities that are not large, recreational space is not much in need because people in the city have enough large open space around the city, as many villages have been in that situation in the past.

12.122 A city as Irbid, which grows rapidly into a big city, must have recreational space planned in the city. At the time when people realize that recreational space is important for urban life after the city has grown to a large scale, it is often very difficult to have enough recreational space in adequate location. Irbid presently has almost no recreational space in it. Even though recreational space should have been considered earlier, it still is not too late. We might meet many difficulties in purchasing adequate public land for recreation, but it is much easier to get the land today than after 10 years.

12.123 In many countries, parks occupy more than 20 percent of whole urban area, and there are many urban regulations which proposes to give at least 30 percent of the urban area for parks and other recreational areas. We may propose that 30 percent should be the minimum standard for recreational land in urban areas newly planned for future urbanization in Jordan. It is desirable to apply this ratio to Irbid for its recreational land use, but we think that Irbid has already become a big city, and that it is very difficult to actually get land for parks and recreational space.

12.124 If we assume that recreational space will be 20 percent of the whole newly developed urban area in Irbid, the space for each person of the city will be: $10m^2$ in 1980, $12m^2$ in 1985, $14m^2$ in 1990, and 16m in 2000. 20 percent is commendable.

v. Frame Setting for Irbid

12.125 We have estimated urban land requirements for the city of Irbid. In order to prepare infrastructure(such as road, community facilities space, recreational and residential space), extra room will be required because infrastructure has to be prepared before construction of the buildings, and also because we need some extra space for the development to be flexible.

12.126 We would use projected population as shown in Table 12.7 for a complete arrangement of community facilities.

12.4.2 Housing for Irbid and Yarmouk Areas

a. Housing Needs and Demand in the City of Irbid

12.127 As discussed in Section 12.4.1, the population in the city of Irbid during the next Five Year Plan period from 1981 to 1985 is estimated to increase by 39,000. Unlike many of the other cities in the world, the number of persons in each family is large in the cities and small in the rural areas, inspite of the large inflow of young people from rural areas to cities. The shortage of housing accounts for this fact.

12.128 Assuming that the number of persons per family is 6.0, the houses necessary to cope with the population increase in the Irbid city would be around 6,500 during the five years between 1981 and 1985. We further add 1,000 units as the demand for rebuilding caused by the aging of the houses and the division of families.

12.129 Housing demand caused by aging and nuclearization of families are calculated as follows: Rebuilding demand for the entire country is unknown. But according to the investigation by the U.N. which is mentioned in the Housing Five Year Plan (1976 to 1980), the demand is 2,000 units in Jordan every year. The population of the Irbid city is approximately 17 percent of that of the entire country. Using this ratio, we can derive 140 units/year. Based on a very rough presumption, the number of units required due to the division of family would be 60 units/year. We thus come up with 200 units/year as the total housing needs per year caused by above two reasons. The demand during the five years (1981-1985) would be 1,000 units.

12.130 Theoretically, there are other causes of housing needs. For example, too large number of persons in a house create another housing needs. But these causes of housing needs are ignored in our estimation of housing needs, since we do not have reliable data for them.

12.131 Population of Jordan (East Bank) was estimated at 1,774,000 in 1972 and 1,952,000 in 1975. The increase of the population in these 3 years was 178,000. If we assume the family size to be 6.5, the housing needs from the population growth was about 27,000. To these figures we add the needs from rebuilding of old houses and family nuclearization as 6,000 houses in 3 years. The total housing needs estimated was 33,000 houses. The number of houses built in these 3 years was estimated at 21,000 (see Chapter VIII of Volume 3). It means about 64 percent of the housing needs was actualized in these 3 years.

12.132 As for the current Five Year Plan period, housing needs in the East Bank is estimated to be 80,000 (16,000 x 5 years) from 1976 to 1980. And the planned number of housing construction is the Housing FYP 31,000. Thus the actualization of the needs is implied to be 39 percent, which is too low.

12.133 Based on above two data, we assume that the actualization of the housing needs in the Irbid city will be 60 percent for the period from 1981 to 1985. It means the actualization ratio for housing needs only from the population growth will be 69 percent in the Irbid city.

12.134 In summary, housing needs in the Irbid city for the period from 1981 to 1985 will be 7,500 units, and effective demand (that is, the number of housing which will be actualized) will be 4,500. In other words, the need is 1,500 units and the demand is 900 units per year.

b. Housing Demand in the Irbid City by Income Group

12.135 If we assume that the housing needs exist at the same ratio in each income group, we can classify these housing needs and demands according to the income groups. In 1973, the low income families (below JD 500 annually) was 53.4% of the whole families in the urban area in the Irbid Governorate; and the middle income families (between JD 500 - 1,200 annually) was 36.4%. The high income families should be 10.2%. This income classification is done by the Urban Planning Expert of the Study Team, based on the informations that the upper limit of the low income defined by the Housing Corporation was JD 400 per year in 1967 and about JD 1,000 at present and that the upper limit of the middle income is about JD 2500 at present.

12.136 Table 12.8 presents the calculation of housing needs and demands for the period from 1981 to 1985 within the Irbid City.

Table 12.8 Housing Needs and Demand in Irbid City, 1981 to 1985

	Low Income	Middle Income	Higher Income	Total
Population Growth 1981 - 1985	20,826	14,186	3,978	39,000
Housing Needs from Population Growth	3,471	2,366	663	6,500
From Rebuild and Family Nuclearization	534	364	102	1,000
Total Housing Needs	4,005	2,730	765	7,500
Housing Demand From Population Growth	2,083	1,420	397	3,900
From Rebuild and Family Nuclearization	320	218	62	600
Total Housing Demand	2,403	1,638	459	4,500

c. Housing Needs for Yarmouk University

12.137 As discussed earlier, the total number of persons in the Yarmouk University will be 30,000. This is based on the University's current plan. The breakdown is that the numbers of students will be 21,000 and faculty and staff members 9,000 at the time of completion. Some faculty members and half of the students are expected to live on campus.

12.138 The number of persons involved in the University can be calculated by the following assumption: (1) 50 percent of the students live on campus; (2) 5 percent of the students are married and there are 4 members per family; (3) 1,500 of the faculty and staff members will live on campus; (4) 70 percent of them have 5 family members including themselves; and (5) those for the services for the above people is about 30 percent of the number of students, and faculty and staff members. The following table shows the calculation of the total number of persons involved in the University, (Table 12.9).

Table 12.9 Population Involved in Yarmouk University

		On Campus	Off Campus	Total
Students	Single	10,500x0.95 = 9,975	10,500x0.95 = 9,975	
	Married	10,500x0.05x4= 2,100	10,500x0.05x4= 2,100	
Faculty Staff members	Single	1,500x0.3 = 450	7,500x0.3 = 900	
	Married	1,500x0.7x5 = 5,250	7,500x0.7x5 =26,250	
Subtotal		17,775	40,575	58,350
Service Personnel			58,350x0.3 =17,505	17,505
Total		17,775	58,080	75,855

12.139 The total is 75,855, among which 58,000 will live off campus. Since community services, for example, housing, educational facilities and commercial facilities, will be provided for those living on campus, our concern will be on those living off campus.

12.140 Several cases were thought to be possible as to where the 58,000 people would live. In Phase 1, however, we would only examine two cases.

i. Case 1: All of Them Live in Irbid

12.141 The city of Irbid is approximately 15 km to the west of the University. When we timed on the 8th of August, it took 20 minutes by car on Baghdad Street. It is expected to take even less when the road becomes improved. Thus, it is possible to assume all of the off campus personnels will live in the Irbid City.

ii. Case 2: A New Town Will Be Created in Close Vicinity to the University

12.142 If a new town is created, it might be able to attract about 50 percent of the off-campus population. In addition, large accumulation of population is thought to be better in organizing a new town. Therefore we assume that the new town population is about 30,000. Those which are single would be included in this population, and thus we assume that the average number of persons in each family is 5. Approximately 6,000 units will therefore be necessary. If it is decided to supply 4,000 units as public housing for the low and middle income groups, infrastructure and community facilities for 6,000 units, and 4,000 units as housing for those two income groups are required.

12.143 These two alternatives are evaluated as components of four overall development strategies, which is discussed in Chapter II. As the result of the evaluation of the overall strategies, the Combined Pattern (see Chapter III of Volume 2) of development is recommended, which is the combination of the Duo - Centric Pattern and the Decentralized Pattern. In order to promote this recommended overall development pattern in the Study Area, the encouragement and development of the Yarmouk Complex area (the area covering the site of the University and the area to the east of the University is imperative. To serve for this purpose, the Case 2 of the location alternatives of the off-campus population should be taken.

d. Housing Supply for Irbid City and Yarmouk Complex Area by 1985

12.144 According to the president of the Yarmouk University, the entire Yarmouk University is expected to be completed around 1990. So, it is assumed that a half of the University will be completed by 1985. Accordingly, a half of families, that is, 3,000 families or 15,000 persons, will live in Yarmouk University Complex area. According to the result of Chapter VIII of Volume 3 on housing supply, a reasonable amount of housing supply to the Study Area by the Housing Corporation is estimated to be 4,000 units for the period from 1981 to 85. On the other hand, the total housing demand in the Irbid city will be 4,500 and that in the Yarmouk Complex area for the University 3,000.

12.145 Since the combined Pattern of overall development is recommended for the Study Area, the public housing supply should also put a relative emphasis on the development of the Yarmouk Complex area. As a consequence, it is proposed that the public housing will be allocated to the Irbid city and the Yarmouk Complex area by 2,000 to 2,000.

12.4.3 Community Facilities for the Study Area

a. Educational Facilities

12.146 The school Construction Plan for the Irbid Governorate by the Ministry of Education is utilized to set up the target, i.e., the number of required classrooms, for the Study Area. The

Plan has the estimates of the required classrooms for the Irbid Governorate excluding Ghor Mutserfieh. So, we assumed that the Study area and the above target area of the Plan are roughly identical. The Plan starts in 1978/79 and ends in 1982/83. Using this Plan, we have estimated the target for 1983/84 and 1984/85. As to the short-term college education, please refer to Appendix E.

12.147 Number of classrooms newly required for the period of the next Five Year Plan (1981-1985) for the Study Area are estimated and the result is on the following Table 12.10.

Table 12.10 Number of Newly Required Classrooms, Study Area, 1981 to 1985

		Compulsory Schools	Secondary Schools	Vocational Schools
5 years	Irbid M.	400 classrooms	53 classrooms	1,344 stud.
	Other Area	286 classrooms	688 classrooms	711 stud.
Annual Average	Irbid	80 classrooms	11 classrooms	269 stud.
	Other	57 classrooms	138 classrooms	142 stud.

12.148 We assumed that the construction cost of school will be 1,000 JD per one student. And we estimated that there will be a total of 1,344 students.

b. Health Facilities

12.149 We have set up the frame for health facilities of the Irbid Governorate during 1981-85 based on a very rough estimation method. We, first of all, assumed that the ratio of the budget for Irbid Governorate to that of the Country is the same as the ratio of the populations of the two. The population of Irbid Governorate during 1981 to 1985 is estimated to be 28 percent of the entire Country. We also assumed that the budget will increase by 30 percent annually until 1985. This 30 percent is taken from the following. The annual increase rate of budget by the Five Year Plan of 1976 - 1980 by the Ministry of Health is 30 percent. Around 78 percent of the total budget is from the general budget of the Jordanian Government, and the rest is from foreign aid.

12.150 The frame of the budget for the health facilities is as follows (Table 12.11). The Hospital within the Yarmouk University is not included.

Table 12.11 Frame of Budget

(Unit: JD 1,000)

1981	1982	1983	1984	1985	Total (1981-1985)
896 1/	1,165	1,514	1,969	2,559	8,103

Note: 1/ 2,462,000 x 0.28 = 689,000 for 1980
689,000 x 1.3 = 896,000 for 1981.

In total, JD 8 million will be required, and this amount will be equivalent to 810 hospital beds.

12.5 Recommended Projects 3/

12.5.1 Recommended Projects for the Next Five Year Plan Period

a. Urban Development and Planning

i. Land Use Plan Preparation for the Irbid City and Yarmouk Complex Area

12.151 We would like to propose to have an ideal urban in the city of Irbid and around the Yarmouk Complex area as far as financial resources allow, hoping that this urbanization could become a model of the urban developments. For this purpose, it is proposed to prepare a land use plan for these two areas, and these urban areas will be undertaken in accordance with the plan.

12.152 The land use plan should cover the two areas mentioned above and the areas between the two, amounting in total to approximately 300 km^2. The cost to make a land use plan is estimated to be about 1,000 JD/km^2 including basic studies but excluding master-plan making for the two urban areas. Thus the total cost for this work will be JD 0.3 million.

ii. Master Plan Preparation for Irbid City

12.153 To cope with the urban growth pressure and to integrate the effects of the Yarmouk Complex area, it is necessary to prepare an adequate urban development master plan for the city of Irbid envisaging the year 2000. The planning area measures roughly 5,000 ha. About 100 JD/ha is estimated to be necessary for the plan making. Thus the total cost will be about JD 0.5 million.

iii. Urban Renewal Study for Irbid City

12.154 Existing built-up area in the Municipality of Irbid is also very important for the whole Governorate in the future.

3/ The costs in this section are all based on their values at 1977 prices.

However, as we mentioned already, there are many problems in it, especially in the central area. We propose to make an urban renewal study for the central built-up area, and to set up several projects with stages in this study. The actualization of urban renewal projects will start after 1985 in accordance with the urban renewal study.

12.155 We have to realize that the existing Irbid has its charm in its narrow streets, its old stone buildings, some attractive places and unique character of shopping districts. These places and unique characters should be preserved even in the future. It is not wise to expect so-called "modern city" in the centre of Irbid. Road widening and park establishment must be kept at the minimum, at the most effective section, in order for not killing the atmosphere of the central part which the people loved and which makes Irbid full of "Irbidness". The study should take into consideration pedestrians and their paths. At the same time we propose to keep some existing buildings to be used as new community facilities after renovation.

12.156 We need a new spacious and functional city hall for the future Irbid. The existing city hall can be used for a cultural centre. The jail is also better to be moved to outside of the city, and the existing jail building can be made into a museum. Thus, we can make the "Tell" into a cultural centre of Irbid. The "Tell" should have a green park by removing the schools which occupy the Tell, and should be developed into a new urban area.

12.157 The study area will be within 10 ha, and the cost will be about JD 12,000/ha. Thus the total cost will be JD 0.12 million.

iv. Infrastructure and Community Facilities Preparation for Irbid City

12.158 We estimated the population in the Municipality of Irbid to be 160,000 in 1980 and 199,000 in 1985. At least, we have to provide adequate infrastructure for the additional population to be expected by this population growth. The net population growth of the Irbid Municipality is 39,000 from 1980 to 1985. The urban area with adequate infrastructure should be prepared for this population, it also should be prepared with enough rooms in addition to the net land requirement by this population. Thus, the total urban area for infrastructure preparation for the period from 1981 to 1985 is estimated to be 1,000 ha.

12.159 The cost for infrastructure 4/ preparation is JD 10,000 per ha.5/ It includes roads, water supplies, sewerage and recreational facilities. For compulsory schools and local government facilities such as police, post, council, clinic, library and market, we need JD 60 4/ for each new inhabitant. Thus the total cost will be about JD 12.34 million.

4/ This cost has been calculated on the basis of relatively small-scale housing site. So, probably, another estimation will be needed in case of large-scale one.

5/ See next page.

v. New Residential Area Master Plan for Yarmouk Complex Area

12.160 About the half of the students, faculty and supporting members of the Yarmouk University are supposed to live outside the campus. In addition, there is a project of industrial estate development in the Yarmouk Complex area. Hence it will be necessary to supply both sites with infrastructure and some housing for those population within the Yarmouk Complex area. Thus it is proposed to prepare a master plan for (1) a new town with 2,000 units and (2) housing site preparation with infrastructure for 4,000 families, at a location near the permanent site of the Yarmouk University.

12.161 It should be planned as a beautiful new town that would be a model not only for Jordan but also for the entire Arab world.

12.162 The cost of new town planning is 300 JD/ha, and the area size of the new town and the housing site with infrastructure is estimated to be 450ha. 300 JD/ha includes the cost for layouting of housing. Thus the total cost will be JD 0.135 million.

12.163 The total planning area is for 6,000 families or 30,000 persons assuming the average family size of 5 persons per family. The detail of the 450 ha is as follows:

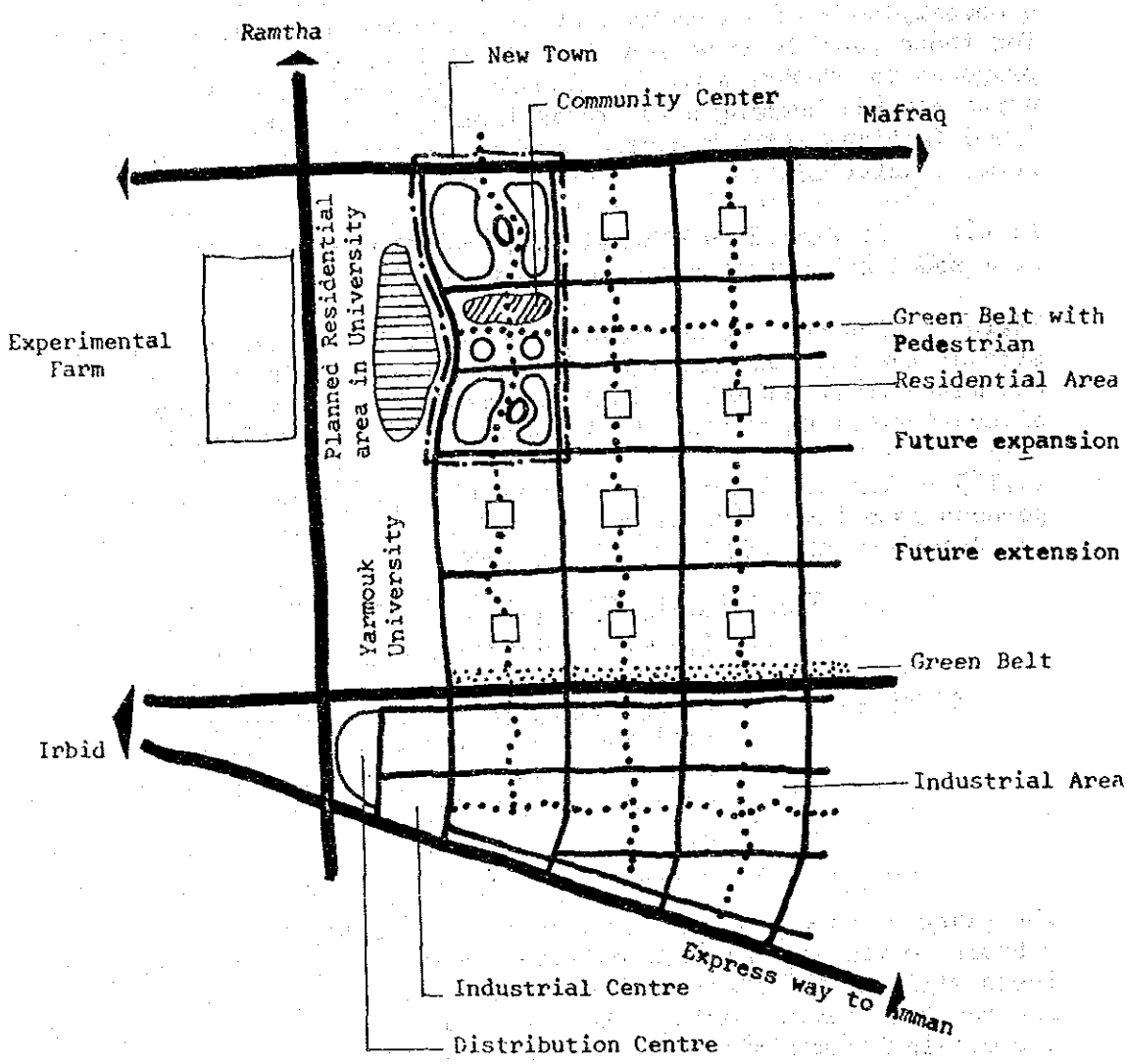
Land Use	. Recreation space (park, sport area and green belt)	= 135 ha	30%
	. Residential area (including parking space for houses)	= 180 ha	40%
	. Road and pedestrian road	= 90 ha	20%
	. Community facility space (school, shopping, social, etc.)	= 45 ha	10%
	Total	450 ha	100%

The planning area will have one secondary school, 3 preparatory schools, 6 primary schools, 6 kindergartens and 3 nursery schools. There will be 15 clinics with dentists. Among 6,000 units, 2,000 are publicly built apartment houses with 2 to 5 stories mainly for the middle incomes and some for the low incomes. The other 4,000 units will not be built, but sites for them are prepared assuming detached houses with an average lot size of 450 m^2 for higher and middle income groups.

12.164 Figure 12.6 shows a diagramatic concept of the new residential area as a core of urbanization of the Yarmouk Complex area.

5/ According to the data by Housing Corporation which is discussed in Section 12.2.2 b. ii., the cost of infrastructure was JD 355 per family, and JD 200 for other community facilities in 1975. The cost in 1977 was about 1.6 times more than that in 1975.

Figure 12.6 Conceptual Diagram of New Residential Area at Yarmouk Complex Area



vi. Infrastructure Preparation for Yarmouk Complex Area

12.165 For the above 6,000 families including those in the new town, housing site should be prepared at first. The total area for them is estimated at 450 ha in the previous section. The cost of infrastructure preparation (excluding the cost for community facilities) is estimated to be 11,000 JD/ha. Hence, the total cost will be JD 4.95 million.

b. Housing Development

For the housing development, please also refer to Chapter VIII of Volume 3.

i. Housing Construction for a New Town at Irbid

12.166 We propose a new town with 2,000 units in order to meet the population growth of the city of Irbid. The total inhabitants will be 12,000, which is about 30 percent of the population estimated to increase from 1981 to 1985. The site should be selected in the city planning area which we proposed to prepare infrastructure. The average cost of each house is estimated at JD 6,300. Thus the total cost will be about JD 12.6 million.

12.167 Figure 12.7 shows a schematic concept of the new town and its relation to the area for infrastructure preparation. This is a scheme and so location or size in the figure has no meaning.

ii. Housing Construction for a New Town at Yarmouk Complex Area

12.168 In section 12.5.1 a. v., a new town near the permanent site of the Yarmouk University is proposed mainly for families related to or supporting the Yarmouk University. 2,000 units of multi-storied apartment houses for middle and low income groups are proposed. 2,000 units and community facilities for 6,000 families is estimated to cost at roughly JD 12.4 million. Since the housing is expected to be mainly occupied by students, cost of a housing unit will be lower than the cost mentioned above.

12.169 Figure 12.8 shows a schematic concept of the new town just to present an image of the town. Again, location and size in this figure have no meaning.

c. Community Facilities

12.170 About the community facilities in the Study Area, we do not know much. So, for the purpose of estimating future needs in this field, we will basically extend the figures within the existing five-year plan in each field to the year 1985.

i. Educational Facilities Construction

12.171 Based on the school construction plan (1979-1983) by the

Figure 12.7 Schematic Diagram of New Town in the City of Irbid

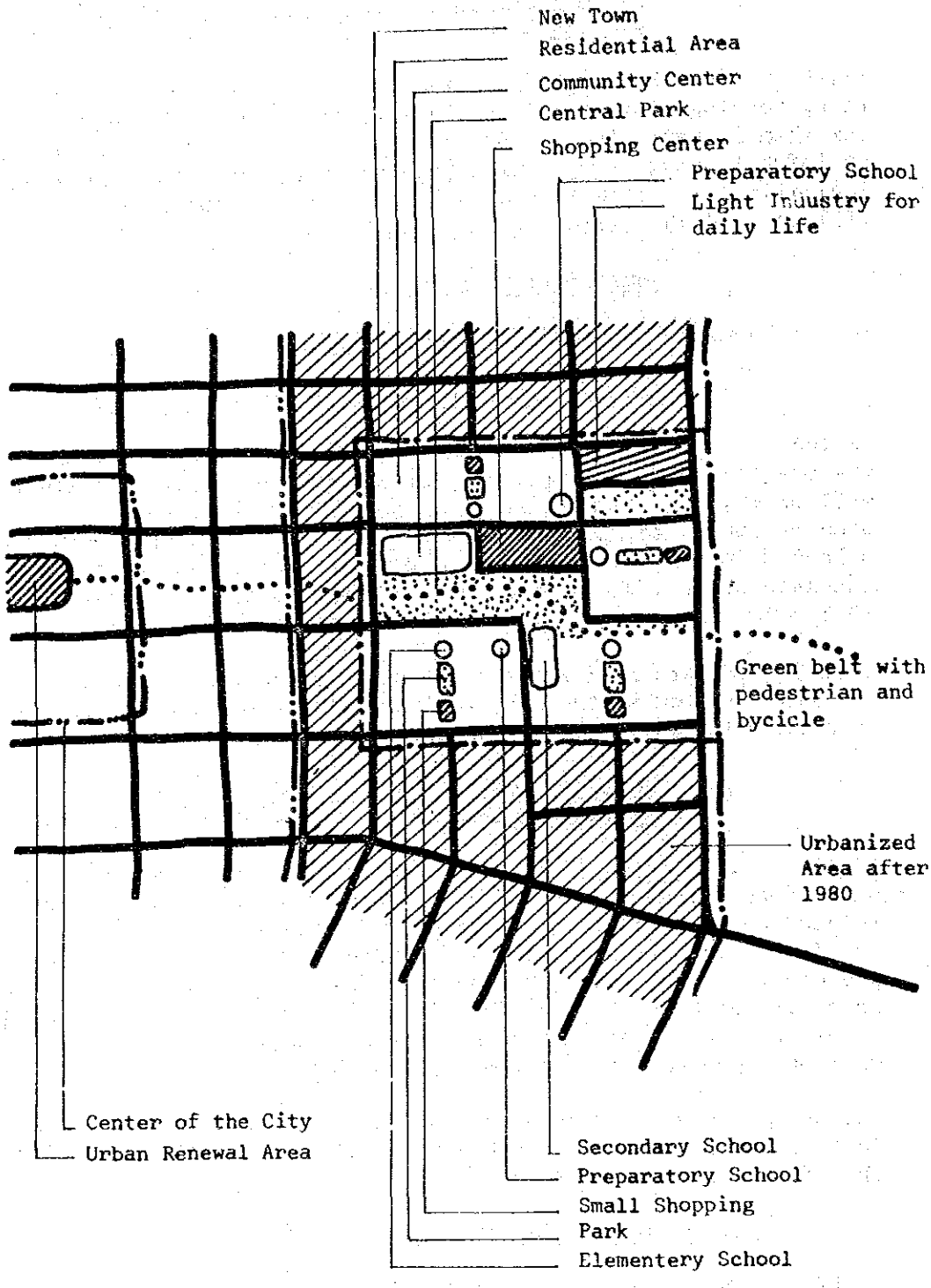
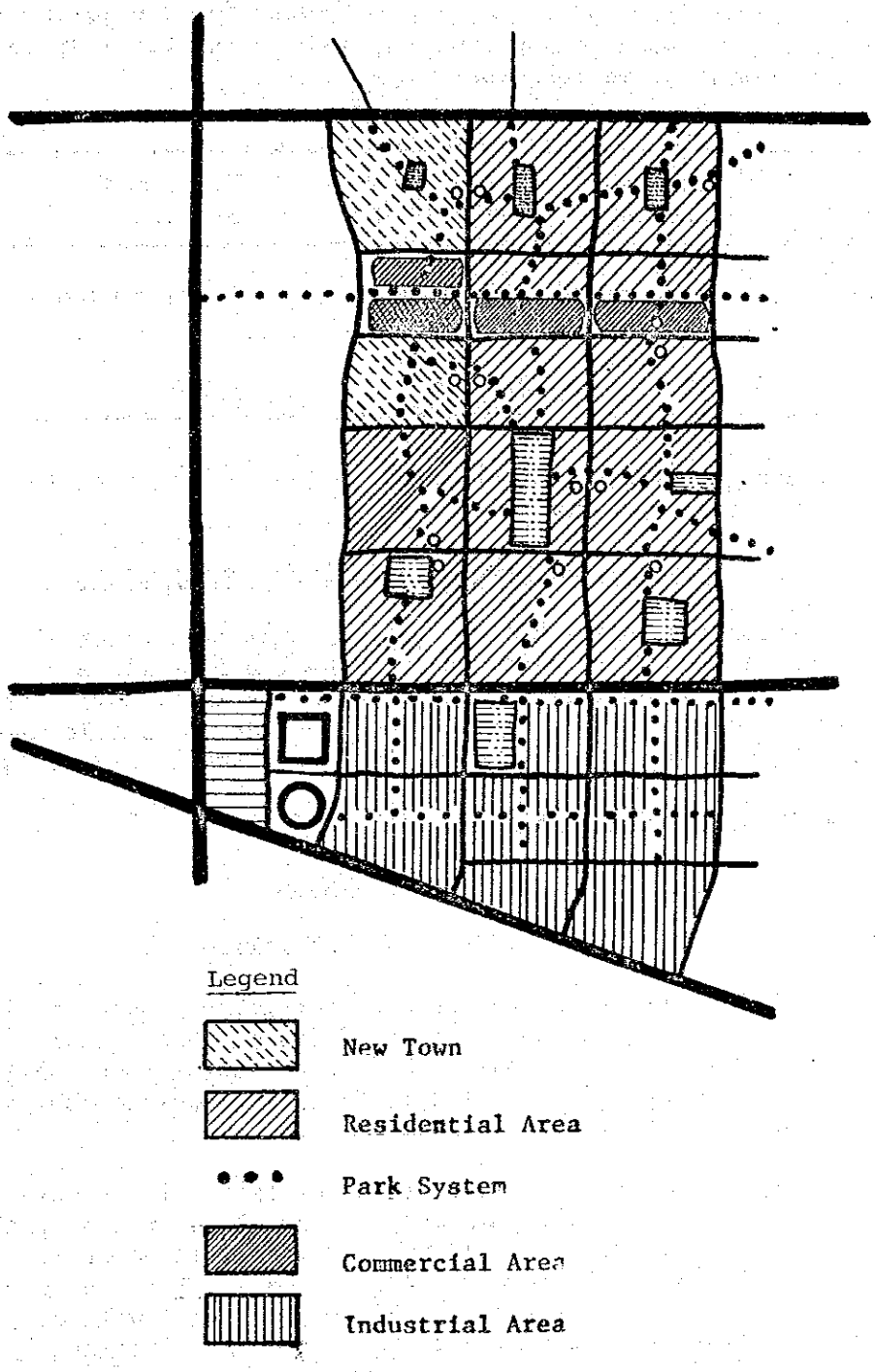


Figure 12.8 Schematic Diagram of a New Town at Yarmouk Complex Area



Ministry of Education, we extended the figures for the Northern Jordan (the Irbid Governorate excluding Ghor Mutserfieh) up to 1985. The result is as follows:

	Compulsory Schools	Secondary Schools	Vocational Schools
1981-84 6/	548 class rooms	596 class rooms	1,644 students
1985	141 " "	153 " "	423 "
Total	689 " "	749 " "	2,067 "

The total cost required for this construction is estimated to be JD 12.443 million.

ii. Medical and Health Facilities Construction

12.172 According to the health facility part of section 12.4.3 of this chapter, it is expected to build health facilities at the total cost of JD 8.103 million within the Study Area, during the period from 1981 to 1985. This does not include the development cost for the new hospital planned in the new Yarmouk University.

12.5.2 Recommended Projects After 1985 to 2000

a. Urban Development and Planning

12.173 Major recommended projects are as follows:

(1) To prepare infrastructures for urban growth after 1985 to 2000 in the city of Irbid. The preparation area will be about 2,000ha. The total construction cost including community facilities development will be about JD 26 million.

(2) Urban renewal of the centre of Irbid at the total cost of JD 11.4 million. To buy land of 5 ha with a unit cost of 30 JD/m^2, the cost will be JD 1.5 million. To remove 1,000 houses existing on 10 ha area, JD 5 million (5,000 JD per house) will be required. To build roads and public buildings, JD 4.9 million (road and park 50 ha : 5JD/m^2 and public building floor area 20,000 m^2: 120 JD/m^2) will be required.

6/ School Construction Plan, by the Ministry of Education

(3) To prepare infrastructures for urban growth after 1985 to 2000 in the Yarmouk Complex area. Its size cannot be specified at this moment, and should be estimated toward the end of the next Five Year Plan.

(4) New towns near Jerash to accommodate the excess population from Amman. Three new towns are envisaged, each of which accommodate 40,000 inhabitants. Infrastructure and community facilities will be prepared by the Government at the cost of JD 6.4 million per new town. The total cost will be JD 19.2 million.

b. Housing Development

(1) To build 10,000 units of low cost housing for the city of Irbid. Each unit has $45m^2$ and will cost JD 2,000. The total cost will be JD 20 million.

(2) To expand the new town at the Yarmouk Complex area. The size of expansion cannot be specified at this moment. It depends upon the growth potentiality of the Complex area.

12.6 Study and Policy Recommendations

12.6.1 Urban Development and Planning

a. Study About Present Situations

i. City Map Preparation

12.174 In preparing physical town plan, it is vital that detailed maps of the latest condition of the town be provided. Maps can be survey maps in nature but should be revised every 5 years, or at least every 10 years. For cities like Irbid however, where the population increases rapidly, it is necessary to prepare maps at least every 5 years. The recommended scales of the maps are 1/2,500 and 1/5,000.

ii. Socio-Economic Data

12.175 Socio-economical survey of a city is also necessary at every 5 years, or at least every 10 years. It would cover number of population, age structure, distribution of occupations, income distribution by family, land price by each block, etc.. Also, an opinion survey on what kind of town environments and community facilities they want to be provided in their city, and what part of the city they like or they do not like, etc., should be undertaken. These data are necessary to find the character of the city, to make efficient plans, and also to find out the quality and quantity of the people's needs.

b. Master Plan Preparation

12.176 Town development master plan, including land use plan, must be prepared based on those maps and data mentioned above. The government of Jordan has already prepared or is preparing, authorized master plans for many cities and villages. A master plan should be revised in accordance with the changes in socio-economic background and to solve the problems and difficulties contained in the master plan, which were not found when the master plan was made. However, it should not be changed easily. It is imperative that the masterplan must keep its authority and be regarded with respect. Easy change will reduce its authority. Revision of the plan should be discussed every 5 years by authorized organizations on the basis of a study on whether or not the plan is functioning.

c. Urbanization Control

12.177 Each city has its master plan, but we can often see that its urban growth goes beyond the planned area. City should have adequate measures to prevent its urban growth beyond the planned area. There are some ways to serve for this purpose as follows:

(1) To designate the area outside of the planned area as an agricultural area where no building is allowed except those for agricultural use; or

(2) To designate the area outside of the planned area as building prohibited area except for building by the Governmental development.

These two are the most direct ways, but at the same time, we have to prepare other measures for the inside of the planned area, in order to support the above policies. They are:

(3) To supply lands well equipped with infrastructure at a reasonable cost to the people who want to build their buildings. Private or public land development undertakings should be encouraged. We suggest "land readjustment" development as a new method for this purpose. Land readjustment means the rearrangement of town lots or agricultural land in accordance with a replanning of streets for the purposes of residential use. This usually provides basic infrastructures and sites for community facilities.

(4) Infrastructure preparation in the planned area (town planning area) through land-readjustment development.

(5) To prevent land speculation.
There are already many discussions for this problem. Some of them were proposed to Governments but failed to be implemented. Land speculation should be prohibited, and we think taxing the sellers on land sale

tax must be very heavy when land owner wants to sell his land within 5 years after his purchase of land.

d. Land Readjustment

i. Mechanizm

12.178 Here, the land readjustment recommended in the previous section will be explained in detail. It is the rearrangement of town lots or agricultural land in accordance with a replanning of streets for the purposes of (1) providing orderly residential area with standard quality, (2) providing infrastructures particularly roads, and (3) providing public lands for community facilities at the least cost for the public.

12.179 The Jordanian Government already has a road development law very similar to the idea of land readjustment, but land readjustment development will be more effective to build desirable urban area. We would like to roughly explain this idea using a model (see Figure 12.9). The right hand map of Figure 12.9 shows a land readjustment plan. The plan basically aims at providing (1) a trunk road (r') by expanding the existing narrow road (r), (2) parks for recreation, and (3) lands for scale (K).

12.180 This development by land-adjustment requires certain conditions to be implemented. They are:

(1) Land owners of this area (a through j) should make an authorized cooperative association for this development.

(2) Lands for new public spaces (roads, parks, and K) should be charged equally in ratio to each land owner.

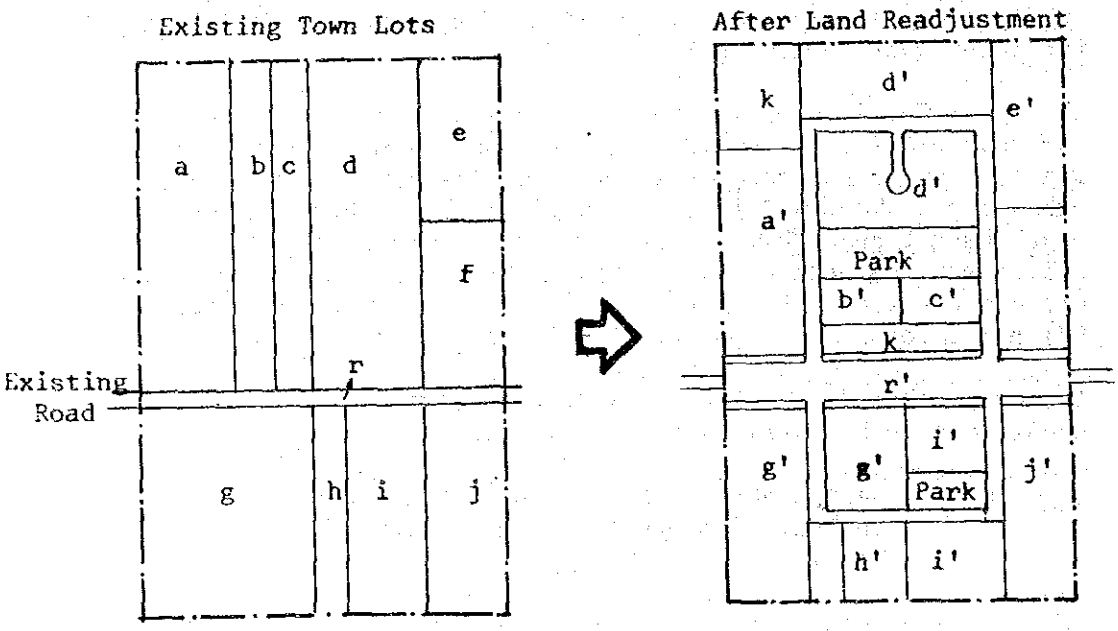
(3) The land value will increase after the development.

12.181 Usually, if the increase of land value after the development is below 3 times of the present value, it would be difficult to make cooperative association. The estimation method of land value and the mechanism of the land-adjustment are as follows:

(1) Before the development:
The total private land value (B) = $(a + \cdots + j) \cdot m$
Where
a through j = private land (m^2); and
m = average cost of land (JD/m^2).

(2) After the development:
The total private land value (C) = $(a' + \cdots + j') \cdot m'$
Where
a' through j' = readjusted private land (m^2);
m' = expected land value (JD/m^2);
and $\frac{m'}{m}$ should be equal to or more than 3.

Figure 12.9 A Model of Land Readjustment Process



Source: Study Team

And, C should be equal to or more than B in order to formulate a cooperative.

(3) Land to be sold (K):
A before the development = Private Land (a through j) + Public Land (r), and
A after the development = Private Land (a' through j') + Public Land (r' + parks) + K

Where
K is the land (m^2) to be sold in order to finance the cost (D) of (1) the cost of construction, (2) interests of loans, etc..
The required size (m^2) of K can be calculated as:

$$K = \frac{D(JD)}{m'(JD/m^2)}$$

Implementation is as follows. After inspection and approval of the plan, the government in charge of this project will finance all the expenses (D) required for the development to the cooperative association. And the association has to payback the cost and interests to the government after the completion of the project. For this payback, the association can sell "K" area. Often, the local government buy this K in order to use as lands for community facilities such as schools, clinics or meeting-hall.

(4) Then each private land will be reduced in order to create public spaces (r' and parks) and K space. But this reduction will be by 25 percent to 30 percent. Since the land price rises to m'/m, so their land value will rise more than twice. In many cases, m' rises more than 10 times than before (m).

ii. Benefit of Land Readjustment Development

12.182 First, urban infrastructure are built completely by private efforts(land owners), and thus the local government can use its town planning budget more effectively for its own projects.

12.183 Second, the local government can check the associations plan to let it fit to the town plan, and can change the associations plan to right directions when their development plan is not satisfactory.

iii. Caution

12.184 First, land readjustment development is useful only for building urban infrastructure. To make desirable urban environment, we need to control the buildings and landscaping of the town.

12.185 Second, it will take a long time to complete this development. At first we need to be patient in persuading the owners to establish their cooperative association.

e. Land Purchasing by Local Governments for Public Use

12.186 In order to create ideal space for urban area, it is the easiest way to have government owned land. We should have some ways to encourage local governments to increase their public land. Long term, low interest finance for this purpose by the Governmental banks must be considered.

12.6.2 Education

12.187 It is very clear that educational level in Jordan is high as compared to the level of other Arab countries. But school building conditions are really poor. The percentage of budget allocated to the Ministry of Education is extremely low, even compared with other Arab countries. The budget in 1976/77 is 6.7 percent of the total governmental budget. This percentages in some of the other countries are 11.5 percent (1976) in Iraq, 16.5 percent (1976) in Algeria, 18.64 percent (1973) in Lebanon and 14.3 percent (1971) in Sudan.

12.188 Ministry of Education proposed to construct 388 schools which would cost about JD 300 million in their 5 Year School Construction Plan (1977-1981). It is estimated to cost about JD 60 million per year on average, while the budget of 1978 for school building is about JD 1.5 million. We strongly recommend raising the amount of budget for school buildings.

12.189 As the numbers of nurseries and kindergartens increase, women's participation to this field will be required. To promote this women's participation, there should be coordination among pertinent authorities particularly between the Ministry of Education and Department of Social Affairs.

CHAPTER XIII

LAND USE

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LAND USE

13.1 Purposes of Land Use Planning

13.001 Land use planning must be consistent with the development policy frames adopted by the regional government or by the Central Government. The purposes of land use planning is differently set depending on the stages of planning. In the First Stage, the primary purpose is to analyse the natural and socio-economic characteristics of a region and thereby to suggest a broad outline of land use policies for the future. The Stage includes spacial allocation of variously proposed sectoral projects in accordance with natural endowments and agglomeration of population and economic activities within the region. The output contains locations of cities and industries which are expected to develop in the future and of infra-structural facilities which are necessary to support such development.

13.002 In the Second Stage, the purpose of land use planning is to indicate the guidelines according to which the actual construction of various physical facilities is controlled in relation to the varying purposes these respective facilities are expected to serve. The Stage consists of two steps of planning. The final output is to formulate and finalize a set of legally effective construction regulations. Preceding this step, a thorough examination of its merits and effects must be made by those who are responsible for its execution and those who are affected by its execution (e.g. The residents of the region) in order to reach a broad consensus.

13.003 Land use planning in this Study corresponds to the First Stage indicated above. In other words, its purpose is to suggest an outline of the direction to which the Northern Region is expected to develop in the following two decades. More detailed planning will have to be done after feasibility studies of major sectoral projects are completed.

13.2 Methods of Land Use Planning

13.004 The rough outline of the method adopted here for land use is shown here to indicate the order of presentation which will be followed in this Chapter.

13.005 Land use planning consists of three steps, (1) a survey of the present land use patterns, (2) an identification of potential land use possibilities, and (3) plan formulation.

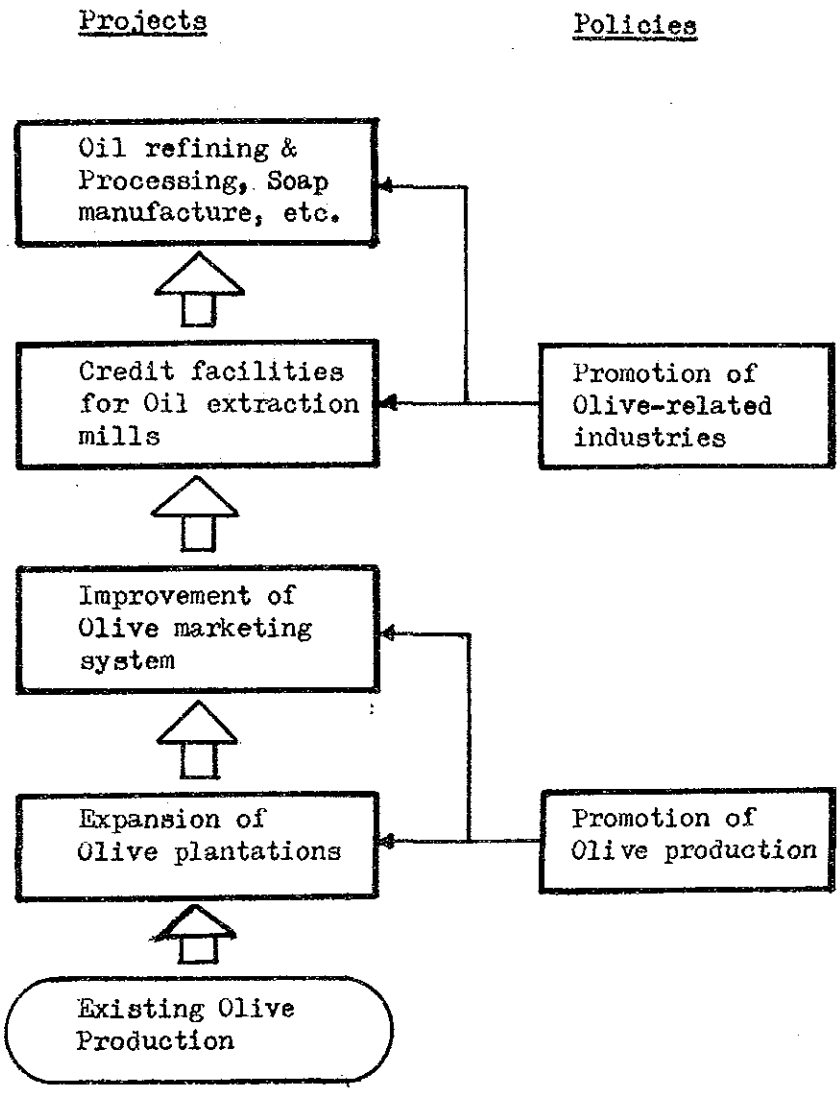
13.006 The outputs of the first step are maps of 1: 50,000 and 1: 100,000 scale. These maps are to show the present land use on the basis of the topographical map made in 1961. The entire Study Area will be mapped with a scale of 1:500,000 to distinguish the cultivated area, orchards (olive plantations are shown separately), woods, wood-scrubs, and desert, with separate plotting for the irrigated area. For the Greater Irbid Area, another land use map of 1:25,000 will be prepared. The changes since 1961 are corrected by incorporating data made available at the Department of Agriculture in the Irbid Governorate. With regard to the geological and soil conditions, the Geological Map (Scale 1:250,000) drawn up in 1968 by the team led by Dr. F. Bender is used for the entire Study Area, while the soil map recently finished by the Soil Division of the Ministry of Agriculture with FAO assistance is used for the Greater Irbid Area.

13.007 The second step is carried out on two levels. One aims at identifying possibilities for agricultural use on the basis of topographical and pedological potentials, while the other examines the distribution of urban agglomerations and transportation facilities and the availability of public utilities such as electricity and water in order to identify development possibilities of industrial, commercial and distributional establishments. In addition, use will be made of the information obtained during the field survey on the sphere of activity of inhabitants in respective communities in the Study Area.

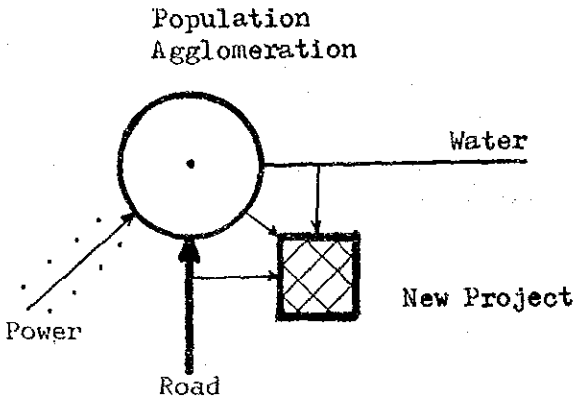
13.008 As for the Greater Irbid Area, it was proposed in the Phase I, Inception Report to identify agricultural development possibilities on the basis of the distribution of government-owned land in addition to soil conditions in the area, because publicly-owned land is more readily available for project implementation. However, because the information has not yet reached the Study Team, the identification is done only on the basis of soil conditions.

13.009 The third step of land use planning requires, in addition to the outputs of the two preceding steps, a planning frame. The frame must incorporate the distribution of population and sectoral activities in the Study Area, on the one hand, and projects proposed for the respective sectors, on the other. For the plan formulation, the following points need be kept in mind in order to facilitate the efficient implementation of the proposed projects.

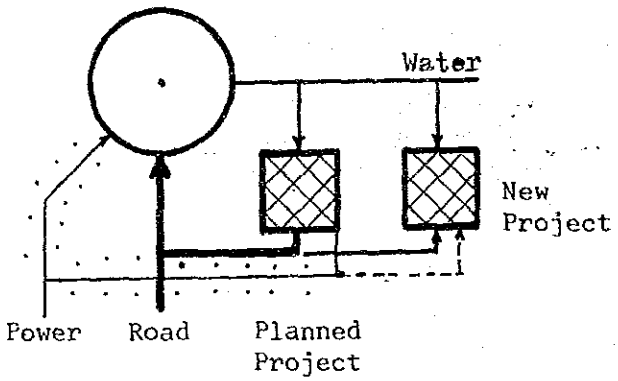
An Example of Project Linkage



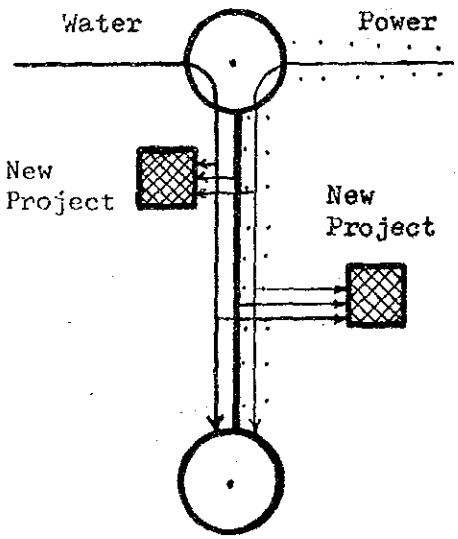
Types of Locational Integration



Concentration on the basis of the existing resource availability



Concentration on the basis of the development effects of the already Planned Project



Linear Location on the basis of the existing infrastructure

13.010 First, it is necessary to take into consideration their linkages with the existing industries and resource endowments. For example, the promotion of olive planting will have to be carried out apace with improvement of the agricultural produce marketing system and with promotion of the oil extracting industry. This example is illustrated in the following figure titled An Example of Project Linkage . Or, a white cement factory planned for Salt and a pre-fabricated construction material factory planned as part of Yarmouk University can be linked with revamping of the existing local steel or metal fabrication workshops through providing industrial estates for these medium-and small-scale enterprises.

13.011 Second, exact locations of the newly proposed projects must be determined by considering such factors as accessibility to the existing and planned infrastructural facilities, complementary linkage with other sectoral activities and agglomeration effects with other industries and urban centers. This is also illustrated on the following figure titled Types of Locational Integration. It is desirable that a new project, especially when it is an economic sector project, be located in such a way that it can make full use of the available industrial establishments, population and infrastruture. When there is already a big project which includes the development of associated transportation, utilities and other infrastructural facilities as well, locations of the new projects must be determined in such a way as to be able to maximize the development effects anticipated for the big project.

13.3 Present Land Use in the Study Area

13.3.1 Topography and Climate

13.012 As to the topography, it is discussed in Chapter I Overview of Volume 2. The climate in Jordan is broadly classified as arid and semi-arid. 1/ However, the western highlands have a Mediterranean climate with an annual precipitation of more than 500 mm, one of the highest rainfall levels in Jordan.

a. Temperature

13.013 The mean daily temperature in Jordan varies during the winter (January) from less than 10°C in the western hilly highlands to 4°C in high altitude areas (more than 1,000 m) around Madaba and Karak. In the Study Area, the temperature goes down below 8°C in mountainous areas around Ajlun and below 10°C in the highlands in Irbid and Ramtha, whereas it is around 14 to 16°C in the Jordan Valley.

13.014 During the summer (August), the mean daily temperature is above 20°C all over the Country. The highest temperature of 32°C is recorded at Wadi Araba, and the lowest of 20°C in mountainous areas above 1,500 m. The eastern desert areas have a temperature ranging from 26 to 28°C.

1/ The information for this section is drawn from Climatic Atlas of Jordan, prepared by the Meteorological Department, The Ministry of Transportation.

13.015 In the Study Area, recorded temperatures are below 30°C except the area in the Jordan Valley. In the hilly areas of Ajlun and Jerash, it is around 24°C. In the rest of the Area, the mean daily temperature generally ranges from 25 to 30°C gradually going down towards the east from the Jordan Valley and rising again from areas around Ramtha and Mafraq to the further east.

b. Precipitation and Humidity

13.016 As for the precipitation, look at Chapter V Water Resources of Volume 3. The humidity varies widely in Jordan in correspondence with precipitation. During the rainy winter season, the area between the Jordan Valley and the Hijaz Railway records 70 percent. During the summer, the humidity is around 40 percent to the north of Karak and less than 40 percent to the south. In the eastern deserts, the humidity is below 60 percent in the winter and around 30 percent during the summer.

13.3.2 Present Land Use in the Study Area

a. General

13.017 According to the First Census of Population and Housing of 1961, the land area of East Bank Jordan totals approximately 84,535 km^2, of which 20 percent, or 16,369 km^2 is defined as settled area, the rest being deserts. Of the total settled area, 15 percent belongs to the Amman Governorate, 7,24, 30 and 25 percents respectively to the Governorates of Balqa, Irbid, Karak and Ma'an.

13.018 According to the Agricultural Census conducted in 1975, approximately 40 percent of the settled area is classified as privately owned agricultural land, totalling 6,597.7 km^2. The arable land for cereals, pulses and vegetables accounts for 57 percent (3,734 km^2) of the total, and 25 percent (1,643 km^2) is made up of land under permanent crops.

13.019 54.7 percent of the total agricultural land is located in the Irbid Governorate. Of the Governorate total of 3,606.9 km^2, 51 percent is classified as arable land and 27 percent as land under permanent crops. The total agricultural area in the Study Area, which excludes the Ghor area, totals 3,408.5 km^2, with 54 percent being actually used. Unused agricultural land contains gravels and boulders and, coupled with extremely inadequate provision of access roads, is not readily usable. In addition, they are sometimes located in semi-arid area without enough rainfalls.

13.020 Within the Study Area, 42 percent of the total agricultural land is located in Mafraq, and 30, 10, 9 and 7 percent respectively in Irbid, Ramtha, Jerash and Ajlun (Table 13.1).

i. Distribution of Cultivated Arable Land

13.021 The arable land under cultivation in the Study Area centres around Irbid-Ramtha, where blocks with a utilization rate of 80 - 100

Table 13.1 Present Land Use

(Unit: km^2)

	Total Agricultural Land	Arable Land	Land under Permanent Crops	Permanent Pastures and Meadows	Wood	Other
East Bank	6597.7	3734.4	1643.4	39.6	46.0	1134.3
Governorates						
Amman	1446.0	971.8	260.3	19.4	3.4	191.1
Balqa	376.4	206.4	108.1	1.6	5.2	55.1
Irbid	3606.9	1848.2	984.0	3.5	33.2	738.0
Karak	874.2	553.9	212.0	2.6	2.3	103.4
Ma'an	294.2	154.1	79.1	12.5	1.8	46.7
Mutserfieh in Irbid Gov.						
Irbid	1026.3	463.5	357.5	2.2	8.6	195.1
Ajlun	254.4	79.1	97.4	-	16.1	61.6
Jerash	309.1	114.7	124.7	0.5	7.3	62.3
Ramtha	363.8	235.3	79.6	0.2	0.	48.9
Mafraq	1452.9	828.6	266.3	0.4	0.9	358.0
Aghwar Shamaliya	197.7	127.1	58.4	0.4	0.4	12.2

Source: Department of Statistics, General Results of the Agricultural Census 1975.

percent are found in concentration (Figure 13.1). Blocks with a utilization rate of 50 - 80 percent are found in the western parts of Mafraq (Sama Sirhan, Balama and Mafraq City), the area around Jerash, and the area extending from western Bani Kinana to Taiyiba and Kura.

ii. Distribution of Permanent Crops

13.022 Olive plantations and orchards concentrate in the western part of the Study Area. Continuous distribution is found in the central part of Bani Kinana, Taiyiba, the area around the Municipality of Irbid, Kura, El-Mazar and Ajlun. Some scattered plantations (farmland for permanent crops) are found in some parts of Mafraq (Figure 13.2).

iii. Distribution of Forests

13.023 As shown on Figure 13.3, forests are limited to the western hilly areas, such as western Bani Kinana, most of Ajlun, and Jerash.

b. Land Use Patterns

13.024 On the basis of the foregoing information, the land use in the Study Area can be broadly divided into the following three zones (Figure 13.4):

A Hilly Forest Area
The area is predominantly under forests, though olive and other permanent crops are found in some places;

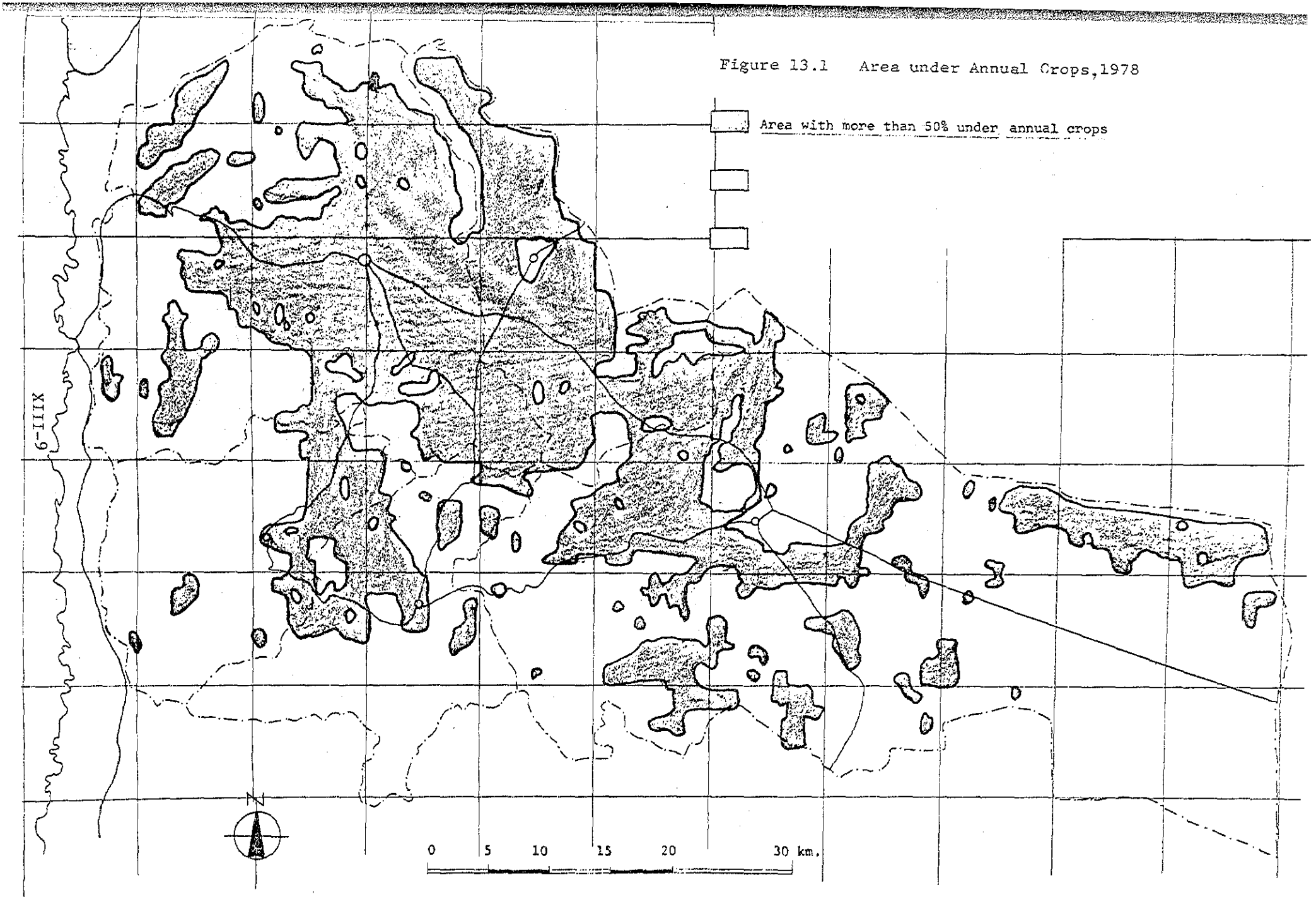
B Agricultural Area
The area can be further divided into three sub-areas according to the dominant types of agricultural operation;

B1 Tree Crop Sub-area
Land under olives and other tree crops predominates, and the terrains contain many slopes;

B2 Annual Crop Sub-area
The area largely consists of flat land suitable for the cultivation of cereals and other field crops. The eastern part with less rainfall is marginal for agricultural use;

B3 Mixed Area
Agriculture is predominant, but its mode of operation varies widely by location, such as ground-water irrigated farming around Dhuleil in Mafraq, and small-scale cultivation on the beds of wadis in hilly areas;

Figure 13.1 Area under Annual Crops, 1978



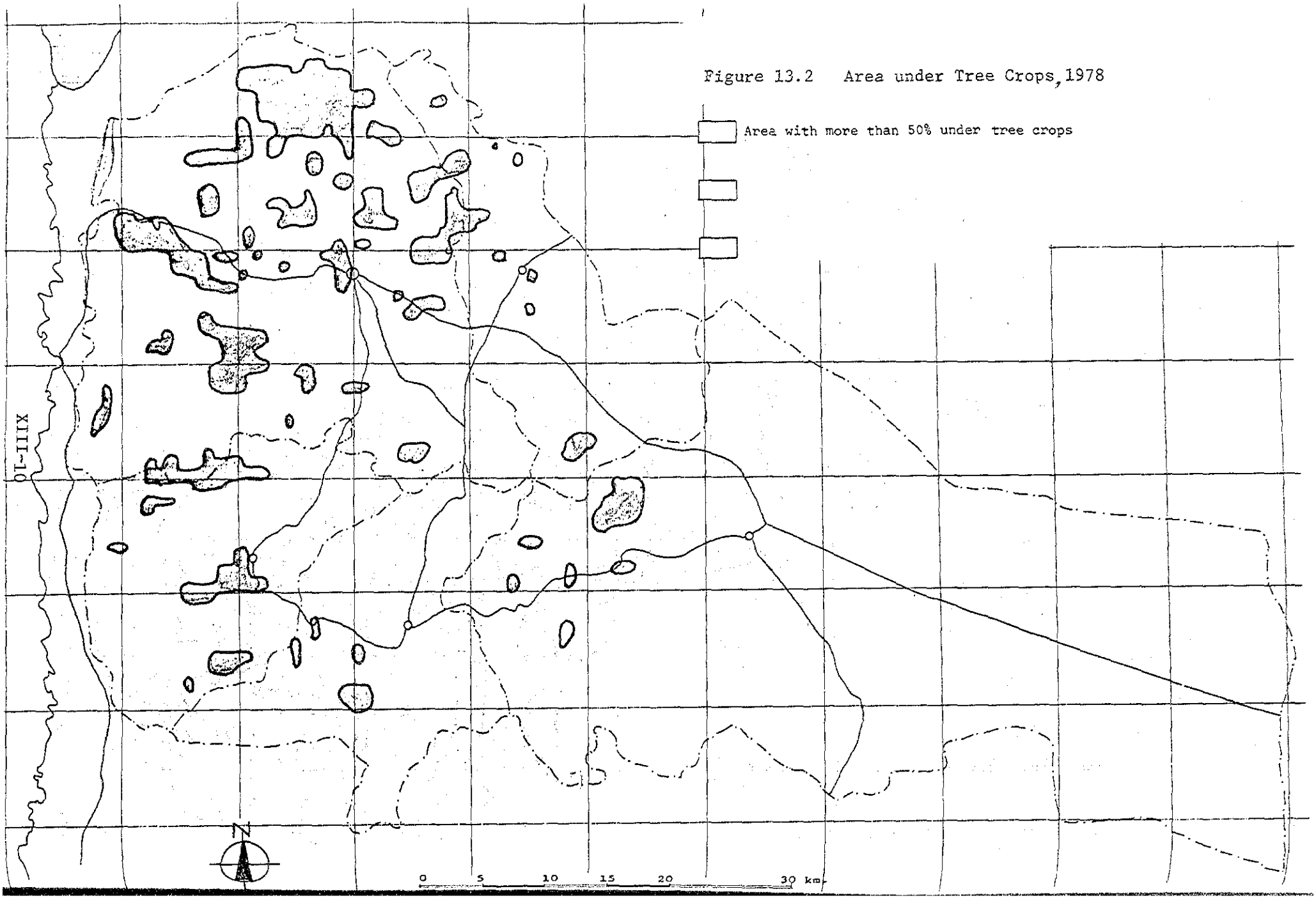


Figure 13.2 Area under Tree Crops, 1978

Figure 13.3 Forest Area, 1978

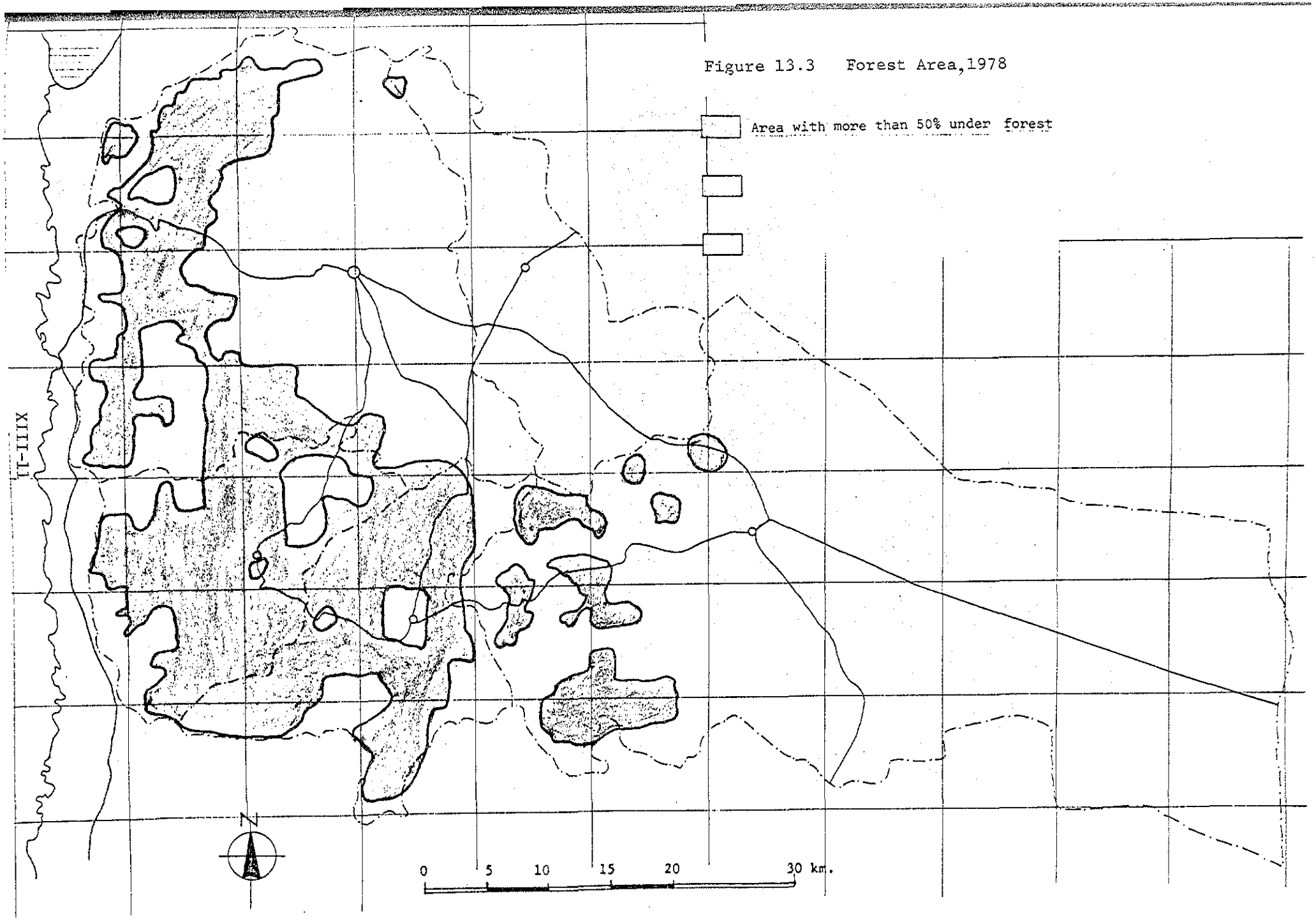


Figure 13.4 Division of the Study Area by Land Use