

CHAPTER 2 ECONOMY AND POPULATION OF THE COUNTRY

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2.1 Economy

Since early part of the 1970s, the Yemeni economy registered a substantial growth and diversification. In the years of 1976/77-80/81 (the First Five Year Plan period), GDP at constant prices of 1981, increased at a rate of 7.0% p.a. The increase was supported by a number of factors including the growth of manufacturing and service activities.

GDP was planned to have a 7.0% p.a. growth in the Second Five Year Plan period of 1982-86. However, the economy in the first 3 years was slowed down caused by earthquake damage in 1982, drought in 1983 and the influence of a sluggish world economy. As a result, the government had to reduce expenditures on projects and current expenditures as well. Import regulation was effective on fruit and vegetable in 1983, which boosted domestic production. Automobiles and other vehicles for private use have been banned for import since January, 1986.

Current revenues and expenditures of the Government from 1981 to 1986 are shown in Table 2.1.1, where it is found the revenue could not cover the expenditure in 1982, 1983 and 1985. The expenditure was less than the revenue in 1986 because of a 70% increase in taxes on goods and service as well as an increase in property revenue. The overall figures of current and capital expenditures and total revenues and grants from 1981 to 1986 are in Appendix Table 2.1.1. Shortages in revenue were filled by financing from other countries and domestic banks. Expenditures on infrastructure including transport and roads in urban areas had to be cost effective under these circumstances.

Gross fixed capital expenditures on various sectors of the economy are shown in Appendix Table 2.1.2. Expenditures on the sectors of construction and transport/communication were Y.R. 687 million in 1986, while they were 937 million in 1981 both in current prices.

Table 2.1.1 Government Current Revenues and Expenditures, 1981-86

	(In current million Rials)						Gr. p.a. 1981-86
	1981	1982	1983	1984	1985	1986	
1. Revenue (current)							
Direct Taxes	339.7	561.1	639.0	820.2	967.0	1,024.1	24.7%
Foreign Trade Taxes	1,633.5	1,840.4	2,213.3	2,254.0	2,540.5	2,881.1	12.0%
On Goods & Service	334.9	314.3	329.6	643.3	492.5	901.1	21.9%
Property Rev., etc.	1,020.9	976.3	1,271.1	1,576.7	1,331.1	2,214.3	16.7%
Total	3,329.2	3,692.1	4,404.5	5,294.2	5,331.1	7,020.6	16.1%
2. Expenditure (Current)							
Public Admi. & Secu.	937.2	1,525.4	1,629.2	1,566.1	1,814.0	2,009.1	16.5%
Defense	1,354.2	2,165.5	2,942.6	2,714.7	2,485.3	2,300.0	11.2%
Ed. Health, Social	818.3	1,307.8	1,400.9	1,437.3	1,932.8	2,224.6	22.1%
Ec-Agriculture	19.4	25.3	27.7	32.6	54.9	65.1	27.4%
Mining	-	-	-	-	-	8.0	-
Const.	95.2	90.1	96.1	105.9	105.5	130.2	6.5%
Transp & Com.	53.5	31.4	27.5	29.6	28.7	35.4	-8.6%
El W. Sewe.	0.4	0.7	1.0	1.2	1.0	1.3	26.6%
Others	47.1	68.3	74.8	65.0	100.9	40.1	3.3%
Total	3,325.3	5,180.7	6,199.8	5,203.2	6,523.1	6,813.8	15.4%
3. Balance (1.-2.)	3.9	-1,448.6	-1,795.3	91.0	-1,192.0	206.8	-

Statistical Year Books, (CPO, 1986 & 1987)

Notes: 1986 figures are provisional

Grants from other countries and capital expenditures are not shown.

When the gross capital expenditures on transport and communication sectors are divided into private and public sectors, the private sector showed a large decrease (Y.R. 345 million in 1981 to 69 million in 1986 under the current prices). While the public sector maintained mostly a same level in 1981 and 1986, its gross capital expenditure decreased in the years of 1982-85 in terms of current prices.

The gross capital expenditures in terms of constant prices of 1981 showed substantial decreases in those years. These figures are also shown in Appendix Table 2.1.2.

Review of these statistical data indicates the background of a slow down in development investment of the Government. This slow down placed severe constraints on the development budget of urban transport facilities; leaving many roads unsurfaced, unsatisfactory maintenance and repair, poorly developed public passenger transport facilities such as terminal areas and parking provisions. While development of the infrastructure was slow in the 1980s, the population concentration in urban area showed a remarkable progress as discussed in 2.2 of this chapter.

GDP in 1981-86 are shown in Table 2.1.2. According to the newest estimate of GDP for 1985 and 1986, the total in constant prices increased by 30% and 37% when compared with 1984. Since the revised figures for the whole of the six years are not published yet, the average growth rate for 1985 and 1986 are hard to determine.

Although the table shows a high GDP growth of 9.5% p.a. in the years from 1981-86, it is likely that the growth would be around 4% p.a., since the average growth rate for 1981-84 was 4.1% and gross domestic product would have continued to increase more or less at the same rate in 1985 and 1986.¹⁾

Per capita GDP and GNP are calculated and shown in Appendix Table 2.1.3. GDP per capita in 1986 was 4,205 rials at current prices

1) "Transport Sector Study" (CPO/RPT Econ. Study Group, October 1986) used 4.3 - 6.5% p.a. growth rate for 1987-91.

Table 2.1.2 Gross Domestic Product, 1981-86

	(In constant prices of 1981 Y.R. Million)						Gr. P.a. 1981-86		
	1981	1982	1983	1984	1985	1986		Present. 1986	
I. Sectors									
Agri., Forest, Fishing	3,685	3,854	3,418	3,414	3,704	4,126	10,680	(28.5)	2.3%
Mining & Quarry	156	163	178	187	172	137	246	(0.7)	-2.6%
Crude Petro	-	-	-	-	-	260	260	(0.7)	-
Manufacturing	820	987	1,216	1,306	2,404	2,462	4,420	(11.8)	24.6%
Petro Refineries	-	-	-	-	-	200	200	(0.5)	-
Electri., Gas, Water	117	138	173	216	239	286	320	(0.9)	19.6%
Construction	1,098	1,167	1,159	1,212	1,101	857	1,285	(3.4)	-5.1%
Whole & Retail Trade	2,046	2,140	2,095	2,150	2,380	2,548	4,573	(12.2)	4.5%
Restaurant & Hotels	139	163	164	167	173	180	323	(0.9)	5.3%
Transport. & Comm.	497	596	593	620	2,406	2,549	4,106	(10.9)	-
Financial Inst.	412	361	438	561	558	604	896	(2.4)	8.0%
Real Est. & Busin. Serv.	567	676	741	783	1,878	1,993	3,270	(8.7)	28.5%
Community, Social, p.s.	131	154	154	160	138	159	286	(0.6)	4.0%
Imputed Banks Charge	-211	-245	-248	-367	-465	-482	-716	(-1.9)	-18.0%
Sub-total	9,457	10,154	10,081	10,409	14,688	15,879	30,149	(80.5)	10.9%
2. Others									
Producers of Gov. S.	1,996	2,180	2,763	2,269	2,291	2,314	4,410	(11.8)	3.0%
Producers of Private S.									
Nonprofit S. to Hshold.	24	27	31	32	36	40	50	(0.1)	10.8%
Import Duties & Ind. Tax	1,634	1,832	2,057	2,060	2,124	2,021	2,863	(7.6)	4.3%
3. Total of GDP	13,111	14,193	14,432	14,770	19,139	20,254	37,472	(100.0)	9.1%

Statistical Year Books (C.P.O., 1986 & 1987)

Notes: 1) In current prices.

: 1986 figures are provisional.

: Gr. p.a. (Average growth per annum from 1981 to 1986) is based on the constant prices.

and 2,184 rials at the 1981 constant prices. Y.R. 4,205 would be equivalent to US\$ 450 using an exchange rate of Y.R. 9.31 = US\$ 1.00.

The 3rd Five Year Development Plan (1987-91) has been authorized by the People's Council. In light of current events, the plan may have a difficulty to set a high target: production and export of oil started late in 1987 while prices in the world market is in a low level; the world economy seems to grow rather sluggishly; remittance by workers abroad decreases particularly from the oil producing countries; weather conditions which is critical in influence on agriculture product are not stable, and so on.

Within the context of this study, it is assumed that GDP will continue to develop at a rate of around 4-5% p.a. in the coming several years. The growth rate would be mostly the same as achieved in the early part of the 1980s.

2.2 Population

The population of the country was 9.3 million in 1986. It had increased from 6.5 million in 1975 to 8.5 million in 1981. These figures indicate an average annual growth of 4.67% in 1975-81 and 1.67% in 1981-86, where it is found the difference in the average rate in the periods is substantial. When the years from 1975 to 1986 were taken into one period, the average growth became 3.29% p.a. The figure is in the range of growth rate generally seen in other developing countries. It seems reasonable to assess that the population of the country, including workers abroad, is approximately 10 million in 1987. Statistical data are shown in Table 2.2.1.

The CPO data of households in 1975 and 1986 show that average size of a household nationwide was 5.1 persons in 1975 and 5.7 persons in 1986. The household size in major towns is summarized below from the census.

Table 2.2.1 Population in 1975, 1981 and 1986

Governorate	1975 Census		1981 Census		1986 Census ²⁾		Intercensal Rate of Annual Increase (1975-1986)
	Number	%	Number	%	Number	%	
Sana'a	1,041,249	17.5	1,740,744	20.4	1,856,876	20.0	4.62
Taiz	1,121,801	18.8	1,553,520	18.2	1,643,901	17.7	2.77
Hodeidah	807,575	13.5	1,085,376	12.7	1,294,359	14.0	3.61
Ibb	1,020,994	17.1	1,347,987	15.8	1,511,879	16.3	2.86
Dhamar	568,186	9.5	787,109	9.2	812,981	8.8	2.54
Hajja	490,820	8.2	880,619	10.3	897,814	9.7	4.86
Sa'ada	268,840	4.5	332,364	3.9	344,152	3.7	1.51
Al-Mahweet	224,054	3.7	292,973	3.4	322,226	3.5	2.59
Al-Beida	229,653	3.8	327,539	3.8	381,249	4.1	3.94
Mareb	225,805	3.4	108,814	1.3	121,437	1.3	*1)
Al-Jawf	-	-	83,074	1.0	87,299	0.9	*1)
Total	6,492,530 ³⁾	100.0	8,540,119	100.0	9,274,173	100.0	3.29

Notes: 1) 1975 Population Census did not include most of Mareb and Al-Jawf Governorates. The population figures were estimated at that time using the population figures of 1981 and 1986. The intercensal annual rate of increase for Mareb was 2.22% and for Al-Jawf was 1.0% for that period.

2) This table includes Yemenis abroad at the time of the census.

3) The 1975 total population include 493,552 emigrants who were not distributed by Governorate but were included in calculating the intercensal rates of increase.

Source: Population Census 1986 (CPO)

Average Numbers of Household Members
(in persons)

Cities	1975	1986
Sana'a	5.3	6.2
Taiz	6.2	6.6
Hodeidah	5.5	5.8
Ibb	5.5	6.2
The Country	5.1	5.7

Source : Population Census 1986 (CPO)

Table 2.2.2 shows the growth of population in urban areas. It has been said that main reasons of rapid urban population development are:-

1. When workers abroad particularly in the oil producing neighbor countries returned to the YAR with their savings, they tended to settle in large urban areas rather than in their original villages. This in turn encouraged their families in villages to immigrate to the urban areas.
2. This movement from villages to urban areas then stimulated other villagers to immigrate into urban area. The percent distribution of urban and rural population in 1975 and 1981 are shown in Table 2.2.2, where changes into a larger share in urban population are found from 1975 to 1981.
3. Rapid population concentration was taken place in the years since the mid-1970s. The nation's economy also expanded rapidly and expanded service sectors in urban areas could absorb this population concentration.

A series of population census data for 1986 have not been published yet, making it difficult to forecast the population size in the coming years. It is assumed that the population in the country will grow around 3% p.a. and the annual growth rate will decrease gradually in the long range.

Table 2.2.2 Population in the Governorate Centres in 1975, 1981 and 1986³⁾

Town	1975	1981	1986	Rate of annual increase between and 1986 censuses
Sana'a	135,625	211,150	427,185	10.99
Taiz	79,720	87,689	178,043	7.58
Al-Hodeidah	72,895	95,873	155,110	7.11
Ibb	17,949	25,888	48,806	9.77
Dhamar	19,540	30,368	47,733	8.46
Hajja	5,813	12,891	15,878	9.57
Saada	4,252	7,131	11,759	9.69
Al-Mahweet	2,421	5,503	5,166	7.13
Al-Beida	5,975	9,626	12,370	6.84
New Mareb	292 ²⁾	-	1,457	1)
Hazm-Aljawf	-	-	2,216	1)

Note: 1) Can't be calculated due to UNAVAILABILITY of Data in 1975

2) OLD MAREB TOWN

3) This Table includes the present population (i.e. Defacto) at the time of the census in Governorate centres.

Source: Population Census 1986 (CPO)

2.3 Transport system

The transport system of the country is composed of roads, airports and seaports. No railways have been constructed yet.

- 1) The existing status of the road network can be identified through the following figures of inter-city road network.

Paved	1. Primary	345 km	Sub total	2053 km
	2. Secondary	1708		
Unpaved	3. Gravel	1004	Sub total	31004 km
	4. Feeder	20000		
	5. Tracks	10000		
Total				33057 km

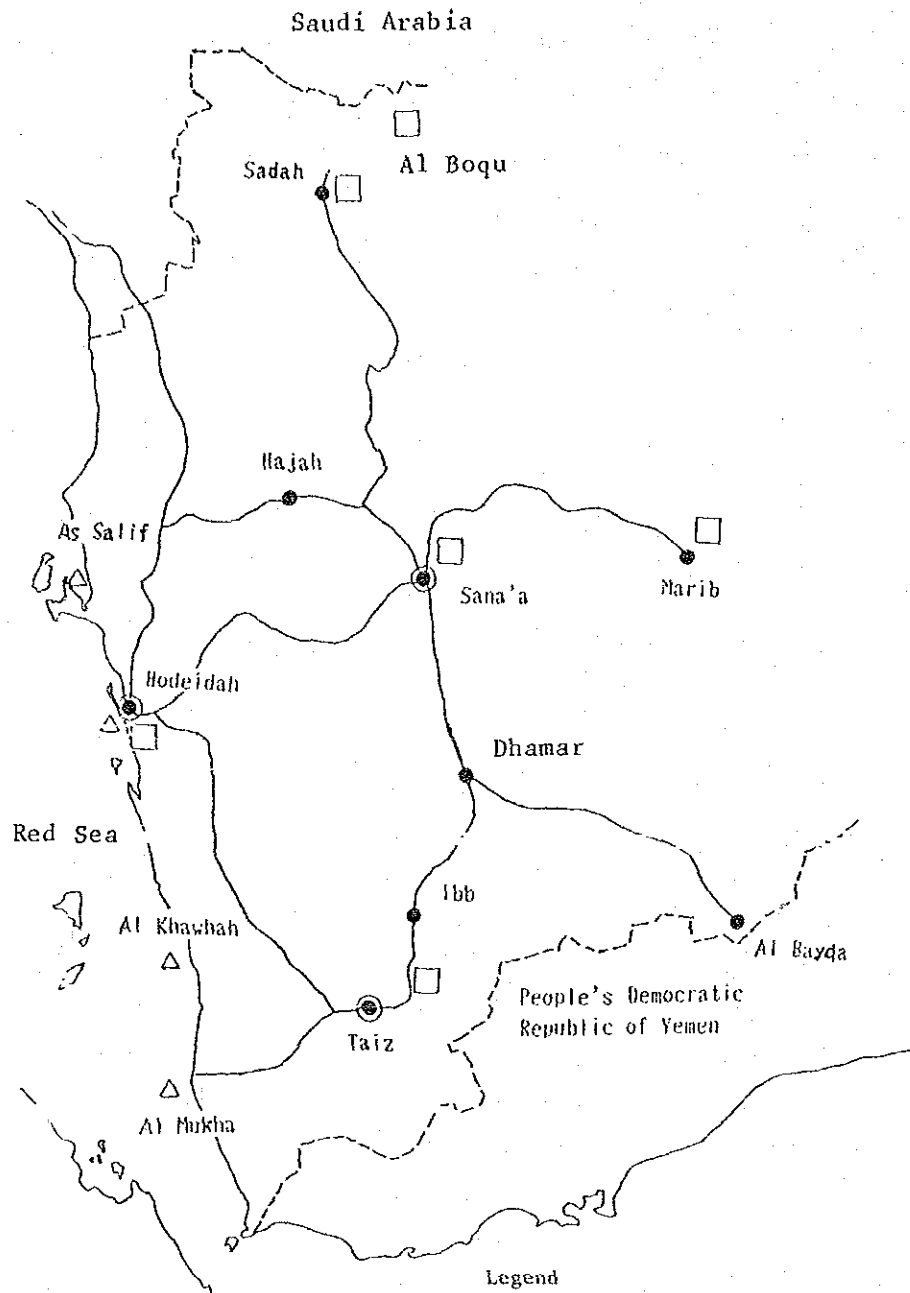
Source: Transport Sector Study (RPT Economic Studies Group, 1986)

Above 1 - 3 are constructed and maintained by Highway Authority (HA), while 4 and 5 are by Local Development Associations (LDA) and Ministry of Agriculture. Road in urban areas are constructed and maintained by Ministry of Municipalities and Housing (MMH). Paved roads linking main cities are shown in Fig. 2.3.1.

Some of the data from routine traffic counts conducted by HA are shown in Table 2.3.1. Generally traffic on those inter-city roads have increased 7-8% p.a. during the years 1980-87. The government established the Ministry of Municipalities and Housing in 1979 to integrate the management of all urban infrastructure and public housing, in which improvement and maintenance of streets in urban areas are included. MMH has recently begun to systematize the filing of traffic data and of road inventory data.

- 2) Airports are classified into international and domestic. Those at Sana'a, Taiz and Hodeidah are both for international and domestic. Other domestic airports are Al Boqu, Sa'ada, Marib, Al Hazm, Suqabs and Al Baida. They are administered by Civil Aviation and Meteorology Authority (CAMA). Yemen Airways (Yemenia) is a public corporation operating regular

Fig. 2.3.1 Transportation System of Y.A.R



- Legend
- △ Seaport
 - Airport with regular flight
 - ⊞ Studied city
 - City
 - Road
 - - - Boundary

service only among Sana'a, Taiz, Hodeidah, Sa'ada, Al Boqu and Marib. Yemenia also operates international services together with other foreign airlines. Passengers and cargo using Sana'a International Airport are shown in Table 2.3.2. It is found landing/departure of the planes increased very little, while passengers increased by 20% and freight by 56% from 1980 to 1986.

- 3) Main seaports are Hodeidah, Mocha, Al Salif and Katheib. Their capacities were increased recently. They are in the system of Port & Marine Public Corporation under the Ministry of Public Works. Commodities of export and import are shown in Table 2.3.3.

Table 2.3.1 Traffic Volume on Highways, 1980-1987

		Unit : A.D.T. (24 hrs)							
Roads	Location	1980	1981	1982	1983	1984	1985	1986	1987
Sana'a	Khidir	2926	2690	3376	2753	3463	5156	4041	4274
-Taiz	0201	100%	92%	115%	94%	118%	176%	138%	146%
Sana'a	Al Hoban	5680	2831	5680	3456	8694	6256	8971	-
-Taiz	0205	100%	50%	100%	61%	153%	110%	158%	-
Sana'a	Buan	1816	3879	2117	3168	3219	4799	3774	3823
-Hodeidah	0101	100%	214%	117%	174%	177%	264%	208%	211%
Sana'a	Km-16	3555	3576	2834	3240	4388	6197	3518	5178
-Hodeidah	0104	100%	101%	80%	91%	123%	174%	99%	146%
Sana'a	Al Azragein	3466	3548	2200	3165	4258	4759	4778	5696
-Sadah	0301	100%	102%	63%	91%	123%	137%	138%	164%
Sana'a	Khashm Al	3234	-	2429	3270	3406	4749	4384	4214
-Marib	Bakra 0401	100%	-	75%	101%	105%	147%	136%	130%
Taiz	Km-6	3648	-	2651	2950	4128	5462	3520	3798
-Al Mafrak	0901	100%	-	73%	81%	115%	150%	96%	104%
Hodeidah	Km-16	2981	-	2923	3071	4377	5205	3764	3386
-Al Mafrak	0801	100%	-	98%	103%	147%	175%	126%	114%
Hodeidah	Km-7	791	779	1444	1646	3812	4131	1928	2951
-Harad	1701	100%	98%	183%	208%	482%	522%	244%	373%

Source: Highway Authority, 1987

* See Figs. 4.1.1.1, 4.1.2.1 and 4.1.3.1.

Export is only 6% of the import at the total of three ports in terms of tons in 1986. Hodeidah handled 73% of imports and 28% of exports in 1986. In the case of exports, Al Salif had a larger share because of rock salt loading, and begun crude oil loading since November 1987. Volumes of trade have fluctuated in the years 1980-86, and it is hard to find a trend of stable increase during the 6 years.

Table 2.3.2 Traffic in Sana'a International Airport (1980-1986)

Year	Freight in Ton		Passengers		Planes	
	Unload	Load	Arrival	Departure	Unload	Load
1980	6,736	1,994	218,000	177,000	5363	5656
81	8,073	3,289	205,000	235,000	6695	6711
82	6,118	3,220	220,000	238,000	6207	6215
83	10,994	3,970	248,000	269,000	6620	6620
84	4,109	11,669	241,000	232,000	2505	2505
85	15	3	231,000	245,000	5174	5174
86	11,211	2,399	225,000	248,000	5080	5080

Source: Statistical Year Book (CPO, 1987)

Table 2.3.3 Goods of Import and Export through the Port 1980-86

(In 1000 tons)

Year	Total		Al. Salif		Al. Mochah		Hodeidah	
	Import	Export	Import	Export	Import	Export	Import	Export
1980	2,513	-	-	-	-	-	-	-
81	2,365	86	-	-	-	-	-	-
82	2,671	99	369	49	332	-	1438	50
83	2,570	144	231	86	357	1	1649	58
84	2,936	206	218	146	566	15	2153	58
85	2,845	205	183	143	528	3	213	59
86	2,404	149	168	103	491	4	1745	42

Source: Statistical Year Book (CPO, 1982-87)

2.4 Vehicle Import

The government has banned import of all private vehicles since January 1986. Vehicles for the use of government organizations are given import license at present. However, as shown below, new registration of vehicles at Traffic Police in Governorates are found in most categories even in 1986, and probably some in 1987. These vehicles may be specifically authorized for import, stocked vehicles imported before the end of 1985, those leaked into the country, etc.

All Gov.'s	1981	1982	1983	1984	1985	1986	Total
Pub. Trans.	12,092	9,630	12,104	2,137	50,883	44,479	131,325
Priv. Trans.	2,505	3,421	9,337	-	18,077	-	33,340
Taxi	4,092	4,515	5,104	-	-	2,262	15,973
Private	4,735	7,676	9,672	1,875	-	20,296	44,254
Others	807	626	395	90	-	11	1,929
Total	24,231	25,868	36,612	4,102	68,960	67,048	226,821

Source: Statistical Year Book, 1983 and 1987, and Traffic Police.

Note : Pub. Trans. means commercial trucks
 Priv. Trans. means private trucks.
 Taxi includes taxis and micro-buses.

Although YAR began to export crude oil in November 1987, it is likely to continue strict control of vehicle import. The government, it is said, will give priority to the use of foreign exchange on projects/policies for development purpose. Priority is determined by Minister's Council when need arises.

Under the circumstances, it is difficult to predict changes in policy of vehicle import in the coming years. It is assumed that there will be no substantial change on import policies of the country, while there will be some increase in vehicle registration as was found in the years up to 1986. Traffic growth prospects being discussed in 9.2 of Chapter 9 is based on this assumption.

CHAPTER 3 URBAN FRAMEWORK

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3.1 Population

3.1.1 Sana'a

The Master Plan Study (1978) presented a population forecast of Sana'a by assuming a basic 3% natural increase and a supplemental growth rate due to immigration. The annual growth were assumed approximately 10% from 1977 to 1986 and 7.6% for the years in 1986-2000. The estimated population are shown in Table 3.1.1.1. and Fig. 3.1.1.1.

Sana'a's urbanization has developed at a larger scale than the estimate of the Study (1978) in the years from 1978-1986. The growth rate can be found at 11% per annum by the Population Census in 1975 and 1986. These statistical data are also shown in Table 3.1.1.1. and Fig. 3.1.1.1.

The following difference are found from the comparisons between the actual development and the forecast of the study (1978).

a) Findings

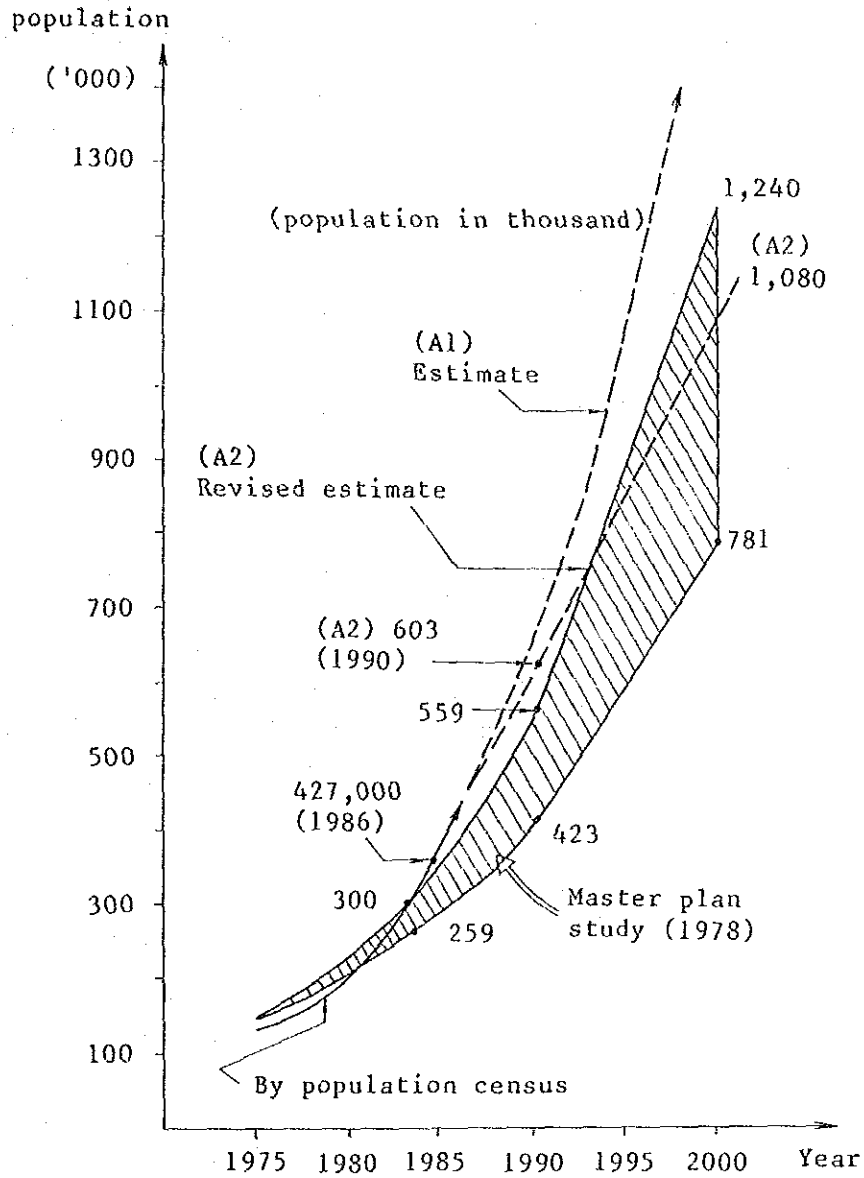
The population of Sana'a in 1983 was 12% larger than the Master Plan and this difference increased in 1986 with the actual population 23% larger than the forecast; i.e. urban expansion in Sana'a in the past ten years has registered a faster development than the forecast of Master Plan Study (1978).

Table 3.1.1.1 Population 1975 - 2000, Sana'a

Year	A. This Study			B. Study (1978)	
	A.1 4)	A.2 3)	A.2/B	2)	
1975	135,600 1)	135,600 1)---		126,700 -----	
					10.3%
1983	312,000	312,000 11.0%		278,000 -----	
1986	427,000 1)	427,000 1)---	20%	347,000 8.1%	
1987		465,000 9.0%			
1990	648,000	603,000 ----	23%	480,000 -----	
1991	719,000	650,000 7.0%	27%	510,000	7.5%
1995	1,092,000	846,000 ----	25%	679,000	
			5.0%		
2000	1,840,000	1,080,000 ----	10%	985,000 -----	

- Notes:
- 1) By the Census 1975 and 1986
 - 2) Medium figures of the Master Plan Study (1978)
 - 3) A.2 - on the assumption of growth rates tapering off gradually
 - 4) A.1 - on the assumption of growth rates same as in 1975 - 86.

Fig. 3.1.1.1 Population Forecast, 1975 - 2000, Sana'a



Note: From Table 3.1.1.1

Background of this development in the area is found in the following points:

- Concentration of population into the urban areas has progressed in the 1970s and 1980s. The growths of population in urban and rural areas from 1975 to 1981 are summarized in Table 3.1.1.2 where the share of urban population increased from 11.4% to 12.4%. Population growths in 11 large cities from 1975 to 1986 are shown in Table 2.2.2 of Chapter 2. The concentration in large urban areas, particularly Sana'a, has been remarkable in recent years.
- Yemenese citizens who once worked abroad with experiences in various technologies have settled down in Sana'a by opening small workshops. Their return coincided with rapid development activities by private or government sectors, such as housing works.

Table 3.1.1.2 Percentage Distribution and Annual Growth Rates of Population between 1975 and 1981 by Rural-Urban Strata

Stratum	Distribution Rate %		Growth ¹⁾ Rate %
	1975 Census	1981 PDS	
Sana'a	3.0	4.3	8.2
Taiz, Hodeidah Ibb, Dhamar	4.2	4.6	3.9
Other Urban	4.2	3.5	-0.001
Total Urban	11.4	12.4	3.8
Total Rural	88.6	87.6	2.5
Total	100.0	100.0	2.6

Notes : 1) Preliminary Results (1981)
 Source: Statistical Year Book (1987)
 : Pilot Demographic Survey (1981) (PDS)

b) Growth in the future

The population of Sana'a in the year 2000 will be 1.84 million on the assumption that the same growth ratio during 1975-1986 is applied as shown in Table 3.1.1.1. But it is unlikely that the population will grow at such a rate for years in the future from the following reasons.

- * Supply of land for urban use is limited. East and west sides of Sana'a are steep mountainous areas and landuse development is now toward the north and south. (Landuse development is discussed in 3.2 of this chapter.)
- * The cost of development in infrastructure for expanding urban area could be a heavy financial burden of the government.
- * Water use in Sana'a depends on the underground water resources and those in the city area are contaminated or already depleted. Increase in supply cost of water is inevitable as available resources become far from the city.
- * Concentration of job opportunities in one city will be controlled by the government from the view point of a balanced regional development policy.

It is assumed that Sana'a population will grow at a high rate but the rate of growth can not maintain a high rate as same as the past 11 years. It will be tapered off gradually in the long range as A.2 in Table 3.1.1.1. The revised forecast is summarized as 603,000 in 1990, 846,000 in 1995 and 1,080,000 in 2000.

c) Zone population distribution

The above forecast figures of population are distributed into zones as shown in Appendix Table 3.1.1.1 through the following method:

- i) Existing ratios of urbanized area by each zone were determined through the field observation and data available in MMH. Population density in each zone in 1986 were also studied in a similar way.

ii) Population densities in the urbanized area are assumed by considering the existing landuse and plans proposed by the Study (1978). The densities used for zonal population distribution are shown below:

	Pers/ha	Old Sana'a
400		
250 - 300	"	high density, i
200 - 250	"	" " , ii
175 - 225	"	medium density, i
150 - 200	"	" " , ii
100 - 150	"	low density

iii) The percentage ratios of urbanized area in the zone for future years are studied as shown in the right-hand side of Appendix Table 3.1.1.1. The zones in Sana'a are shown in Fig. 3.1.1.2, which is used by MMH for address zoning and planning.

iv) Estimated population by zone for 1991 and 2000 are shown also in Table 3.1.1.3 and the density used for the estimate of 2000 is quoted from Appendix Fig. 3.1.1.1.

Population estimates are illustrated on Appendix Fig. 3.1.1.2, through which it is found that the population in the inner zones 1 and 51 will increase by 11% only from 97,000 in 1986 to 109,000 in 2000. On the other hand those in the northern zones of 72,73,84-86 will increase by 5.3 times from 21,000 to 113,000 and that those in the southern zones of 26,38,39 will increase by 7.6 times from 6,000 to 45,000.

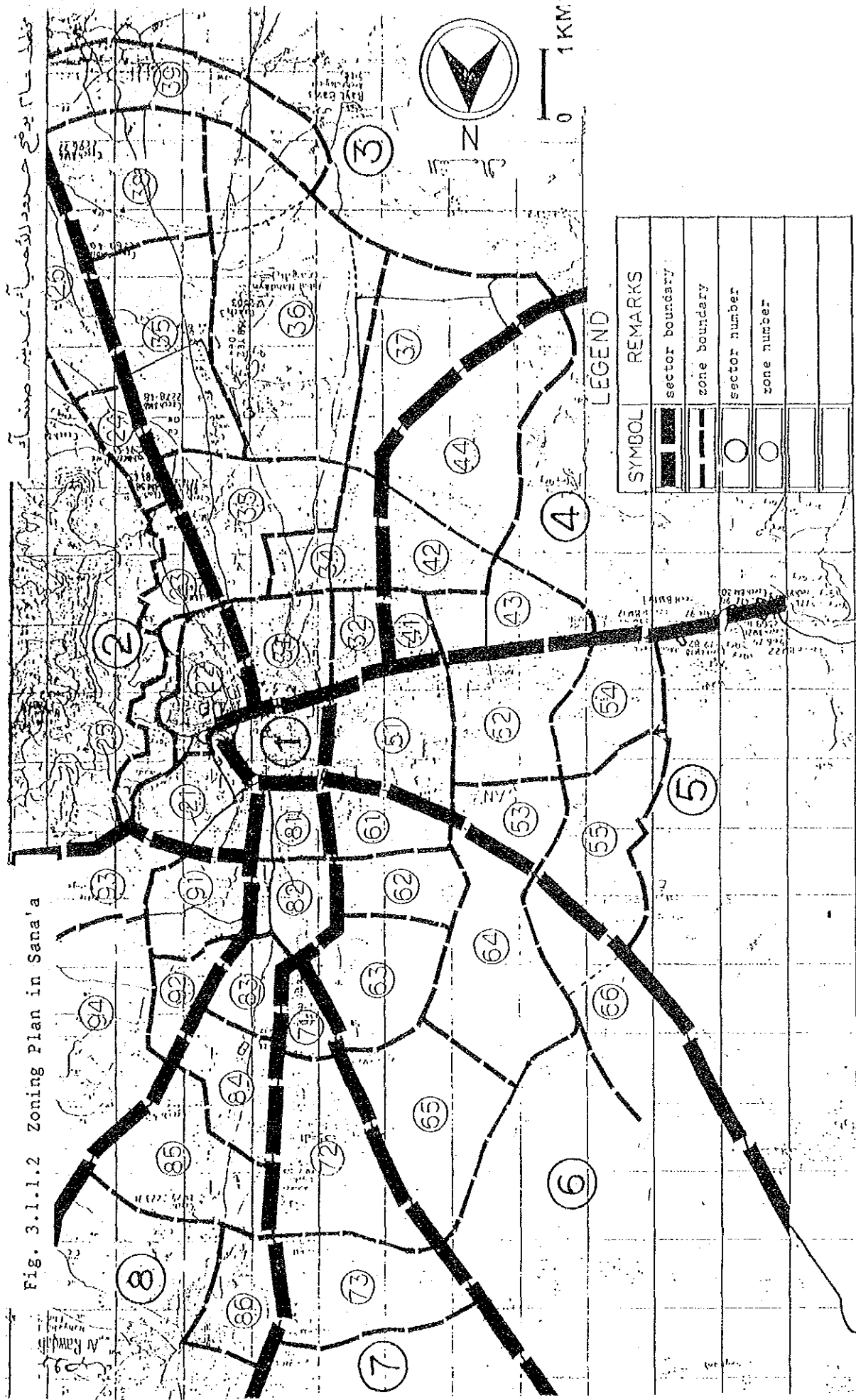


Table 3.1.1.3 Revised Estimates of Population by Sector
(Sana'a City)

Sector Number	Population			Average Rate of Annual Increase	
	1986	1991	2000	1986-1991	1991-2000
1	40,000	42,000	42,000	.98%	-
2	68,500	98,000	167,000	7.40%	6.10%
3	99,000	167,000	293,000	11.00%	6.40%
4	23,000	38,000	81,000	10.60%	8.80%
5	85,500	106,000	149,000	4.40%	3.90%
6	43,500	76,000	137,000	11.80%	6.80%
7	8,500	21,000	46,000	19.80%	9.10%
8	48,500	85,000	132,000	11.90%	5.00%
9	10,500	17,000	33,000	10.10%	7.60%
Total	427,000	650,000	1,080,000	8.80%	5.80%

Study team

3.1.2 Taiz

Changes in population of Taiz in 1975 to 1986 are shown in Table 3.1.2.1. The average annual growth rate during those years was 7.6% p.a. The Study (1978) assumed a 9.3% growth rate up to 1983 and the rate of 6.0% p.a. after 1983 up to 2000.

Census figures in 1986 showed the total city population in 1986 about 7% less than the forecast of the Study (1978). It is considered that the total of population will grow along the forecast of the Study (1978) with a delay of several years.

It is assumed that the population will increase at a rate of 6% at the same rate of the Study (1978) forecast. But the balance of 7% less in volume is maintained up to 2000. The forecast is shown in A.2 of Table 3.1.2.1. Population will be 239,000 in 1991 and 403,000 in 2000.

A population growth forecast using the average rate of 1975-86 is shown in A.1 of the same table. In this case the population will be 498,000 in the year 2000, and that large increase would be achieved only with the development of extensive job opportunities in the area.

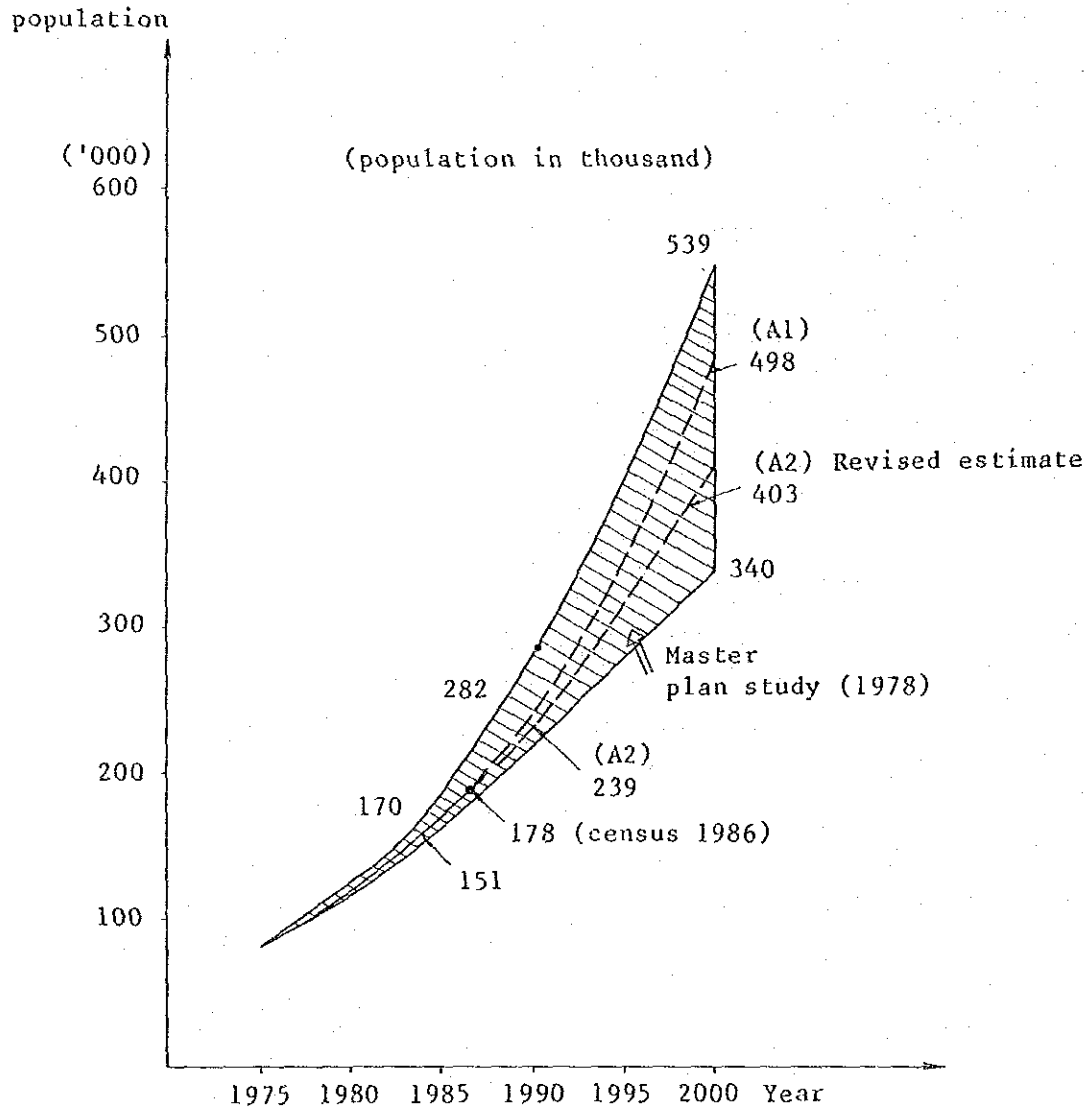
However, there is no indicative development at present nor industrial development plan which support the increase of such job opportunities. Accordingly, this study assumes the A.2 case for the future population in Taiz.

Table 3.1.2.1 Population 1975 - 2000, Taiz

Year	A. This Study		A.2/B	B. Study (1978)	
	A.1	A.2		2)	
1975	79,700	79,700 1)---		78,642 -----	
					9.3%
1983	143,000	143,000 7.6%	90%	160,000 -----	
					4)
1986	178,000	178,000 1)---	93%	191,000 6.0%	
		6.0%			
1990	239,000 5)	225,000 3)	94%	240,000 -----	
1991	257,000	238,000 6.0%			
					6.0%
1995	345,000	301,000 -----	94%	321,000 4)'	
		6.0%			
2000	498,000 5)	403,000 3)---	94%	430,000 -----	

- Notes: 1) By the Census 1975 and 1986
 2) Medium figures of the Master Plan Study (1978)
 3) Assumed a 6% p.a. growth rate
 4) Interpolated by using 6% growth rate.
 5) On the assumption of growth rates same as in 1975- 86

Fig. 3.1.2.1 Population Forecast, 1975 - 2000, Taiz



Note: From Table 3.1.2.1

3.1.3 Hodeidah

Population changes in Hodeidah city are indicated by the census figures of 1975 and 1986. It was 73,000 in 1975 and 155,000 in 1986 as shown in Table 3.1.3.1, resulting in the 7.1% p.a. growth rate in these years. The Master Plan Study (1978) had a population forecast of 200,000 in 1983 with an average growth rate of 10.1% p.a.

The Study (1978) also forecast the population 323,000 for 1990 and 483,000 in 2000, with a gradual decrease in the annual growth rate from 10.1% to 7.1% and 4.1% for those 25 years.

The comparison between the census and the Study (1978) indicates that the actual population in 1986 is at a level of 63% of the forecast of the Study (1978). Urban development was slower than the plan proposed by the Study, although the city has an international port which would have given usually large impact on the development of industries of the city. As discussed in Chapter 2 economic background which influenced the country would have affected unfavourably Hodeidah's development.

If the population increased at the same average rate of 7.1% during 1975-86, the figure in 2000 is 404,000 as shown in A.1 of Table 3.1.3.1.

However, considering the cases of Sana'a and Taiz, the average annual growth rate of 6% seems adequate for the estimate of Hodeidah.

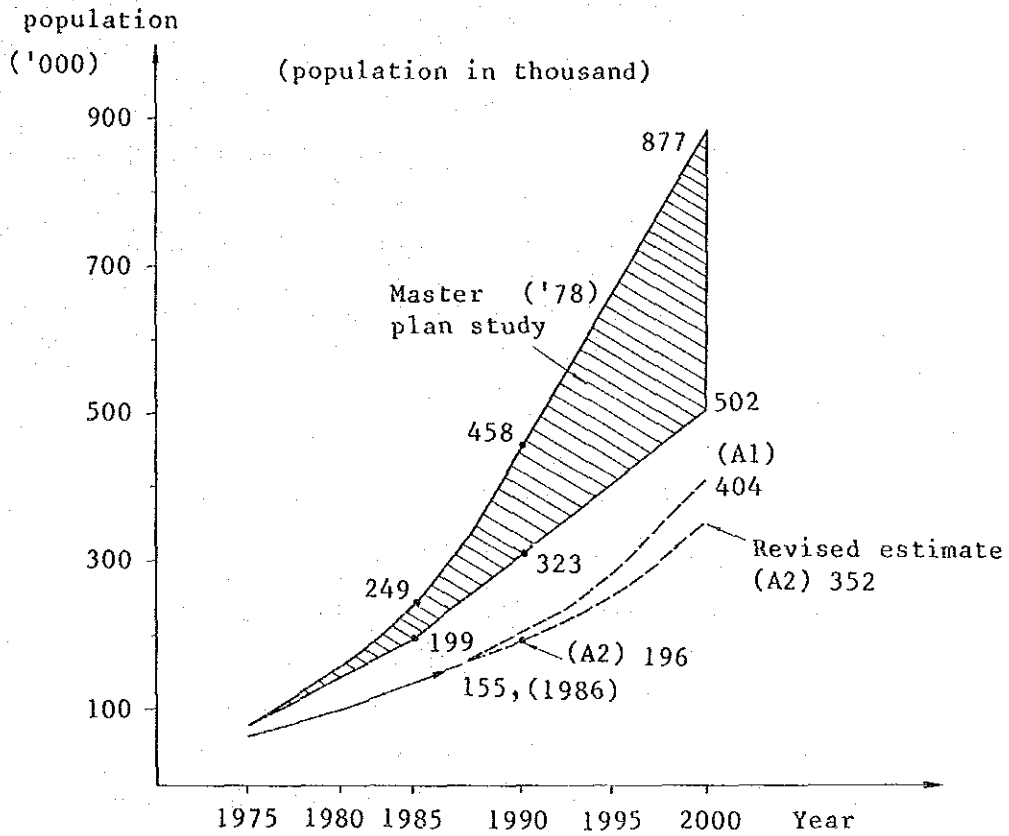
The population in 1991 will be of 208,000 and around 351,000 in 2000, being shown in A.2 of the table.

Table 3.1.3.1 Population 1975 - 2000 --Hodeidah

Year	A. This Study		A.2/B	B. Study (1978)	
	A.1	A.2		2)	
1975	72,895	72,895 1)		80,314	
					10.1%
1983	126,000	126,000 7.1%	63%	200,000	
1986	155,110	155,110 1) 6.0%	63%	246,000 4) 7.1%	
1990	204,000 5)	196,000 3) 6.0%	61%	323,000	
1991	218,000	208,000 6.0%			4.1%
1995	287,000	262,000 6.0%	66%	395,000 4)	
2000	404,000 5)	351,000 3) 73%	73%	483,000	

- Notes:
- 1) By the Census 1975 and 1986
 - 2) Medium figures of the Master Plan Study (1978)
 - 3) Assumed a 6% p.a. growth rate
 - 4) Interpolated by using the average growth rate of 7.1% and 4.1% respectively.
 - 5) On the assumption of growth rates same as in 1975-86

Fig. 3.1.3.1 Population Forecast, 1975 - 2000, Hodeidah



Note: From Table 3.1.3.1

3.2 Landuse and Spatial Expansion

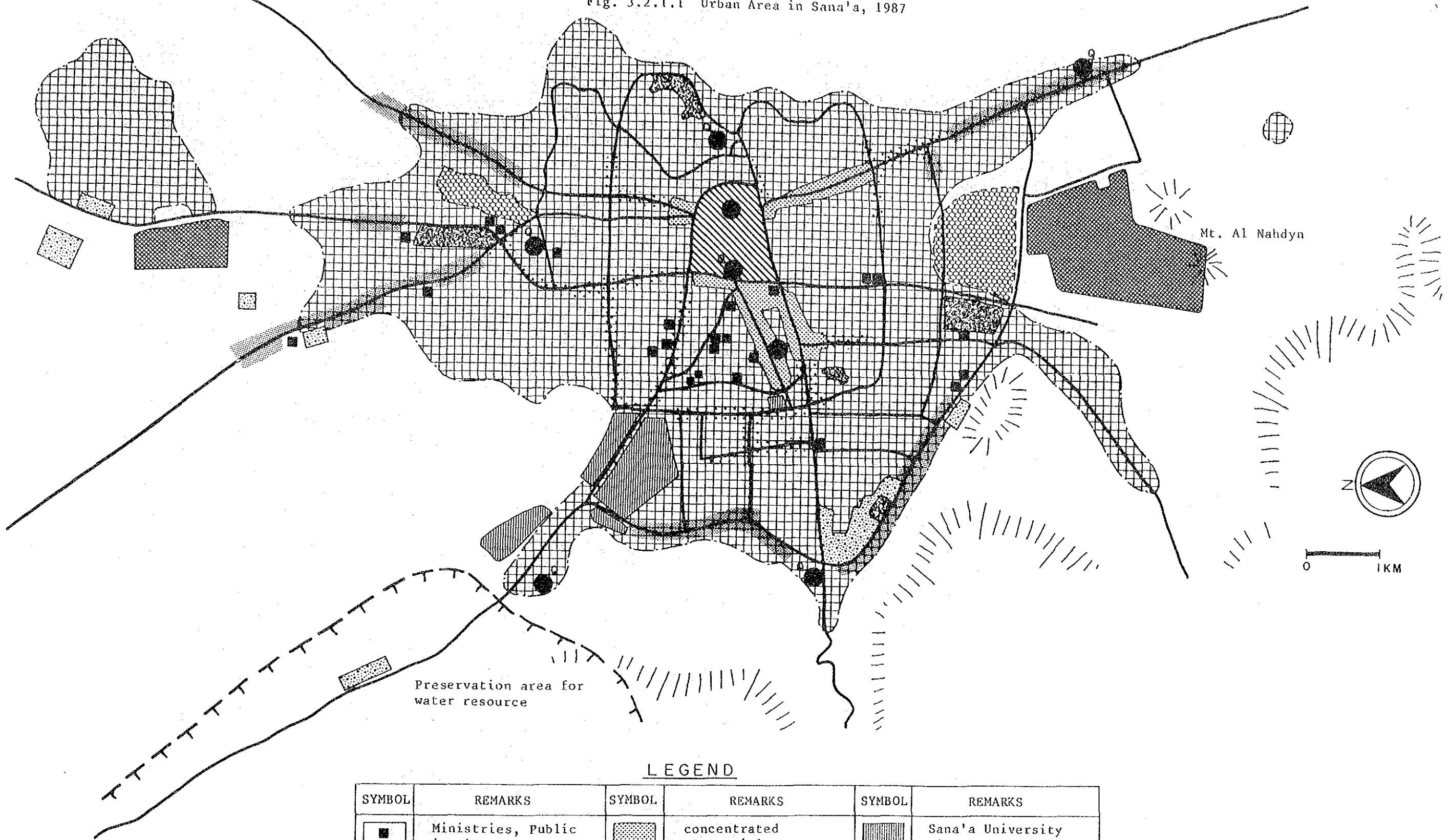
3.2.1 Sana'a

Actual developments in the past ten years are observed in the field. Spatial development and landuse characteristics are studied as shown in Fig. 3.2.1.1. They are summarized in the following:

- a) Concentrated locations have developed along the main streets just like a narrow stretch of corridor, while the Study (1978) supposed an area-wide expansion with a modest stretch toward the outer suburbs. New locations have been concentrated along the surfaced main streets, where other facilities are also served. The reason could be shortages of infrastructure facilities in-between the corridors.
- b) Development toward north seems less extensive than the plan of the Study (1978), while there is much expansion toward south.
Specifically, the area south of Mt. Al Nohdyn is under development of large scale housing projects. This area was not shown explicitly in the Study (1978).
- c) Numbers of housing units in 1975 and 1986 are shown in Appendix Table 3.2.1.1 referring to data in population census. Housing units in Sana'a increased at an average annual rate of 7% in those years. The rate was less than the population growth rate of 11.1% in the same period.

Appendix Table 3.2.1.2 shows the licenses issued by Municipality offices. The licenses in 11 years from 1976-86 was 30,037 in Sana'a, while the census 1975 and 1986 showed an increase of 141,149 houses as in Appendix Table 3.2.1.1. The latter would include non-registered houses constructed.

Fig. 3.2.1.1 Urban Area in Sana'a, 1987



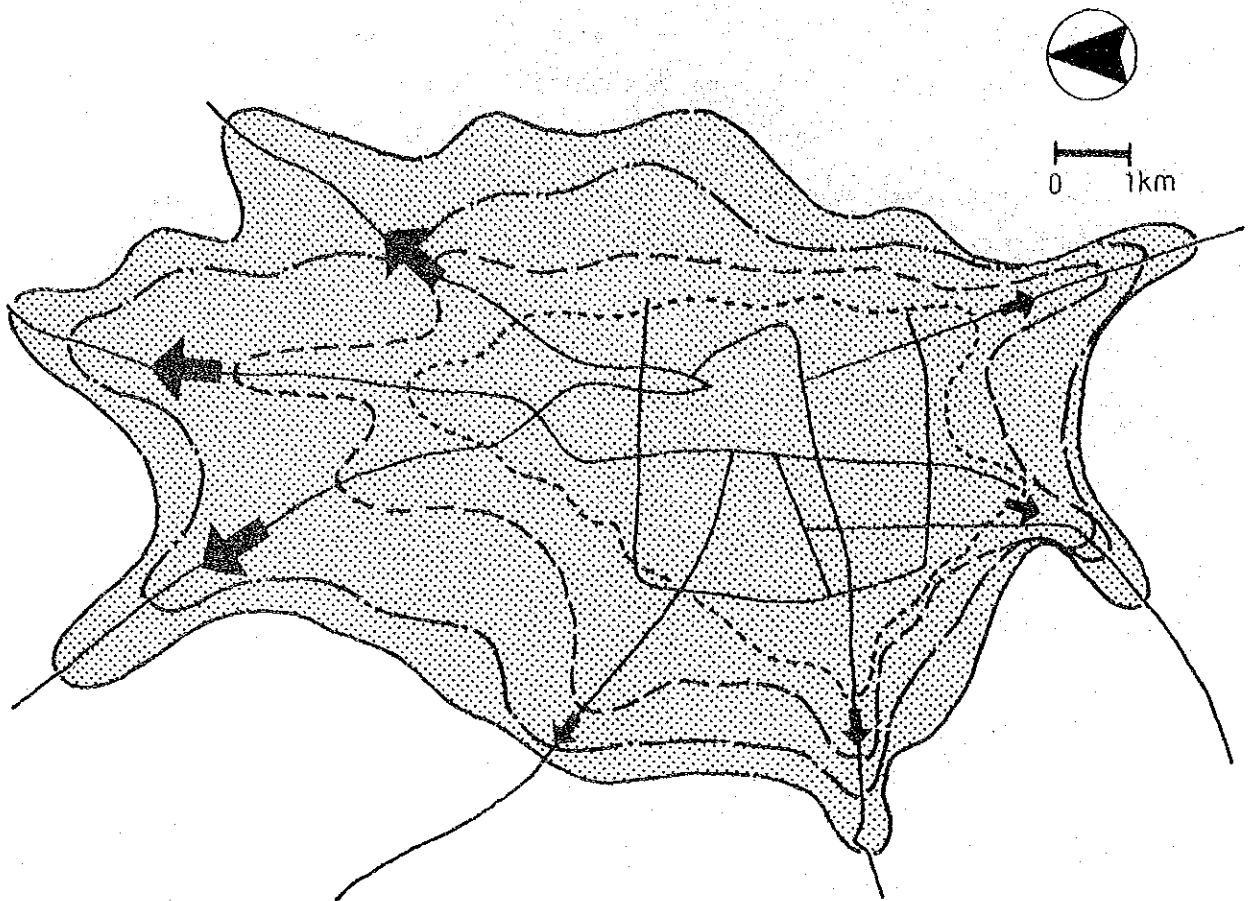
LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS
■	Ministries, Public institutes	⬢	concentrated commercial area	▨	Sana'a University site
●	suq (market)	⬢	neighborhood commercial area	▩	public city park
● ^Q	qu'at market	⬢	light industry work-shop area	⬢	preservation area wadi control
⬢	general residential area ---- 1987	▨	PRESIDENT PALACE ARMY SITE		
▨	old Sana'a historic area	⬢	Industrial area		

The Study (1978) proposed a staged plan of spatial growth up to 2000 with specific emphasis of natural constraints, being shown in Fig. 3.2.1.2. The main points are:

- 1) There is a physical constraint on the east side and the west side because of steep mountains. Sana'a will expand towards north and south.
- 2) Industrial zones are proposed to be developed along and outside the 60m road: near Taiz road, Hodeidah road, Sadah road and Marib road.
- 3) Government and institutional facilities are proposed to be dispersed, not concentrated in the inner area.

Fig. 3.2.1.2 Growth Prospect of Sana'a by Master Plan Study (1978)



urban area 1977

urban area 2000

urban area 1983

direction of urbanization

urban area 1991

However, actual development, being summarized in Fig. 3.2.1.1, becomes larger than the plan's proposal. By taking into account the development, a revised concept of structure plan is proposed in this study which incorporates in the revised population forecast. The revised plan may include the southern suburbs, since actual development in the south has shown a substantial progress. The concept is shown in Fig. 3.2.1.3. The revised conceptual plan with classified landuse for 2000 is shown in Fig. 3.2.1.4. It is to be noted that the southern area development beyond Mt. Al Nohdyn is mostly for residential housings.

Although an area-wide land use plan is expected to be drafted in near future, it is suggested that the landuse plan should be prepared not only for housing area, but also for other uses such as industry, recreation, service, administration, etc. Houses and employment opportunities should be developed in this southern area.

Road network

In the case of road network, the Master Plan Study (1978) proposed a network plan for 2000 to cope with the development of urban expansion. As mentioned already, actual development in the past ten years exceeded the plan of the Study (1978) and MMH has revised the road development plan by considering the recent urbanization. The revised plan can be compared with the Master Plan Study (1978) by Fig. 3.2.1.5. It is found that newly planned roads are mostly in the southern side where urban development has been going on, while the locations of newly planned roads on the other parts coincide with the plan of the Study (1978).

Although the revised MMH plan as shown also in Fig. 3.2.1.4 is compatible with the current urban development, the network in the southern area should be checked when a consolidated landuse plan is determined.

Fig. 3.2.1.3 Revised Growth Prospect of Sana'a by 2000

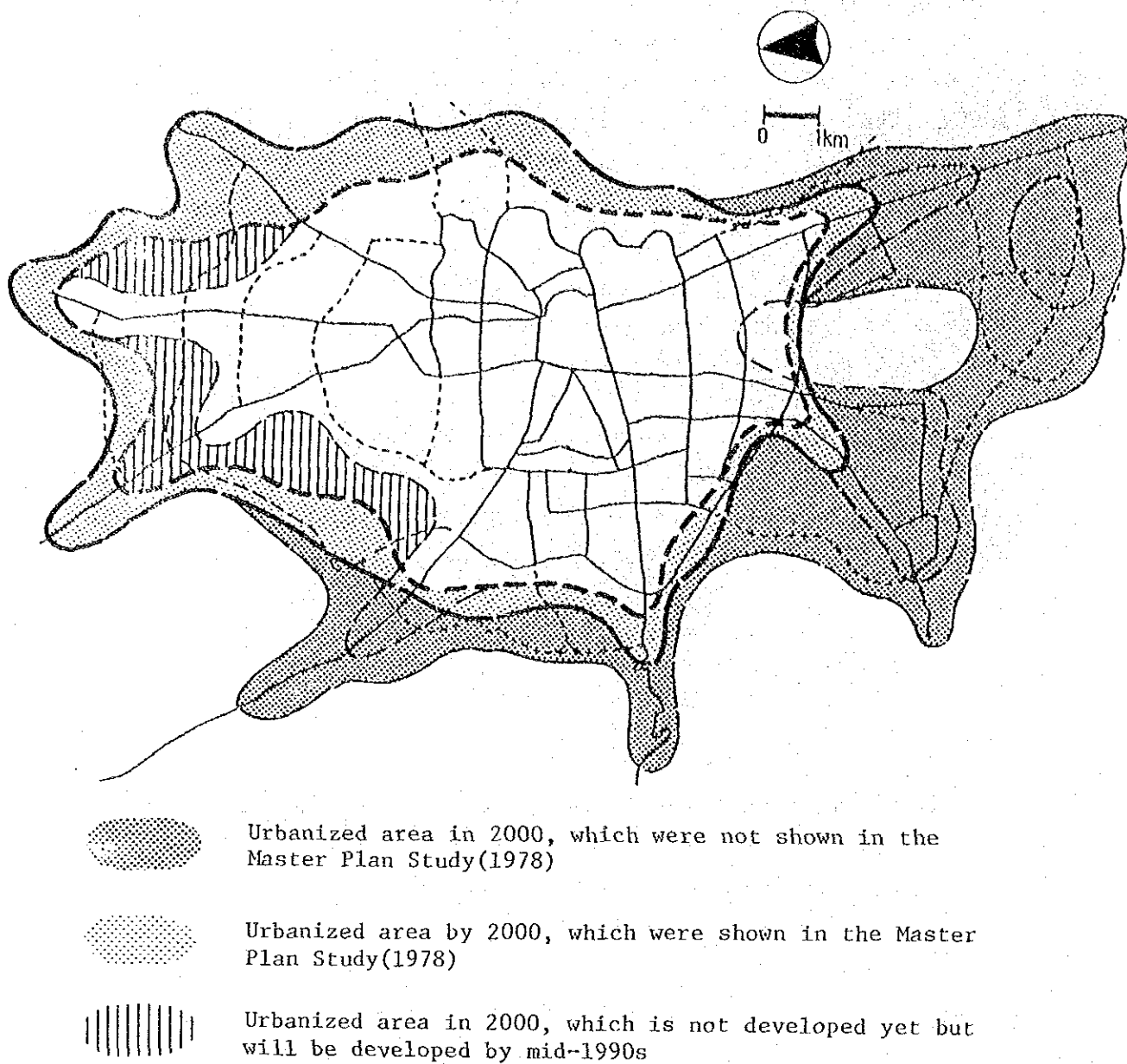
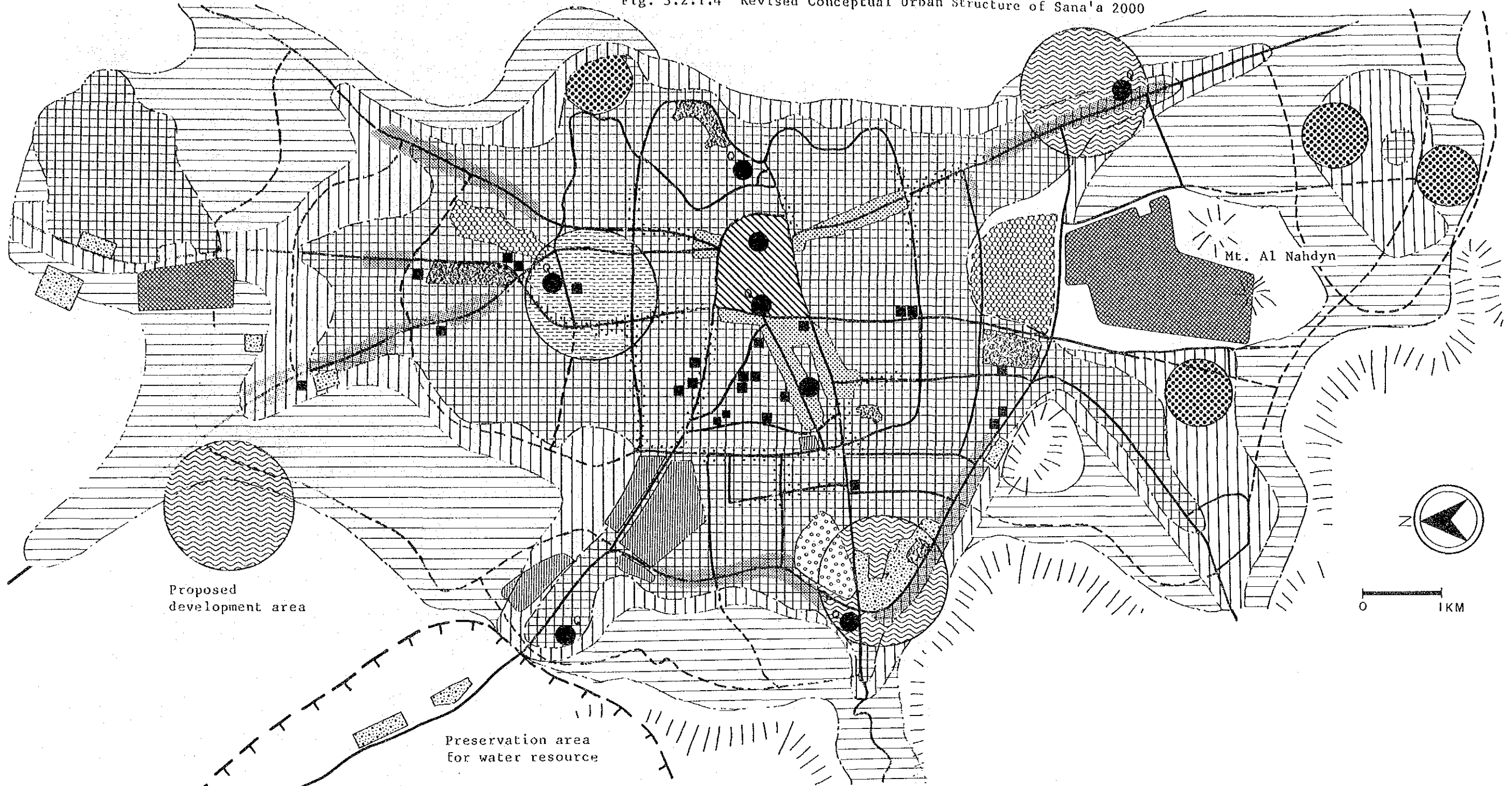


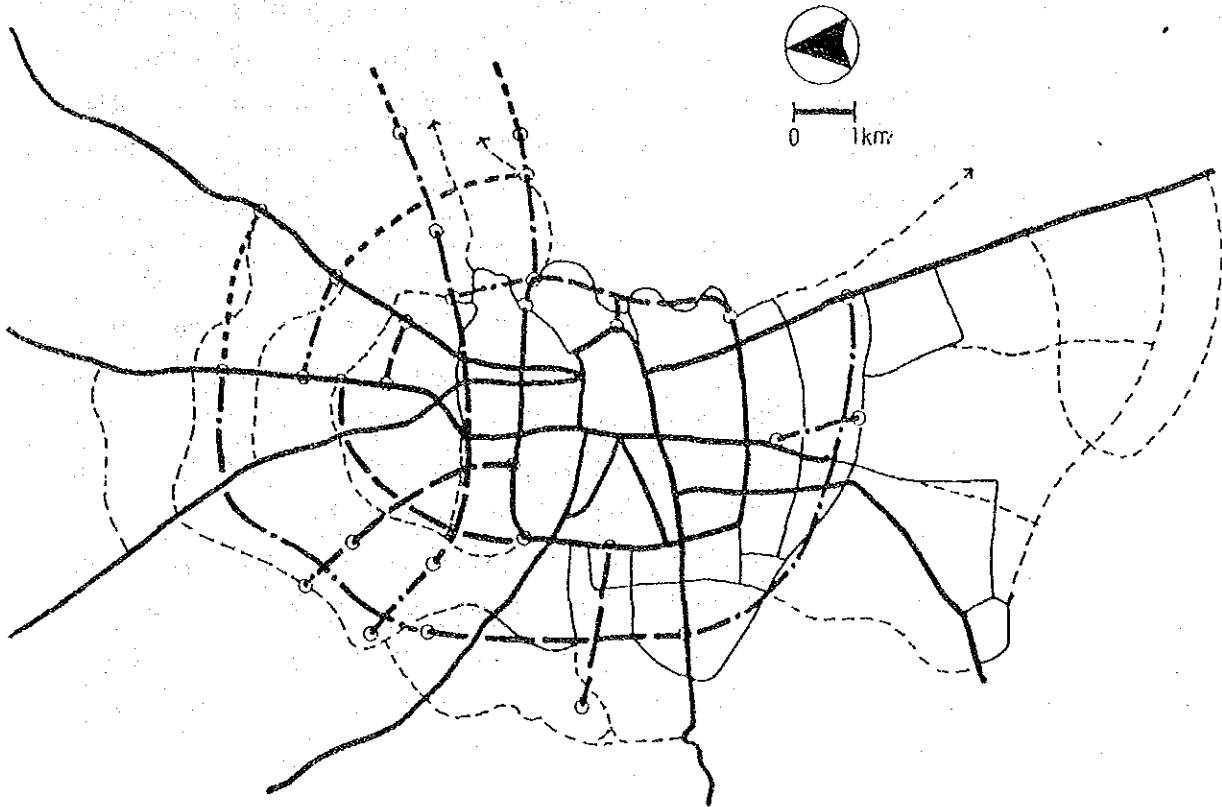
Fig. 3.2.1.4 Revised Conceptual Urban Structure of Sana'a 2000



LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS
	ministries, public institutes		General residential area ----- 1991		Proposed industry area		public city park
	suq (market)		General residential area ----- 2000		proposed commercial area		preservation area wadi control
	qu'at market		concentrated commercial area		PRESIDENT PALACE ARMY SITE		Proposed convention site
	General residential area ----- 1987		light industry work-shop area		industrial area		Proposed housing development site
	old Sana'a historic area		neighborhood commercial area		Sana'a University site		

Fig. 3.2.1.5 Road Development Plan, Sana'a 1977-2000



Roads in 1977



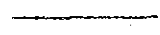
Roads planned for 1983
(the Study 1978)



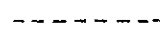
Roads planned for 1990
(the Study 1978)



Roads planned for 2000
(the Study 1978)



Roads - 1987



MMH planned roads-2000

3.2.2 Taiz

The city has developed on the steep hillside of Mt. Sabir, and further expansion on this hillside is virtually impractical. The city's whole area is on a rugged terrain with terraces and valleys. Steep slopes cause rapid rainwater drainages on wadis, often accompanying severe damages by heavy rainstorms and a large cost for rehabilitation. Fig. 3.2.2.1 shows the present urban area in 1987 with newly urbanized areas in the past ten years.

The Study (1978) proposed the spatial expansion toward north which is relatively flat with less extensive expansion toward east. However, actual development in the past 10 years up to 1987 is less extensive in the northern direction than the plan proposed for the stage of 1983, and rather housing area has developed on the southern steep hill slopes, because some southern slopes are less influenced by the rainstorm damage. Urban infrastructure facilities including roads are not developed well in the northern suburbs and would have not attracted much people to settle down.

Rehabilitation of wadi streams have not been completed, and heavy rainstorm flows frequently give damages to roads. Construction of bridges over the wadi and repair work are requested urgently both by local people and MMH staffs.












Spatial development of the urban area will not extend as proposed by the Study (1978). It is expected that the development proposed for 2000 will reach to the proposed boundary for 1990. But the urbanized area will have a higher population density. Fig. 3.2.2.2 shows the differences of expansion in 1977, 1983, 1990 and 2000. Fig. 3.2.2.3 presents also the concept of revised development for 2000 together with planned roads.

Road network

Road development plan studies in the Master Plan Study (1978) proposed the network development corresponding to staged urban development. MMH has reviewed and revised the network plan by conducting location survey in Taiz and its suburbs. The new plan incorporates in the revised urban development prospect and

Fig. 3.2.2.1 Urban Area in Taiz, 1987

LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS
	Existing Road		Hospital
	suq (market)		Urbanized Area
	qu'at market		Urbanizing Area
	Ministries, Public institutes		public city park
	School		Commercial area
			Wadi Saila

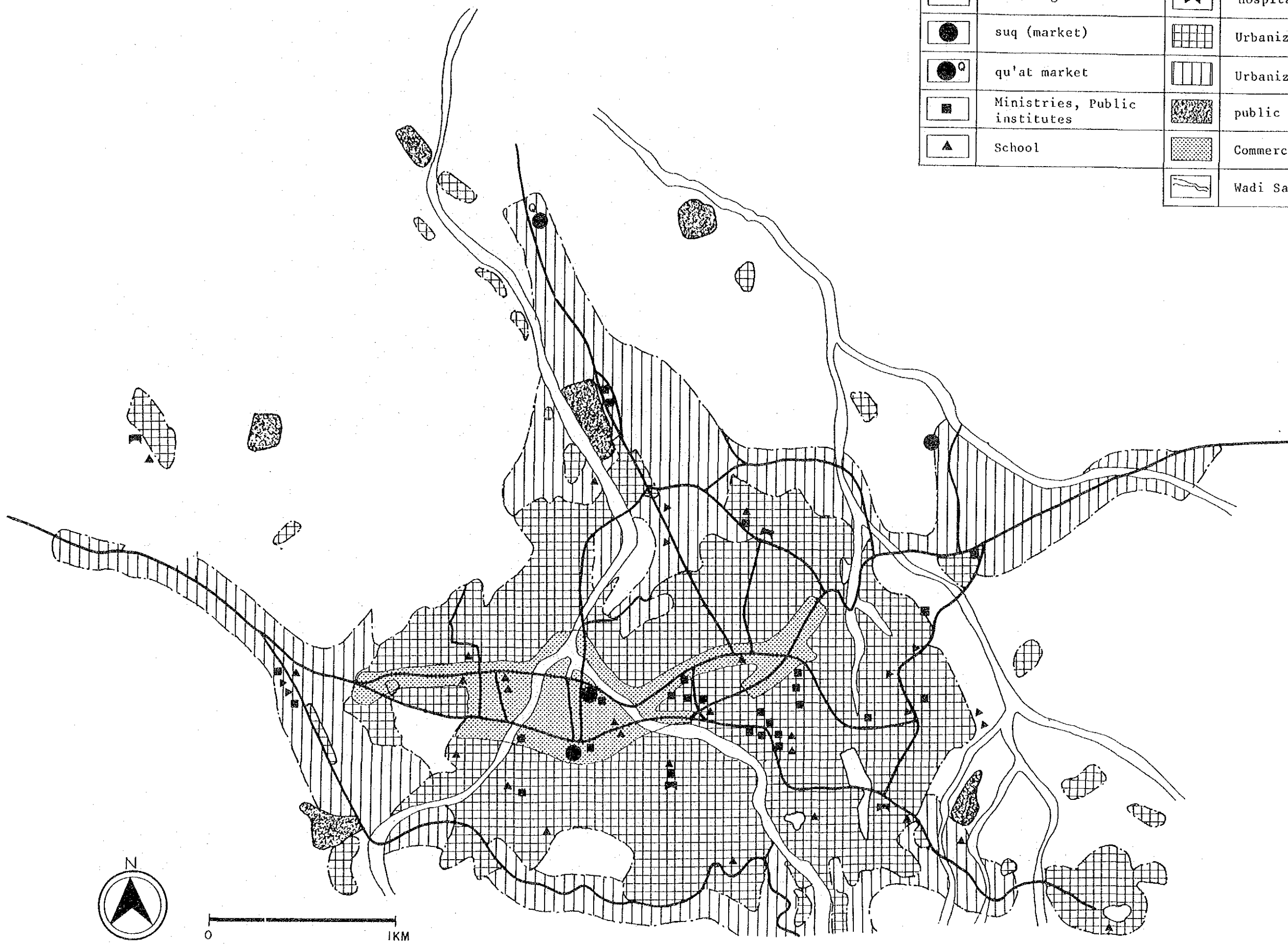


Fig. 3.2.2.2 Growth of Urban Area, Taiz 1977-2000

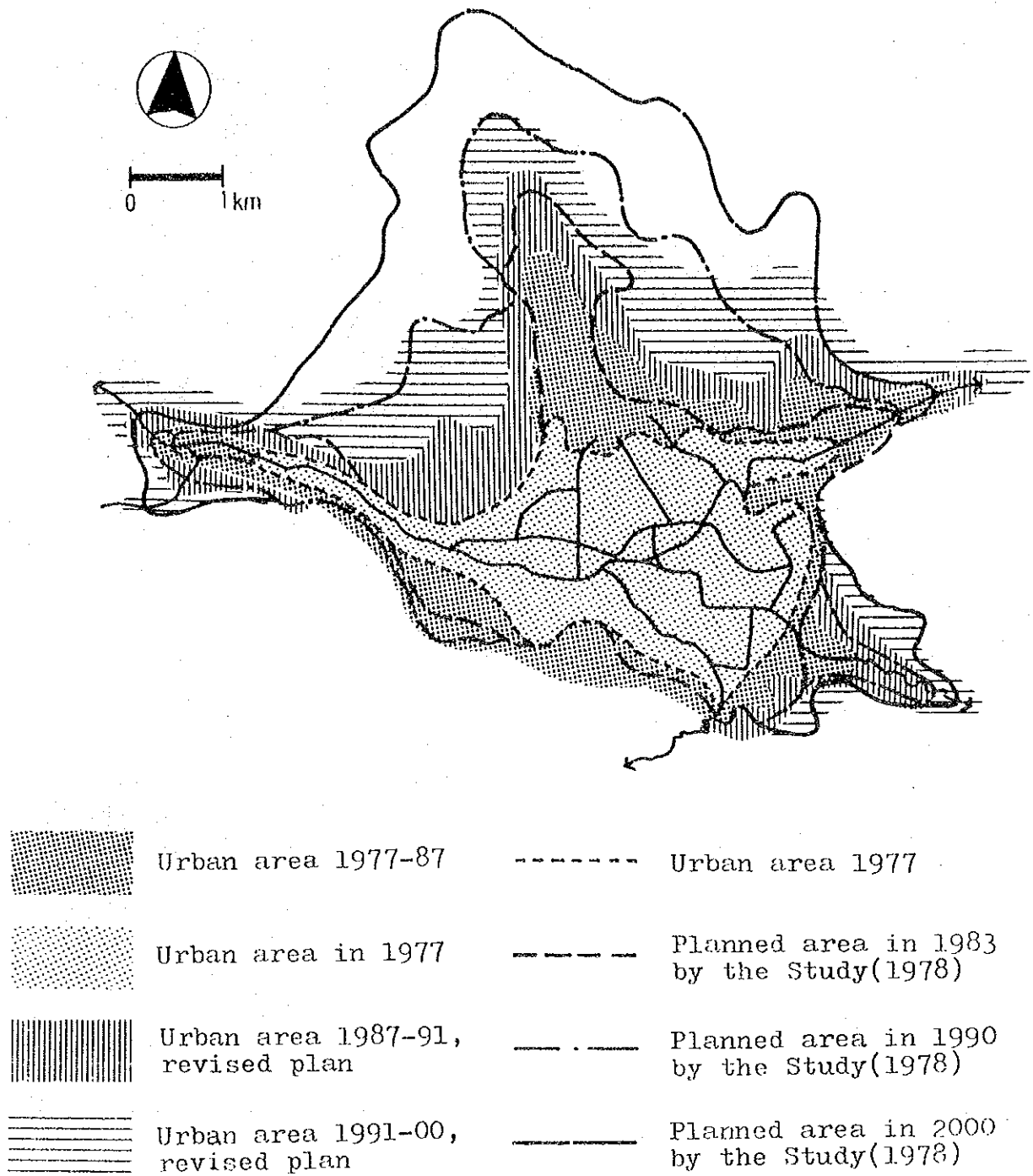
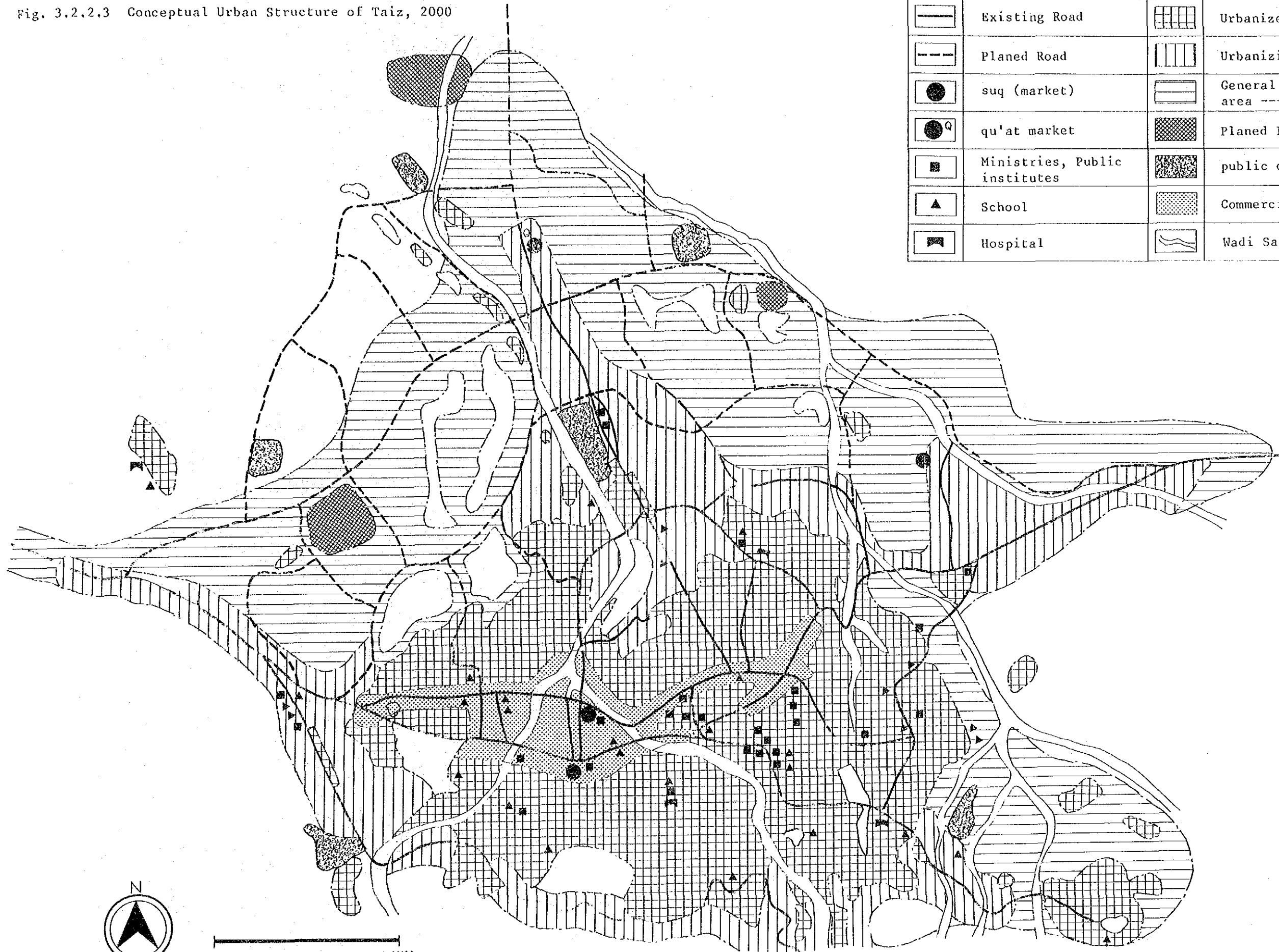


Fig. 3.2.2.3 Conceptual Urban Structure of Taiz, 2000



LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS
	Existing Road		Urbanized Area
	Planned Road		Urbanizing Area
	suq (market)		General residential area ----- 2000
	qu'at market		Planned Industrial
	Ministries, Public institutes		public city park
	School		Commercial area
	Hospital		Wadi Saila

reduced the scale of network of 2000. This network is shown in Fig. 3.2.2.4. The road network development should be emphasized to provide better transport facilities for the development of urban area. Simultaneous with this work, flood control in the wadi should be stressed. In the urban area, submergible bridges which tend to flood should be elevated also.

3.2.3 Hodeidah

The city has expanded on both sides of Sana'a street; particularly on the northern side, spatial development has accompanied the road network development to the extent of Zaid street, a partial ring road approaching to the port. The existing urban area in Hodeidah is shown in Fig. 3.2.3.1.

There are two main factors of constraint in the urban expansion:

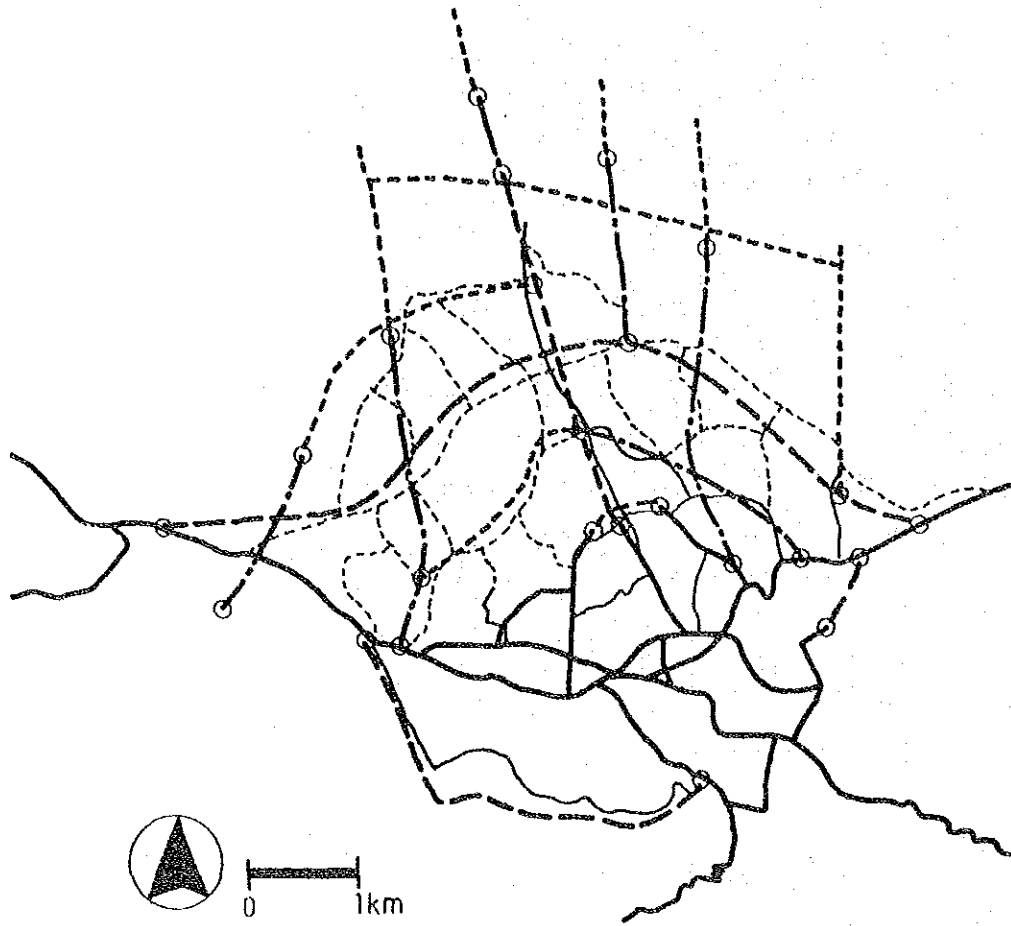
- 1) Shifting sand dunes
- 2) Relocation problems of the airport.

Since sand dunes are shifting in the direction from the north west of the city, the city area will expand rather along the Sana'a street toward the east than the north and the northwest. Hodeidah airport is located at 6 km away east from the center. The Study (1978) proposed to relocate the airport into the inner area of 20 km, because of technical reasons and to redevelop the land for urban landuse, mostly residential. Currently there are around 120 flights (landing plus departure) a week at this international airport, leaving an average of the total of arrival and departure 17 per day.

Meanwhile, urban area expansion was not as rapid as was forecast by the Study (1978). The population was still at 63% of the forecast for 1986. Thus, demand for spatial expansion is not large as supposed in the Study. Fig. 3.2.3.2 shows the difference of urban development between the Master Plan Study (1978) and the actual development. It also shows the revised boundary of development in the future.

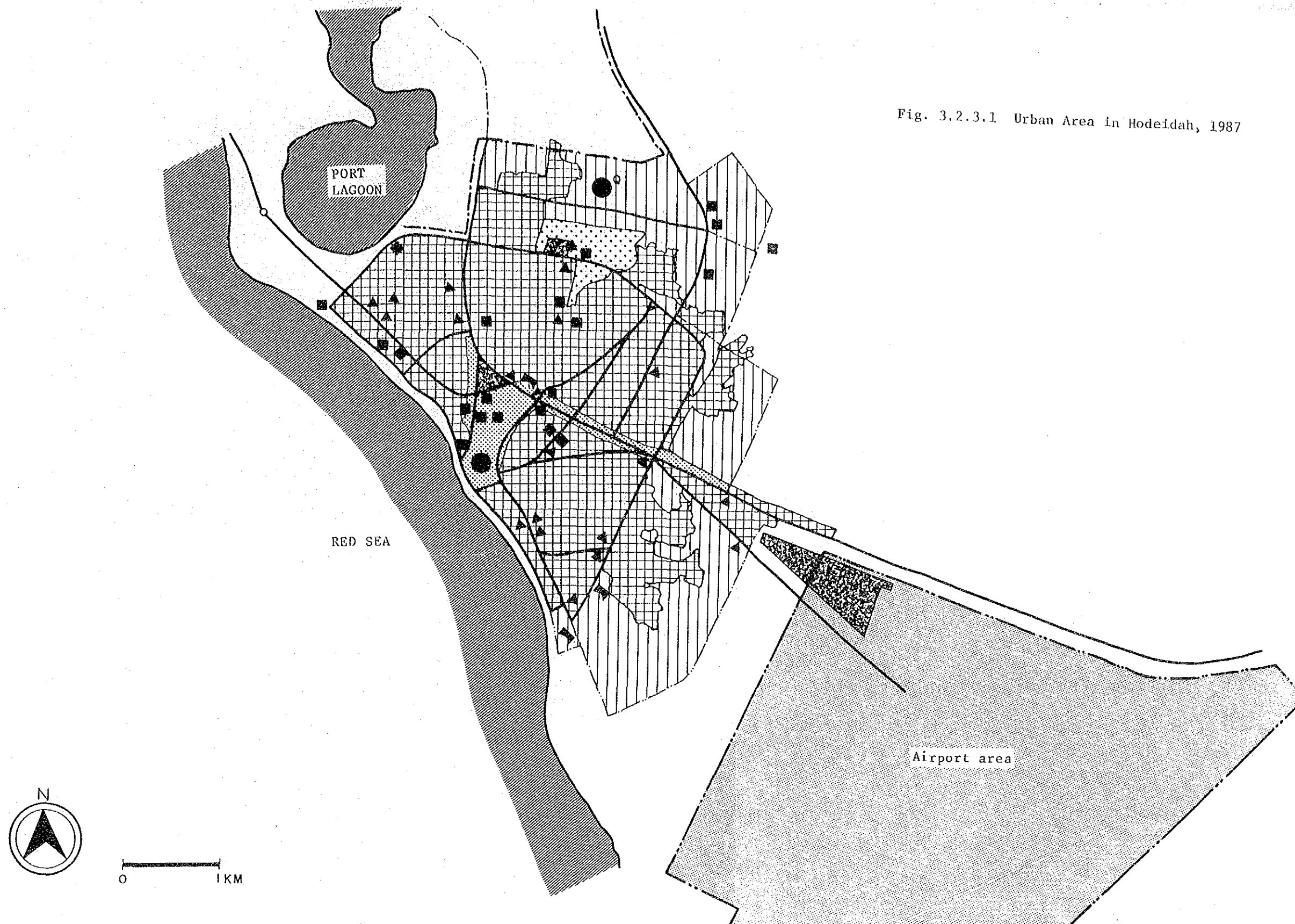
Extensive development was scheduled in the Study (1978) when the

Fig. 3.2.2.4 Road Development Plan, Taiz 1977-2000



- Existing roads 1977
- ⊖ - - - - ⊖ plans for 2000
- ⊖ - - - - ⊖ plans for 1983
- Constructed by 1987
- ⊖ - - - - ⊖ plans for 1990
- - - - - MMH plan roads for 2000

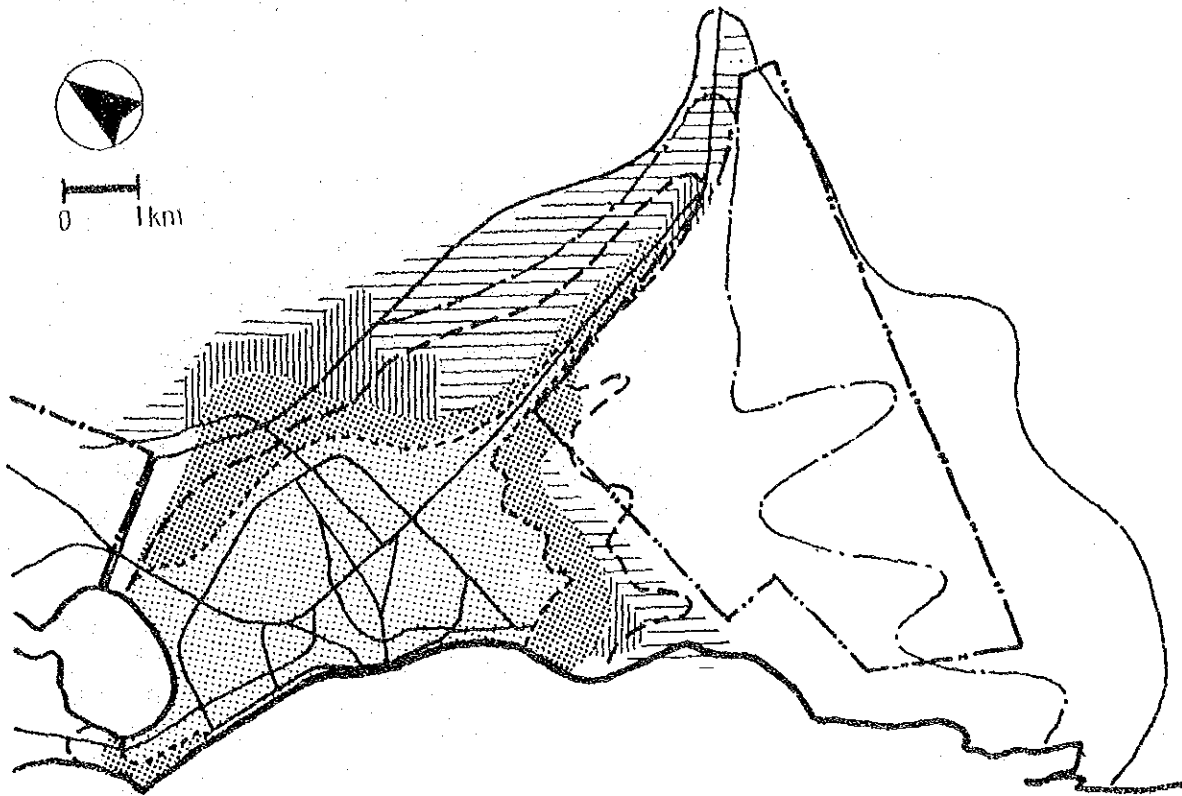
Fig. 3.2.3.1 Urban Area in Hodeidah, 1987

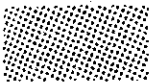




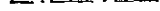
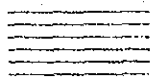





LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS
	Property of Port		qu'at market		Urbanized Area		Industrial
	Property of Airport		Ministries, Public institutes		Urbanizing Area		public city park
	Existing Road		School		concentrated commercial area		
	suq (market)		Hospital				

Fig. 3.2.3.2 Growth of Urban Area, Hodeidah 1977-2000



- | | | | |
|---|---|--|--------------------------------------|
|  | Urban area, 1977-87 |  | Urban area, 1977
(the Study 1978) |
|  | Urban area, 1977 |  | Urban area, 1983
(the Study 1978) |
|  | Urban area, 1987-91
revised plan |  | Urban area, 1990
(the Study 1978) |
|  | Urban plan, 1991-00
revised plan |  | Urban area, 2000
(the Study 1978) |
|  | Port area
(New development plan is yet shown) | | |
|  | Airport area
(The study, 1978 proposed relocation by 1990.
However, this study recommends it needs not be
relocated) | | |

domestic and international economy was achieving a high growth rate. However the situation has changed since the early 1980s, as discussed in Chapter 2. Hodeidah should wait for another several years for the start of industrial development.

Under the circumstances, MMH has drafted a revised conceptual plan for 2000. Basic understanding is stated as follows:

- 1) Airport will remain as it is.
- 2) Urban planning area for 2000 needs not extend beyond the airport.
- 3) A port and industrial development zone is proposed within 6 km of the port by the Port Authority, although no location plan is prepared yet.
- 4) The main road network plan for 1990 proposed by the Study (1978) is effective for 2000 in the above context.

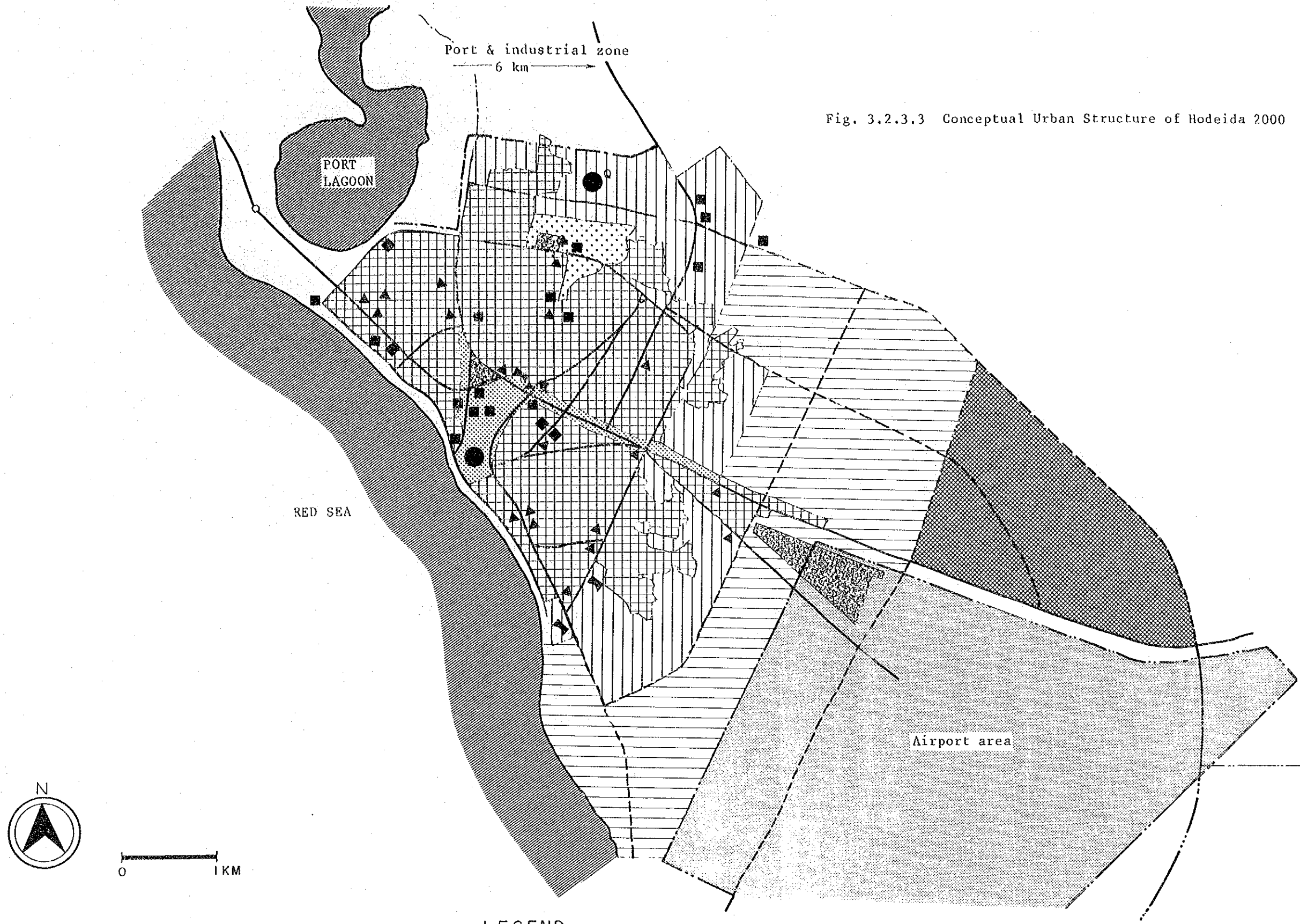
The draft concept is shown in Fig. 3.2.3.3.

Road network

The road network plan proposed by the Study (1978) was based on the eastward urban expansion plan beyond the airport. However, actual urbanization has shown slow progress as discussed in terms of increase in landuse and population. New roads should be constructed in the area between the present urban area and the airport, as well as in the northern side of the airport. These areas seem to continue to develop even in the revised urban draft plan by MMH.

The trunk network shown in Fig. 3.2.3.3 and Fig. 3.2.3.4 is the updated MMH draft plan to be constructed by 2000. The network plan should be consolidated after the port and industrial zone development plan is determined, because of traffic flow which will increase and change the pattern depending on the extent of development.

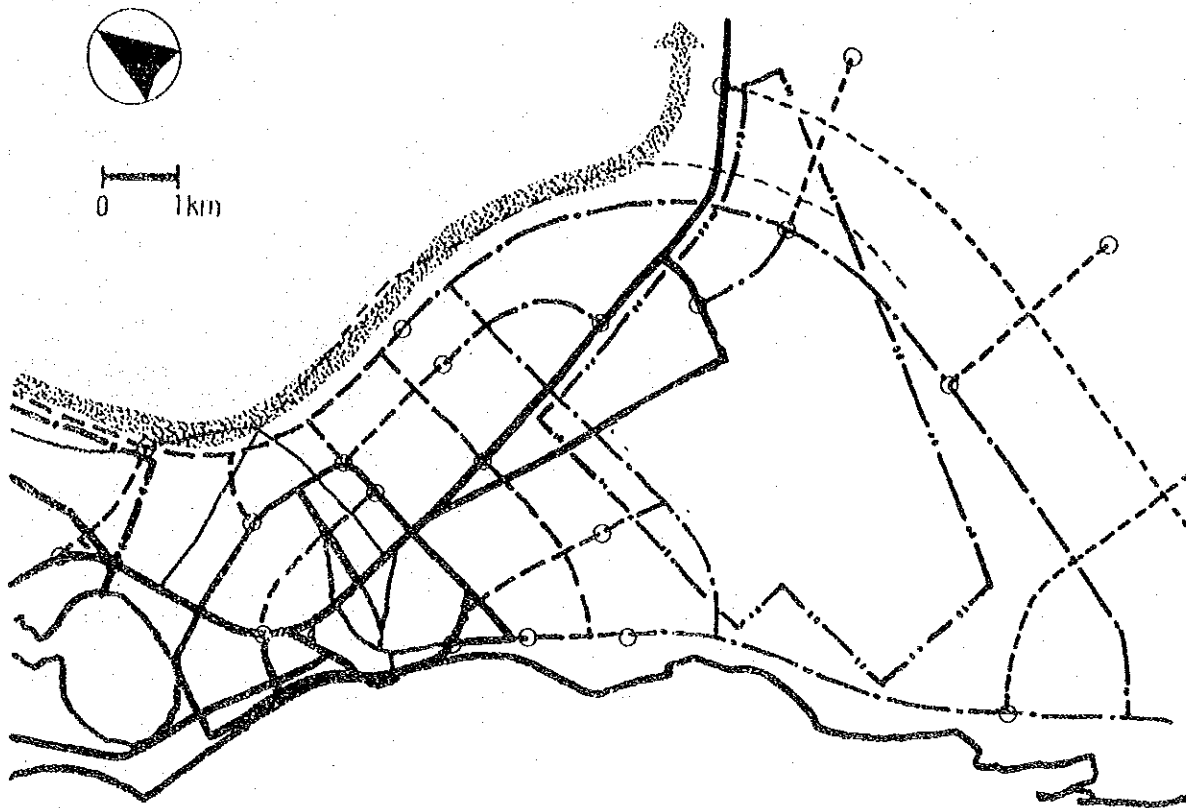
Fig. 3.2.3.3 Conceptual Urban Structure of Hodeida 2000





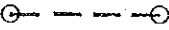

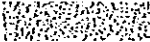


LEGEND

SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS	SYMBOL	REMARKS
	Property of Port		suq (market)		Hospital		Planned Industrial
	Property of Airport		qu'at market		Urbanized Area		public city park
	Existing Road		Ministries, Public institutes		Urbanizing Area		concentrated commercial area
	Pland Road		School		General residential area ----- 2000		Industrial

Fig. 3.2.3.4 Road Development Plan, Hodeidah 1977-2000



- | | | | | |
|---|----------------|--|---------------------|-------------------------|
|  | Roads, 1977 |  | In the Study (1978) | 2000 plan |
|  | Roads, 1978-87 |  | | 1990 plan |
|  | Airport area |  | | 1983 plan |
|  | Port area |  | | Dune Stabilization Area |

CHAPTER 4 ROADS AND STREETS

CHAPTER 4 ROADS AND STREETS

4.1 Inter-city Roads and Related Facilities

4.1.1 Sana'a

Sana'a is an inland city located in the central highland of Y.A.R. at an altitude of 2200 meters. Inter-regional transportation facilities in Sana'a city are shown on Fig. 4.1.1.1.

1) Road facilities

The roads to other main cities have developed in a radial manner and all of them have been paved with two traffic lanes.

The followings are distances to the main cities and traffic volumes counted in 1987.

Name of Road	Terminating at	Distance (Km)	Traffic Volume 1) (per 16 hrs)
Sana'a-Hodeidah road	Hodeidah	226	5,178 2)
Sana'a-Taiz road	Taiz	256	4,294 3)
Sana'a-Marib road	Marib	173	14,214 2)
Sana'a-Sadah road	Sadah	245	5,696 2)
Sana'a-Wadi Dhar road	Thula	41	5,513 2)

Note: 1) Location is shown in Fig. 4.1.1.1.

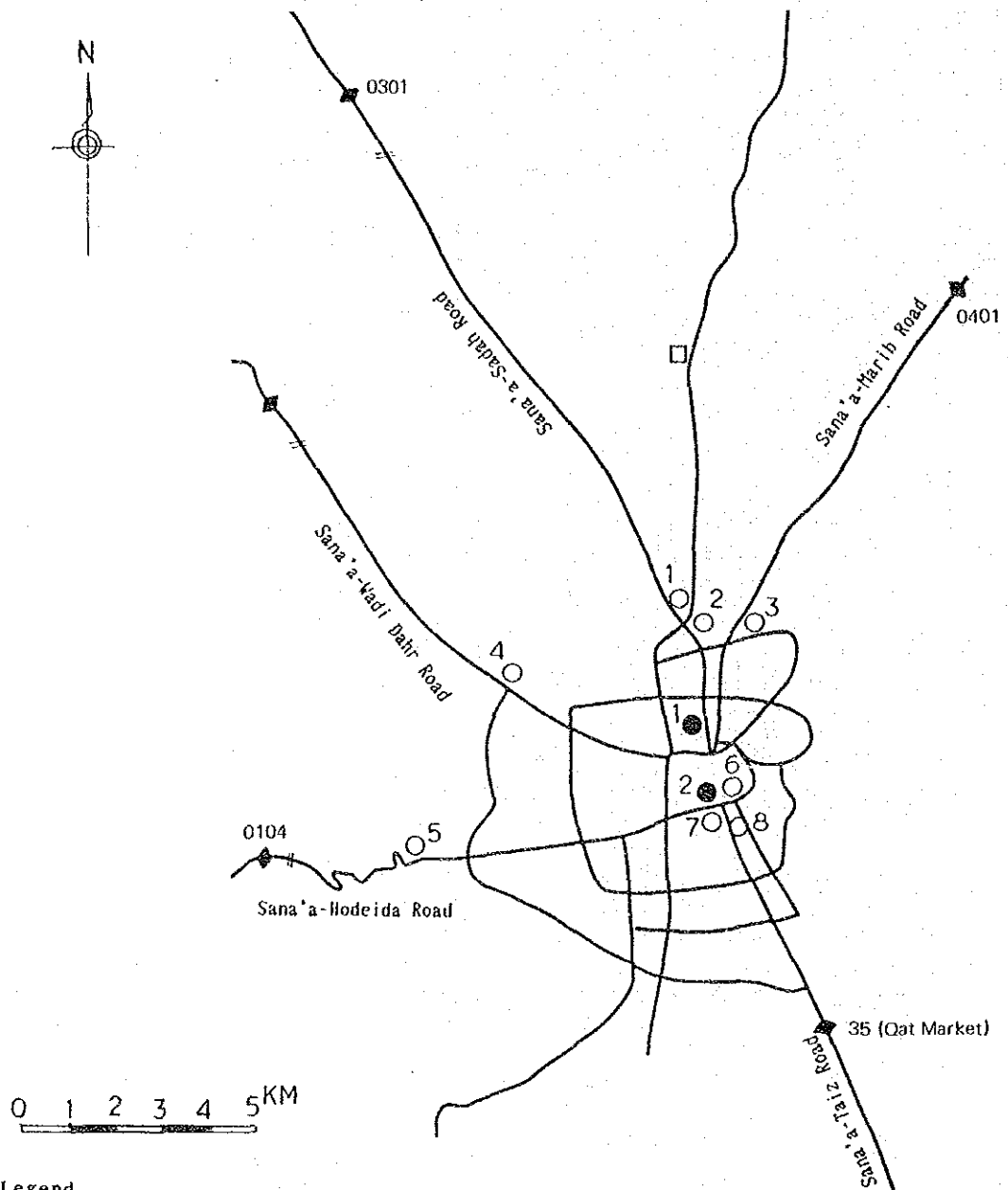
2) Source: Highway Authority, 1987

3) Location No. 35 is of Traffic Survey in this Study.

2) Public passenger transportation facilities

Public passenger transportation service with other main cities are long distance buses and taxis. Long distance buses are generally well equipped and maintained and are operated solely by G.L.T.C. (General Land Transport Corporation) with the terminals at Bab Al Yemen and Bab Shuub. Inter-city taxis are operated by individual owner drivers. The taxis are available at 8 terminals in the city for each direction.

Fig. 4.1.1.1 Inter-Regional Transportation Facilities in Sana'a



Legend

□	Airport
Inter-city taxi center	
○	Center NO. Destination
	1 Sadah
	2 Airport
	3 Marib
	4 Thula
	5 Hodeidah, Marakhah
	6 Al Bayda
	7 Hodeidah, Sadah, Radad, Marib, Ibb
	8 Taiz
Inter-city bus center	
●	Center NO. Destination
	1 Marib, Sadah, Hajah
	2 Hodeidah, Taiz, Ibb, Dhaher, Radda, Al Bayda
—	Inter-city road
◆	Traffic counting point, (Table 5.3.1)

4.1.2 Taiz

Taiz city is located on an undulating hilly area of the foot of Mt. Sabir at an altitude of 1500 meters. Inter-regional transportation facilities in Taiz are shown in Fig. 4.1.2.1.

1) Road Facilities

The city has developed in an east-west fashion along the main road from Sana'a to Hodeidah. The road distances from Taiz city to other main cities and traffic volumes counted are shown below. The roads have two traffic lanes and are paved.

Name of Road	Terminating at	Distance (Km)	Traffic Volume 1) (per 16 hrs)
Taiz-Hodeidah road	Hodeidah	272	3,798 2)
Sana'a-Taiz road	Sana'a	256	8,155 2)

Note: 1) Location is shown in Fig. 4.1.2.1.

2) Source: Highway Authority, 1987

2) Public passenger transportation facilities

The major public passenger transportation service from Taiz to other cities are long distance buses of G.L.T.C. and taxis by private owner drivers. They serve on roads to Sana'a, Hodeidah and other local cities just as in the case of Sana'a city.

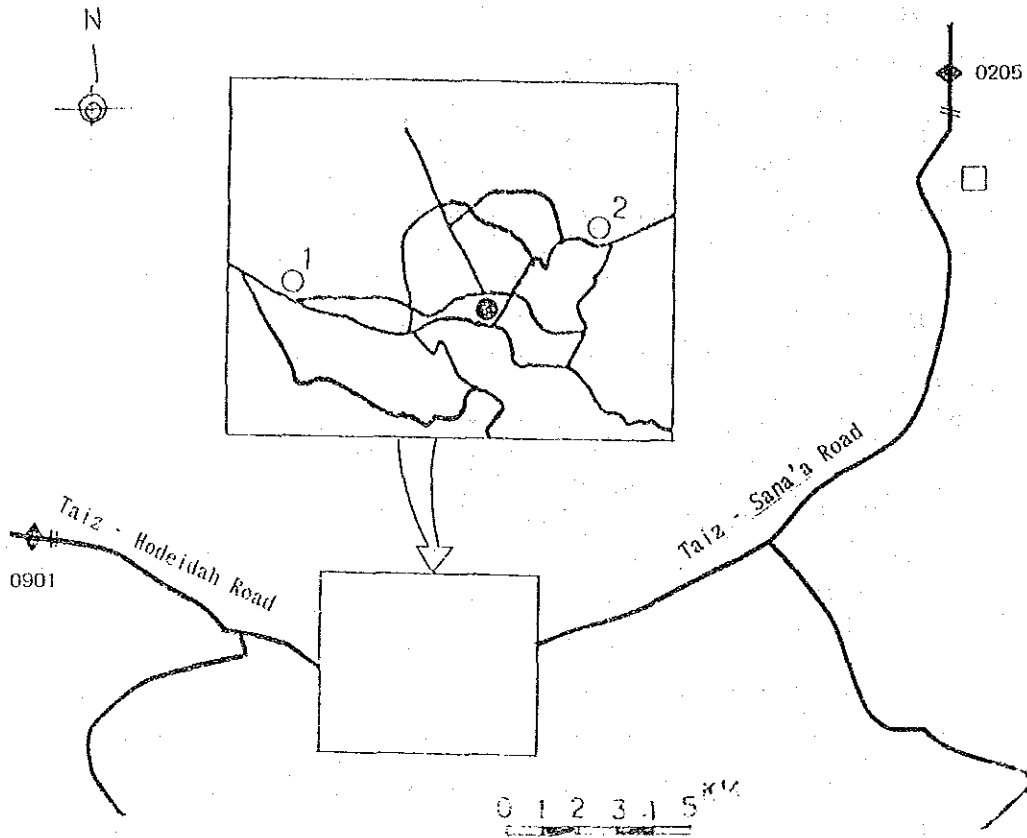
4.1.3 Hodeidah

Hodeidah city is a port town on the Red Sea and is the center of the lowland Tihama district. Inter-regional transportation facilities in Hodeidah are shown in Fig. 4.1.3.1.

1) Road facilities

There are main roads, Jizan road extending to north side to the boundary of Saudi Arabia and Sana'a road to the direction for Sana'a and Taiz. These roads are paved and have two traffic lanes. The followings are distances from Hodeidah to other main cities and traffic volumes.

Fig. 4.1.2.1 Inter-Regional Transportation Facilities in Taiz



Legend

	Airport
	Intercity taxi center
	Center NO. Destination
1	Hodeidah and other cities
2	Sana'a and other cities
	Intercity bus center
	Intercity road
	Traffic counting point (Table 5.3.1)

Name of Road	Terminating at	Distance (Km)	Traffic Volume 1) (per 16 hrs)
Sana'a-Hodeidah Road	Sana'a	226	4,707 2)
Hodeidah-Jizan Road	Jizan	206	2,683 2)

Note: 1) Location is shown in Fig. 4.1.3.1
2) Source: Highway Authority, 1987.

2) Public passenger transportation facilities

Passenger transportation service from Hodeidah to other cities are the G.L.T.C. long distance buses and the taxis by private owner/driver. They serve on roads to Sana'a, Jizan, Taiz and other local cities.

Fig. 4.1.3.1 Inter-Regional Transportation Facilities in Hodeidah

