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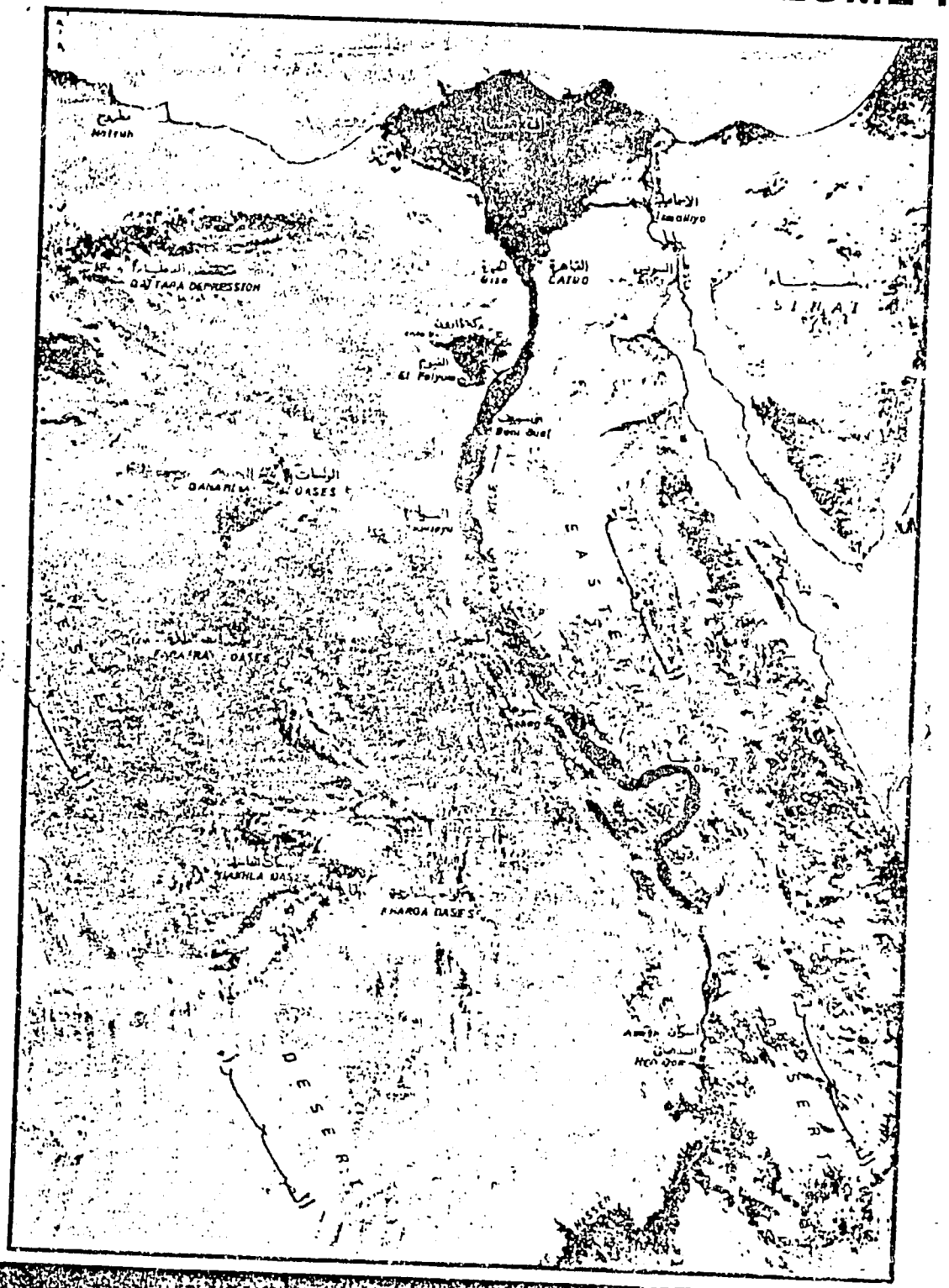
EGYPT NUPS

دراسة السياسة العمرانية القومية

NATIONAL URBAN POLICY STUDY

FINAL REPORT—APPENDICES—VOLUME TWO



ADVISORY COMMITTEE FOR RECONSTRUCTION
MINISTRY OF DEVELOPMENT
ARAB REPUBLIC OF EGYPT
U.S.A.I.D. GRANT NO. 263-0042

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دراسة السياسة القومية للتنمية الحضرية

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THE NATIONAL URBAN POLICY STUDY

APPENDICES

USAID Grant No. 263 -0042

Prepared for the

ADVISORY COMMITTEE FOR RECONSTRUCTION
MINISTRY OF DEVELOPMENT
ARAB REPUBLIC OF EGYPT

PADCO INC.
with
ENGINEERING CONSULTANTS GROUP
and
SHERIF EL-HAKIM AND ASSOCIATES

JULY 31, 1982

PADCO INC
In Association with
ECG ENGINEERING CONSULTANTS GROUP
&
SHERIF EL-HAKIM & ASSOCIATES

بادكو انك
بالاشتراك مع
جماعة المهندسين الاستشاريين
و
شريف الحكيم ومشاركوه

دراسة السياسة القومية للتنمية الحضرية

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ص . ب ١١٦٧ القاهرة تلكس ٩٣٨٧٣

Engineer Soliman Abdel Hai
Chairman
Advisory Committee for Reconstruction
Arab Republic of Egypt

July 31, 1982

Dear Engineer Abdel Hai:

The National Urban Policy Study is pleased to submit its Final Report. This report provides a set of recommendations for urban policy which the Study Team believes could result in improvement of the quality of life of the population and increase the contribution of urban settlements to the major development goals of Egypt. The recommendations relate to spatial priorities, associated sectoral requirements and actions, and national and local administration of urban policy.

The National Urban Policy Study Final Report is complemented by three other major reports which illustrate various aspects of the study: The Urban Growth and Urban Data Report is a compilation of major urban information affecting urban policy choices, the Illustrative Development Project Reports in Tanta and Qena/Naga Hamadi show how urban policy can be implemented in two different regions of Egypt, and the Urban Management Handbook attempts to illustrate how programs and projects can flow from urban policy. The Study Team has also produced numerous working papers and occasional papers on different sectoral and spatial aspects of Egypt.

The NUPS Team has benefitted enormously from the opportunity the study provided to obtain first-hand information about the many different urban areas throughout the country and to discuss urban problems and policy issues with a very broad range of public officials at national and local levels, as well as interested private citizens and other consultants. We wish to acknowledge our indebtedness to all the people throughout Egypt who have contributed to our work. Our special thanks to you, the Chairman, and Members of our Steering Committee, USAID, and ACR's in-house advisors, TAMS and CADSAC.

Sincerely,

Alfred P. Van Huyck
--- Principal in Charge

PADCO INC
In Association with
ECG ENGINEERING CONSULTANTS GROUP
&
SHERIF EL-HAKIM & ASSOCIATES

بادكو انك
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APPENDIX I-A

NUPS PROJECTED POPULATION AND DIRECT INVESTMENT BY SETTLEMENT

APPENDIX I-A
NUPS PROJECTED POPULATION AND DIRECT INVESTMENT ALLOCATION BY SETTLEMENT

This appendix consists of two tables.

Table I-A.1 shows the National Urban Policy Study urban population projections by major urban settlement and by zone.

Table I-A.2 shows the direct investment allocation by settlement for the Preferred Strategy. The data for this table were derived using procedures described in Appendix II-C.

TABLE I-A.1

NUPS PROJECTED URBAN POPULATIONS: MAJOR URBAN SETTLEMENTS AND OTHER URBAN SETTLEMENTS

ZONE/SETTLEMENT	1976 Census Population (000's)	Trend Growth Rate (1960-1976)	1985 Trend Projection[1] (000's)	NUPS PROJECTIONS 1990 (000's)	1995 (000's)	2000 (000's)	Growth Rates 1985-2000
I. MAJOR SETTLEMENTS							
1. GREATER CAIRO[2]	6,711	1.0357	9,707	11,653	13,879	16,500	1.0360
2. ALEXANDRIA	2,319	1.0269	3,042	3,728	4,532	5,500	1.0403
DELTA							
3. Tanta	285	1.0275	375	435	502	575	1.0289
4. Mansoura	258	1.0273	339	400	471	550	1.0328
5. Mahalla El Kubra	293	1.0315	399	451	506	565	1.0235
6. Zagazig	203	1.0310	275	296	315	349	1.0160
7. Damanhour	189	1.0375	271	294	316	340	1.0152
8. Shebin El Kom	103	1.0400	152	160	168	175	1.0094
9. Kafr El Dawar	161	1.0855	347	370	393	415	1.0120
10. Damietta	93	1.0166	111	133	160	190	1.0365
11. Qalyub	63	1.0236	80	93	105	120	1.0274
12. Dess	59	1.0251	76	80	85	90	1.0113
13. Abu Kebir	55	2.0253	72	76	80	85	1.0111
14. Zefta	50	1.0300	67	75	85	95	1.0236
15. Benha	89	1.0333	124	137	151	165	1.0192
16. Belkas	50	1.0324	69	74	80	85	1.0140
17. Mit Ghamr	72	1.0376	103	110	116	120	1.0102
18. Belbeis	69	1.0384	100	104	106	110	1.0064
19. Mataria	61	1.0354	86	93	98	105	1.0134
20. Kafr El Sheikh	78	1.0445	119	124	126	130	1.0059
21. Edku	62	1.0466	96	104	111	120	1.0150
22. Menouf	55	1.0466	86	90	95	100	1.0101
Sub-Total	2,348	1.0366	3,347	3,698	4,066	4,470	1.0195
NORTH UPPER EGYPT[3]							
23. El Fayoum	167	1.0313	228	266	307	355	1.0300
24. Beni Suef	118	1.0256	153	174	196	220	1.0245
25. Minia	146	1.0277	194	222	252	286	1.0262
26. Mallawi	74	1.0217	93	105	116	129	1.0221
Sub-Total	505	1.0276	668	767	871	990	1.0266

TABLE I-A.1 (CONTINUED)

ZONE/SETTLEMENT	1976 Census Population (000's)	Trend Growth Rate (1960-1976)	1985 Trend Projection[1] (000's)	1990 (000's)	1995 (000's)	2000 (000's)	Growth Rates 1985-2000
SOUTH UPPER EGYPT[3]							
27. Assiut	214	1.0329	295	375	475	600	1.0485
28. Aswan	144	1.0707	275	326	384	450	1.0334
29. Sohag	102	1.0316	139	154	169	184	1.0189
30. Qena	94	1.0312	128	156	187	225	1.0383
31. Luxor	93	1.0626	166	183	201	220	1.0193
32. Ekhmim	53	1.0155	63	71	80	90	1.0241
33. Gerga	52	1.0123	60	68	76	86	1.0243
34. Naga Hamadi	47	1.0771	95	117	144	176	1.0416
Sub-Total	799	1.0446	1,221	1,450	1,716	2,030	1.0345
SUEZ CANAL[3]							
35. Port Said	263	N.A.	438	502	572	650	1.0267
36. Ismailia	147	N.A.	291	350	419	500	1.0367
37. Suez	190	N.A.	321	438	610	850	1.0690
Sub-Total	600	N.A.	1,041	1,290	1,601	2,000	1.0445
REMOTE AREAS[3]							
38. Matruh	51	N.A.	68	75	82	90	1.0189
39. New Valley	34	N.A.	75	83	90	100	1.0189
40. Red Sea	56	N.A.	84	93	102	110	1.0189
41. Sinai	10	N.A.	74	39	62	100	1.1000
Sub-Total	152	N.A.	251	290	336	400	1.0195
TOTAL			19,277	22,842	27,004	30,890	1.0227
II. OTHER URBAN[4]							
1. Delta	1,320	1.0430	1,648	1,890	2,176	2,482	1.0277
2. North Upper Egypt	478	1.0211	577	650	733	821	1.0238
3. South Upper Egypt	689	1.0371	956	1,164	1,421	1,718	1.0399
4. Canal	30	1.0381	42	54	69	89	1.0513
Sub-Total	2,517	1.0279	3,223	3,758	4,399	6,110	1.0312
II. TOTAL URBAN	16,082	1.0380	22,500	26,600	31,400	37,000	1.0337

SOURCE: See Notes to this table.

NOTES

TABLE I-A.1

1 Trend projections show a continuation of population growth rates or "trends" which existed between 1960-1976. In the Canal Zone, due to the disruptions caused during the war period, master plan projections were used to project 1985 population. The individual populations have been adjusted somewhat in the projection so that totals equal total urban population projections.

Growth rates for the Canal are not shown since, due to the use period evacuation, they are not representative of current population growth. Growth rates in Remote Areas 1960-1976 were not used for 1985 projections due to the lack of 1960 population data. The 1985 populations were adjusted from total urban population projections.

2 Consists of the entire population of the Governorate of Cairo and the populations of the cities of Shoubra El Kheima and Giza City.

3 With exception of a Naga Hamadi, all of the above settlements had 1976 census populations of 50,000 or greater and were chosen for special study by NUPS. Naga Hamadi was included in the group because it has been the location of major industrial investment.

In the Remote Areas, due to the lack of data about individual settlements, the urban populations in settlements having 1976 census populations greater than 20,000 were grouped together. The settlements included in the populations are as follows: Matruh; Mersa Matruh; New Valley; El Kharga and Mut; Red Sea; Ras Gharib, Hurgada, Safaga and Qoseir; and Sinai; the governorate capital (El Arish). All of the NUPS population projections exclude the 147,000 reported to have been living in the occupied areas of the Sinai during 1976 but not included in the 1976 census and Egyptians not resident in Egypt at the time of the census.

4 Shows the populations living in settlements with 1976 census populations less than 50,000 but classed as urban by the census.

TABLE I-A.2

DIRECT INVESTMENT COSTS: PREFERRED ALTERNATIVE ALLOCATION

	1985-1990 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	1990-1995 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	1996-2000 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	2000 POPULATION (000's)
1. CAIRO	1,922	7[illegible]1	1,049	5,854	4,572	4,572	2,250	1,139	1,055	6,063	6,906	6,906	2,621	1,733	1,064	6,862	11,892	11,892	16,500
2. ALEXANDRIA	678	276	1,055	5,573	1,538	1,538	812	411	1,062	5,8[illegible]2	2,409	2,409	968	640	1,071	6,713	4,296	4,296	5,500
DELTA																			
3. Tanta	59	24	1,041	5,407	130		68	34	1,047	5,625	191		75	48	1,053	6,455	318		575
4. Mansoura	61	25	1,046	6,753	169		71	36	1,054	6,680	240		79	52	1,061	7,212	375		950
5. Mahalla El Kubra	51	21	1,034	5,270	111		56	28	1,038	5,434	152		59	39	1,045	6,267	244		545
6. Zagazig	21	9	1,022	6,455	58		19	10	1,023	6,356	64		20	13	1,028	6,992	91		355
7. Damanhour	23	9	1,024	5,840	53		22	11	1,026	5,857	64		24	16	1,035	6,689	107		340
8. Shebin El Kom	8	3	1,015	6,099	18		8	4	1,019	6,257	25		7	5	1,023	6,831	34		175
9. Kafr El Dawar	22	9	1,019	5,726	52		24	12	1,024	5,791	69		22	15	1,028	6,416	96		415
10. Damietta	22	9	1,047	5,135	46		27	14	1,058	5,529	77		30	20	1,063	6,342	127		190
11. Qalyub	13	5	1,044	5,011	25		12	6	1,042	5,546	32		15	10	1,056	6,415	64		120
12. Dessouk	4	2	1,019	6,429	13		5	3	1,026	6,430	19		5	3	1,024	6,864	21		90
13. Abu Kabir	4	2	1,019	6,551	13		4	2	1,018	6,154	12		5	3	1,026	7,045	21		85
14. Zefta	8	3	1,030	5,190	16		10	5	1,042	5,835	29		10	7	1,047	6,656	47		95
15. Banha	13	5	1,029	4,628	23		14	7	1,034	4,961	35		14	9	1,038	5,930	53		165
16. Belkas	5	2	1,020	6,115	12		6	3	1,027	6,374	19		5	3	1,024	6,675	20		85
17. Mit Ghamr	7	3	1,019	6,097	18		6	3	1,018	6,075	18		4	2	1,011	6,379	13		120
18. Belbeis	4	2	1,020	6,381	13		2	1	1,010	5,887	6		4	3	1,028	7,015	21		110
19. Mataria	7	3	1,023	6,185	19		5	3	1,021	6,094	18		7	5	1,032	6,957	35		105
20. Kafr El Sheikh	5	2	1,011	6,250	12		2	1	1,006	6,068	6		4	3	1,018	7,032	21		130
21. Idku	8	3	1,022	5,794	17		7	4	1,027	6,022	24		9	6	1,036	6,742	40		120
22. Menouf	4	2	1,018	6,171	12		5	2	1,018	6,232	12		5	3	1,025	6,891	21		100
SUB TOTAL	352	143				850	373	189				1112	401	265				1,761	4,470
NORTH UPPER EGYPT																			
23. El Fayoum	38	15	1,040	6,892	103		41	21	1,048	6,824	143		48	32	1,061	7,422	238		355
24. Beni Suef	21	9	1,038	7,202	65		22	11	1,041	6,901	76		26	16	1,051	7,346	118		220
25. Minia	28	11	1,038	6,978	77		30	15	1,045	6,920	104		34	22	1,055	7,452	164		266
26. Mallawy	12	5	1,037	6,955	35		11	6	1,038	6,876	41		13	9	1,048	7,514	68		129
SUB TOTAL	99	40				280	104	53				364	119	79				588	990

TABLE I-A.2 (CONTINUED)

DIRECT INVESTMENT COSTS: PREFERRED ALTERNATIVE ALLOCATION

	1985-1990 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	1990-1995 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	1996-2000 POPULATION CHANGE (000's)	CHANGE IN EMPLOYMENT (000's)	EMPLOYMENT ANNUAL GROWTH RATE	AVERAGE COST(L.E.) AC*=Ag4	TOTAL COST (L.E. MILLIONS)	ZONE TOTAL COST	2000 POPULATION (000's)
SOUTH UPPER EGYPT																			
27. Assiut	80	32	1,070	8,144	260		100	50	1,081	7,725	386		125	83	1,094	8,064	669		500
28. Aswan	51	21	1,055	7,055	148		58	29	1,057	6,818	198		65	44	1,067	7,401	325		450
29. Sohag	15	6	1,029	6,739	40		15	9	1,035	6,459	53		15	10	1,039	5,125	61		184
30. Qena	28	11	1,058	7,581	81		31	15	1,065	7,027	112		38	25	1,077	7,567	189		225
31. Luxor	17	7	1,029	6,605	45		18	3	1,034	5,550	59		19	13	1,044	7,117	93		229
32. Ikhmim	8	3	1,035	6,845	21		9	5	1,048	7,147	35		10	6	1,047	7,412	44		90
33. Girga	8	3	1,035	6,808	21		9	4	1,041	5,901	29		10	6	1,052	7,449	45		86
34. Naga Hamadi	22	9	1,061	7,665	67		27	14	1,073	7,337	103		31	21	1,081	7,545	158		175
SUB TOTAL	230	93				884	256	135				979	318	208				1,585	2,030
SUEZ CANAL																			
35. Port Said	64	26	1,037	6,896	179		70	35	1,042	6,841	239		79	52	1,051	7,438	387		590
36. Ismailia	69	24	1,052	6,790	161		69	45	1,059	6,716	235		81	54	1,068	7,294	394		500
37. Suez	126	51	1,090	6,905	332		172	87	1,100	6,747	587		240	158	1,111	7,532	1,190		850
SUB TOTAL	251	102				672	311	157				1,061	399	244				1,971	2,000
REMOTE AREAS																			
38. Matruh	7	3	1,030	6,927 [1]	21		7	3	1,027	6,754	20		8	5	1,040	7,503	37		90
39. New Valley	8	3	1,027	6,850 [1]	21		7	3	1,025	6,836	21		10	7	1,051	8,184	57		100
40. Red Sea	9	4	1,031	7,400 [1]	30		9	5	1,033	6,969	34		9	5	1,029	7,297	36		110
41. Sinai	15	6	[2]	16,900 [1]	41		25	12	[2]	16,900 [1]	92		38	25	[2]	7,500	188		100
SUB TOTAL	39	16				113	46	23				197	64	42				318	400
TOTAL	3,565	1,449		5,997		8,589	4,162	2,107		6,162		12,986	4,888	3,231		6,939		22,421	30,890

* A.C. = Average Cost in L.E.

1 These cost estimates are based upon limited data, since there is relatively little industry in the Remote Areas. Estimates of cost per job are very much higher than these figures in the investment plans of the Red Sea Governorate Regional Plan, Sinai Development Plan and the Northwest Coast Plan. Consequently, the above estimates are low for these areas, unless only very high payoff projects are selected for funding.

2 Meaningful growth rates for Sinai are difficult to establish because of great uncertainty about the potential 1985 base.

SOURCE: MUPS Elaboration.

APPENDIX I-B

MACRO-ECONOMIC PROJECTIONS, INVESTMENT REQUIREMENTS AND FINANCING

APPENDIX I-B

MACRO-ECONOMIC PROJECTIONS, INVESTMENT REQUIREMENTS AND FINANCING

I. ECONOMIC PROJECTIONS TO YEAR 2000

Economic projections were made to provide order-of-magnitude estimates of some of the major elements of an economic profile of Egypt through the year 2000 -- Gross Domestic Product (GDP), employment and investment.

The purpose of these projections was to provide rough order-of-magnitude estimates of the required investment to achieve different levels of economic growth. These were used, in turn, to provide reference points against which to judge the likely adequacy of needed saving to finance growth at different rates and to array the total investment requirements of pursuing alternative spatial and sectoral objectives.

As indicated in the main report, there are two major concerns which prompted our interest in and need for these rough estimates:

- Domestic saving performance in recent years has been very weak and clearly below the level needed (without major foreign contributions) to achieve the levels of investment that would be required to maintain high overall growth rates.
- The sum of existing spatial and sectoral investment plans was clearly beyond the amounts that could be financed domestically.

Consequently, we needed a mechanism to demonstrate the possible significance of these concerns.

The projections, based upon a combination of historical and plan data, served this purpose well. It was not part of our purpose, nor indeed our obligation, to develop a sophisticated econometric model of the Egyptian economy and all its sub-sectors. Furthermore, given the well-known gaps and weaknesses of the disaggregated time series data on Egypt, it is possible to question the utility of elaborate models.

Nevertheless, readers of this report should be aware that our projections are based upon fairly aggregated data and assumptions about sectoral mix, efficacy of investment, capital/output and labor ratios and should not, therefore, be viewed as point predictions of the future performance of the economy. From the point of view of NUPS, our favorable projection is quite optimistic. Therefore, the findings that total investment required for urban development purposes far exceed the likely saving and investment rates for the alternatives that contain substantial decentralization

and high service levels in decentralized sites strongly reinforces our central contentions. These are that the Government should: pursue efficiency in its spatial and sectoral choices; and pursue conservation of public investment in the areas chosen for spatial and sectoral emphasis.

- The Government should pursue efficiency in its spatial and sectoral choices, and

- The conservation of public investment in the areas chosen for spatial and sectoral emphasis.

The 1980 population of Egypt was 42 million. Approximately 19 million lived in areas classified as urban places. According to our medium estimate, the population will reach about 68 million by year 2000, of which about 65 million are expected to be resident in the country. The corresponding urban population in the year 2000 is expected to be about 37 million (with range of 34 to 39 million), nearly double the current urban population. Our projections show an increase in the ratio of employment to population from 23.8 percent in 1980 to 31.4 percent in year 2000, if 7 percent growth rate is achieved.

Reported GDP in 1979 was L.E. 10.2 billion at the time the projections were made -- about L.E. 250 per capita. Economic growth was projected at rates of 5.5 and 7 percent per year over the 20 year period using different assumptions about the level of investment that might be sustained. At these rates of growth, Gross Domestic Product in the year 2000 would be between L.E. 35 billion and 43 billion -- L.E. 490 and 650 on a per capita basis in 1979 prices, respectively. The projected growth of the economic variables is shown in Table I-B.1.

The following section is a discussion of methodology used in developing these estimates. Section III focuses on investment requirements. Section IV discusses financing of investment and Section V calls attention to the difficulty of financing needed investment from domestic saving.

The economic projections show possible consequences for the rate of growth of domestic product and employment at different levels of investment in the economy. The amount of investment which can be achieved depends upon the amount of resources which are saved -- that is, not used for consumption. An additional study of expected savings of public and private domestic resources and foreign resources available to Egypt has been conducted. The amount of saving is strongly influenced by public policy. For this initial set of projections, we have assumed that -- in the favorable scenario -- 29 percent of the Gross Domestic Product will be available for investment. This is the proportion that is assumed in the current 1980-84 Development Plan. If consumption requirements are higher than anticipated in this plan, the amount of possible investment will be lower. To account for this possibility, an estimate of the growth that might be achieved if investment is reduced to 20 percent of Gross Domestic Product is provided -- the less-favorable scenario.

There is a great deal of uncertainty about both the amount of future saving (and, therefore, the ability to finance investment) that is possible in Egypt since it depends upon so many factors, including public policy choices and economic circumstances not completely controllable by public policy. There is uncertainty

also about the degree to which future investment and its allocation by sector will yield economic growth. Consequently, the projections should be viewed as an effort to establish a range of possible economic levels for the economy rather than firm predictions.

The initial more favorable and less favorable projections of GDP investment and employment are shown in Table I-B.2 and, graphically, in Figures I-B.1 and I-B.2.

TABLE I-B.1

PROJECTIONS OF BASIC VARIABLES

	1980	1990		2000	
Economic Scenario	-	A[1]	B[1]	A[1]	B[1]
GDP (L.E. Billions)	11.2	23.4	21.4	3.4	32.9
Employment (Millions)	10.8	15.4	14.4	21.2	19.6
Investment (L.E. Billions)	3.4	6.7	3.3	12.6	6.6

[1] Projections shown under A are based upon a favorable investment scenario (29 percent of GDP) which would provide for a GDP growth rate of 7 percent and those shown under B are for a less favorable investment scenario (20 percent of GDP) which would provide for a GDP growth rate of 5.5 percent.

SOURCE: NUPS Projections.

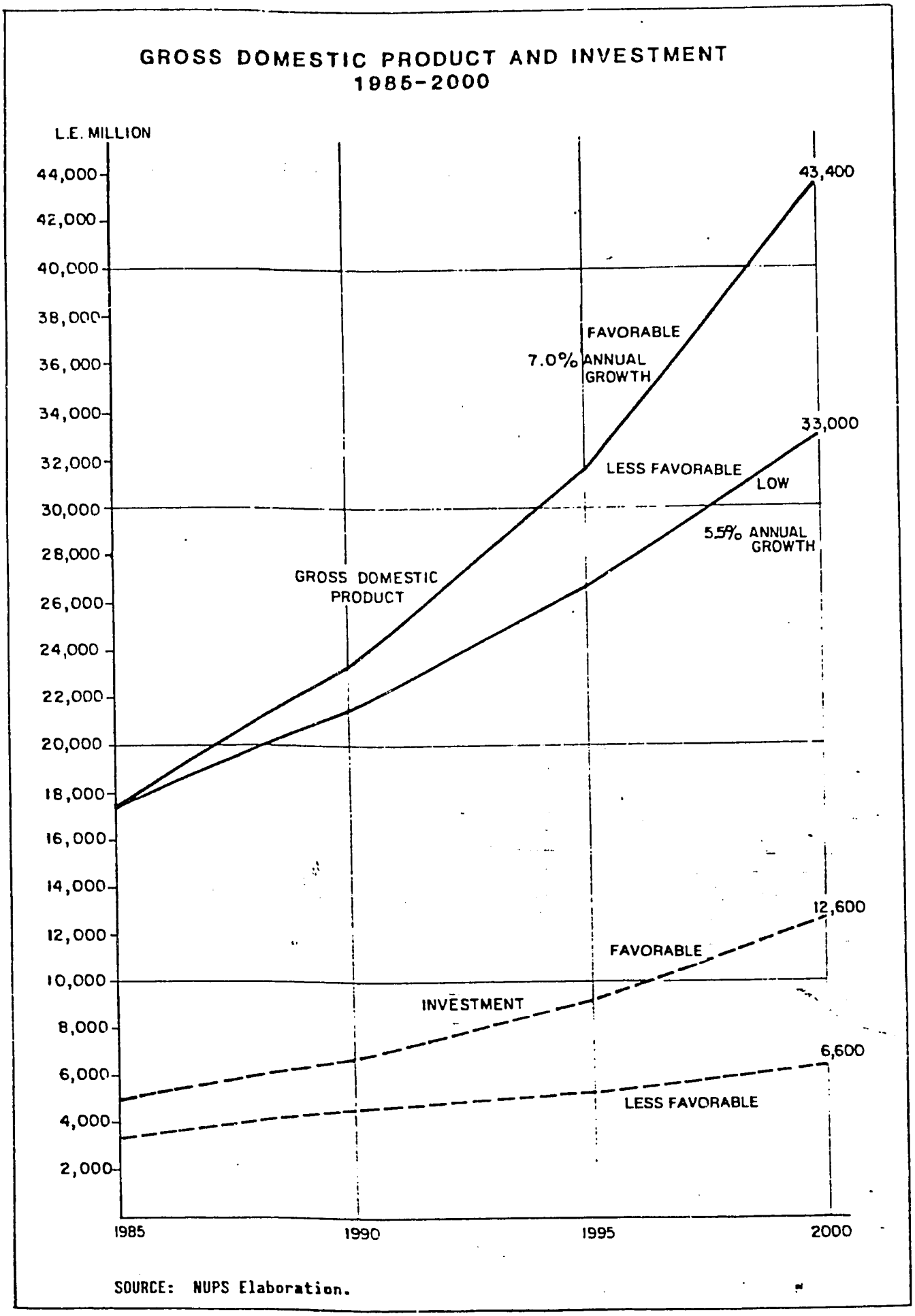
TABLE I-B.2

NUPS ECONOMIC PROJECTIONS [1]

	FAVORABLE			LESS FAVORABLE		
	GDP	INVESTMENT	EMPLOYMENT	GDP	INVESTMENT	EMPLOYMENT
1980	11,227	3,350	10,821	11,227	3,350	10,821
1985	17,500	5,100	12,900	17,400	3,500	12,700
1990	23,400	6,800	15,400	21,400	4,300	14,400
1995	31,700	9,200	18,600	26,500	5,300	16,600
2000	43,400	12,600	21,200	33,000	6,600	19,600

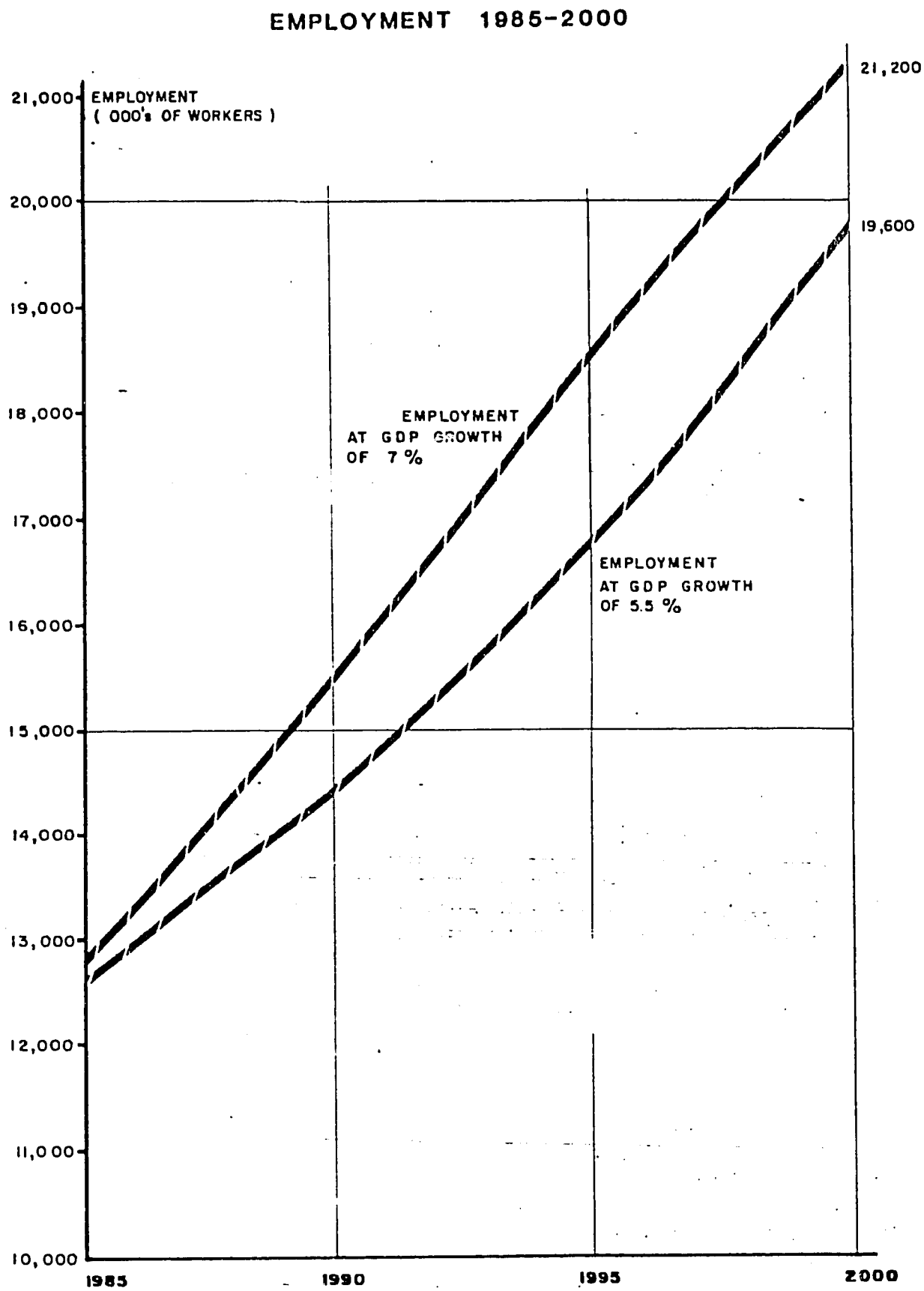
[1] Gross Domestic Product and Investment are in L.E. millions and Employment in thousands of employees.

SOURCE: NUPS Projections.



SOURCE: NUPS Elaboration.

FIGURE I-B.1



SOURCE: NUPS Elaboration.

FIGURE I-B.2

As indicated above, there is uncertainty about both the amount of investment and the allocation of investment by sector, both of which influence the growth of Gross Domestic Product and employment. The sectoral distribution of investment implied by the favorable and less favorable scenarios are shown in Figure I-B.1. The distributions which will actually be made are subject to public policy choice in Egypt, as well as to the investment choices made by private investors. The total required investment, in turn, is a function of these sectoral distributions.

Table I-B.3 summarizes the effect of the investment assumptions made on the growth rates of Gross Domestic Product, investment and employment.

TABLE I-B.3

ANNUAL GROWTH RATES OF ECONOMIC VARIABLES

(1980-2000)

	Favorable	Less Favorable
Gross Domestic Product	7.0%	5.5%
Investment	6.8%	3.4%
Employment	3.4%	3.0%

SOURCE: NUPS Projections.

The difficulty of maintaining an output growth rate of 7 percent over a 20 year period should be recognized. In a World Bank tabulation of 125 countries, only 7 countries were able to maintain this growth rate over a 17 year period.[1] Three factors stand out from among those which may impede the attempt to achieve such sustained high growth rates. First, the import content of investment is high. Therefore, rapid growth will generate a large demand for foreign exchange. Secondly, rapid growth imposes increasingly high demands for management skills.

Finally, it is difficult to align investment strategies with factor endowments. Imported technologies tend to be labor-saving rather than capital-saving, while labor-intensive technologies may be better suited to using Egypt's growing labor supply. An investment strategy that includes some imported capital-intensive projects with long gestation periods may be necessary, but may increase the difficulty of achieving an appropriate balance between growth in Gross Domestic Product and employment.

II. ECONOMIC PROJECTION METHODOLOGY

The model used to generate the economic projections was a Fixed Component System.

The Fixed Component System is an investment-driven model; that is, it is assumed that both increases in output (lagged one year) and employment are linked to the amount of investment spending. In this formulation the economic growth rate is, therefore, a function of the ratio of investment to GDP and the ability of investment to generate future output — as measured by the incremental capital-output ratios (ICOR).

In the remainder of this section the parameters are described, the data base supporting the estimation of parameter values is discussed, and the assumed time trends in parameter values are discussed. The data sources are identified in the annex to this Appendix.

We now turn to a description of the parameters. (Figure I-B.3) The incremental capital-output ratios (ICOR) indicate the amount of investment required in year t to generate one L.E. of output in year t+1. Annual estimates of ICORS often display erratic shifts due to short-run cyclical economic effects. Nevertheless, an effort has been made to identify the underlying secular level and trend of the ICOR's used, which would be maintained in the absence of dramatic changes in the composition and gestation periods of the investment portfolio.

The ratio of investment to GDP (a) measures the extent to which output is devoted to capital formation rather than current consumption. During the 1975-1979 period, this ratio fluctuated around 0.27 and is expected to increase during the Plan years to 0.29. A high ratio of investment to GDP must be maintained to sustain economic growth.[2]

The third set of parameters is the sectoral shares of investment (b_i). Since most investment in Egypt now takes place through the public sector, these parameters largely reflect policy choices of government. As private sector investment increases, the private sector will influence the sectoral shares.

The final set of parameters is the sectoral employment multipliers (d_i). These coefficients indicate the employment effect of investment spending. The growth rate of employment is a function of these parameters and the sectoral allocation of investment. An analytically equivalent and more commonly encountered statistic of employment creation is capital per worker, the amount of fixed capital introduced into the production process with each new worker. These statistics, based on the 1980-1984 average employment multiplier for each sector, derived from the 1980-1984 Development Plan, are shown in Table I-B.4. Historical parameter values and values derived from the 1980-1984 investment plan are presented in Table I-B.5. Those parameters used in the fixed system component for economic projections between 1985 and 2000 are presented in Table I-B.6.

FIGURE I-B.3

EQUATIONS OF THE FIXED STRUCTURE COMPONENT

Production Block

Gross Domestic Product, Agriculture (GDP_t)	$= GDPA_{t-1}/ICORA$
Gross Domestic Product, Manufacturing, Mining and Construction ($GDPM_t$)	$= GDPM_{t-1}ICORM$
Gross Domestic Product (Petroleum ($GDPP_t$)	$= GDPP_{t-1}+IP_{t-1}/ICORP$
Gross Domestic Product, Housing and Infrastructure ($GDPH_t$)	$= GDPH_{t-1}+IH_{t-1}/ICORH$
Gross Domestic Product, Services ($GDPS_t$)	$= GDPS_{t-1}+IS_{t-1}/ICORS$

Investment Block

Total Investment (I_t)	$= a\ GDP_t$
Investment, Agriculture (IA_t)	$= b_1 I_t$
Investment, Manufacturing, Mining and Construction (IM_t)	$= b_2 I_t$
Investment, Petroleum	$= b_3 I_t$
Investment, Housing & Infrastructure (IH_t)	$= b_4 I_t$
Investment, Services (IS_t)	$= b_5 I_t$

Employment Block

Employment, Agriculture (EA_t)	$= EA_{t-1}+d_1 IA_t$
Employment, Manufacturing, Mining and Construction (EM_t)	$= EM_{t-1}+d_2 IM_t$
Employment, Petroleum (EP_t)	$= EP_{t-1}+s_3 IP_t$
Employment, Housing & Infrastructure (EH_t)	$= EH_{t-1}+d_4 IH_t$
Employment, Services (ES_t)	$= ES_{t-1}+d_5 IS_t$

SOURCE: NUPS.

TABLE I-B.4

1980-1984 DEVELOPMENT PLAN
CAPITAL PER WORKER

SECTOR	CAPITAL PER WORKER (1979 Prices)
Agriculture	L.E. 8,100
Manufacturing, Mining and Construction	6,700
Petroleum	47,600
Housing and Infrastructure	43,500
Services	3,300

SOURCE: NUPS Calculations.

TABLE I-B.5

HISTORICAL PARAMETER

VALUES AND VALUES DERIVED FROM 1980-1984 PLAN

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
(a) Ratio of Investment of GDP	27.4	26.2	27.5	28.4	25.3	30.2	29.0	28.7	29.1	29.0
(b_1) Sectoral Shares of Investment										
- Percent of Total										
Agriculture	7.3	6.5	7.5	8.1	7.7	12.8	12.9	13.0	13.1	13.1
Mfg., Mining & Construction	22.8	28.4	31.0	27.6	25.1	18.8	18.8	19.0	19.1	19.2
Petroleum	13.6	19.4	10.7	7.9	8.9	4.3	3.6	3.0	2.5	2.1
Housing & Infrastructure	49.7	39.6	43.9	46.3	44.5	50.3	50.7	51.0	51.3	51.5
Services	6.6	6.1	6.9	10.0	13.8	13.8	13.9	14.0	14.0	14.1
(c) Employment to Investment Ratio*	.21	.04	.09	.14	.15	.11	.11	.10	.09	.08
Agriculture	.036	--	.216	.152	.145	.142	.136	.126	.114	.105
Mfg., Mining & Construction	.365	.097	.033	.202	.225	.160	.159	.153	.142	.137
Petroleum	.003	.003	.000	.035	.004	.020	.027	.017	.027	.030
Housing	.022	.025	.035	.026	.055	.025	.023	.023	.022	.021
Services	2.722	1.207	.760	.573	.429	.328	.275	.321	.282	.225
ICOR: Ratio of Investment to Change in Gross Domestic Product		2.90	4.38	3.35	2.00	3.18	2.89	3.27	3.28	3.26
Agriculture		0.77	1.04	2.20	6.06	7.27	6.32	2.46	11.88	5.51
Mfg., Mining & Construction		6.30	13.31	4.59	11.52	2.68	3.62	2.70	3.07	2.49
Petroleum		1.92	1.63	1.68	0.23	0.75	0.52	0.35	0.43	0.32
Housing & Infrastructure		4.70	489.00	5.75	15.47	10.11	5.42	10.37	15.64	12.57
Services		1.95	1.05	1.36	2.81	1.16	1.27	2.25	0.99	1.42

* Thousands of jobs per L.E. million of investment (1979).

SOURCE: NUPS Calculations from data shown in the Annex.

TABLE I-B.6

PARAMETERS USED IN FIXED COMPONENT SYSTEM

	1985-1989	1990-1994	1995-2000
Production Block			
ICOR, Agriculture	6.00	6.20	6.50
ICOR, Manufacturing	3.20	3.40	3.65
ICOR, Petroleum	4.00	4.20	4.40
ICOR, Housing & Infrastructure	10.00	11.00	11.50
ICOR, Services	2.00	2.10	2.20
Investment Block			
b_1 (Agriculture)	.13	.15	.15
b_2 (Manufacturing)	.20	.29	.39
b_3 (Petroleum)	.02	.02	.02
b_4 (Housing & Infrastructure)	.51	.40	.30
b_5 (Services)	.14	.14	.14
Employment Block			
d_1 (Agriculture)	0.100	0.095	0.090
d_2 (Manufacturing)	0.135	0.128	0.123
d_3 (Petroleum)	0.003	0.003	0.003
d_4 (Housing & Infrastructure)	0.020	0.018	0.016
d_5 (Services)	0.225	0.224	0.223

SOURCE: NUPS Calculations.

The data base used to derive the parameter values is shown in Table I-B.7. The historical data (1975-1979) is expressed in constant 1979 prices to conform to the Plan data (1980-1984) and to facilitate calculation of the parameters. The parameter values were calculated for each of the ten years (1975-1984).[3]

The following general comments apply to the parameter values used in the 1985-2000 projections: (1) the 1980-1984 parameter values form the basis of the initial 1985 parameter values; (2) the ratio of investment to GDP remains constant at 0.29 through year 2000 for the favorable projection and is 0.20 for the less favorable projection; (3) the investment share of the manufacturing sector is assumed to increase over time, while that of the housing and infrastructure sector declines; (4) the ICORS are assumed to increase over time; and (5) the employment multipliers are assumed to decline over time.[4]

Although the likely direction of change of the ICORs and employment multipliers over the next 20 years seems clear as a result of both employing longer lasting capital and more relative capital use in production processes, the rate of change is uncertain. In the selection of parameter values used in these projections, it was assumed that the economy-wide ICOR, although rising, would remain below 5 percent and that the sectoral capital/labor ratios would rise by 10 percent, on average, between 1985 and 2000. Under the assumptions made in the favorable 7 percent growth rate scenario, real output per worker (valued at 1979 prices) is projected to rise at an annual rate of 3.4 percent from 1976 to 2000.

III. ESTIMATES OF INVESTMENT REQUIREMENTS

The Government of Egypt has chosen a number of social goals toward which its development efforts are directed. These include: self-sufficiency in food, the development of industry, increased quantity and improved quality of social services, the exploitation of desert resources and the provision of productive employment opportunities. These goals are interrelated in a variety of ways. Of particular importance here is the fact that attainment of each of these goals requires the use of scarce resources, which if used for one purpose, are not available for the other. Growth in the economy provides a way to increase the resources available to distribute among these partially competitive demands for resources.[5]

The relationship between investment and output growth in Egypt was discussed above. Using historical data and information from the 1980-1984 Development Plan, it was projected that a 6.8 percent annual growth rate in investment would lead to a 7 percent rate of growth in output. Sustained growth at this rate requires that the absolute level of investment double every 10 years, reaching L.E. 12.6 billion by the year 2000. The focus of this section is the ability of the Egyptian economy to generate the resources necessary to finance this level of investment.

It is necessary to emphasize, however, that investment in industrial and social infrastructure capital alone will not ensure growth. Rather, there are a number of

TABLE I-B.7

BASIC ECONOMIC DATA

SECTOR	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
GDP (L.E. Millions)	6,926	7,614	8,122	8,874	10,160	11,227	12,479	13,677	15,007	16,475
Agriculture	2,129	2,295	2,455	2,547	2,580	2,640	2,714	2,861	2,909	3,023
Mfg., Mining & Construction	1,542	1,632	1,684	1,836	1,892	2,130	1,319	2,595	2,866	3,235
Petroleum	215	417	564	683	1,680	1,874	2,128	2,466	2,717	3,030
Housing & Infrastructure	677	845	847	1,050	1,124	1,293	1,632	1,825	1,968	2,164
Services	2,363	2,425	2,572	2,758	2,884	3,290	3,686	3,930	4,547	5,023
Gross Investment (L.E. Millions)	1,897	1,995	2,230	2,520	2,574	3,350	3,600	3,920	4,385	4,830
Agriculture	138	129	167	203	200	436	468	509	570	628
Mfg., Mining & Construction	433	567	692	697	645	637	684	744	833	918
Petroleum	258	387	239	200	230	100	108	118	131	145
Housing & Infrastructure	942	791	978	1,167	1,145	1,708	1,836	2,001	2,237	2,463
Services	126	121	154	253	365	469	504	548	614	676
Employment (Thousands)	9,432	9,505	9,715	10,069	10,459	10,821	11,228	11,630	12,038	12,436
Agriculture	4,217	4,068	4,104	4,135	4,164	4,226	4,290	4,354	4,419	4,485
Mfg., Mining & Construction	1,606	1,661	1,684	1,825	1,970	2,072	2,180	2,294	2,412	2,538
Petroleum	18	19	19	26	27	29	32	34	37	40
Housing & Infrastructure	638	658	692	722	785	827	870	916	965	1,016
Services	2,953	3,099	3,216	3,361	3,513	3,667	3,856	4,032	4,205	4,356

SOURCE: See Annex. GDP and Investment are in 1979 prices.

necessary ingredients that must be brought together if sustained economic growth and development are to occur.

First, there must be a labor force with the right mix of skills. Since the required mix of skills changes during the course of development, the educational and training system must be flexible enough to anticipate these changes. Growth in the human capital embodied in the work force is repeatedly found to be a major factor in studies examining the causes of output growth. Thus, investment in training and education can complement investment in new capital and new technology.

Second, new technology, suited both to the evolving composition of output and to the price of inputs, can contribute to output growth. An expanding range of consumer and intermediate goods calls for more specialized production techniques, which can be either imported or developed locally.

Third, the capital stock must increase for two reasons: (1) more capital stock is needed to provide the tools and machinery needed by new entrants to the labor force; and (2) it is needed to provide all workers with more capital because this leads to higher labor productivity and higher real wages. A higher employment level is both a goal of and a necessary condition for economic growth. The growth rate of output and employment depends on the rate at which capital is accumulated.

The fourth necessary ingredient is entrepreneurship. The role of the entrepreneur is to identify investment opportunities and bring the labor, technology and capital together in a production process. One of the significant differences of economic systems is the location of the entrepreneurial function. It can range from an exclusively state function to an exclusively private sector function. Egypt has chosen an intermediate path with the state taking a leading role, while encouraging private entrepreneurship.

Finally, the development process requires public policies that establish an environment conducive to economic growth. That is, in order to achieve growth, public policies should encourage the creation of an appropriately skilled work force, facilitate the introduction of new technologies, encourage the accumulation of capital in the private sector and/or generate increases in the public capital stock and assist in identifying and developing talent.

As stated above, each of the five requirements is necessary for development. The emphasis in this section is on the accumulation of capital and policies that encourage it. This emphasis is the result of the relatively long-time horizon (19 years) of the study. Determination of the correct mix of skills and the correct types of technological changes requires more of a detailed specification of the kinds of goods to be produced than is possible in this study. The same thing would be true if one wanted to describe the specific types of capital to accumulate. These issues are appropriate to annual and five-year development plans within a framework of reasonable expectations of longer term prospects for capital accumulation.

Even though capital accumulation is discussed here at the macroeconomic level, it is desirable to make some broad distinctions between types of capital. In particular, we distinguish between social overhead capital (the distribution sectors) and directly productive capital (commodity and service sectors). This distinction is

important when analyzing alternative national urban policies because it is the distribution sector that links the spatially-distributed productive captial and the associated spatial distribution of the population. Put another way, the estimate of the amount of capital needed to generate a target rate of growth in the commodity producing sectors will depend on the locations specified for economic activity. This, in turn, depends on the characteristics of the national urban policy.

It is worthwhile to make a few general comments about the determination of the levels of required investment before presenting the figures. The amount of capital needed to generate a target level of output depends on the capital intensity of the production process, the productivity of capital and the time period over which the capital is productive.[6] Because the future characteristics of each of these elements are not currently known, but will be determined by the investment patterns that will evolve during the 19-year period, the analysis in this report is necessarily based on some general assumptions.[7] It is assumed that capital intensity will rise modestly over the period, but the character of much of the industrial sector investment will be labor intensive with a short payoff period.[8] These characteristics are appropriate for an economy in which labor force growth is vigorous and the risk associated with long-lived projects undertaken during a transitional period is high.

The starting point for the investment projections is the 1980-1984 Development Plan. The major points of the plan are:

- Fixed investment will rise from L.E. 3.3 billion in the initial year to L.E. 4.8 billion in the final year.

- The share of total investment financed by domestic saving will rise from .51 to .68 during the plan years.

- Foreign saving is not expected to rise, although it remains significant throughout the plan.

These are very ambitious targets, particularly for overall investment and the domestically financed portions. If realized, the total planned investment during the five-year period will be L.E. 20,085 million and would be allocated as indicated in Table I-B.8.

This allocation reflects the government's determination to reverse the past negligence of the nation's social and economic infrastructure. The NUPS projections for the period 1985-2000 assume that as these infrastructure deficits are eliminated, the relative share of infrastructure will decline and the relative share of the commodity producing sectors will rise. The projected investment levels under the favorable investment scenario are shown in Table I-B.9.

The sectoral allocation in Table I-B.9 is suggestive of how the government and private sector may act during the period. The amount of investment required in the productive and distribution sectors depends on spatial policy as clearly shown in this and earlier reports. For example, it was stated above that the spatial distribution of economic activities and population generate demands for interregional infrastructure networks. A widely-dispersed population will need more interregional networks than a concentrated population. The likelihood of generating resources

TABLE I-B.8

INVESTMENT TARGETS OF 1980-1984 PLAN

	L.E. Million	Percent
Agriculture	2,611	23.0
Mfg., Mining & Construction	3,816	19.0
Petroleum	602	3.0
Housing & Infrastructure	10,245	51.0
Services	2,811	14.0

SOURCE: Ministry of Planning, A.R.E.

TABLE I-B.9

INVESTMENT REQUIREMENTS 1985-1999

(L.E. Million, 1979 Prices)

	1985-1989		1990-1994		1985-1999		1985-2000	
	L.E.	Percent	L.E.	Percent	L.E.	Percent	L.E.	Percent
Agriculture	3,723	13.0	5,779	15.0	7,850	14.5	17,352	14.5
Mfg., Mining & Construction	5,728	20.0	11,172	29.0	20,410	39.0	37,310	31.2
Petroleum	573	2.0	771	2.0	1,047	2.0	2,391	2.0
Housing & Infrastructure	14,607	51.0	15,401	40.0	15,700	30.0	45,717	14.0
Services	4,010	14.0	5,394	14.0	7,327	14.0	16,731	14.0
	28,641	100.0	38,526	100.0	42,334	100.0	119,501	100.0

SOURCE: NUPS Projections.

sufficient to meet the investment requirements is the topic of Sections IV, V and VI of this Appendix.

IV. FINANCING INVESTMENT

Investment, in any year, is that portion of the available resources (outputs) that is not consumed. This is the macroeconomic identity -- saving equals investments ex post. Investment was presented above as a requirement of economic growth. This requirement can be met only if sufficient saving occurs to direct resources into investment.

In this analysis of the saving/investment relationship, the variables of interest are flows of goods and services rather than financial flows or stocks. Saving is by definition, output that is not consumed. It may be either domestically produced or imported. Thus, total resource availability is the sum of Gross Domestic Product (at market prices) and the excess of imports over exports. Gross National Saving is the difference between total resource availability and total consumption (private consumption plus public consumption). Gross National Saving is comprised of Domestic Saving (Gross Domestic Product minus consumption) and Foreign Saving (imports minus exports). Foreign Saving can be financed in a variety of ways: worker remittances, direct foreign investment, medium- and long-term official loans and grants, private loans and the drawdown of foreign balances.

When domestic saving is large enough to meet the required investment levels, it is not necessary to draw on foreign savings, provided the imports needed for investment projects (or for consumption) can be paid for with export earnings. This is not the case in Egypt today, nor is it likely to be in the near future. Consequently, there are three gaps that could constrain investment below the desired level. The first is the overall saving/investment gap. If Gross National Saving is deficient, investment will be held below the target level. The other two gaps arise if there is a single source of supply for the investment inputs. If a required input is not available in the domestic market (as is often the case with capital goods), there must be a source of foreign exchange to purchase the input. This source can be either foreign savings or export earnings. If these are less than required, a foreign exchange gap results which can keep investment below the target level. Likewise, when a required input cannot be imported, either because it is physically impossible to import or because the import cost is prohibitive, it must be financed by domestic savings. Foreign exchange provides Egypt with a claim on the resources of the rest of the world, it does not make available additional local resources.

The implication of the foregoing is that there must be a balance in the sources of saving. In particular, excessive reliance on foreign financing of investment can lead to a number of problems. Servicing a large foreign debt requires that the investments result either in a larger volume of exports or a smaller volume of imports. If delays are encountered in completing the investments, or if actual

productivity is below expected productivity, there may be insufficient foreign exchange in future years to service the foreign debt. In turn, this would adversely affect credit-worthiness and lead to a reduction of foreign saving. Delays are likely if there are shortages of domestic inputs.

V. RECENT SAVING TRENDS AND THE DEVELOPMENT PLAN

A. Saving Trends

Table I-B.10 displays the relationship between resource availability and saving for the period 1975-1979.

Domestic production at market prices in 1979 was L.E. 12,475 million, of which L.E. 10,682 million was consumed.[9] Domestic production available for investment was L.E. 1,793 million, while investment in 1979 was L.E. 3,796 million. This means L.E. 2,002 million of total investment (53 percent) came from outside the country as an excess of imports of exports.

The domestic saving effort (shown in Table I-B.11, row 1) is both below international standards and declining. Although there have been significant gains in production in recent years, only a small portion of the gains have been directed to investment. Table I-B.11 shows in row 3 the consequent increased reliance on foreign sources to finance the country's investment program (i.e., the ratio of import surplus to gross investment is increasing).

These data suggest the following characterization of the Egyptian economy. The country has begun an enormous investment program, partly to rehabilitate the capital stock that was neglected in the late 1960's and early 1970's and also to bring about a higher level of output and employment. This desire to increase investment has not been accompanied by much increase in domestic resources for investment. In this situation, either the investment effort must be scaled down or foreign financing must close the gap. Foreign resources can (and did) close the gap in the short run.

Excessive reliance on foreign financing exposes the nation's investment plan to the vagaries of foreign economic and political events. This is especially true when a substantial portion of the foreign saving takes the form of government to government concessionary loans and transfers. An investment program financed largely with domestic resources will have a more sturdy foundation than one relying on foreign sources. An indication of the magnitude of the required change in Egyptian saving patterns can be gotten from a comparison of recent data and the 1980-1984 Development Plan. The marginal propensity to save (MPS) for the years 1976-1979 and the MPS used in the Development Plan are shown in Table I-B.12. The marginal propensity to save is the fraction of output growth which is saved. In 1978 and 1979 this figure fell far short of that anticipated in the Development Plan.

TABLE I-B.10

NATIONAL SAVING

(L.E. Million, Current Prices)

		1975	1976	1977	1978	1979
	GDP Factor Cost	5,061			9,003	11,936
+	Net Indirect Taxes	186			744	539
=	GDP at Market Prices	5,247	6,705	8,210	9,782	12,475
+	Net Factor Income	-16	133	433	983	761
=	GNP Market Prices	5,221	6,838	8,643	10,765	13,236
	GDP at Market Prices	5,247	6,705	8,210	9,782	12,475
-	Private Consumption	3,101	3,965	4,917	6,278	8,623
-	Public Consumption	134	1,572	1,697	1,841	1,793
=	Domestic Saving	802	1,168	1,596	1,663	1,793
	Investment (Fixed)	1,265	1,450	1,838	2,618	3,345
+	Change in Stock	459	439	561	416	450
-	Domestic Saving	802	1,168	1,596	1,663	1,793
=	Import Surplus	922	721	803	1,371	2,002

SOURCE: Ministry of Economy and USAID/Cairo.

TABLE I-B.11

SAVINGS RATIOS

	1975	1976	1977	1978	1979
Domestic Saving/Gross National Product	.15	.17	.19	.17	.14
Domestic Saving/Gross Investment	.45	.62	.67	.55	.47
Import Surplus/Gross Investment	.53	.38	.33	.45	.53

SOURCE: Table I-B.10.

TABLE I-B.12

MARGINAL PROPENSITY TO SAVE

		1976	1977	1978	1979
Historical Data		.37	.35	.04	.05
	1980	1981	1982	1983	1984
Plan Data	.33	.36	.29	.33	.30

SOURCE: Ministry of Planning and IMF.

In other words, an increase in national income of one L.E. led to an increase in saving of only four to five piasters in 1978 and 1979. If this pattern were to persist, the investment targets would become hopelessly out of reach. Investment projects would have to be abandoned, employment growth would slow down, and self-sustained economic growth would not occur.

B. Development Plan

The importance of an improved saving effort is clear to Egyptian economic planners and is made explicit in a Ministry of Planning document regarding the Five Year Plan.

> "The domestic savings target will require special efforts, because it calls for a significant change in the existing pattern of saving. Government current expenditure will clearly have to be rationalized and the public sector enterprises and organizations will have to eliminate their deficits and generate sizeable profits. The need to increase domestic resource generation cannot be exaggerated because it is becoming clear that, at the present time, it is the shortage of domestic resources that is slowing down the implementation of projects and inhibiting the utilization of the project aid that has already been committed by doner countries and organizations."[10]

Table I-B.13 presents the saving/investment relationship derived from the Five Year Plan. The Plan's reduction in the foreign share of investment financing from one-half to one-third in a period of five years would be quite remarkable and is probably not achievable. The Plan envisions that a relatively slower growth rate of private consumption will release resources for investment. The annual growth rate of private consumption is 5.8 percent, compared to an output growth rate of 10.8 percent. The Plan document referred to above is not explicit, however, about policy changes that could lead to the increases in the saving rate. Prudence requires scepticism about achieving such a substantial level of domestic saving.

C. Financing Foreign Saving

Since the mid-1970's, there has been a large inflow of foreign low-interest loans and grants into Egypt from other countries and institutions. Direct private investment has grown rapidly but is still concentrated in the petroleum sector. When the loans come due and the foreign investment projects come on-line, foreign exchange will be needed for debt repayment and profit repatriation. If Egypt is to continue to attract foreign savings throughout the period, it must earn (or save through import substitution) enough foreign exchange to meet the repayment schedule. At the present time, Egypt's foreign exchange earnings come from four principal sources: worker's remittance, petroleum, Suez Canal and tourism. As foreign loans come due, these revenues will have to be shifted from paying imports to repaying debt. Unless these revenues continue to grow rapidly or new revenue sources are found, imports will be curtailed.

TABLE I-B.13

NATIONAL SAVINGS 1980-1984 DEVELOPMENT PLAN

(L.E. Million, 1979 Prices)

		1980	1981	1982	1983	1984
	GDP at Factor Cost	11,257	12,479	12,667	15,007	16,475
+	Indirect Taxes	2,290	2,525	2,780	3,050	3,335
=	GDP at Market Prices[1]	13,547	15,004	16,457	18,057	19,810
+	Net Factor Income	685	661	640	683	687
=	DNP at Market Prices[1]	14,232	15,665	17,097	18,740	20,497
	GDP at Market Prices[1]	13,547	15,004	16,457	18,057	19,810
-	Private Consumption[1]	9,407	10,110	10,925	11,805	12,805
-	Public Consumption	2,390	2,700	2,985	3,270	3,580
=	Domestic Saving	1,750	2,194	2,547	2,982	3,425
	Investment (Fixed)	3,350	3,600	3,920	4,385	4,830
+	Change in Stocks	100	110	120	140	200
-	Domestic Saving	1,750	2,194	2,547	2,982	3,425
=	Import Surplus	1,700	1,516	1,493	1,543	1,605
	Ration DS/Total 1	.51	.59	.63	.66	.68

[1] Includes consumer subsidies, therefore, these are not technically market prices. This accounting procedure does not affect the saving section.

SOURCE: Ministry of Planning, A.R.E.

Estimating future receipts from these four sources is problematic. The Development Plan forecasts that by 1984 worker's remittances will level off and Suez Canal revenues will rise at a modest 6 percent over 1983. Oil exports (not including the oil companies' share) will rise 10 percent and tourism revenues 14 percent.

A logical source of new foreign exchange earnings is the non-oil commodity sectors. Foreign markets for manufactured and agricultural goods should be identified and developed. A more diversified mix of exports would protect the economy from adverse changes in one of the four principal sources. It would disperse the development process throughout the economy and, as domestic firms become competitive in world markets, import substitution will be economical. In summary, over the next 19 years Egypt must both amortize its existing foreign debt and finance future import surpluses. Current foreign exchange sources may not be buoyant enough to provide funds for both. If this happens, a shortage of foreign exchange would disrupt the investment program. A diversified program of export promotion and import substitution in manufacturing and agriculture can both provide foreign exchange and spread the development process throughout the economy.

At the same time that foreign exchange sources are being developed, economic planners must identify policies to bring the domestic saving effort into accord with the Development Plan.

VI. POLICY CHANGE TO INCREASE SAVING

It was pointed out in Section V that there is an incompatibility between Egypt's desire to mount a large investment effort and its current saving performance. The investment effort will be jeopardized unless the domestic saving effort improves. This fact is well known to policy-makers and is the topic of a number of recent studies.[11]

The reasons for a low domestic saving rate can usually be identified by analyzing the economic environment in which savings decisions are determined. These savings decisions are made in both the public and private sectors.[12] For public saving to take place, government revenue must exceed government current expenditure. In 1979, government revenue was L.E. 3,684 million, while government current expenditure (including public authority deficits and subsidies) was L.E. 3,774 million. Public saving was a negative L.E. 90 million. During the same period, government investment was L.E. 2,547 million, producing a public deficit of L.E. 2,637 million. Comparable data for previous years are shown in Table I-B.14.

A closer look at the fiscal operations in 1979 shows some of the more important reasons behind this poor saving performance. Transfers from the Public Enterprises to central government amounted to L.E. 501 million. However, L.E. 401 million came from petroleum and the Suez Canal. The other authorities and companies, in spite of their dominant role in the economy, did little more than cover their production costs.[13] The domestic saving effort would be substantially improved if these companies were operated more efficiently. If efficiency increases, they would be better able to compete with foreign firms in both domestic and international markets. While it is true that the motivation behind some of the current regulation of the public sector is the important social equity objective, there are better ways to enhance social equity than operating the industrial sector inefficiently.

TABLE I-B.14

PUBLIC SAVING

(L.E. Million, Current Prices)

	1976	1977	1978	1979
TOTAL REVENUE	2,015	2,755	3,306	3,684
- Current Expenditure	2,300	2,476	3,072	3,774
= Public Saving	(285)	279	234	(90)
PUBLIC INVESTMENT	980	1,549	2,311	2,547
- Public Saving	(285)	279	234	(90)
= Government Deficit	1,265	1,270	2,007	2,637

SOURCE: IMF.

A second reason for the weak public saving effort is the level of subsidies, L.E. 1,230 million in 1979, of which L.E. 880 million was for the General Authority for Supply Commodities. Here again, there appears to be a conflict between economic development objectives and social equity objectives.

However, the right question regarding consumer subsidies is how extensive they should be and not whether there should be subsidies. Both the food subsidy and the implicit fuel subsidy are open-ended; they are available to and used by all income classes, although the intent of the subsidies is to protect the poor. A reduction in the number of items subsidized and in the number of people eligible for the subsidy would release funds for investment and move market prices toward levels that reflect relative scarcities.

Decisions in the private sector are also important in determining the overall saving effort. Households can invest their savings directly in family-owned enterprises, or they can use the commercial banking system to channel savings into investment projects. The real return on private savings held in the banking system depends on the bank interest rate and the rate of inflation. With rates of inflation above bank interest rates, the real return to savings is negative. This tends to discourage saving. This situation has developed in Egypt over the past several years primarily as a result of government borrowing to finance the deficit (Table I-B.14 shows the magnitude of the deficit.) This borrowing has contributed to money supply growth that exceeds the growth of output.

During the mid 1970's, the private sector was willing to hold these money balances and this reduced upward pressure on prices. By the late 1970's, the inflation rate had risen to the point that real rates of return were, and continue to be, negative. Additional deficit financing can be expected to generate higher prices more quickly than was the case in the past. The government has announced that the 1981-1982 Budget does not require deficit financing, but this expectation is currently being reversed. If it occurs, it would reduce inflationary pressures. It should be combined, however, with higher bank interest rates to encourage a larger flow of funds into the banking system.

Inflation is probably the predominant short-run factor affecting private saving rates. Reducing the inflation rate should be an important government policy goal. Other policy changes that could contribute to higher savings rates are expenditure taxes, especially on luxury goods, and a floating unified exchange rate. The latter policy change would affect saving, both by making luxury imports more expensive and by increasing the profitability of Egyptian firms selling in domestic and foreign markets.

Egypt needs to build up its industrial capital stock. The government policy is to encourage the private sector to contribute to this effort. In addition to the specific policy changes discussed above, the government must also establish a legal, administrative and economic environment in which citizens have enough confidence in the stability of public policies to make long-term investments in industry.

In this discussion, we have touched briefly on some of the ways by which saving can be fostered. The purpose of this section is to indicate the types of changes that will be necessary to generate sufficient domestic savings to finance the investment program. Recent evidence suggests that without these types of changes, the investment program will fall short of its needed levels because of real resource constraints.

NOTES

APPENDIX I-B

MACRO-ECONOMIC PROJECTIONS, INVESTMENT REQUIREMENTS AND FINANCING

1 *World Development Indicators, World Bank, June 1979.*

2 *For comparison, we note that the ratio in Japan is over 0.30.*

3 *These values are presented in the Annex.*

4 *The parameter values are presented in the Annex.*

5 *The demands are described as "partially competitive" because increasing the resources devoted to any one of the goals can have positive effects on the others. Consequently, the effects are sometimes complementary, even though they compete for funds in the short run.*

6 *For equally productive capital, the annual increment of output is lower the longer the life of the capital.*

7 *The parameter values which were used are presented in the Interim Action Report.*

8 *This characterization, of course, refers to averages; they will simultaneously be investments in large-scale industrial complexes and traditional handicraft production activities.*

9 *These GDP figures for 1979 are revised upward from those used in the projections and were in the process of being revised again; we, therefore, did not re-estimate the projections made earlier. The higher GDP figures shown here would lead to higher year 2000 GDP levels, if the even larger amounts of required investment were forthcoming. As indicated in this Appendix, however, our analysis suggests caution in assuming that the levels of investment we have projected will necessarily be achieved.*

10 *Ministry of Planning, Egypt's Development Strategy, Economic Management and Growth Objectives, 1980-1984, p. 13.*

11 *For example, World Bank, Arab Republic of Egypt, Domestic Resource Mobilization and Growth Prospects for the 1980's, Report No. 3123-EGT, December 1980, and A.R.E., Ministry of Economy, Economic Studies Unit, Recent Development in the Egyptian Economy, January 1981. The latter study is a very lucid presentation of recent economic developments, presented in more detail than can be done in this section.*

12 *The Study Team has been unable to obtain data on the distribution of domestic saving between the public and private sectors from the Ministry of Planning.*

13 *There was also L.E. 374 million in investment self-financing, but its source is not explicit.*

ANNEX TO APPENDIX I-B

A. The ten sectors found in Egypt's National Income Accounts have been grouped in the Fixed Component System as follows:

- Agriculture
- Manufacturing, Mining, Construction
- Petroleum, Housing and Infrastructure -- includes Housing, Public Utilities
- Transportation, Communication, Storage and Electricity Services -- Trade and Finance, Other Services

B. The sources of the basic data are as follows:

Gross Domestic Product

1975-1978: Arab Republic of Egypt, Economic Development and External Capital Requirements, World Bank, November 1979.

1979,1980 1984: Egypt's Development Strategy, Economic Management and Growth Objectives, 1980-1984. Ministry of Planning, November 1979.

1981-1983: Derived from the General Equilibrium of the five year plan contained in the Ministry of Planning Documents. The General Equilibrium shows gross output for each sector, but not the sectoral GDP. The ratio of gross output to GDP in each sector was calculated for the year 1979, 1980 and 1984. The 1981-1983 ratios were selected to move incrementally from the 1980 ratio to the 1984 ratio.

Gross Investment

1975-1979: Same as GDP 1975-1978.

1980-1984: Based on the Ministry of Planning documents cited above and General Framework for Socio-Economic Development, Five Year Plan, Ministry of Planning, October 1979. Both documents contain five year sectoral investment totals and sectoral percentage shares, but they do not show the same figures. The annual investment amounts are from the General Equilibrium of the five year plan. The sectoral shares are from the General Framework.

Employment

1975-1976: Statistical Yearbook, A.R.E., July 1979.

1977-1978: Same as GDP 1975-1978.

1979: World Bank

1980-1984: Total annual employment is from General Framework. Sectoral employment is not given. The annual rate of growth of each of the four non-agricultural sectors was calculated. These sectors are assumed to expand at their historical growth rates. This left a residual of 321,000 jobs which was allocated to agriculture, producing a growth rate of 1 percent in that sector.

Constant Price GDP and Investment

1975-1979: GDP, in current and constant 1975 prices, is found in Arab Republic of Egypt-Recent Economic Developments, International Monetary Fund, February 25, 1980. From this data, an implicit GDP deflator was calculated and the base year was changed to 1979. The calculated deflators are:

Implicit GDP Deflator (1979-100)

1975	69
1976	76
1977	83
1978	88
1979	100

APPENDIX II-A

A NOTE C URBAN DISAMENITIES

APPENDIX II-A

A NOTE ON URBAN DISAMENITIES

Several reviewers of our earlier reports have expressed the view that our analysis has insufficiently accounted for the urban disamenities or diseconomies associated with the large and growing size of Cairo and Alexandria. We have attempted to account for these extra costs in two ways. In estimating direct investment costs for job creation, we have assumed a positive exponential relationship between costs and the settlement growth rates (growth management costs). Part of these increased costs are associated with diseconomies. In addition to this, we have accounted for the increased housing, social and physical infrastructure costs in our intra-urban infrastructure estimates. However, the concern indicates the importance of attempting independent estimates. This note discusses the general issue and the difficulties of disentangling urban economies and diseconomies and then provides order of magnitude estimates of total urban disamenities and the disamenity cost of greater versus less concentration in the Cairo and Alexandria regions.

We have emphasized the complexity of making a complete net benefit estimate since both productivity (external economies or agglomeration economies) and disamenities or diseconomies are associated with city size. The nature of the difficulty is well described by William Alonso:

> "The problem of city size has been discussed by many and often forms a cornerstone of location policy in both developed and developing countries. In general, most nations seem to feel that their principal cities are excessively large; consequently, they follow policies of decentralization, particularly for manufacturing industry. The factual basis for this policy is lacking: no one knows when a city becomes too big. Nonetheless, this concern is so central to so many countries that some of the theoretical aspects will be discussed here. In general, it is based on a belief that some set of costs rises after cities reach a certain size. Among the costs mentioned are those of traffic congestion, water and sewage disposal, shelter, policing, and some social costs. While it must be emphasized that there is no empirical verification of the fact of rising costs, the argument, in one of its most sophisticated forms, runs thus: any particular businessman or government agency, in moving into a congested center, will pay only the prevailing or average costs for labor, food, movement, utilities, etc. The addition to the size of the city of this new activity will change these costs only imperceptively for any user. The marginal costs (that is to say, the addition to total costs of the new arrival), however, will be much larger than average costs.

"Thus, if costs are rising with urban size, new activities will continue to be attracted to the city far beyond the point at which the increasing marginal costs begin to make this a relative or even absolute loss from the point of the national economy. A cost-benefit analysis would use the marginal costs produced by the external diseconomies of congestion, etc., in evaluating that location. If we knew what these costs were, the central planning agency might require operating agencies to use them in their calculation and the government might charge private business the full costs by some form of taxation.

"It was pointed out in an earlier section that there are reasons to believe, however, that productivity may also increase with city size. Among the factors mentioned was the facility of communications and the availability of information, the availability of specialized services, the richness of inter-industry linkages, and the principle of massed reserves. If productivity increases with urban size, then the project or the businessman will take into account only the effects of these externalities upon his firm, which in a sense, may be termed the average productivity. But the project will not take into account, under normal procedures, the external economies that it produces for other activities. In other words, the symmetrical analysis should be performed on the benefit side as on the cost side, and the public agency should take into account the marginal effect on total production in the city. If productivity rises with urban size, marginal product will be considerably larger than average product. No more do we have reliable information as to whether productivity rises with urban size, but a great deal of corroborating evidence suggests that it does. The magnitudes involved in terms of per capita income, net regional income, value added per industrial worker, local government expenditures, and cost of living indexes for those few countries in which they are available, suggest to this writer that marginal product is far greater than marginal cost for large cities, and consequently that anti-urbanization policies are in error with respect to the goal of national production, for they compare marginal cost to average product."[1]

The issue is discussed also in a paper prepared for the World Bank by Harry Richardson as follows:

"The Optimal City Size Myth

1. "Objections to the planner's concept of an optimal city size are so well known (e.g., Richardson, 1972, 1973 & 1976) that they require little elaboration here. The idea is based upon a comparison of hypothetical cost and benefit curves with city size (population) measured on the horizontal axis.

2. "Adopting the common assumption (and it is only an assumption) of an S-shaped benefit curve and a U-shaped

cost curve, it follows that net benefits will become zero at some finite city size. Hence, this is the optimal city size. In fact, it is not quite as easy as that: if average and marginal curves are used,[2] a bewildering set of alternative optima can be identified: least cost city size (minimum AC); maximum citizen welfare (maximize AB-AC); social optimum with unlimited population (MB-MC-OC), where OC equals the opportunity costs of locating the population elsewhere). There are other possibilities such as the threshold city size (AB-AC, AC falling), maximum gross benefits or maximum net average benefits, not to mention the possibility that the optimum for households may be quite different from that for firms.

3. "A more serious drawback is the fact that the meaning of the cost and benefit curves is at best obscure. Leaving aside all the standard economic assumptions (homogenous households with a constant set of preferences, a static framework abstracting from shifts in production functions, and so on), the critical assumption is that all benefits and costs are additive. In fact, many of the important items such as pollution, congestion, mental stress, exposure to crime, externalities in assumption, and agglomeration economies for industry are difficult to measure, and where measurable, hard to convert into monetary units. Without precise measurement, the "objective" assessment of evidence degenerates into value judgments, implicit weighting systems and arbitrary selection of criteria. Even if the model had any pedagogic virtues, it is non-operational for policy and planning purposes.

4. "Suppose for a moment that there is a hypothetical optimum city size. Would this be found at the same population size in developing countries as in developed countries? Or, turning the question around into more meaningful terms, is a city of a particular size (say one million) more liveable and/or more efficient in a developing country than in a developed country? Since most of the work in this area has been on cities in developed countries, there is a danger of bias in generalizing from currently available evidence. The superficial judgment might be that the "big city problem" (a code phrase for excessive size) is more serious in developing countries simply because Sao Paulo, Mexico City, Calcutta, Bangkok, Jakarta and other cities in the developing world make the headlines.

5. "In fact, a second look suggest a reversal of this judgment. The economic advantages of primate cities in developing countries are considerable: higher returns to investment than at alternative location, economies of concentration in urban service provision in capital-poor economies; transportation advantages, communication economies, the

dominant source of innovation and managerial expertise and the diffusion center fo developmental impulses and for economic, technical and social change. The finding that in a study of 46 developing countries there was a strong positive association between aggregate growth performance and increasing primacy (Mera, 1973) deserves emphasis. The economic and social benefits of large relative to small cities (e.g., a wider range of job opportunities including employment for secondary workers in the "informal" service sector, better health and education facilities) appear stronger in developing than in the developed countries. Furthermore, the social costs (as opposed to the private costs, where absolute living standard differentials blur comparison) probably remain lower in LDC cities, despite recent increases in pollution and congestion. This is reinforced if the hypothesis that social costs are a function of industrialization and affluence is accepted. The value of eliminating a given physical amount of pollutant will be greater in a developed country than in an LDC city, simply because wealthier people value clean air more highly. Thus, there are some grounds for arguing that the hypothetical critical city size that equates marginal costs and benefits, if it could be measured, would be greater in developing countries (this statement does not concede the possibility that net benefits may remain positive for all current world city sizes)."[3]

Nevertheless, the evidence of pollution, congestion and other social disamenities is apparent in Cairo and Alexandria and needs to be taken seriously. Therefore, the NUPS Team has attempted to make an indicative assessment of the order-of-magnitude of these costs using comparative data from the United States. (See also the last Section of Chapter I and Table I-A.2.)

The first comparisons derive from U.S. estimates of the costs of environmental pollution and pollution control. The Commission for Environmental Quality estimated total pollution-control costs from 1970 to 1988 to be approximately 2.63 percent of GNP over the period. Using this proportion, equivalent Egyptian costs (in 1979 prices) would be L.E. 460 million in 1985 and L.E. 1,141 million in year 2000. Total 1986-2000 pollution costs would be L.E. 11,673 million.

Alan Kneese made estimates of pollution control costs from 1970-1975. These were 2.03 percent of GNP. Using this proportion, equivalent Egyptian costs would be L.E. 355 million in 1985 and L.E. 881 million in year 2000. Total 1986-2000 pollution costs would be L.E. 9,008 million.

A more specific cost comparison is possible using parameters derived from an empirical estimate of urban disamenities as a function of city size made by James Tobin and William Nordhaus. Their data shows an elasticity of disamenities to large city population growth of 1.0205. That is, a 1 percent increase in large city population produces a 1.0205 percent increase in disamenities. We are interested in testing how much difference there would be in urban disamenities between our recommended strategy (Cairo and Alexandria to grow to between 21 and 22 million) and Alternative

C, which hypothesizes a Cairo plus Alexandria population of 16.6 million. On this basis, total disamenities are L.E. 514.8 million in 1985, rise to L.E. 943 million in year 2000 for the recommended strategy and to L.E. 829 million for Alternative C. This means that the relative disamenity cost of the degree of concentration recommended is L.E. 777 million. Table II-A.1 summarizes these data.

Although the magnitude of disamenities estimated are large in absolute terms, the table shows that the addition of the disamenity costs attributable to concentration does not change the strong relataive advantage of the recommended strategy over greater decentralization. Furthermore, as suggested by the World Bank and others, there are strong reasons for believing that many of the existing disamenities (e.g., traffic congestion) could be substantially reduced by better management without extensive investment costs. Consequently, the NUPS Team recommends that such possibilities be seriously explored by the GOE as a means of reducing total diseconomies, rather than attempting a high risk, high cost effort at massive decentralization. The above evidence strongly suggests that massive decentralization to non-economic locations cannot be justified on the basis of diseconomies or disamenities associated with Cairo's and Alexandria's size.

Some reviewers of the Draft Final Report have stated that the NUPS analysis does not indicate at what population size urban economies associated with agglomeration are exceeded by urban diseconomies resulting in a "threshold" where net benefits become negative. The implication of these comments is that the Cairo Region may already have exceeded this threshold and would certainly have exceeded the threshold at the regional population of 16.5 million in the recommended strategy.

The analysis which we have done on net benefits (see Chapter I, Section II) does not support this conclusion. On these estimates the Cairo Region produces large positive net benefits after taking account of additional costs associated with its growth and provision of needed housing and infrastructure to accommodate a year 2000 population of 16.5 milliion in the Region. It should be emphasized also that NUPS has recommended for the Cairo Region a strategy of intra-regional decentralization (deconcentration) which is expected to facilitate the achievement of regional positive agglomeration effects (economies of scale) while limiting the increase in diseconomies compared to regional growth through only contiguous fringe expansion.

An additional body of evidence has come to NUPS' attention since the preparation of the Draft Final Report. A 1981 article by William Wheaton and Hisanobon Shishido, "Urban Concentration, Agglomeration Economies, and the Level of Economies Development," in Economic Development and Cultural Change, directly addresses the question of the relationship between optimal city sizes and development. The conclusion of the article is that the optimum size of a city is a function of development and increases as GNP per capita increases up to a per capita income of the equivalent of U.S. $2,000. The optimal size, according to this article, reaches 22 million at the above level of development before reaching a "turning point" where the optimum size begins to fall. The authors state:

> "Up to a level of development near $2,000 per capita, greater capital usages increases scale and urban agglomeration economies quite rapidly...the optimum population size for a metropolitan area peaks at just over 20 million, again around the $2,000 level of development. From there on it falls off."

TABLE II-A.1

COMPARATIVE DATA ON URBAN DISAMENITIES

	DATA SOURCES					
	NORDHAUS-TOBIN @ 3%		NORDHAUS-TOBIN @ 5%			
	ALTERNATIVE A	ALTERNATIVE C	ALTERNATIVE A	ALTERNATIVE C	CEQ[1]	KNEESE[1]
Total 1986-2000 Disamenities	6,497	6,031	10,829	10,052	11,673	9,008
Disamenity Cost of Concentration	466		777			
Total Cost of A + Disamenities	109,688		114,020			
Total Cost of C + Disamenities		137,425		141,446		
C + Disamenities / A + Disamenities	1.253		1.241			
C/A (From Second Round Alternatives)	1.273		1.273			

1 These two cost estimates are based upon GNP figures only. Urban concentration elasticities cannot be calculated from available data for these costs. They are provided as partial verification of the reasonableness of estimates derived from Nordhaus and Tobin, from which concentration elasticities have been calculated.

SOURCE: NUPS Analysis.

APPENDIX II-B

ANALYSIS LEADING TO THE PREFERRED STRATEGY

APPENDIX II-B

ANALYSIS LEADING TO THE PREFERRED STRATEGY

This appendix provides a compilation of material from earlier reports that summarizes aspects of our analysis leading to the Preferred Strategy. The material presented relates to our costing of alternatives and a judgmental evaluation of the alternatives to supplement the cost analysis.

TABLE II-B.1

KEY FEATURES OF ALTERNATIVE A — (DIRECT INVESTMENT COSTS)

1986-2000 INVESTMENT COST

ZONE	COMMENTS	2000 POPULATION[1] (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB[2] L.E.	TOTAL COST L.E. MILLION
Cairo	Expansion at slightly above-trend growth rates: infill in Greater Cairo; fringe expansion on East -West corridors; non-fringe settlements and new intra-regional infrastructure.	16,419	3,714	6,438	23,909
Alexandria	Emphasis on Alexandria Metropolitan Region, infill to higher densities, New Ameriyah development.	5,778	1,469	6,274	9,217
Canal	Expansion of Canal Cities below current master plan estimates but with some in-migration, especially in Suez.	1,577	289	6,581	1,902
Delta	Within boundary population growth in Tanta, Mahalla and Damietta, possibly as regional service centers: within boundary expansion of cities near Cairo region (Banha and Qalyub), and near Alexandria (Kafr El Dawar).	5,175	982	6,470	6,354
North Upper Egypt	Greater expansion in Fayoum, but moderate expansion in all cities.	849	98	6,959	682
South Upper Egypt	Emphasis on growth in Aswan, followed by Qena/Naga Hamadi.	1,581	189	6,926	1,309
Remote Areas	No major expansion in these zones.	270	23	7,174	165
TOTAL		31,649	6,764	6,437	43,538

[1] In Tables II-B-1, 6 populations shown are for cities with over 50,000 in 1976. Remote area figures include main settlements.

[2] Average cost per job for each zone in each alternative calculated as described in Appendix II.C.

SUMMARY OF INTRA-URBAN INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE A 1986-2000

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS[1] (L.E.)	DESCRIPTION
Greater Cairo	13,531	345	With the exception of water nd sewerage standards which are the same as other alternatives, Greater Cairo standards are the same as non-Canal growth centers to encourage growth outside Greater Cairo. Slightly higher growth rates than B_1 contribute to higher per capita costs.
Alexandria	5,795	495	Reduced population growth rates and an emphasis on concentration in the metropolitan area result in lower per capita costs. Water and sewerage at Alexandria masterplan costs increase per capita costs higher than Greater Cairo costs, otherwise, standards are the same as Greater Cairo.
Canal	8,445	1,446	Housing and physical infrastructure are lower than B_1, resulting in per capita costs.
Delta	8,937	679	Tanta and Mansoura developed into regional service centers. Other settlements at standards similar to B_1 (Efficiency). Higher population growth rates result in higher gross densities as settlements are constrained to existing boundaries, but lower per capita costs.
North Upper Egypt	4,788	1,458	Due to growth enter emphasis, Fayoum, Beni Suef and Minia higher standards than B_1, which except for water and sewerage are at the same level as Greater Cairo and Alexandria.
South Upper Egypt	3,960	658	Assiut, Qena, Naga Hamadi, and Aswan are developed into growth centers and have standards similar to Greater Cairo. Other settlements have standards similar to B_1 (Efficiency). Larger number of non-growth centers settlements and reduced regional construction costs in Qena and Aswan.
Remote Areas	2,133	2,014	Higher growth rates result in higher demand for infrastructure which increase per capita costs even though standards are similar to B_1 (Efficiency).
TOTALS	47,589	593	Emphasis on improved standards in growth centers. Horizontal expansion onto non-arable land when gross densities of 300 persons/hectare are reached.

[1] Per capita costs = Total cost divided by year 2000 population.

SOURCE: NUPS.

TABLE II-B.2

KEY FEATURES OF ALTERNATIVE B1 EFFICIENCY (DIRECT INVESTMENT COSTS) 1986-2000 INVESTMENT COSTS

ZONE	COMMENTS	2000 POPULATION (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB L.E.	TOTAL COST L.E. MILLION
Cairo	Expansion of Cairo above natural increase rates; maximum encouragement of out-migration and migration diversion to Canal Region; requires all elements of infill, fringe and new settlement development.	14,999	2,947	6,218	18,323
Alexandria	Major development for expanded metropolitan role but at lower growth rate than Alternative A.	5,258	1,133	5,848	6,626
Canal	Expansion of Suez as new major metropolitan center, expansion of corridors plus new satellite development on both sides of Canal; expansion of all three cities over current plan; very high growth rates in all cities.	3,999	1,661	8,368	13,899
Delta	Same as Alternative A, except that more out-migration is expected.	4,864	823	6,345	5,222
North Upper Egypt	Emphasis on Fayoum as in Alternative A; lower growth rates for all cities than in Alternative A.	795	62	6,548	406
South Upper Egypt	Emphasis on Aswan, Qena/Naga Hamadi as regional centers lower growth rates for all cities than in Alternative A.	1,482	128	6,547	838
Remote Areas	No major expansion in these zones.	253	12	6,667	80
TOTAL		31,650	6,766	6,709	45,394

SUMMARY OF INTRA-URBAN INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE B1 EFFICIENCY (1986-2000)

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS (L.E.)	DESCRIPTION
Greater Cairo	12,938	332	Growth rates and standards similar to B_1 (Efficiency).
Alexandria	5,972	486	Standards are similar to B_1 (Efficiency), however, reduced population growth rate lowers requirements for new infrastructure; thus, reducing per capita costs.
Canal	17,437	2,203	Standards similar to B_1 (Efficiency).
Delta	9,360	737	Tanta and Mansoura developed into regional service centers as in B_1 (Efficiency). Although all growth occurs within settlement boundaries, standards are improved to level of non-Canal Cities growth centers in B_1 (Efficiency) to increase inter-regional equity.
North Upper Egypt	2,502	943	All settlements at standards similar to B_1 (Efficiency). Increased population growth rates results in higher per capita costs due to increased infrastructure requirements and regional cost variations.
South Upper Egypt	2,208	459	All settlements have standards similar to Aswan, Qena and Naga Hamadi in B_1 (Efficiency). As in North Upper Egypt, increased population growth rates increases demand for new infrastructure. Per capita costs are lower than North Upper Egypt due to lower construction costs in Qena and Aswan where most growth occurs.
Remote Regions	1,763	1,972	Standards are similar to North and South Upper Egypt settlements. Per capita costs are higher due to lower gross densities and higher regional construction costs.
TOTAL	52,180	648	Standards of all settlements at levels proposed for North and South Upper Egypt growth centers (except Greater Cairo, Alexandria and the Canal Cities) to improve inter-regional equity. Settlements with horizontal expansion potential allowed to expand onto non-arable land when gross densities reach 300 persons/hectare.

SOURCE: NUPS.

SUMMARY OF INTRA-URBAN INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE B1 (EQUITY) (1986-2000)

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS (L.E.)	DESCRIPTION
Greater Cairo	12,358	318	Reduction in new population results in lower per capita costs than A due to less need for new infrastructure. Water and sewerage at masterplan standards. Other physical and social infrastructure at medium standards. Housing reduced to National Housing Plan standards.
Alexandria	7,809	578	Increase in new population plus higher costs of water and sewerage result in high per capita costs than Greater Cairo Zone. Water and sewerage at Alexandria masterplan standards. Other infrastructure similar to Greater Cairo.
Canal	16,964	2,108	Major emphasis on growth in Canal Cities results in large requirements for new infrastructure. Standards are high (at Canal Cities masterplan standards or Sadat City masterplans standards) to induce growth especially in the counter magnet.
Delta	7,920	621	Reduced population lowers infrastructure requirements. Tanta and Mansoura developed into regional service centers emphasizing vertical expansion. Other settlements have standards which maintain existing physical infrastructural standards but improve health and education standards. Due to reduced populotion growth, rehabilitation of existing stock contributes to per capita costs.
North Upper Egypt	1,459	644	Fayoum, Beni Suef and Minia at standards higher than other secondary cities, but lower than Canal Cities. Costs remain high due to regional construction cost differences.
South Upper Egypt	1,308	311	Low per capita costs result from reduced infrastructure requirements due to reduced growth rates. Aswan, Qena and Naga Hamadi at standards higher than other secondary cities, but lower than Canal Cities. Secondary cities at standards which maintain existing infrastructure standards.
Remote Areas	661	900	Standards bring infrastructure to national urban average standards or maintain existing standards. High per capita costs due to higher construction costs in remote regions.
TOTALS	48,479	600	Settlements with horizontal expansion potential allowed to expand boundaries when gross densities of 300 persons/hectare are reached.

SOURCE: NUPS.

TABLE II-B.3

KEY FEATURES OF ALTERNATIVE B1 EQUITY (DIRECT INVESTMENT COSTS)

1986-2000 INVESTMENT COST

ZONE	COMMENTS	2000 POPULATION (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB L.E.	TOTAL COST L.E. MILLION
Cairo	Same as Alternative B1, Efficiency.	15,011	2,947	6,216	18,315
Alexandria	Slower population growth than Alternative B1, Efficiency. Governorate population twenty percent below Alternative A.	4,630	811	5,641	4,575
Canal	Same as Alternative B1, Efficiency.	3,999	1,661	8,368	13,899
Delta	Same total population as Alternative B1, Efficiency; balanced population growth in all cities.	4,869	823	6,501	5,350
North Upper Egypt	Higher population growth rates than Alternative B1, Efficiency; balanced growth in all cities.	999	167	6,904	1,153
South Upper Egypt	Same as North Upper Egypt.	1,813	298	6,933	2,066
Remote Areas	Balanced growth in all areas at near natrual rate of population increase.	341	58	7,259	421
TOTAL		31,652	6,765	6,768	45,783

TABLE II-B.4

KEY FEATURES OF ALTERNATIVE B2 EFFICIENCY (DIRECT INVESTMENT COSTS)

1986-2000 INVESTMENT COST

ZONE	COMMENTS	2000 POPULATION (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB L.E.	TOTAL COST L.E. MILLION
Cairo	Population growth rate slightly above Alternative B1; otherswise, similar to Alternative B1.	15,200	3,054	6,256	19,106
Alexandria	Population growth rate near rate of natural increase. More emphasis on regional economic links and less on national economic links than either Alternative A or Alternative B1, Efficiency. Similar to Alternative B1, Equity.	4,400	724	5,721	4,142
Canal	Expansion beyond current plan population levels. A major development zone in Lower Egypt but on a smaller sclae than Alternative B1.	2,596	832	7,320	6,090
Delta	Essentially the same as Alternative A.	5,111	965	6,510	6,282
North Upper Egypt	Expansion of all four cities, creation of major new centers at Fayoum and east bank of Nile at Beni Suef.	1,374	376	7,593	2,855
South Upper Egypt	Large and fairly balanced expansion of all cities; leading regional cities to be Aswan and Qena/ Naga-Hamadi.	2,526	693	7,664	5,311
Remote Areas	Partial implementation of Red Sea Governorate Plan to Ghardaka, Safaga, and Ras Gharib to 157,000. Expansion of Western Desert cities to serve agriculture. Expansion of urban areas in Northwest Coast and Sinai.	438	112	7,714	864
TOTAL		31,645	6,756	6,609	44,650

SUMMARY OF INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE B2 (EFFICIENCY)
(1986-2000)

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS (L.E.)	DESCRIPTION
Greater Cairo	15,679	378	Large expansion of population results in large requirement for new infrastructure. Thus, zone Total costs are high. Water and sewerage at Greater Cairo masterplan standards. Other physical and social infrastructure improved to medium high standards. Housing increased to 125% of National Housing Plan standards.
Alexandria	9,944	700	Emphasis on infill of Alexandria Metropolitan Region results in large requirement for new infrastructure. Higher per capita costs due to high costs of Alexandria masterplan standards for water and sewerage. Other standards similar to Greater Cairo.
Canal	2,492	611	Reduced growth rates result in lower infrastructure requirements. Water and sewerage standards maintain existing standards which are higher than national urban average standards. Other infrastructure similar to Greater Cairo, but housing at National Housing Plan standards.
Delta	8,442	634	Growth of all settlements within boundaries resulting in extremely high gross densities in Zagazig, Damanhour, & Kafr El Dawar. Higher existing standards in Tanta & Mansoura maintained, standards of other settlements improved to national urban average or maintained at existing levels.
North Upper Egypt	1,675	718	Fayoum, Beni Suef and Minia at standards similar to Canal Cities, but water and sewerage improved to lower target standards for provincial cities.
South Upper Egypt	1,443	334	Aswan, Qena and Naga Hamadi at standards similar to growth centers in North Upper Egypt. Other settlements at standards improved to national urban average standards or maintained at existing levels.
Remote Areas	772	1,022	Low growth rates do not require large investments in new infrastructure. Although standards are at national urban average standards, per capita costs are high due to low gross densities and higher unit construction costs.
TOTAL	40,447	504	Emphasis on deconcentration of major metropolitan areas. Thus, standards in Greater Cairo and Alexandria zone new towns and satellites are high.

SOURCE: NUPS.

TABLE II-B.5

KEY FEATURES OF ALTERNATIVE B2 EQUITY (DIRECT INVESTMENT COSTS)

1986-2000 INVESTMENT COST

ZONE	COMMENTS	2000 POPULATION (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB L.E.	TOTAL COST L.E. MILLION
Cairo	Same as Alternative B2, Efficiency.	15,200	3,058	6,258	19,137
Alexandria	Same as Alternative B2, Efficiency.	4,400	725	5,739	4,161
Canal	Slower population growth than B2, Efficiency.	2,342	697	7,241	5,047
Delta	Same total population as Alternative B2, Efficiency; balanced population growth in all cities.	5,113	967	6,829	6,604
North Upper Egypt	Higher population growth than Alternative B2, Efficiency; otherwise similar to it.	1,456	420	7,669	3,221
South Upper Egypt	Same as North Upper Egypt.	2,639	753	7,652	5,762
Remote Areas	Higher population growth than Alternative B, Efficiency; otherwise similar to it.	502	147	7,966	1,171
TOTAL		31,652	6,767	6,664	45,103

SUMMARY OF INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE B2 (EQUITY)

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS (L.E.)	DESCRIPTION
Greater Cairo	13,772	351	Standards and population growth rates similar to B_2 (Efficiency).
Alexandria	5,880	502	Standards similar to B_2 (Efficiency).
Canal	8,127	1,542	Standards are similar to B_1 (Equity) which results in higher per capita costs than B_2 (Efficiency). However, per capita costs are lower in B_2 (Equity) than B_1 (Equity) because reduced population growth rates (especially in the counter-magnet) reduce demand for new infrastructure.
Delta	11,897	892	Tanta and Mansoura developed into regional service centers at standards of B_1. Other settlements at same standards as B_1 (Equity) to improve inter-regional equity.
North Upper Egypt	4,886	1,465	Standards the same as B_2 (Efficiency).
South Upper Egypt	5,538	861	Standards in Assiut, Nagg Hamadi, Qena and Aswan similar to standards of Greater Cairo due to emphasis on growth centers. Other settlements have standards similar to B_1 (Equity), i.e., emphasis on improving social and physical infrastructure and housing at National Housing Plan standards.
Remote Areas	3,392	2,777	Standards are similar to the non-growth center settlements in North and South Upper Egypt. Increased, population growth rates result in higher demand for infrastructure which in addition to low gross densities and regional construction costs differences increase per capita costs.
TOTALS	53,492	666	Emphasis is on growth centers, however, secondary settlements have infrastructure service levels improved over B_2 (Efficiency). Horizontal expansion onto non-arable land after settlement gross densities exceed 300 persons per hectare.

SOURCE: NUPS.

TABLE II-B.6

KEY FEATURES OF ALTERNATIVE C EFFICIENCY (DIRECT INVESTMENT COSTS)

1986-2000 INVESTMENT COST

ZONE	COMMENTS	2000 POPULATION (000)	1986-2000 EMPLOYMENT CHANGE (000)	AVERAGE COST PER JOB L.E.	TOTAL COST L.E. MILLION
Cairo	Similar to Alternative B1.	15,000	2,956	6,232	18,422
Alexandria	Similar to Alternative B2.	4,379	721	5,692	4,104
Canal	Development at about current plan levels.	2,165	597	7,246	4,326
Delta	Same as Alternative B1, Equity.	4,861	811	6,449	5,230
North Upper Egypt	Similar to Alternative B2, Efficiency, although growth among cities is more balanced.	1,398	384	7,583	2,912
South Upper Egypt	Same as North Upper Egypt.	2,525	682	7,554	5,152
Remote Areas	Expansion of Red Sea to population targets in Red Sea governorate plan (70,000); Western Desert expansions at Gharga, Dakla Farafra and Bahariya Oases (300,000); expansion of Northwest Coast and Sinai (300,000).	1,300	616	9,886	6,070
TOTAL		31,648	6,765	6,832	46,216

SUMMARY OF IN INFRASTRUCTURE IN SETTLEMENT ALTERNATIVE C

SETTLEMENT ZONE	TOTAL COSTS L.E. (MILLIONS)	PER CAPITA COSTS (L.E.)	DESCRIPTION
Greater Cairo	13,229	341	No change in standards from B_2. However, reduced population growth rates result in less demand for new infrastructure and lower per capita costs.
Alexandria	5,842	499	No change from B_2.
Canal	8,345	1,616	Standards similar to B_2 (Equity), however, reduced population growth rates reduce per capita costs due to lessened demand for new infrastructure.
Delta	10,624	830	Tanta and Mansoura standards similar to B_2, other settlements have standards similar to Greater Cairo except for water and sewerage which are lower than Greater Cairo.
North Upper Egypt	5,841	1,637	Fayoum, Beni Suef and Minia have water and sewerage standards which are similar to the Canal Cities. Other infrastructure is similar to B_2 except that housing standards have been increased 50 percent.
South Upper Egypt	4,965	821	Assiut, Qena, Naga Hamadi and Aswan have standards similar to North Upper Egypt growth centers. Other settlements have high standards similar to Greater Cairo and Alexandria.
Remote Areas	11,955	5,106	Standards are similar to Greater Cairo and Alexandria except for water and sewerage which are at Canal Cities standards. High per capita costs result from low densities and high regional construction costs.
TOTALS	60,441	749	Decentralization is encouraged through providing most settlements with standards which are roughly equivalent to or higher than Greater Cairo/Alexandria standards. Higher per capita costs result from higher standards and regional construction cost variations. Settlements with horizontal expansion potential onto non-arable land allowed to expand boundaries when gross densities reach 300 persons per hectare.

SOURCE: NUPS.

TABLE II-B.7
FINANCIAL COST OF ALTERNATIVES AND PREFERRED STRATEGY [1]
1986-2000

ALTERNATIVE	JOB CREATION DIRECT INVESTMENT COSTS (L.E. BILLIONS)	COST AS PERCENT OF ALTERNATIVE A	INFRASTRUCTURE INVESTMENT COST (L.E. BILLIONS)	COST AS PERCENT OF ALTERNATIVE A	TOTAL INVESTMENT COST (L.E. BILLIONS)	COST AS PERCENT OF ALTERNATIVE A
Preferred Strategy	44.1	101.4	57.1	95.6	101.2	98.1
A	43.5	100.0	59.7	100.0	103.2	100.0
B_1 Efficiency	45.4	103.5	67.9	113.7	113.3	109.8
B_1 Equity	45.8	105.3	72.8	121.9	118.6	114.9
B_2 Efficiency	44.6	102.5	69.0	115.6	113.6	110.1
B_2 Equity	45.1	103.7	73.9	123.8	119.0	115.3
C	46.2	106.2	85.2	142.7	131.4	127.3
A (At C Standards)	43.5	100.0	66.4	111.2	109.9	106.5
C^0 (At A Standards)	46.2	106.2	72.8	121.9	119.0	115.3

[1] The costs shown in this table include both intra-urban and inter-urban infrastructure costs.

SOURCE: NUPS.

SUMMARY URBAN DEVELOPMENT COSTS
1986-2000
(L.E. MILLIONS)

SECTOR	A	B_1 EFFICIENCY	B_1 EQUITY	B_2 EFFICIENCY	B_2 EQUITY	C	PREFERRED STRATEGY[1]
			1986 - 1990				
Industry[2]	8,423	8,891	9,030	9,134	9,239	9,531	8,689
Urban Infrastructure	12,429	13,728	15,528	14,646	16,266	17,803	10,008
Inter-Urban Infrastructure	4,883	5,117	5,280	5,192	5,279	6,071	5,071
TOTAL	25,735	27,736	29,838	28,972	30,784	33,405	23,838
			1991 - 1995				
Industry	12,826	13,493	13,598	13,236	13,360	13,620	12,984
Urban Infrastructure	13,200	16,394	17,129	15,474	17,551	21,884	10,023
Inter-Urban Infrastructure	6,375	6,016	3,877	7,199	5,949	8,212	8,891
TOTAL	32,401	35,903	37,604	35,909	36,860	43,716	31,898
			1996 - 2000				
Industry	22,247	23,010	23,157	22,268	22,475	23,051	22,421
Urban Infrastructure	14,818	18,357	19,523	17,496	19,675	23,127	11,324
Inter-Urban Infrastructure	7,990	8,285	8,496	9,044	9,136	10,468	11,702
TOTAL	45,055	49,652	51,176	48,781	51,286	56,646	45,447
			1986 - 2000				
Industry	43,496	45,394	45,785	44,638	45,074	46,202	44,094
Urban Infrastructure	40,447	48,479	52,180	47,589	53,492	60,441	31,425
Inter-Urban Infrastructure	19,248	19,418	20,653	21,435	20,634	24,751	25,664
TOTAL	103,191	113,291	118,618	113,662	118,930	131,394	101,183

1 These costs for the Preferred Strategy are those for a modified infrastructure package. The costs for the Preferred Strategy at existing standards is L.E. 107,028 million. The larger estimates for inter-urban infrastructure and lower estimates of inter-urban infrastructure reflects the deduction of all telecommunication costs from the latter and their addition to the former, as well as the modified standards. The estimates provided here assume satisfaction of power demands from non-nuclear facilities.

2 These are estimated costs for mining, manufacturing, construction and services.

SOURCE: NUPS.

TABLE II-B.9.a
SOCIAL EFFECTIVENESS CRITERIA[1]
(LOWER NUMERICAL VALUES ARE BETTER)

CRITERION	ALTERNATIVE A AVG. SCORE	A AVG. RANK	B1 EFF. AVG. SCORE	B1 EFF. AVG. RANK	B1 EQ. AVG. SCORE	B1 EQ. AVG. RANK	B2 EFF. AVG. SCORE	B2 EFF. AVG. RANK	B2 EQ. AVG. SCORE	B2 EQ. AVG. RANK	C AVG. SCORE	C AVG. RANK
1. Likely Contribution to Inter-regional Equity.	4.8	4.1	7.1	5.6	5.7	3.1	4.3	2.5	3.1	1.9	8.1	3.0
2. Likely Contribution to Inter-personal Equity.	2.1	1.4	4.8	3.4	4.6	3.4	3.7	2.7	5.0	4.1	8.1	6.0
3. Minimizing Social Costs (e.g. congestion and over crowding).	4.4	3.5	4.4	2.9	4.0	3.2	2.3	2.2	3.6	3.7	6.0	5.6
4. Least Social Disruption: maintenance of Family and Cultural ties.	6.5	4.6	6.2	3.7	6.0	4.3	3.5	2.0	3.8	2.1	6.7	6.0
5. Ability to absorb additional urban population at acceptable services levels.	2.0	1.3	5.9	4.0	5.3	3.4	4.8	3.4	4.4	3.0	8.3	5.7
6. Minimum Intrusion on Arable Land	4.0	3.1	2.2	1.4	3.5	2.4	5.8	4.3	6.8	5.2	6.3	4.6
Social Effectiveness Average	4.0	3.0	5.1	3.5	4.8	3.3	4.1	2.8	4.4	3.3	5.9	4.8

1 Numerical Values are shown to help provide a sense of the relative differenced among alternatives as judged by NUPS professional staff. Judgments of others may differ or individual criteria may be weighted differently than the equal weighting used to derive the average values. There is no technical or scientific basis for adopting a particular weighting system. Average scores and average tanks are both shown in this table. In the procedure used, an alternative could be assigned a score of 1 to 10, with a score of 1 best and 10 worst. The numerical values of the scores are a rough guide to not only which alternatives rank highest, but how great the differences are among them. The average rank is simply the sum of the ranks assigned by all evaluation staff divided by their number.

TABLE II-B.9.b

ECONOMIC EFFICIENCY CRITERIA[1]

CRITERION	ALTERNATIVE A AVG. SCORE	A AVG. RANK	B1 EFF. AVG. SCORE	B1 EFF. AVG. RANK	B1 EQ. AVG. SCORE	B1 EQ. AVG. RANK	B2 EFF. AVG. SCORE	B2 EFF. AVG. RANK	B2 EQ. AVG. SCORE	B2 EQ. AVG. RANK	C AVG. SCORE	C AVG. RANK
1. Economic Efficiency (Economic Growth at Least Cost).	1.3	1.0	2.9	2.1	4.4	3.3	4.3	3.6	7.1	5.0	9.4	6.0
2. Encouragement of Private Investment.	1.7	1.1	2.6	1.9	4.6	3.2	5.0	3.8	6.7	5.0	9.0	6.0
3. Ability to attract Foreign Assistance	3.3	2.6	3.2	2.5	4.9	3.8	3.8	2.4	5.0	3.8	8.1	5.9
4. Reduce Likelihood of Severe Unemployment	2.2	1.4	3.8	2.3	5.0	3.2	5.3	3.2	6.5	4.4	7.8	6.0
Economic Efficiency Average	2.1	1.5	3.1	2.2	4.7	3.4	4.6	3.2	6.7	4.6	8.6	6.0

1 See Footnote Table II-B-9.a.

TABLE II-B.9.c

MANAGEMENT & IMPLEMENTATION CRITERIA [1]

CRITERION	ALTERNATIVE A AVG. SCORE	A AVG. RANK	B1 EFF. AVG. SCORE	B1 EFF. AVG. RANK	B1 EQ. AVG. SCORE	B1 EQ. AVG. RANK	B2 EFF. AVG. SCORE	B2 EFF. AVG. RANK	B2 EQ. AVG. SCORE	B2 EQ. AVG. RANK	C AVG. SCORE	C AVG. RANK
1. Minimization of Administrative Cost	2.0	1.4	4.1	2.6	5.3	4.1	4.8	3.0	6.6	4.1	9.4	5.9
2. Flexibility overtime to alter:												
a. Spatial Priorities	3.0	2.1	5.9	4.4	5.6	4.5	3.0	2.0	4.1	2.6	7.1	5.2
b. Sectoral Priorities	1.8	1.3	4.2	2.8	3.9	3.7	5.0	3.3	5.7	4.5	8.6	6.0
c. Project Mix	2.7	2.4	3.7	3.9	6.0	4.0	3.5	2.4	4.4	3.4	7.4	5.5
3. Ability to Sustain Implied Settlement Growth Rates	1.7	1.1	4.8	3.6	6.7	4.0	4.3	2.9	5.0	3.4	8.5	6.0
Management and Implementation Average	2.2	1.7	4.5	3.5	5.5	4.0	4.1	-2.8	5.2	3.6	8.2	5.7

1 See Footnote Table II.B.9.a.

TABLE II-B.9.d
RISK CRITERIA [1]

CRITERION	ALTERNATIVE A AVG. SCORE	A AVG. RANK	B1 EFF. AVG. SCORE	B1 EFF. AVG. RANK	B1 EQ. AVG. SCORE	B1 EQ. AVG. RANK	B2 EFF. AVG. SCORE	B2 EFF. AVG. RANK	B2 EQ. AVG. SCORE	B2 EQ. AVG. RANK	C AVG. SCORE	C AVG. RANK
1. Risk of Exceeding Financial Constraints.	1.6	1.1	4.4	3.1	5.6	4.1	4.8	2.5	6.6	4.3	9.6	5.9
2. Risk of Exceeding Real Resource Constraints.	1.9	1.0	4.4	2.9	6.0	3.6	5.3	3.1	6.5	4.5	9.7	6.0
3. Risk of Exceeding Management Constraints.	2.1	1.3	4.4	2.2	5.4	3.4	5.0	3.4	6.7	4.4	9.3	6.0
4. Risk Environmental Damage	7.3	5.1	4.3	3.1	4.2	2.9	4.2	2.8	5.0	3.4	4.5	3.4
Risk Criteria Average	3.2	2.1	4.4	2.9	5.3	3.5	4.8	3.0	6.2	4.2	8.3	5.3

[1] See Footnote Table II.B.9.a.

SOURCE: NUPS.

TABLE II-B.10a

ALTERNATIVE A

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]
1. Economic Efficiency	1.0
2. Least Risk of Exceeding Real Resource Constraints	1.0
3. Least Risk of Exceeding Financial Constraints	1.1
4. Encouragement of Private Investment	1.1
5. Implies Sustainable Settlement Growth Rates	1.1

CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Reduction of Rural and Urban Migration	5.4
2. Political Acceptability	5.3
3. Least Environmental Risks	5.1
4. Least Social Disruption due to Migration & Maintenance of Cultural & Family Ties	4.6
5. Inter-regional Equity	4.1

NUMBER OF CRITERIA FOR WHICH AVERAGE TANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	TOTAL
Number	11.0	3.0	2.0	2.0	3.0	21.0
Percent	52.4	14.3	9.5	9.5	14.3	100.0

1 A Rank of 1 is considered best and a rank of 6 is worst.

TABLE II-B.10.b

ALTERNATIVE B1 EFFICIENCY

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]	CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Minimize Intrusion on Arable Land	1.4	1. Inter-regional Equity	5.6
2. Encouragement of Private Investment	1.9	2. Flexibility in Shifting Spatial Priorities	4.4
3. Least Risk of Exceeding Managerial Constraints	1.4	3. Ability to absorb expected urban population at acceptable service levels	4.0
4. Economic Efficiency	2.1	4. Reduction of Rural to Urban Migration	3.6
5. Least Risk of Unemployment	2.3	5. Implies sustainable settlement growth rates	3.6

NUMBER OF CRITERIA FOR WHICH AVERAGE RANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	TOTAL
Number	9.0	8.0	8.0	2.0	1.0	21.0
Percent	9.5	38.1	38.1	9.5	4.8	100.0

[1] A Rank of 1 is considered best and a rank of 6 is worst.

TABLE II-B.10.c
ALTERNATIVE B1 EQUITY

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]	CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Minimize Intrusion on Arable Land	2.36	1. Flexibility in Shifting Spatial Priorities	4.50
2. Reduce Rural to Urban Migration	2.50	2. Least Social Disruption	4.29
3. Least Environmental Risks	2.93	3. Least Risk of Exceeding Financial Constraints	4.14
4. Least Risk of Unemployment	3.21	4. Administrative Cost Minimization	4.07
5. Social Cost Minimization	3.21	5. Flexibility in Project Choice	4.00

NUMBER OF CRITERIA FOR WHICH AVERAGE RANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	TOTAL
Number	0.0	3.0	12.0	6.0	0.0	21.0
Percent	0.0	14.3	57.1	28.6	0.0	100.0

1 A Rank of 1 is considered best and a rank of 6 is worst.

TABLE II-B.10.d

ALTERNATIVE B2 EFFICIENCY

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]	CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Political Acceptability	1.79	1. Minimize Intrusion on Arable Land	4.29
2. Least Social Disruption	2.00	2. Encouragement of Private Investment	3.79
3. Flexibility in Shifting Spatial Priorities	2.00	3. Economic Efficiency	3.57
4. Social Cost Minimization	2.21	4. Ability to Absorb Expected Urban Population at Acceptable Service Levels	3.43
5. Ability to attract Foreign Investment	2.43	5. Risk of Exceeding Managerial Constraints	3.43

NUMBER OF CRITERIA FOR WHICH AVERAGE RANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 4	5 - 6	TOTAL
Number	1.0	10.0	9.0	1.0	0.0	21.0
Percent	4.8	47.6	42.9	4.8	0.0	100.1

1 A Rank of 1 is considered best and a rank of 6 is worst.

TABLE II-B.10.e
ALTERNATIVE B2 EQUITY

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]	CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Inter-regional Equity	1.86	1. Minimize Intrusion on Arable Land	5.21
2. Least Social Disruption	2.14	2. Economic Efficiency	5.00
3. Reduce Rural/Urban Migration	2.50	3. Encouragement of Private Investment	5.00
4. Flexibility in Shifting Spatial Priorities	2.57	4. Flexibility in Shifting Sectoral Priorities	4.50
5. Political Acceptability	2.64	5. Risk of Exceeding Real Resource Constraints	4.50

NUMBER OF CRITERIA FOR WHICH AVERAGE RANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	TOTAL
Number	1.0	4.0	6.0	9.0	1.0	21.0
Percent	4.9	19.0	28.6	42.9	4.8	100.1

[1] A Rank of 1 is considered best and a rank of 6 is worst.

TABLE II-B.10.f

ALTERNATIVE C

CRITERIA ON WHICH ALTERNATIVE RANKS HIGHEST	AVERAGE RANK[1]	CRITERIA ON WHICH ALTERNATIVE RANKS LOWEST	AVERAGE RANK[1]
1. Inter-regional Equity	3.00	1. Inter-personal Equity	6.0
2. Least Environmental Risks	3.42	2. Economic Efficiency	6.0
3. Political Acceptability	3.79	3. Encouragement of Private Investment	6.0
4. Reduce Rural/Urban Migration	3.86	4. Flexibility in Shifting Sectoral Priorities	6.0
5. Least Social Disruption	4.00	5. Least Risk of Exceeding Real Resource Constraints	6.0
		6. Least Unemployment	6.0
		7. Sustainable Growth Rates	6.0

NUMBER OF CRITERIA FOR WHICH AVERAGE RANK IS:

BETWEEN	1 - 2	2 - 3	3 - 4	4 - 5	5 - 6	TOTAL
Number	0.0	1.0	3.0	2.0	15.0	21.0
Percent	0.0	4.8	14.3	9.5	71.4	100.0

[1] A Rank of 1 is considered best and a rank of 6 is worst.

SOURCE: NUPS.

WORKSHEET FOR CALCULATING GROWTH RATES

CITY	MC = 6500 g		MC = 75000 g		MC = 7000 g	
Mahalla	1.0462	29.4	1.0675	44.8	1.05705	37.1
Mansoura	1.0181	9.4	1.0377	20.3	1.0281	14.9
Zagazig	1.0126	5.0	1.0318	13.0	1.0224	9.0
Beni Suef	1.0059	1.3	1.0247	5.7	1.0155	3.5
		45.1		83.8		64.5

CITY	$\frac{MMCEMPI}{TOTEMPI} \Big/ \frac{MMCEMPc}{TOTEMPc}$	RCVI	INTERCEPT (A)	EMPLOYMENT GROWTH RATE (g)	(000)	AVERAGE COST = Ag^4	TOTAL COST = $L \times 4g^4$ (L.E. MILLION)
Mahalla	1.09	- 0.045	4611	1.05705	37.1	5757	213.6
Mansoura	0.66	0.170	5649	1.0281	14.9	6311	94.0
Zagazig	0.56	0.220	5890	1.0224	9.0	6436	57.9
Beni Suef	0.43	0.285	6204	1.0155	3.5	6598	23.1
					64.5	6025	388.6

APPENDIX II-C

METHODOLOGY FOR ESTIMATING DIRECT INVESTMENT COSTS

APPENDIX II-C

METHODOLOGY FOR ESTIMATING DIRECT INVESTMENT COSTS

Although much has been written about the causes of regional investment cost variations, the NUPS Study Team is unaware of any previous attempt to specify the effects of regional cost differences on investment requirements in a quantitative macroeconomic planning framework. The methodology developed by NUPS was outlined in the Working Paper on First Round Alternatives. In this section it is more fully described and an example calculation shown in order to provide a point of departure and framework for continuing regional economic analysis by the government. In the analysis undertaken by the NUPS Study Team, it was necessary to rely on a more limited number of variables than would have been desirable. Collection of regional economic data and follow-up evaluations of investment projects by government agencies in the future could improve the precision of the parameter estimates.

The estimation of direct investment costs was done in two stages. First, investment, employment and output relationships were examined using national data. Historical data and the 1980-1984 Development Plan were analyzed to estimate the quantitative relationships between investment and both output and employment. From these the Study Team derived estimates of the average cost per new job by sector. The average cost per job by sector for the period 1986-1990 is shown below (Table II-C.1):

TABLE II-C.1

AVERAGE COST PER JOB 1986-2000

	Average Job Cost (1979 Prices)
Agriculture	L.E. 10,000
Mining, Manufacturing & Construction	L.E. 7,000
Petroleum	L.E. 333,000
Housing & Infrastructure	L.E. 50,000
Services	L.E. 4,400

SOURCE: NUPS Estimates.

The second stage in the methodology involved adjusting the average cost per job and total investment cost to account for the effects of regional cost variations and differences in the spatial allocation of investment. Comprehensive city-specific data that might indicate the presence and extent of agglomeration economies was not available for the 40 urban areas included in the study. As a measure of the current extent of agglomeration economies, the Study Team selected the ratio of mining, manufacturing and construction employment to total employment from the 1976 Census. The larger the share of employment in mining, manufacturing and construction, the greater the agglomeration economies.

After extending the basic 1976 employment data to 1985 using a trend line projection, an index of regional cost variation in the average cost per industrial and service job was calculated from equation (1).

$$\text{Regional Cost Variation Index (RCVI)} = .5 \left[1 - \frac{EMPMMCi}{TOTEMPi} \Big/ \frac{EMPMMC}{TOTEMP\ CAIRO} \right] \quad (1)$$

Where:

EMPMMCi	=	Employment in mining, manufacturing, and construction in City i
EMPMMC	=	Employment in mining, manufacturing, and construction in Cairo
TOTEMPi	=	Total employment in City i
TOTEMP CAIRO	=	Total employment in Cairo

The index value for a city measures the percentage deviation of the city average cost per job from the national average cost per job.

The element other than regional cost variation which determines the average cost per job is the growth management cost. Here again, the Study Team could not locate either previous estimates of this cost or data from which it could be estimated. The functional form and parameter value used in the equation reflect a plausible relationship and value of average costs over a reasonable range of settlement growth rates.

The city-specific average cost per job formula is presented in equation (2).

$$\text{Average Cost} = Ag^4 \quad (2)$$

Where:

g	=	City annual employment growth factor (e.g., 1.03 for 3 percent)
A	=	$\dfrac{\text{National average cost per job} \times (1 + \text{RCVI})}{(\text{National average annual employment growth factor})}$ 4

The 40 city-specific average cost curves form the basis of the calculation of total direct investment cost. The total direct investment cost calculation of the

settlement alternatives that follow from population constraints and equal per capita allocations of new employment (B1 Equity, B2 Equity, and C) are straightforward. From the 1985 employment base and the amount of new employment in the 1986-1990 period in each city (ΔL), the annual employment growth rate is calculated. The required investment in any city, for the five-year period is $\Delta L \times Ag^4$. The total cost of the alternative for the five-year period is the sum of the 40 city investment costs.

The settlement alternatives based on the least-cost principle (A, B1 Efficiency, and B2 Efficiency) require a different procedure. The least-cost solution obtains when the marginal cost of job creation is the same in all areas receiving an investment allocation. Equation (3) is the city marginal cost curve (i.e., the change in total investment cost of adding or subtracting a unit of employment).

$$\text{Marginal Cost} = 5Ag^4 - 4Ag^3 \qquad (3)$$

The solution procedure is to find the set of city employment growth rates that simultaneously equalize the 40 marginal costs and allocate the target amount of employment growth. Figure II-C.1 shows in graphic form the relationship between average cost and marginal cost and the least-cost solution at which the marginal costs of two cities are equal.

After completing the employment allocations for the period 1986-1990, a new regional cost variation index is calculated for each alternative. The procedure described above is then repeated for the 1991-1995 and 1996-2000 periods. Figure II-C.2 illustrates the sequence of steps that leads to the direct investment cost estimates.

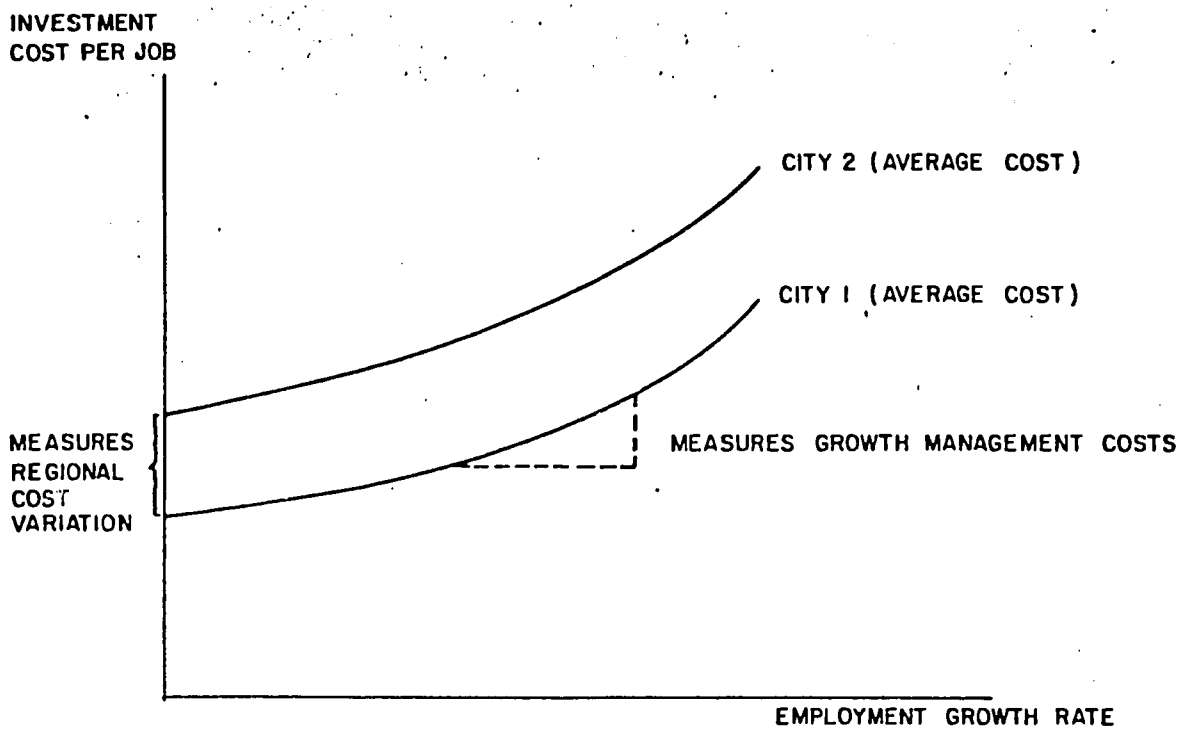
Growth management costs are the additional costs per job associated with growth of a local economy at greater or smaller rates of growth. They are measured as the difference in the average cost of a job at different growth rates. The matrix below shows the growth management costs associated with growth at different rates for cities with different average costs.

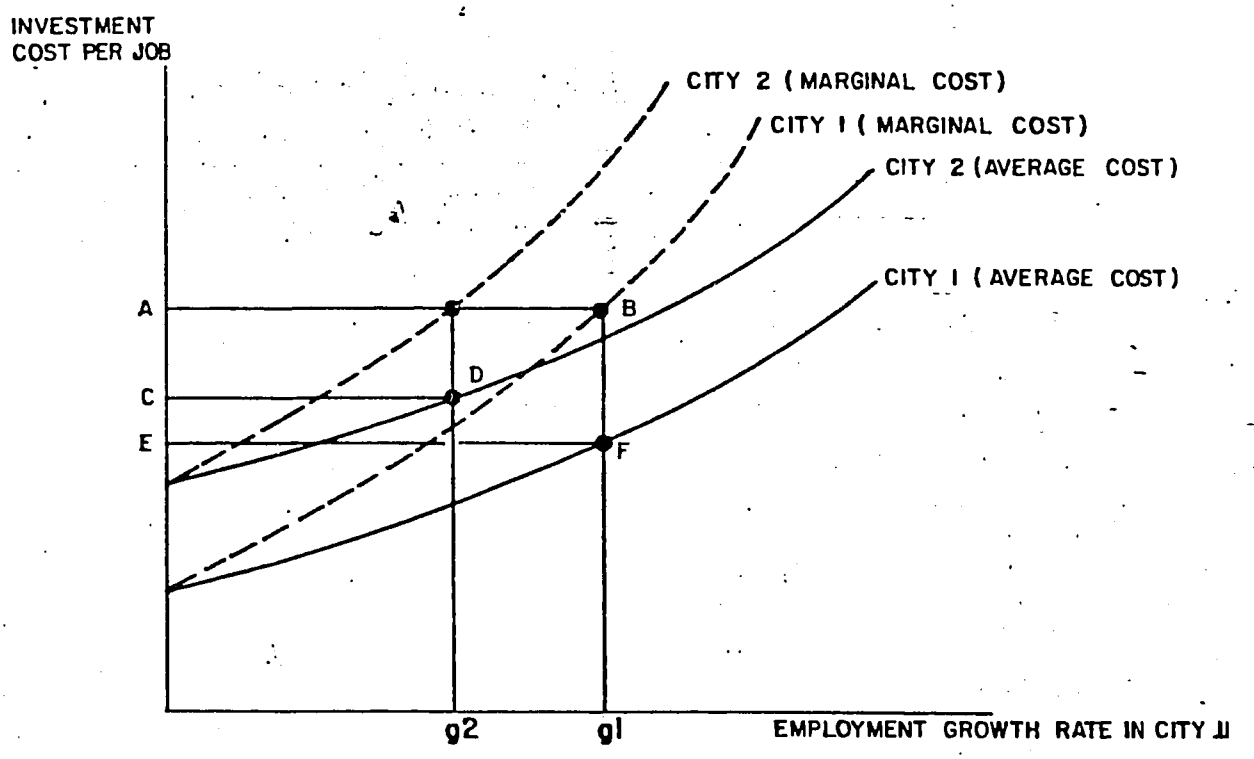
$$AC = A(g)^4$$

AC = Average cost per job
A = intercept
g = annual growth of labor

For example: If A = 4,500, average cost at a growth rate of 1.01 is equal to L.E. 4,683. Average cost at a growth rate of 1.02 is equal to L.E. 4,871. The growth management cost for growing at the higher rate is, therefore, 4,871-4,683 = 188 per job. (Table II-C.2)

DETERMINATION OF LEAST-COST SETTLEMENT GROWTH RATES





1 AT CITY GROWTH RATES g1 AND g2, THE COST OF CREATING AN ADDITIONAL JOB IS EQUAL IN BOTH CITIES, AS SHOWN BY LINE AB.
THE AVERAGE COST PER JOB IN CITY 2 IS SHOWN BY LINE CD AND FOR CITY 1 BY LINE EF.

FIGURE II-C-1

FLOW DIAGRAM OF DIRECT INVESTMENT COST ESTIMATION

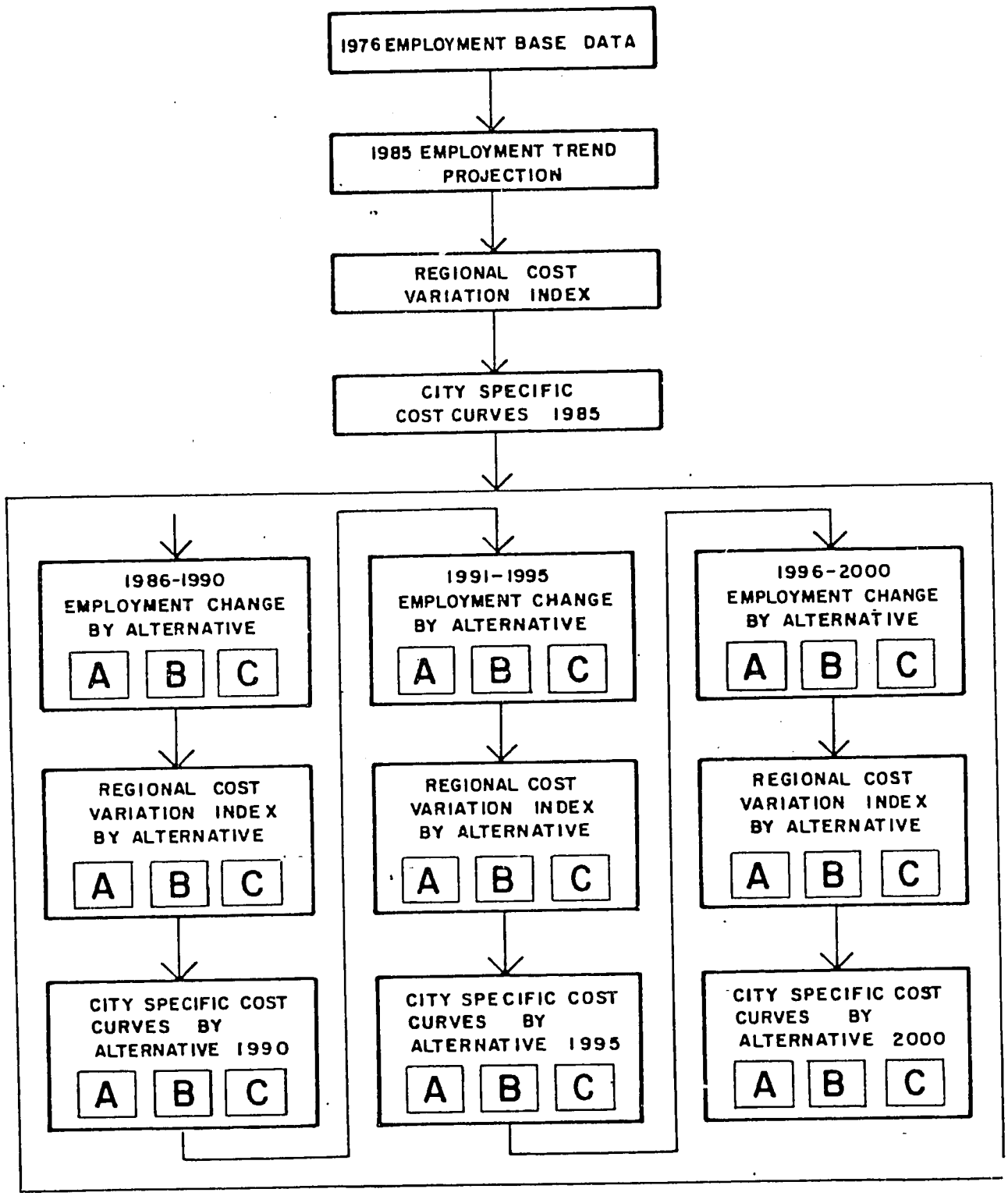


FIGURE II-C.2

TABLE II-C.2

GROWTH MANAGEMENT COSTS

(L.E. PER JOB)

INTERCEPT	0 - 1%	1 - 2%	2 - 3%	3 - 4%	4 - 5%
4,500	183	188	194	199	206
5,500	223	230	237	244	251
6,500	264	272	280	288	296

SOURCE: NUPS Analysis.

An Example of the Procedure for Determining the Least-Cost Solution for Further Clarification

1. Calculate the national average cost per job for mining, manufacturing and construction, and services.

   For 1986:

	Employment Growth Rate		Cost Per Job		
MMC	.46	x	7,400	=	3,404
SVC	.54	x	4,400	=	2,376
					5,780 = National average job cost at 4.6% employment growth rate

2. Calculate the Intercept term for each city.

   In the case of. Mahalla:

$$\frac{(MMCEMP)/(TOTEMP)\ MAHALLA}{(MMCEMP)/(TOTEMP)\ CAIRO} = 1.09$$

The regional Cost Variation Index... (RCVI) = .5(1-1.09)
(RCVI = .045

The Intercept Term (A) =

$$A = \frac{5{,}780 \times (1+RCVI)}{(1.046)^4}$$

$$= 4{,}611$$

3. Derive the Marginal Cost Curves from the Average Cost Curve.

Average Cost $= Ag^4$ where $g = (1 + \frac{\Delta L}{L})$

Total Cost $= \Delta L \times Ag^4$

Marginal Cost $= \frac{\partial TC}{\partial L}$

$= \Delta L\, 4Ag^3 \times \frac{1}{L} + Ag^4$

$= (g-1)\, 4Ag^3 + Ag^4$

$= 4Ag^4 - Ag^3 + Ag^4$

$= 5Ag^4 - 4Ag^3$

4. Determine the target level of employment growth. In the NUPS costing procedure, this was taken from the macroeconomic projections. For this example it will be 64,000.

5. Take a guess at the marginal cost per job, equal for each of the four cities in this example, that will result in an employment growth of 64,000.

See the worksheet. The first guess was L.E. 6500. Using Mahalla as an example, the marginal cost curve is:

MC $= 5 \times 4{,}611 \times g^4 - 4 \times 4{,}611 \times g^3$

Set MC = 6,500 and solve for g

$6{,}500 = 23{,}055\, g^4 - 18{,}444\, g^3$

$1.0462 = g$

The 1985 employment level in Mahalla is projected to be 116,000. If employment grows at 4.62 percent during 1986-1990, then the change in employment will be:

$116{,}000 \times (1{,}0462)^5 - 116{,}000 = 29{,}389$

Repeat this step for each of the other 3 cities and sum the Δ Ls. The result is 45,100. This is less than the 64,000 target so the marginal cost must be increased. Cols (3) + (4) repeat the procedure using a marginal cost of L.E. 7500. In this case the employment increase is too large, 83,800. The next, and final, iteration is done with the marginal cost equal to L.E.

7,000. In this case, the employment growth is 64,500 which is within 1 percent of the target.

6. Using the newly calculated city growth rates (worksheet column (5)) and the Intercept Term, calculate the average cost and total cost.

For Mahalla:

$$AC = 4.611 \times (1.05705)^4 = 5.757$$

$$TC = 5.757 \times 37.1 = 213.6$$

7. Any other distribution of employment among the four cities will result in a higher total cost than L.E. 388.6 milliion.

APPENDIX III

INTRA-URBAN TRANSPORT ISSUES IN CAIRO AND ALEXANDRIA

APPENDIX III-A

INTRA-URBAN TRANSPORT ISSUES IN CAIRO AND ALEXANDRIA

I. BACKGROUND

As in the case of inter-urban transportation, intra-urban transport is inextricably linked to urban development as both an agent generating changes in the pattern of development, as well as responding to meet urban development and growth. This dual role as a mechanism for directing change and more passively responding to urban change has not always been considered in urban transport planning. Planning techniques draw heavily on past relationships and a relatively static analysis; not because the planners know no better but because the issues and relationships are so complex that simplification of analysis is necessary if any conclusions are to be drawn.

Urban areas are characterized by complex networks interacting on one another in an almost infinite number of ways, and understanding the repercussions of all these impacts is difficult indeed. Even within the transport sector alone, it is difficult to analyze all the interactions — e.g., a change in per capita income may affect not only vehicle ownership but mode use (rail vs. road, bus vs. private car, etc.), place of residences and work, and trip locations in terms of origins and destinations. It is not surprising that transport planning must rely on partial analysis (no matter how complex or sophisticated the analytic tools might be).

However, one major point is quite clear. Given these complex interrelationships, urban transport development is an important mechanism for promoting urban change. Most transport planning is rooted in demands reflected by population-related trips for employment and social activities. These in turn are spatially related in terms of both time and place utility, and it is the function of zoning and related ordinances to relate these trip demands to specified land-use patterns which are in turn set (typically) by some set of previously identified land-use objectives (urban development goals).

Thus, the cycle is completed with land-use objectives acting upon the spatial distribution of social and economic activities which in turn set the nature of transport demands that must be met. To the extent that land-use objectives (urban development goals) change, the spatial patterns will change and, thereby, the transportation demand patterns. Though it may not be possible to quantify the extent to which transport facilities and services generate changes in urban

development patterns, there is sufficient evidence to confirm their importance. The spatial development patterns of most cities have been significantly (though by no means entirely) affected by the urban road network and to a lesser extent by the rail systems (at least in the last half of the century).

II. THE URBAN TRANSPORT NETWORKS AND THE NUPS PREFERRED STRATEGY

Although a wide range of urban transportation studies have been undertaken in Egypt, most of the emphasis has been on Cairo or for the proposed new town developments in Suez, 10th of Ramadan and other similar projects. Detailed studies are not readily available for most of the other cities, and comments on urban networks here are confined to Cairo and Alexandria. There are, however, a number of general comments that apply to all urban centers with regard to the NUPS Preferred Strategy.

A. General Considerations

Whatever urban area may be involved in the context of implementing a preferred strategy, it will be essential to evaluate all urban transport for all modes. If road congestion diverts urban development into undesirable directions and locations, then urban transport policy might consider not only improved public transport but also controlled road development and use as well as vehicle ownership and use. This applies to the entire urban transport network; central business district problems of parking and congestion cannot be considered in isolation of overall traffic circulation in the entire urban region. Because urban transportation is characterized by systemic impacts, a systems approach will be needed with the added feature of evaluating each project recommended against specified national urban policy goals and objectives.

Policies with respect to vehicle ownership and recovery of public investments in urban areas fall into national, governorate and local urban areas of responsibility. Obviously, national taxation policies and transport subsidy programs must be coordinated with those other governmental jurisdictions. National financial policy with respect to cost recovery and user charges should be focused on each mode bearing its full share of costs. If subsidies are permitted for one mode and not another, serious imbalances in modal development will occur, resulting in associated imbalances in resource use and the pattern of transport action in urban areas. Only the most overriding equity or economic benefit issues should alter this basic policy.

To avoid repetition of the congestion in the core area of Egyptian cities, a national policy of private vehicle ownership and use restraint will be necessary. This can be carried out through tax measures. At the local level, motor vehicle use restraints will also have to be implemented -- perhaps through local taxation and licensing -- but also through controls over traffic management, parking and street use.

In Cairo and Alexandria, like other Egyptian cities, traffic problems are largely due to poor traffic management and enforcement and a lack of any circulation studies. In many instances, low-cost traffic management and circulation and parking studies, such as those underway in Cairo, could provide important contributions to the improvement of congestion problems and traffic circulation. The use of controls on street use (by time of day, type of vehicle or pedestrian only, direction, parking regulations and enforcement) are important tools for reducing congestion and controlling the direction of urban development.[1]

Vehicle congestion generates costs to all users of the urban network. Obviously, recommendations for traffic management are intended to reduce these congestion costs -- particularaly in the central areas. However, increased congestion costs generate changes in the pattern of urban development. The movement from central areas to more dispersed locations by industry and other activities in response to congestion costs is well documented. If such dispersion were coupled with strong development controls to assure that the location of the dispersion was controlled and channelled into the desired direction, policy objectives could be realized. If policies were firmly set as to the density of this dispersed development, the role of public transit could be enhanced and congestion even relieved in central areas permitting greater viability (albeit altered in character).[2]

When it is considered that vehicle ownership and use is expected to grow significantly over the next 10 to 20 years in Egypt (even if a policy of traffic restraint were implemented), control and quantum reductions in traffic congestion in central areas could be slow and difficult. The impact of "latent demand" on traffic improvements are also well documented.

B. Cairo

Cairo's transportation networks largely reflect the patterns of urban growth, the land uses and lifestyles which were current at the time they were introduced. For example, in the old city, streets are narrow and crooked and designed for pedestrians and animals of burden. In Garden City, streets are narrow and winding, designed to provide access to the villas which were once there. Each area and sub-area has its own pattern of development but a number of key features characterize Metropolitan Cairo's transport network.[3]

- According to a recent IBRD report, about 25 percent of Greater Cairo's total urbanized area is road space but the practical traffic carrying capacity is about 25 percent less than that achieved in developed countries.

- There is a high percentage of unsurfaced roads in the city's secondary and tertiary systems which is compounded by poor maintenance and repair.

- Lack of traffic signs, signals and controls, aggravated by poor or no enforcement, further add to traffic problems.

- Public transport is operating at a high level of inefficiency — about one-third of the operational fleet is unavailable for a variety of reasons.

These highlights by no means exhaust the scope of problems for Cairo. They do, however, well illustrate that key improvements are largely in the

area of traffic management and control rather than major additions to network capacity. Given the rate of growth of Greater Cairo, strong development controls will be needed to direct growth towards selected urban development objectives.

Among the various proposals to help relieve Cairo's transportation crisis is the Underground. The idea of a subway was first introduced in 1954 and has been debated ever since. Until very recently, no concrete action was taken, but it now appears that the first section will be implemented. The first stage is intended to link by underground tunnel the existing regional rail line which goes north to El Marg with the southern regional line to Helwan. The 8 km tunnel will link Sayeda Zeinab in the south with Ramses Square. There will be five new stations, one of which (Tahrir) will replace the present Bab El Luk Station. Completion is scheduled for 1986.[4]

The second stage of the project would involve an entirely new (underground) line from Shoubra El Kheima in the north to Ramses Station in the city center and thence (under the Nile) to El Dokki which would be an interchange (transfer) for the line to Upper Egypt (Figure III-A.1). There is a third stage (also fully underground) for a line to Imbaba, across Zamalek and east to Salah Salem at El Darrasah.

Part of the reasoning for the underground and the first stage proposal is to serve the residents of the populous and poor northern and western districts. However, in terms of development objectives of the Preferred Strategy, the underground reinforces the north/south axis -- accepting past development trends as irrevocable and unchangeable. If it is implemented in its entirety, the underground could set the north/south urban development pattern and seriously limit future urban development strategies. It might also be noted that the areas to be served by the second stage of the underground are the same areas in which the government is trying to suppress informal development on arable land.

There is a serious question whether the underground is needed in the form proposed. It is passing through areas already well developed, and even if land use controls can be effectuated, it is very likely that densities will rise to even more intolerable limits within these already crowded areas. For these reasons, alternative schemes should be reconsidered. A number of consulting studies have suggested that greater capacity is not really required in Cairo, rather, better traffic management and improved public services including better bus service, private para-transit services and development of an east-west rail system using the present LRT (tram) and suburban rail systems as a point of departure.

As in the case of the underground, there are other proposals for urban transport networks that will encourage north/south development (and the loss of arable land). The proposed road extension from Tahrir Street to the Alexandria Road, for example, will run across the agricultural land on the west bank and create strong pressure for development in these areas. On the other hand, this development will also open up the western desert area to development.

Obviously, these concerns do not mean that the projects should be categorically abandoned. But they should be reconsidered in light of the Preferred Strategy. Transit options that reinforce the east/west axis on desert land should be favored over others.

PROJECTED CAIRO METRO NETWORK

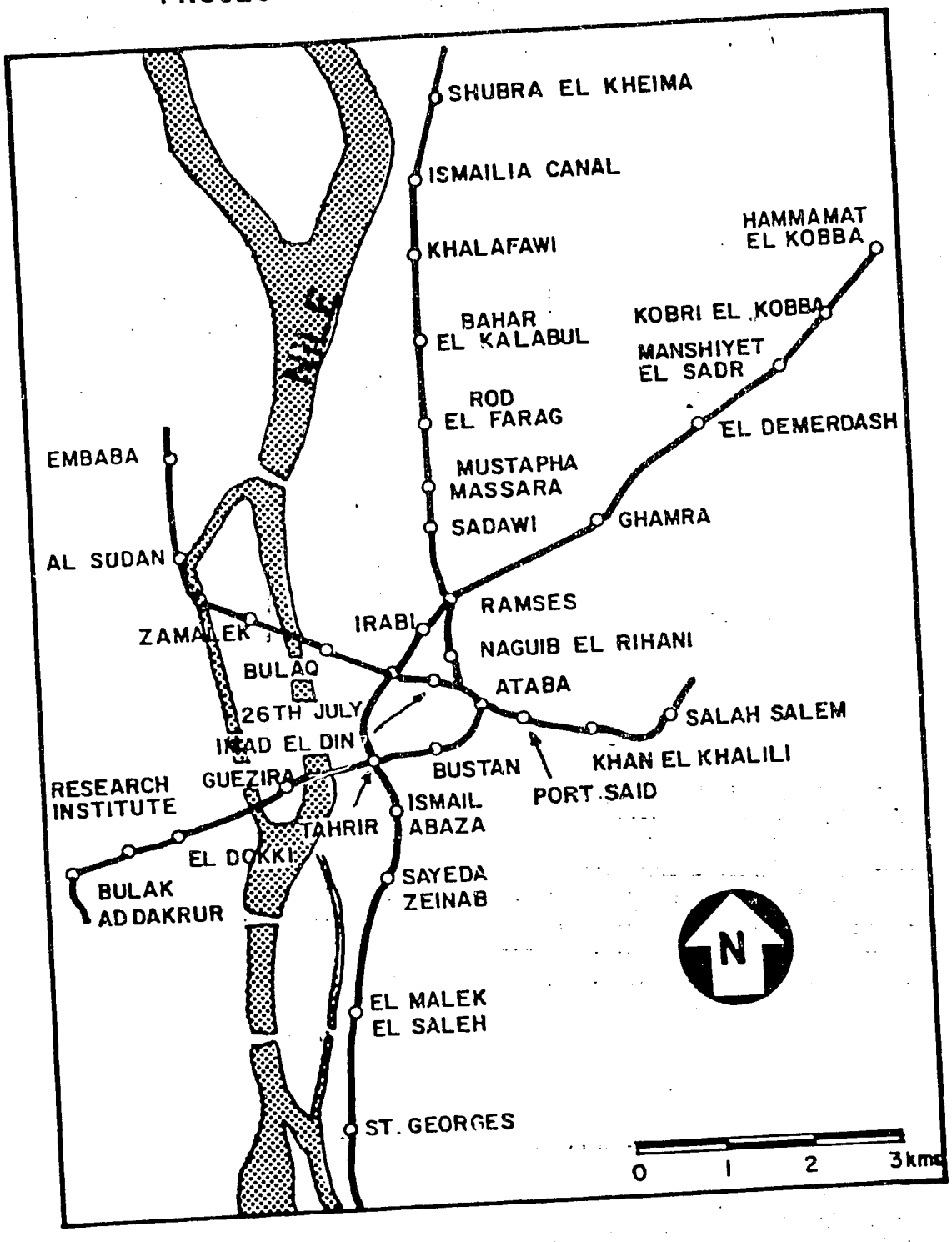


FIGURE III-A-1

Controlled development in Cairo (and relieving congestion in the central area) will require a full range of restraints on motor vehicle use -- both through pricing and taxation, and traffic management and street use control. The congestion issue and impacts described earlier are quite relevant for Cairo. For example, the high income residential communities of Heliopolis, Nasr City, Pyramids Avenue, Maadi, etc., evolved partially because of the crowded conditions of the central areas. Even the proliferation of informal housing in fringe areas is partially due to a desire to leave the central area, and industrial locations have also shown a clear preference for locations outside the central area.

Government functions have also been locating in more peripheral areas, especially in Nasr City, Giza and Heliopolis. Obviously, not all central area functions will move. Many are dependent on externalities with other firms and proximity to one another (e.g., banking, finance, etc.). Transport policy can help encourage the shift but it must be coupled with strong land-use controls to assure that the shift moves in a direction that is consistent with development objectives (i.e., east/west). These controls are needed at once -- before undesired areas are opened and private transport use patterns have been established.

One related aspect of urban transportation in Cairo that requires examination is the present location of a number of transportation-sensitive activities such as warehousing, shipping, terminal facilities and agricultural processing and grading plants. All of these could be relocated so that they take development pressure off the central area while at the same time, they encourage a redirected east/west development axis. That would, however, require careful consideration (for both passenger and freight traffic) between regional and peripheral semi-urban distributory transport systems and facilities and the more centralized urban transport system. It has been successfully implemented in other countries. In Seoul, Korea, regional and inter-urban bus and freight terminals share facilities with the local transit lines, thereby, providing easy transfer for inter-urban travellers while at the same time restricting the number of regional and inter-urban buses and trucks on the city streets. A similar approach is used for freight movements of many kinds with interchange between inter-urban and regional carriers and local distributors and shippers.[5]

Policy with respect to vehicle storage (parking) is one of the most powerful mechanisms for encouraging or discouraging specific urban development patterns and use of public transit. Enforcement of existing parking regulations is obviously an important need. However, even more critical for longer view concerns is the design of a parking policy covering such issues as vehicle storage or parking requirements for specific types of buildings, height and location (e.g., number of spaces per floor area ratio per activity type or building use) and control and balance between short term (less than 3 hours) and all day parking. These policies can contribute substantially to any selected urban development strategy.

In summary, the transport investment program and policies for Cairo should be directed toward encouraging the selected development pattern designed to deconcentrate development and relieve congestion pressures on the central area. The following are among the more important considerations.

- Investment policy should be directed towards improving the overall transportation base through improved traffic management and enforcement,

and better parking controls and structure rather than through major investments to increase the capacity base.

- Currently proposed Cairo entranceways (both inter- and intra-regional) should be re-evaluated in terms of their impact on desired development objectives.

- Alternative routes should be identified for those entranceways causing undesirable development. (See Cairo and Alexandria concept plans Chapter III.)

- Increased access to the central area should be carefully controlled while developing a policy of urban core deconcentration. In this context:

  - The underground proposals need to be re-evaluated for the implications on the core; experience elsewhere suggests that land-use patterns around stations generate high volumes of motor vehicle traffic. Particularly, station spacing and location needs to be re-evaluated.

  - Though congestion is costly, if coupled with strong policy and controls, it can help induce core deconcentration and direct development into viable alternative areas.

- Public transit development should be given a high priority and linked to urban development goals for Cairo. Good public transit service (both in the quantity and quality of service) is essential if motor vehicle restraints and development controls are to work. Particular emphasis should be placed on developing good bus services (including express services, preferred lanes and separated rights-of-way where warranted). A start is being made in currently planned programs. An increased range of private para-transit services should be encouraged as a means of serving a wide range of population and income groups and reducing the use of private vehicles. The potential role of present tram and suburban rail lines to encourage an east/west development axis needs to be explored.[6]

- Improvements in public transport systems should be linked to better cost recovery provisions either directly from users (e.g., fares) or via more general but related sources such as fuel taxes, vehicle taxes, etc.

- A number of important transportation network issues need to be evaluated in terms of their feasibility:

  - Increased east/west linkages.

  - The possibility of a north/south bypass through El Obour to Helwan.

  - The feasibility of an alignment of the Desert Road through 6th of October to an alternative road to Upper Egypt (at least in the Cairo Zone), especially to separate traffic destined to or from Alexandria.

  - Evaluation of the potential for more limited access (or alternative) to Cairo/Benha Road.

- Feasibility of an alternative bypass alignment for the present Ismailia Agricultural Road to serve through traffic to Zagazig and points east and northeast.

C. Alexandria

Although the scope and character of the urban development and transport problems of Alexandria are of a different scale than those of Cairo, many of the problems are quite similar. Furthermore, recommendations made earlier (in the section on Cairo general comments) with respect to public cost recovery, pricing, private motor vehicle restraints, traffic management, enforcement and parking, upgrading public transport, and relating transport investments to urban development objectives for Alexandria all are relevant.

As noted in the Alexandria Concept Plan developed in the Second Round Alternatives, as in the case of Cairo, urbanization in Alexandria will play an important part in the success of implementing the selected national urban development strategy. Alexandria's population growth rate is likely to exceed that experienced during the period 1960-1976. Consequently, government initiatives in transportation will be needed to both assist in directing growth in a manner consistent with growth objectives and to assure that present transportation plans for Alexandria are not inconsistent with these objectives.

As in the case of Cairo, there are a number of important features with respect to Alexandria that will affect not only urban development but related urban transport development as well. The fact that currently established boundaries of the Governorates of Alexandria, Beheira and Matruh do not lend themselves to effective planning and administration of the region is as important to transportation planning as it is to urban planning more generally. A regional public transport system is required for consistency with urban regional development goals. Without a regional system, public transit tends to be fragmented and limited — usually requiring many transfers at great inconvenience and (often) cost. Clearly, this reinforces the need to consider the means for providing for some form of regionalization among the three governorates in these issues.

To the extent that current and future development opportunities lie primarily to the south, southwest and east (Idku), transport corridors and projects need to be evaluated with respect to their potential for stimulating desired development patterns. Furthermore, little attention has been given to the possible role that transportation corridors might play in stimulating development in more desirable locations. For example, the Alexandria/Cairo Agricultural Road (discussed under inter-urban considerations) and rail lines along the same alignment have induced considerable development near Alexandria (i.e., factories, warehouses and housing between Alexandria and Kafr El Dawar). Furthermore, volumes on this road are expected to increase from 14,590 ADT in 1979 to 65,300 ADT by the year 2000. As a consequence, transport planners have envisaged a much greater capacity, involving widening and additional lanes. The NEDECO Study, for example, discusses road requirements varying from 8-12 lanes by the year 2000.

In contrast, the Alexandria/Cairo Desert Road is projected to carry significantly lower levels of traffic -- increasing from 1,675 ADT in 1979 to 7,890 ADT

in the year 2000. The Alexandria/Cairo Desert Road has, not uncoincidentally, stimulated substantial development in Ameriyah which would otherwise have been impossible. This is a good example of the beneficial role that transportation corridors can play in inducing development.

Other major corridors in Alexandria which deserve attention include the Abu Kir/Rosetta highway, the Corniche, the Abu Kir Road, the Seven Sisters/Agamy Road, the Mahmudiya Canal Road and linkages between the Agricultural Road, the Desert Road and New Ameriyah. Major industrial development in Abu Kir and residential development in Montazah will inevitably result in major east/west traffic volumes. The most obvious solutions will lead to either new corridors from the industrial zone through agricultural areas to the south of the city or expanded capacity of current routes. These must be carefully studied and located in order to minimize the loss of intervening arable land and remain consistent with national urban development objectives.

In the west, the extension of the Agricultural Road/Desert Road linkage and the Seven Sisters/Agamy Road towards Matruh are already highly congested and will probably need expansion and upgrading. However, care should be taken not to promote easy access to the central areas of Alexandria which could lead to over concentration and congestion. Thus, a strategy is required which will permit good access to the port area but not necessarily to the commercial central area.

In addition to roads, rail facilities in Alexandria will need major expansion and upgrading by the year 2000. Demands of the expanding port and suburban needs will increase if the central area becomes more decentralized. Thus, the lines, for example, towards Abu Kir/Idku and Matruh/New Ameriyah could be expected to carry a greater number of commuters in the future.

As noted at the outset, traffic management and other urban transport policies related to vehicle restraints and the development of public transport need to be implemented as soon as possible. Though the impact of traffic is not so severe in Alexandria as in Cairo, Alexandria should attempt to resolve the problem before it becomes severe. This will require disincentives to keep vehicles out of the core area, better parking facilities (i.e., as part of building construction), restricted pedestrian areas, restrictions on the use of some corridors, and promotion of public transport. Restrictions on seasonally operated vehicles should also be encouraged.

NOTES

APPENDIX III-A

INTRA-URBAN TRANSPORT ISSUES IN CAIRO AND ALEXANDRIA

1 Obviously, this is not a list of all options. It does not include animal-drawn vehicles creating serious traffic restrictions when mixed with motorized vehicles and pedestrians and other problem areas.

2 The key issue is strong development controls. In the U.S. where strong development controls do not generally exist, this dispersion is spread throughout the region at low densities creating other problems.

3 IBRD, Staff Appraisal Report, Egypt, Greater Cairo Urban Development Project, April 24, 1981.

4 Estimates of the impact which the Underground will have on the costs of Greater Cairo's intra-urban infrastructure requirements are shown in the Section II of Chapter IV.

5 As part of this effort, local food and retail distributors have been reorganized into central locations. In some cities the hours during which trucks can enter city streets providing access to markets have been set not to conflict with peak period work trips and street demands.

6 In Section II of Chapter IV, we illustrate the financial impacts on Greater Cairo's intra-urban infrastructure costs of increasing public transport funding. Feasibility tests of these proposals would have to be continued to determine actual transport requirement.

APPENDIX IV-A

THE GROWTH OF POPULATION IN SUEZ GOVERNORATE

APPENDIX IV-A

THE GROWTH POPULATION IN SUEZ GOVERNORATE [1]

I. INTRODUCTION

The objectives of this appendix are to establish estimates for the growth of population in the Suez Governorate, and particularly in the urban areas, for the next five years, and to identify longer-term growth possibilities up to the end of the century. The five-year estimates are needed as the basis for the governorate's annual and five-year budget projections, which are to be prepared early in 1982.

The population estimates take into account the historical growth of Suez prior to 1975, the projections included in the Suez Master Plan (1976), the implications of the Suez Canal Regional Plan (1976) recommendations, the 1976 National Population Census, surveys conducted by the Suez Governorate Technical Assistance Programme (1980 and 1981), the proposals of the National Urban Policy Study and current estimates of existing urban population.

II. POPULATION GROWTH 1937-1975

Population growth of the Suez Canal Cities was exceptionally rapid in the decade 1937-1947 (Table IV-A.1), both as a result of the 1936 Agreement to restrict the British Military presence to the Canal Zone and as a result of activity during the Second World War. Thereafter, growth was somewhat slower, particularly after 1960. Nevertheless, the cities of the zone with joint urban populations of almost 700,000 formed at that time the third urban region after Cairo and Alexandria and were both larger and growing faster than the Tanta - Mahalla El Kubra - Mansoura axis in the Delta.

During the 1960's, the population of Suez increased rapidly; its rate of growth (4.2 percent p.a.) exceeded that of Cairo. Following the establishment of oil refining in the 1950's, the 1960's saw major development in heavy industry, notably petro-chemicals. Between 1960-1967, 15 percent of all government investment in industry was in Suez and wage rates were twice the national average.

During the 20 year period up to 1966, half the increase in the population of Suez was due to immigration. Suez attracted 56 percent of all migrants from Qena and Sohag, the two poorest and most overcrowded governorates in Upper Egypt.

TABLE IV-A.1

POPULATION OF THE SUEZ CANAL REGION 1937-1975

1.a Growth of the Cities of the Suez Canal Region, 1937 - 1975 (000)

	1937	1947	1960	1966	1974	1975
Port Said	125	178	244	283	20-25	300
Ismailia	36	68	116	144	50	180
Suez	50	107	204	264	8	150
TOTAL	211	353	564	691		630

1.b Average Annual Growth Rates for the Cities of the Suez Canal Region, 1937 - 1966 (%)

	1937-1947	1947-1960	1960-1966
Port Said	3.6	2.5	2.4
Ismailia	6.6	4.2	3.8
Suez	7.9	5.1	4.2
OVERALL	5.3	3.7	3.4

1.c Total Population of the Region in 1947, 1960 1966 and 1975 (000)

	1947	1960	1966	1975
Port Said Urban Governorate	178	244	283	300
Isamlilia City	68	116	144	180
Ismailia rest of Governorate	109	168	200	220
Ismailia total Governorate	(177)	(284)	(364)	(400)
Suez Urban Governorate	107	204	264	150
TOTAL	462	732	981	850

SOURCES: 1937, 1947 and 1960 Population Censuses and 1966 Sample Population Census of Egypt.

1974 figures are for the population prior to the official return of refugees in June and are from the Master Plans.

1975 figures refer to the end of 1975 and are also from the Master Plans.

In 1967, there was an abrupt break in the region's development. Following the war, the Suez Canal remained closed. The population of the Canal Zone, including the people of the three cities, was evacuated although most of Ismailia's rural population remained. Before the return of evacuees was authorized in mid-1974, the three cities probably contained only about 80,000 people, with only about 8,000 in Suez, the city which had been most damaged.

III. SUEZ MASTER PLAN PROJECTIONS

The Suez Master Plan prepared between 1974 and 1976 was based on the achievement of a target urban population in the Governorate of 1,000,000 by the end of the century. The projected rate of population increase to reach this target is shown in Table IV-A.2 in five year intervals from 1980 onwards. The high rate of increase anticipated in the early years of the Plan's implementation was influenced by the identified opportunities for rapid industrial development in Suez. The projections assumed that the Family Planning Programme would be successful, with a resulting national population of 56,000,000 in the year 2000 and that Egypt would maintain an average national economic growth rate of 6.5 throughout the plan period.

TABLE IV-A.2

POPULATION PROJECTIONS, SUEZ MASTER PLAN

YEAR	PROJECTED POPULATION	AVERAGE ANNUAL GROWTH RATE (%)
1975	150,000	
		15%
1980	300,000	
		10%
1985	480,000	
		8%
1990	700,000	
		4%
1995	850,000	
		3.5%
2000	1,000,000	

SOURCE: Suez Master Plan, Volume 2, Tables 5.4/5.5

IV. SUEZ CANAL REGIONAL PLAN: IMPLICATIONS FOR THE GROWTH OF SUEZ

The Suez Canal Regional Plan was still being prepared when the Suez Master Plan was presented in March 1976. The Regional Plan took into account the population projections shown in Table IV-A.2 but also identified two major possible changes to the Master Plan projections:

- The population growth in Egypt might not be controlled to result in an end of century total of 56,000,000 but could reach 70,000,000 by the year 2000.

- The opportunities for substantial urban growth at Suez, based on land availability and the city's strong industrial base, combined with increased pressures of higher national urban population could justify a much higher end of century population target for Suez: possibly as high as 1,700,000 to 3,000,000 people.

The implications of these possibilities were considered before the final presentation of the Master Plan and are discussed in Appendix 2, Volume 3 of the Suez Master Plan Final Report. The chief effects on Suez which arise from a national population of 70 million in the year 2000 are:

- More children in the population, thus, a larger average family size and a larger average household size. This means that there will be proportionally fewer people working, fewer jobs and more schools. There will also be a different income structure. Table IV-A.3 suggests the order of differences in age structure which could arise.

TABLE IV-A.3

PROJECTED AGE STRUCTURE (%) OF SUEZ POPULATION IN YEAR 2000

Age Group	Low National Population (%)	High National Population (%)	Percent Change (%)
Less than 14	32	43	+ 11
15 - 19	12	12	-
20 - 24	7	6	-1
25 and over*	49	39	-10
TOTAL	100	100	

* Number of persons aged 25 and over in Suez remains unchanged with low or high national population, at just under 0.5 million.

SOURCE: NUPS Elaboration.

- The increase in the number of households will be marginal -- perhaps 5 percent -- but there will be a substantial increase in average household size from the 3.9 projected in the plan to approximately 4.7 persons per household.

- The increase in the demand for facilities such as education, health and welfare will be substantial and may suggest adjustments to the local urban structure within the urban area.

- At a strategic scale, Suez's share of national urban population will be nearly 3 percent in the lower national population context, and nearer 2 percent in the higher context (assuming national urban population levels in the year 2000 of 37 million and 47 million, respectively).

The most recent comprehensive population survey of Suez was the 1976 CAPMAS census. The total governorate population recorded by the census was 194,000. The Suez Governorate Technical Assistance Programme estimates that approximately 10,000—15,000 people were resident in rural settlements, and that the urban population of Suez was approximately 180,000 in late 1976, which implies an average annual growth rate of 10 percent for the two years 1975-1976.

V. SUEZ GOVERNORATE TECHNICAL ASSISTANCE PROGRAM SURVEYS

During 1980, the Suez Governorate Technical Assistance Programme (STAP) carried out a complete physical survey of the city and interviewed most major employers. Using data collected in 1977[2] on dwelling occupancy and an analysis of residential accommodation from these surveys, STAP estimated that the mid-1980 urban population of Suez was approximately 225,000. Employment data from the surveys broadly confirmed this estimate. However, subsequent sample surveys of dwelling occupancy[3] indicated higher occupancy rates and our 1981 employment surveys revealed a number of errors and omissions in the 1980 survey. The revised data indicate that the mid-1980 urban population was approximately 288,000, representing an average annual growth rate of 12 percent since the 1976 census.

In the report "Working Paper on Second Round Alternatives," the National Urban Policy Team point out ". . . that the natural rate of population increase remains high, as the decline in fertility rates anticipated in many population forecasts has not yet appeared." Consequently, the resident (national) population total of 67.5 million in year 2000 adopted by NUPS as a reasonable medium estimate for planning purpose may turn out to be on the low side. It is highly unlikely that the population will be lower than this estimate.

The NUPS report also points out that ". . . continued high birth rates, possible reductions in the rate of external migration, and continued high rates of rural to urban migration mean that the NUPS assumption of 37 million urban residents by the year 2000 is, if anything, on the low side."

Clearly, current national population estimates for the end of century, which have been analyzed in detail in several studies since the Suez Master Plan was prepared, indicate that the implications of high total population and high urban population described above must be taken into account in any review of population projections for Suez.

The NUPS examined a wide range of alternative urban strategies which were subjected to intensive comparative evaluation. The alternative year 2000 target populations for Suez which were examined ranged from 582,000 to 1,505,000. The main conclusions reached were as follows:

- Current Master Plan targets appear to be the maximum levels that could be sought and targets below these levels more realistically achievable. Such targets would still aim at the eventual creation of a major metropolitan area in the Canal Zone at Suez with complementary growth in Ismailia and Port Said.

- The emphasis upon investment in Suez would require improved administration of the Suez Governorate and a shifting of investment funds to that area. However, beyond the provision of a vastly larger number of technical personnel there would not seem to be insurmountable administrative problems in the creation of one growth center, as long as sufficient investment monies are provided. Certainly, the administrative problems in Suez which must be resolved would be somewhat less than for the new towns or satellite cities because of the existing infrastructure and the lesser risk of failure or frozen investments in infrastructure. Suez is the most likely spot for economic growth outside of Cairo and Alexandria assuming continued stability of the political situation in the Middle East. Furthermore, Suez could serve as a good demonstration zone for the encouragement of private, Arab and foreign investment in manufacturing as well as low cost infrastructure standards and housing solutions.

The Preferred Strategy recommended by NUPS includes ". . . a concentrated effort to support growth possibilities of the Suez Canal Zone with a focus on Suez City (year 2000 population targets of 750,000 to 850,000 in Suez, 400,000 to 500,000 in Ismailia, and 550,000 to 650,000 in Port Said)."

VI. CURRENT POPULATION ESTIMATE 1981

It is now five years since CAPMAS conducted a comprehensive population census of Suez. Since that time, the only indicators of the rate and scale of population growth have been a combination of sample surveys of residential occupancy rates, physical surveys of all built residential development, monitoring of the current rate of dwelling construction in the city and surveys of existing "basic" employment. Such indicators cannot substitute for a controlled population census, but they do provide a basis for estimating the order-of-magnitude of population growth rates and the best available estimates of current urban population in the Governorate.

Housing completions by the governorate, companies and the private "informal" sector since early 1980 indicate an annual increase in dwelling stock of about 10 percent. If the higher occupancy rates identified above have been maintained, the mid-1981 urban population of Suez was approximately 320,000.

1981 surveys of "basic" employment in the Suez Urban area (see Table IV-A.4) have identified almost 23,000 manufacturing jobs and more than 25,000 basic non-manufacturing jobs. In theory, this level of "basic" employment could support an urban population of more that 400,000 people.[4] SPDD believes that the low population of the urban area relative to the "basic" jobs identified indicates a substantial deficiency in service sector employment.

Current estimates of the urban population of Suez show that the city's pre-war history of rapid population growth generated by large-scale industrial development and building construction is continuing. Population growth since the recent war has been rapid, despite the constraints of war damage, housing shortages and the severe limitations of the utility infrastructure. The overall growth of the city's population appears to be close to the targets set in the Suez Master Plan, but employment growth shows an unexpected bias towards industrial expansion and slow development of both public and private services.

VII. THE FUTURE URBAN POPULATION OF SUEZ: SHORT TERM ESTIMATES

The continuing high national rates of both natural population increase and "urbanization" will inevitably maintain external pressure on Suez to accommodate a high rate of population increase -- population is likely to be "pushed" to Suez from elsewhere in Egypt. At the same time, the prospects of increasing job opportunities, especially in manufacturing and the construction industry (Table IV-A.4), must provide substantial attractions for potential new residents -- people will also be "pulled" to Suez.

Detailed "basic" employment predictions by firms interviewed in mid-1981 (Table IV-A.4) indicate a consistent growth in job opportunities in Suez for the next four to five years of approximately 9 to 11 percent per annum. At the present time, there are more jobs in manufacturing and less jobs in services than is normal in urban Egypt. During the next five years of rapid expansion of manufacturing, it is likely that this imbalance will be maintained. Taking these factors into account, the predicted growth of urban population and employment in Suez shown in Table IV-A.5 will result in a total city population of approximately 455,000 in mid-1985 and almost 550,000 in mid-1987. The total increase in population between mid-1982 and mid-1987 is expected to be approximately 200,000. Compared to the population targets of the Suez Master Plan, SPDD expects slightly slower growth, giving a mid-1985 population of 455,000 some 25,000 less than the expected total of 480,000 people.

TABLE IV-A.4

BASIC EMPLOYMENT ESTIMATES: DECEMBER 1981

NO.		EMPLOYMENT 1980-81	EMPLOYMENT 1985-865	INVESTMENT (L.E. MILLIONS)	SOURCE OF INFORMATION
3	Manufacturing				
	Free Zone/Red Sea	240	470	N/A	SGPDD
	Free Zone/Adablya		930	N/A	GOFI
	Oil Industries	6,435	8,080	46	SOPCO
	Fertilizer I	3,600	5,170	35	GOFI
	Fertilizer II	-	1,000	55	SEMADCO
	Miratex Textile	1,400	2,050	55	IRATEX
	Glass	-	2,000	30	ACDIMA
	Cement	135	400	120	USAID
	Brick Factory	-	550	9	MOH
	Pre-Fabricated	120	550	3.2	MOH
	Suez Shipyard	795	1,000	9.7	SGPDD
	SCA Shipyard	560	1,060	16	SCA
	Montubi	370	370	N/A	SGPDD
	Nasser Road	375	1,690	N/A	PRIVATE
	Ismailia Road	2,030	2,380	N/A	PRIVATE
	Dispersed	6,880	11,870		
	TOTAL MANUFACTURING	22,940	39,570	863	
	(MASTER PLAN ESTIMATE	24,500	37,500)		
13	Fishing	5,040	7,050		
2	Quarrying	730	900		
4	Power	600	915	50	
5	Construction	15,000	20,000		
6	Canal	1,575	1,730		
	Port	1,655	3,650		
	Free Zone - Transit	700	850		
	TOTAL NON MANUFACTURING	25,300	35,095		
	(MASTER PLAN ESTIMATE	11,500	27,500)		
	TOTAL BASIC	48,240	74,665		
	(MASTER PLAN ESTIMATE	36,000	65,000)		
	IMPLIED POPULATION	402,000	622,210		

SOURCE: Suez Planning and Development Department

TABLE IV-A.5

GROWTH OF SUEZ URBAN POPULATION AND EMPLOYMENT 1981-1987

Mid-Year	Population (000's)	Employment Total*	Non-Basic (000's)	Basic (000's)
1981	317	95	48	47
1982	347	104	52	52
1983	380	114	57	57
1984	416	125	62	63
1985	455	137	68	69
1986	500	150	74	76
1987	547	164	80	84
% Increase per annum	9.5	9.5	9	10

* Total employment is assumed to represent 30% of urban population throughout this period.

SOURCE: NUPS Elaboration.

VIII. FUTURE URBAN POPULATION OF SUEZ: GROWTH TO THE END OF THE CENTURY

Since 1975, the many studies concerned with the growth of Suez have produced a wide range of predictions of the urban population, with year 2000 total varying between a half million and almost two million. Since the Master Plan was adopted in 1976, evidence of actual and committed development in the city has provided a more substantial basis for population projections. In the intervening five years the trends in national population growth have also become clearer; by the end of the century, Egypt is more likely to have a population of 65 million to 70 million, with a relatively lower working population (estimated at 30 percent rather than 40 percent as predicted in the Suez Master Plan).

It is now possible to provide clearer answers to the following questions:

- What is required to achieve the population targets of the Suez Master Plan?
- What is required to achieve the population targets for Suez estimated in the National Urban Policy Study?
- What will happen if the "basic" employment targets of the Suez Master Plan are achieved?

Achieving the Master Plan target population growth should be relatively easier, at least in terms of employment growth. With the lower activity rate, less jobs will be required to support a given total population. The rates of growth required are shown in Table IV-A.6; increase in "basic" jobs appears modest compared with current industrial expansion and indicates a dramatic "slow-down" after 1985. This could result from the early completion of major public sector industrial projects followed by relatively slow development of private sector medium and small scale industries. This scale of growth would require considerably less industrial land than is designated in the Master Plan.

TABLE IV-A.6

SUEZ URBAN POPULATION GROWTH 1985-2000:

SUEZ MASTER PLAN POPULATION TARGETS [1]

YEAR	POPULATION (000's)	EMPLOYMENT (000's)[3] TOTAL[2]	BASIC	NON-BASIC
1985	455	137	68	69
	(9.0)	(8.9)	(4.6)	(12.6)
1990	700	210	85	125
	(4.0)	(4.0)	(3.3)	(4.4)
1995	850	255	100	155
	(3.3)	(3.3)	(1.9)	(4.2)
2000	1,000	300	110	190

NOTES:
1 Annual percentage growth rates shown in brackets.
2 Constant activity rate of 30% percent of population.
3 Non-basic and basic employment directly related to total population.

SOURCE: NUPS Elaboration.

Even the high population target of 850,000 included in the National Urban Policy Study appears low compared to current estimated growth rates. The target implies that industrial growth will be severely constrained after 1985, either through lack of investment, physical constraints or urban management (Table IV-A.7).

TABLE IV-A.7

SUEZ URBAN POPULATION GROWTH 1985-2000: NATIONAL URBAN POLICY STUDY TARGET [1]

YEAR	POPULATION (000's)	EMPLOYMENT (000's)[3] TOTAL[2]	BASIC	NON-BASIC
1985	455 (7.0)	137 (6.9)	68 (2.3)	69 (10.8)
1990	638 (4.0)	191 (4.1)	76 (4.1)	115 (4.0)
1995	776 (1.8)	233 (1.8)	93 (0.2)	140 (2.8)
2000	850	255	94	161

NOTES:
1 Annual percentage growth rates shown in brackets.
2 Constant activity rate of 30% percent of population.
3 Non-basic and basic employment directly related to total population.

SOURCE: NUPS Elaboration.

NOTES

APPENDIX IV-A

THE GROWTH OF POPULATION IN SUEZ GOVERNORATE

1 *Working paper submitted to NUPS by the Suez Planning and Development Department, December 1981.*

2 *Suez Demonstration Projects: Social & Physical Surveys of Qalzam.*

3 *HRD Study and Solid Waste Management, both 1980-1981.*

4 *Assuming that:*

a. *30 percent of the total population are "economically active," i.e., are employed or seeking employment."*

b. *"Basic employment" represents 40 percent of the "economically active" population.*

APPENDIX IV-B

IMPLEMENTATION OF THE SUEZ MASTER PLAN 1976-1981

APPENDIX IV-B

IMPLEMENTATION OF THE SUEZ MASTER PLAN 1976-1981

A. Population and Employment

	1980 Master Plan Estimate	1980 Actual
Population	300,000	288,000
Employment		
Basic	35,600	43,415
Non-Basic	53,500	42,985
Total	89,100	86,400

1. Population heavily concentrated in and close to existing Suez:

- Emphasis on early population growth in Western Sector (cabanon) to ease pressure on existing Suez and improve worker/job balance not possible due to lack of utilities.

B. Industry

1. Oil refineries will be back to full capacity in mid-1982:

- Major program for expansion and reorganization underway.

2. Fertilizer Plant will be back to full capacity in mid-1982:

- Major expansion programs underway (nitrate/urea plant) and new plant planned.

3. Miratex Textile Plant established and in production -- completion in two to three years.

4. Glass works about to start on site.

5. Two light industrial areas established:

- Ismailia Road, 23 establishments existing or approved (312,625 sq. m).
- 19 other projects under consideration (53,755 sq. m).
- Nasser Road, 13 establishments existing or approved (124,000 sq. m).

- 22 other projects under consideration (136,150 sq. m).

6. Off shore oil related free zone established at Ein Sukna.

7. Suez Cement Plant under construction.

8. Adabiya Manufacturing Free Zone not started.

9. Port Tewfik Transit Free Zone established and operating.

10. Fishing industry back to pre-war levels.

C. Housing

1. Master Plan target 60,000 units by 1980, actual estimated 52,000.

2. Feisal and Heifein completed. Sabah to be completed 1982.

3. 500 new units on infill sites in Sabah and Feisal.

4. 1,000 new units in Sadat project nearing completion.

5. Major "Company Housing" projects by Suez Canal Authority, Oil Companies, Fertilizer Plant, Sumed, Miratex.

6. Informal house building on infill sites accelerating -- new informal housing areas expanding west of Suez into agricultural land. Densities in existing Suez rising.

- Estimated infill capacity for additional 80,000 population.

D. Utilities

Pre-war system largely back into operation but expansion and improvement only just beginning.

1. Sewerage:

- Still 14 emergency outfalls to Suez Bay and Suez Creek, only 50 percent of dwellings connected, treatment plant back in operation.

- Major program to complete first phase of wastewater master plan by 1986 (includes new treatment plant).

2. Water:

- Improvement and expansion program of treatment plant.

3. Power:

- Existing power station back in full production, new 300 MW plant under construction.

Transport

1. Major bulk port at Adabiya under construction. Financing: loan of US $30 million and L.E. 54 million from central government.

2. Port Tewfik rehabilitation in progress -- new passenger terminal planned 1982-1983. Passenger traffic already reaching projected year 2000 levels (200,000 last year).

3. Ferry link to Jeddah and Akaba.

4. Cairo – Suez Highway implemented -- last link to open within three months. Tunnel relocated, construction finished.

5. Rail line to Port Tewfik removed -- new station under construction at Sabah City -- new long term route for by-pass rail line defined.

6. Public transport: rapid growth in taxi/microbus services:

- Majority of work journeys, express to West Sector by company buses.
- East Delta Bus Co. back in full operation but under capacity.

F. Community Facilities

1. Primary school provision consistent with Master Plan predictions; Preparatory and Boys Secondary Schools lagging -- big problem of finding sites within existing urban area.

2. Health facilities lagging, especially local health care -- hospital bed spaces appear statistically adequate but suspect quality of facilities and staffing below Master Plan predictions.

3. Social welfare facilities nowhere near Master Plan standards:

- Left largely to private sector community organizations.

G. Local Government

1. Governorate expanded to include part of Sinai District Authorities established 1979 with consequent dispersal of staff.

2. All ministry outpost departments under the Governor's control.

3. Local Housing Fund established -- sales of land have generated L.E. 7.5m.

H. Agriculture

1. No attempt to extend pre-war agricultural area:

- Possible major project north of city which would use effluent from Sewage Treatment Plant.

I. Commerce

1. Rapid revival of small scale "informal" commerce since war but no major commercial center emerging:

- Land ownership and costs will probably prevent development of Suez District Center; it could be achieved through infill and reclamation in the old port area.

J. Land

1. Army occupying substantial areas within Master Plan boundaries.
2. Six million square meters allocated to cooperatives.
3. Major reclamation potential in Suez Bay now that main port at Adabiya.
4. At NUPS proposed densities Master Plan area should accommodate up to one-third or one-half more population than planned.

NOTES

APPENDIX IV-B

IMPLEMENTATION OF SUEZ MASTER PLAN 1976-1981

1 *Prepared by the Suez Governorate Technical Assistance Program (now the Suez Planning and Development Department of the Suez Governorate), December 1981 at NUPS request.*

APPENDIX IV-C

SUEZ MASTER PLAN STANDARDS ANALYSIS

APPENDIX IV-C

SUEZ MASTER PLAN STANDARDS ANALYSIS

I. GENERAL

In order to evaluate development standards employed in the Suez Master Plan of 1976 for the period 1976-2000, an assessment was made of land budgets, physical standards and costs. On the basis of this assessment and comparisons with other development standards either in use or proposed, a recommended package has been developed of reduced standards which are more compatible with household affordability. For the purpose of this exercise, the focus on standards has been limited to residential development.[1]

II. LAND USE BUDGET

The general land use budget worked out in the Suez Master Plan for the existing city and new development areas is presented in Table IV-C.1. However, the NUPS Study Team found that the budget did not provide enough detail for standards assessment. Local circulation space, for example, was found to be included in residential land use. Therefore, a more detailed assessment was made for the existing and new development areas in Tables IV-C.2, IV-C.3 and IV-C.4. Indications as to how this data was derived is found in Note 1 to Table IV-C.2.

In general, the proposed land use budget provides a reasonably sound basis for future development. However, land budgets for circulation, open space and community facilities are relatively high. These could be reduced in order to increase the overall area of saleable land and increase gross densities.

In the SMP, gross and residential densities of 98 and 370 persons per hectare are relatively low.

However, this is partly the result of a conscious effort to limit building height in residential areas, provide spacious streets (walkways) for small-scale commercial activities and add green space to a city built in a desert environment with little opportunity for access to the coastal and agricultural areas.[2]

TABLE IV-C.1

SUEZ MASTER PLAN LAND BUDGET, CITY OF SUEZ, 2000

Land Use	New Areas (ha)	Existing Suez (ha)	Total (ha)	Percentage (%)
Residential	2,947	544	3,491	39
Community facilities	930	206	1,136	13
Principal Industrial Area *	1,630	---	1,630	19
Light Industrial Areas	808	---	808	9
Centers	248	47	295	3
Ports	100	258	358	4
Major open space	359	36	395	5
Other Facilities	123	67	191	2
Main Road network **	488	---	488	6
TOTAL	7,633	1,158	8,792	100

* Plus oil refinery area and including Industrial Free Zones

** Land allocation for main roads in Suez; 72 ha has been included in gross allocation for other uses. The total land area for main roads in the city is 560 ha, 6.5% of the total urban area.

SOURCE: Suez Master Plan.

TABLE IV-C.2

LAND USE BUDGET SUEZ MASTER PLAN (NUPS ESTIMATE)[1]

LAND USE	SUEZ PROPER		NEW AREAS (DISTRICTS)		OTHER URBAN[1]		URBAN TOTAL	
	(ha.)	%	(ha.)	%	(ha.)	%	(ha.)	%
Residential	462	48.7	2210	51.4	-	-	2,672	30.4
Industrial								
- light	-	-	-	-	728	20.6	728	8.3
- other	-	-	-	-	1,435	40.6	1,435	16.3
Circulation	255	26.9	1140	26.5	369	10.5	1,764	20.1
Comm. Fac.								
- health	26	2.7	75	1.7	5.4	0.2	106	1.2
- education	101	10.6	280	6.5	37	1.0	418	4.8
- other	11	1.2	35	0.8	4.4	0.1	50	0.6
Open Space	75	7.9	503	11.7	395	11.2	973	11.1
Commerce	19	2.0	60	1.4	30	0.9	109	1.2
Port	-	-	-	-	390	11.0	390	4.4
Other Services	-	-	-	-	139	3.9	139	1.6
	949	100.0	4,303	100.0	3,533	100.0	8,784	100.0

[1] Primarily non-residential uses.

SOURCE: Suez Master Plan.

Explanatory Note to Table IV-C.2

Land use areas in hectares found in Table IV-C.2 were calculated on the basis of the following data:

Industry

Urban: Heavy Industry: 1,535 hectares minus 100 hectares circulation or 1,435 hectares. Includes oil refineries and and power station. Table 10-9, Vol. 2, SMP 1976 (Av. 337 m^2 per employee).

Light Industry: 809 hectares minus 81 hectares circulation or 728 hectares. Table 10-10, Vol. 2, SMP 1976. (Av. 80.6 m^2 per employee).

Residential

New City: 2,210 hectares based on 27.6 m^2 per capita from Figures 11.1, 11.2, 11.4, and 11.5, Vol. 2, SMP 1976. Note all local circulation and parking has been deducted as well as public service. (These were included in Table 10-5 of SMP.)

Old City: 462 hectares minus 15 percent local circulation (82 hectares estimate). From Table 12-5, Vol.2, SMP 1976.

Circulation

New Areas: 1,140 hectares at 14.3 m^2 per capita based on circulation at district level. Figures 11-1 through 11-5.

Existing Suez: 255 hectares derived from Table 12-5, Vol. 2, SMP 1976, including main roads and 15 percent circulation in residential areas: 173 hectares plus 82 hectares.

Urban: 369 hectares including 100 hectares heavy industrial area (Table 10-9), 81 hectares light industrial areas, (Table 10-10) and 188 hectares not included in district circulation (488 hectares) - (5 x 60 hectares) Tables 10-5 and 11-1, Vol. 2, SMP 1976.

Community Facilities

Health:

New Areas: 75 hectares based on standards in the Suez Master Plan and 0.9 m2 per capita at district level.

Old City: 26 hectares from Table 12-5 "other services" (Vol. 2, SMP 1976 and hospital).

Urban: 5.4 hectares: hospital (Table 10-17, Vol. 2, SMP 1976).

Education

New Areas: 280 hectares based on standards in the Suez Master Plan and 3.5 m^2 per capita at district level.

Old City: 101 hectares from Table 12-5, Vol. 2, SMP 1976.

Urban: 37 hectares from Table 10-17, Vol. 2, SMP 1976.

Other: (District Center Facilities)

New Areas: 35 hectares from 0.4 m^2 per capita and 7 ha. per district (Table 11-3: community facilities and recreation).

Old City 10 hectares from Table 12-5, Vol. 2, SMP 1976 (club 7 ha. and recration center 4 ha.).

Urban 4.4 hectares (museums, cultural palace, city mosque, oceanographic center Table 10-17, Vol. 2, SMP 1976).

Open Space

New Areas: 503 hectares from 6.25 m2 per capita at district level including district and local open space derived from Figures 11. 1 through 11.5.

Note SMP called for 8 m^2 per capita at district and local level.

Old City: 75 hectares (from Table 12-5, Vol. 2, SMP 1976).

Urban: 395 hectares (from Table 10-17, Vol. 2, SMP 1976).

Commerce

New Areas: 60 hectares from 0.9 m^2 per capita at district level (See Table 11-3 "four districts").

Old City: 19 hectares at local district center (Table 12-7).

Urban: 30 hectares at CBD (See Table 10-14).

Port

Urban: 390 hectares (175 hectares Port Tewfik, 215 hectares Adabiya) from Table 10-12 container port shifted to Adabiya.

Services

Urban: 139 hectares from Table 10-17 including mortuary, transport services, other services and water utilities from Table 12-5 Hadj terminal (100 hectares) not included.

Note other urban services outside the urban area 546 (546 hectares) have not been included (Table 10-18).

TABLE IV-C.3

LAND USE BUDGET: SUEZ PROPER, 2000

Land Use Suez Proper: (2000) *

Local:	Area (ha)	Percentage of Total (%)
Residential:	462	45.5
Industrial:	68 **	6.7
Open Space:	75	7.4
Circulation:	255	25.1
Comm. Fac:		
Health	26	2.6
Ed.	101	9.9
Other	29	2.8
	1016 ha.	100.0

* See Table 12.5, Vol. 2, SMP 1976.

** Note industry included in urban wide functions in Table IV.C.2

SOURCE: Suez Master Plan.

TABLE IV-C.4

NEW DEVELOPMENT AREAS

DISTRICT LEVEL[1] POPULATION : 160,000			DISTRICTS (5) LEVEL[2] POPULATION : 800,900[3]	
LAND USE:	DISTRICT AREA(ha.)	PER CAPITA m2	DISTRICTS AREA (ha.)	PER CAPITA m2
Industry	244	15.30	1,220	76.3
Residential	441	27.60	2,205(810)[4]	137.8
Circulation:				
Main Roads	33	2.10	165	10.3
District Roads	11	0.70	55	3.4
Local Roads	175	10.90	875	54.7
Center[2]	9	0.60	45	2.8
Open Space:				
Center	36	2.25	180	11.3
Comm. Fac.	30	1.90	150	9.4
Local	34	2.10	170	10.6
Commerce:	15	0.90	75	4.7
Community Facilities				
Health:	15	0.90	75	4.7
Education:	56	3.50	280	17.5
Other:	7	0.40	35	2.2
	1,106		5,530	345.6

1 Theoretical (See Table 11-1), Figs. 11.1-11.5., Vol. II, SMP 1976.

2 5 districts in New Development Areas.

3 From Table 10.16, old Suez pop. 187,250, New Areas 800,900.

4 Theoretical = 2205 Ha;
Actual = (810) Ha;
In land use Table III-D.2 industry is considered an urban-wide function.

SOURCE: Suez Master Plan.

An effort was made to adapt housing costs to household income (assuming relatively low financial terms and disregard costs for infrastructure or land).[3] Based on the affordability assessment in the Suez Master Plan, for example, the average dwelling unit at Master Plan standards would only be affordable by the 85th income percentile. (See Section V, this Chapter.)

As a consequence, the NUPS Study Team feels that greater densities must be achieved primarily by reducing open space, circulation and community facility areas and providing greater areas for private use. In addition, it is felt that open space per se is better allocated to private use. Although an adequate but minimum amount of public open space is necessary, most should be provided to private households to be used in the form of courtyard and private space. This would have the additional advantage of reducing public responsibilities and cost of maintenance.

The same reasoning applies to areas devoted to circulation space. Generally, the rights-of-way for secondary district and primary roads (varying between 21-43 meters) are excessive. In fact, as the circulation standards indicate in the SMP, most of the R.O.W. for these roads is for walkways. It is expected, rightly, that the walks will serve for small-scale commerce, parking and other activities. However, this implies that local government will be responsible for provision and maintenance of this area though it will be used primarily for private interests (however, they will also serve for the installation of public underground services).

III. LAND BUDGET ANALYSIS

In order to determine the land use standards employed in the SMP, an analysis was made for Suez Proper, or the expanded old city, and new development areas.

A. Suez Proper Land Budget

The land use budget for Suez Proper in year 2000 (a single SMP district) is presented in Table IV-C.3. These values were primarily derived from Table 12-5 of the SMP. However, urban-wide functions were deleted and additional circulation space (15 percent) was added to account for local access streets. Although no recommendations regarding future development standards of Suez Proper were made, those suggested for new development areas should be applicable for expansion and infill areas.

B. New Development Areas

For analysis of the land use budget in new development areas, an initial assessment was made at the district level (population 160,000) as presented in Figures IV-C.1 and IV-C.2. The land use budget which was derived is presented in Table IV-C.4. In order to calculate the land use budget for new development areas as a whole, per capita values obtained at the single district level were used. These results, also shown in Table IV-C.4, were found to relate closely to SMP estimates. However, it was found that areas for light industry did not coincide, since areas actually allocated in the SMP were smaller than that implied at the district level.

TYPICAL DISTRICT LAYOUT

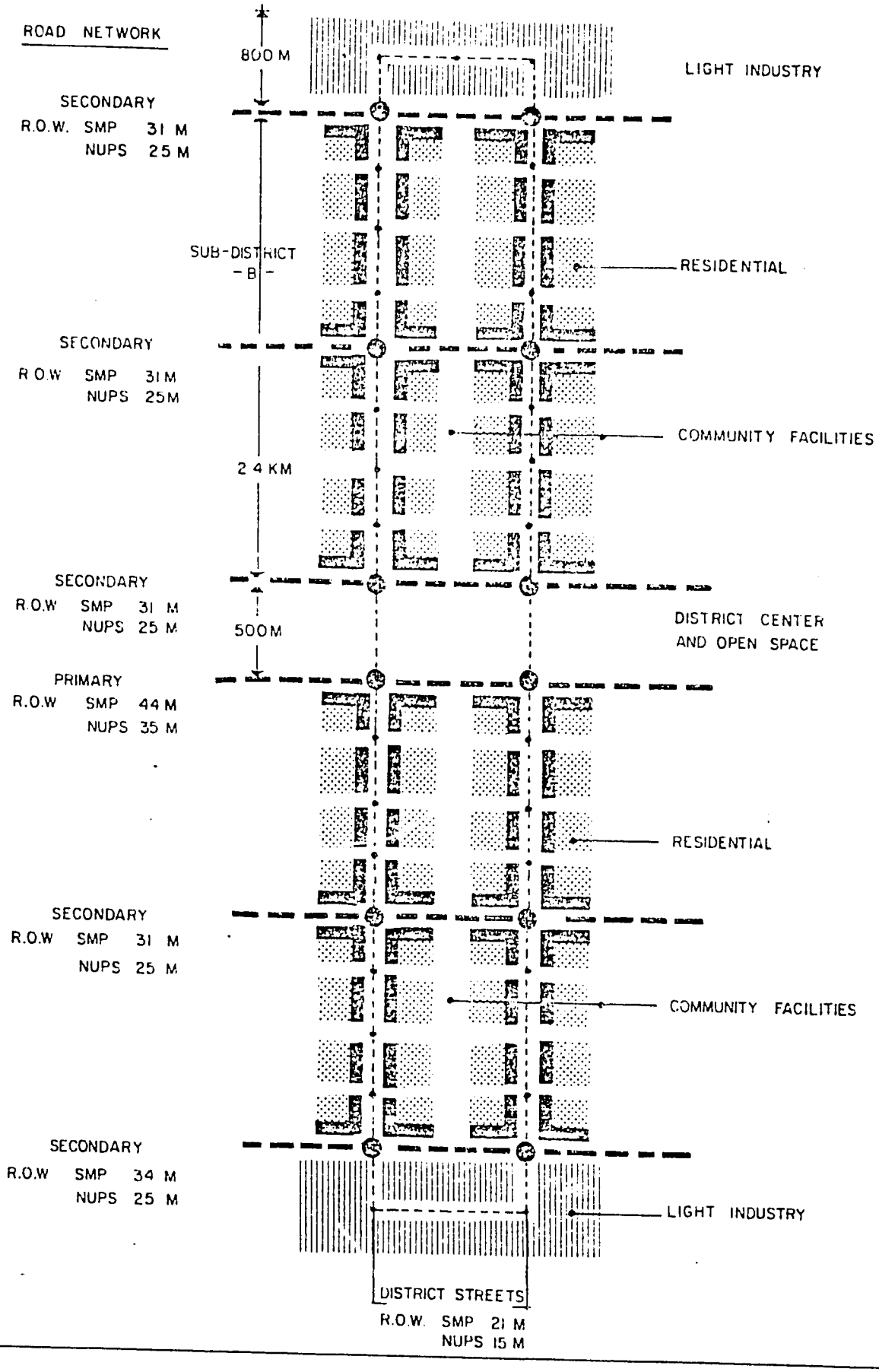
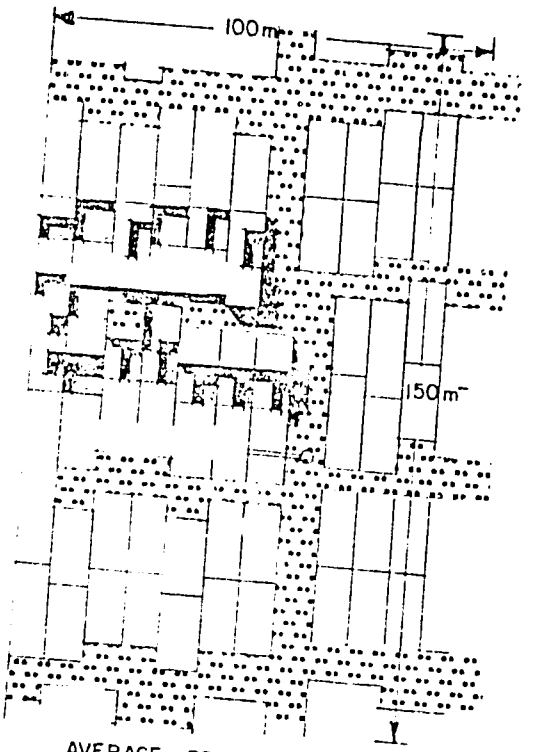


FIGURE IV-C.1

RESIDENTIAL SUB-DISTRICTS

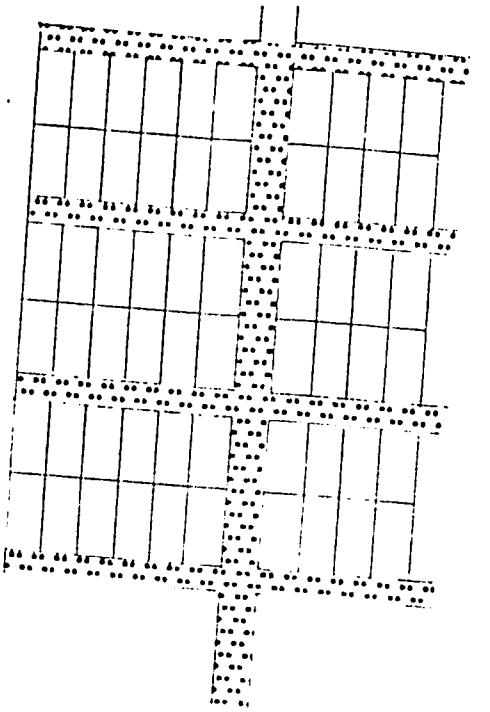
SUB-DISTRICT A

SUEZ MASTER PLAN



AVERAGE FOOTPATH 8.8 M
AVERAGE PLOT SIZE 160 M²

NUPS REVISION



AVERAGE FOOTPATH 7 M
AVERAGE PLOT SIZE 130 M²

SUB – DISTRICT – B –

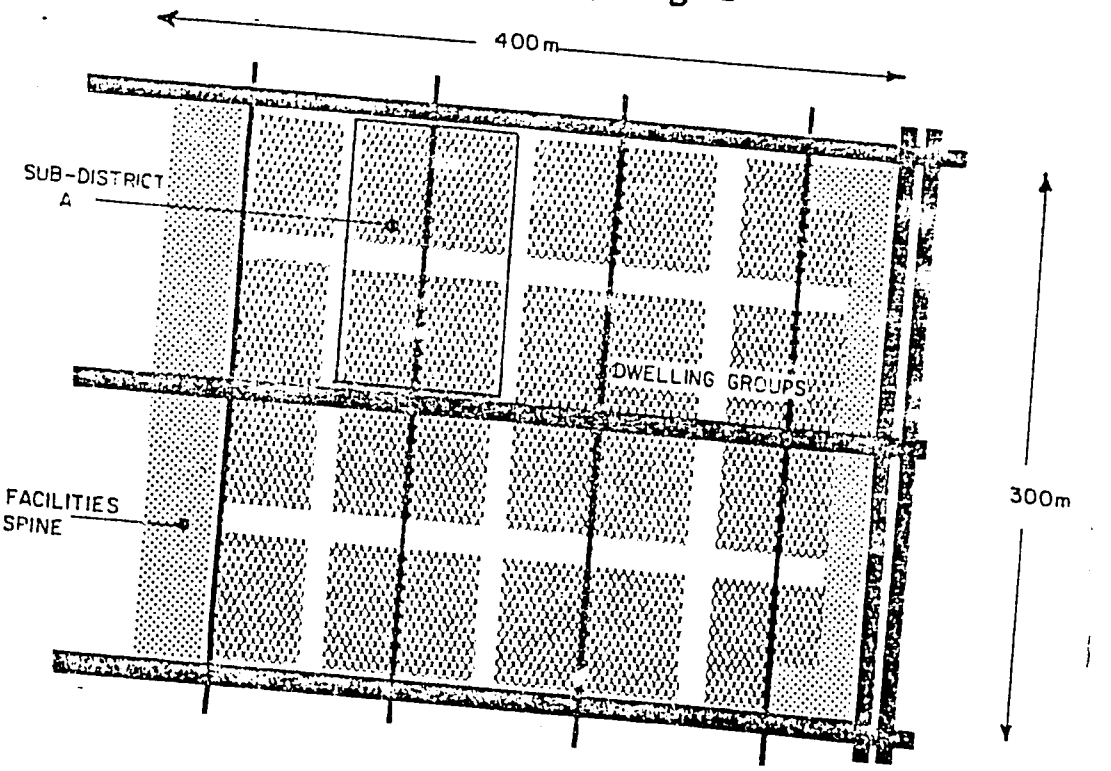


FIGURE IV-C.2

In Table IV-C.5 land use standards of new development areas, as derived by NUPS, are compared to two NUPS development packages from the NUPS First Round Alternatives, GOPP standards and Sadat City and 6th of October New Community standards. Comparisons are made on both a percentage of area and per capita basis for each of the land use items. With respect to GOPP standards, the SMP has a relatively large residential area in per capita terms. However, SMP standards compare favorably with the other development standards. In percentage of area terms, on the other hand, only Sadat City and the 6th of October can be readily compared with the SMP since GOPP and NUPS package standards are not designed for urban areas but rather residential extensions. Consequently, with respect to the former two, the SMP has a higher share of both residential and industrial area. In per capita terms, the SMP has slightly higher standards for community facilities than GOPP standards but quite high standards for open space. The latter is also relatively high compared to the other development standards.

Generally, as was true for the urban area as a whole, large areas for open space, circulation and community facilities are characteristic in the "new development areas." Consequently, densities are also relatively low. It was found, for example, that overall circulation space (about 27 percent) could be reduced to 20 percent by reducing walkway widths on primary and secondary streets to 4m on a side and pedestrian paths from an average of 8.8m to 6m. It was also found that community facilities and open space could be reduced in the plan to standards slightly exceeding those of GOPP, yet still permit the same levels of service. Consequently, open space could be reduced from 11.2 percent of area to 4 percent while community facilities could be reduced from 14.5 percent or $5.8m^2$ per capita to $4.5m^2$ per capita. (See Affordability Analysis, SMP.)

IV. DEVELOPMENT COSTS

In Table IV-C.6, development costs for physical infrastructure and housing and social services are presented. The SMP development costs (in January 1975 prices) have been updated to October 1980 costs in order to make them comparable with those in Table IV-C.7 which are presented in per capita terms.

In Table IV-C.7, per capita infrastructure costs compare favorably with those employed at the New Communities of the 6th of October and Sadat City. Housing costs, on the other hand, are substantially greater in the SMP than in Sadat City but much less than in the 6th of October. Community facilities per capita costs in the SMP are generally lower than all others. This is largely due to the low cost of health services: presumably because of the services already in place (existing Suez).

The physical and social infrastructure costs indicated above, however, would not entirely be supported by households. Community facilities and primary infrastructure are normally subsidized in full. As a consequence, in Table IV-C.8 an estimate has

TABLE IV-C.5

SUEZ MASTER PLAN — LAND USE BUDGET STANDARDS COMPARISON

	PERCENTAGE OF AREA COMPARISON						AREA (M2) PER CAPITA COMPARISON					
LAND USE	SUEZ MASTER PLAN	280 DENSITY PACKAGE[1]	140 DENSITY PACKAGE[1]	SADAT CITY	6th OF OCTOBER	GOPP[2]	SUEZ MASTER PLAN	280 DENSITY PACKAGE[1]	140 DENSITY PACKAGE[1]	SADAT CITY	6th OF OCTOBER	GOPP[2]
RESIDENTIAL	30.4	57	57	25	20.6	41.7	27.0	27.6	40.7	24.4	26.0	17.5
CIRCULATION	20.1	20	8.4	13	17.3	33.3	17.9	14.3	6	21.2	16.4	13.9
COMMUNITY FACILITY	5.6	15	26.6	41	4.8	10	5.8	4.8	19	39.5	6.1	4.2
- HEALTH	(1.2)	-	-	-	-	(0.9)	(1.07)	-	-	-	(0.2)	(0.38)
- EDUCATION	(4.8)	-	-		-	(7.7)	(4.2)	-	-	-	(0.2)	(3.23)
- OTHER	(0.6)	-	-	-	-	(1.4)	(0.51)	-	-	-		(0.6)
OPEN SPACE	11.1	-	-	-	6.1	7.1	9.85	-	-		7.7	3.0
INDUSTRY	24.6			20	32	-	21.9	-	-	32.6	-	-
COMMERCE	1.2	8	8	-	1.3	1.3	1.1	0.9	-	-	1.6	0.53
OTHER	6	-	-	-	18	6.6	5.4	-	-	-	22.5	2.75
TOTAL	100.0	100.0	100.0	100.0	100.0	90.0	89.0	47.6	65.7	162.8	126.2	41.9
DENSITY		GROSS DENSITY					RESIDENTIAL DENSITY					
	98	280	140	103	79	238	370	490	246	411	386	571
SALEABLE LAND	60.4[3]	65	65	46	72	48.3						

1 From NUPS first round alternatives

2 General Organization for Physical Planning

3 Includes port, industry, residential + commerce

SOURCE: NUPS Elaboration.

TABLE IV-C.6
1976 SUEZ MASTER PLAN: YEAR 2000 INFRASTRUCTURE AND SOCIAL SERVICES COSTS

ITEM	SUEZ MASTER PLAN (1976) DEVELOPMENT COSTS FOR THE YEAR 2000 1975-2000		
	Jan. 1975	October 1980[2]	October 1980
	Costs (L.E. Million)	Costs (L.E. Million)	Per Capita Costs (L.E. Per Million Population
Physical:			
Waste Disposal	65	139.1	139.1
Water Supply	55	117.7	117.7
Electricity	126	269.6	269.6
Telecommunications	15	32.1	32.1
Roads	55	117.7	117.7
Housing	325	695.5	695.5
Total Housing and Physical Infrastructure	641	1371.7	1371.7
Social:[3]			
Education	34	92.0	92.0
Hospitals and Health	17	51.4	51.4
Welfare Facilities	16	34.2	34.2
Religious Buildings	32	68.5	68.5
Cultural and Recreation	37	79.2	79.2
Grand Total[1]	152	325.3	325.3

Note 1: Other cost items concerning full metropolitan development which are not likely to be supported in full or part by the households have not been included. These include: Reconstruction, Industry, Commerce, Public Administration and Defense, Business Services, Personal and Household Services, Hotels and Camping Facilities, Maritime Transport, and Railways. The combined cost of these items was estimated at L.E. 1,092 Million in January 1975 and L.E 2,337 Million in October 1980 costs.

Note 2: Costs were updated as follows: January 1975 costs minus 20 percent (to reflect Cairo estimates--paragraph 19.4, Vol. 2, SMP 1976) At a rate of 15 percent inflation for 5.75 years, to which a 20 percent cost differential was added. This produced a cost increase factor of 2.14 for the period in question.

Note 3: Education and health estimates include costs for plant and equipment.

SOURCE: NUPS Elaboration.

TABLE IV-C.7

SUEZ MASTER PLAN HOUSING, PHYSICAL, & SOCIAL INFRASTRUCTURE COST COMPARISON PER CAPITA COSTS (L.E.)

ITEM	SUEZ MASTER PLAN	SADAT CITY	6th OF OCTOBER
HOUSING	689	349	1333
INFRASTRUCTURE	(667)	(952)	(853)
- Water	116	209	264
- Sanitation	137	94	180
- Electricity	266	69	91
- Circulation	116	155	98
- Transport	-	-	-
- Telecommunications	32	55	144
- Solid Waste	-	17	-
- Other	-	-	-
COMMUNITY FACILITIES			
- Education	72	176	-
- Health	75	210	-
- Social Services	78	-	-

SOURCE: NUPS Elaboration.

TABLE IV-C.8

SUEZ MASTER PLAN:

INFRASTRUCTURE COSTS SUPPORTED BY HOUSEHOLDS

	A Full Cost In Plot		B 50% recovered through user charges	
	1975 cost	1980 cost	1975 cost	1980 cost
Water Supply[1]	18.3	39.10	9.15	19.55
Sewage[1]	19.4	41.60	9.70	20.80
Roads				
Secondary[2]	3.6	6.98	NA	NA
Local[2]	12.9	27.60	NA	NA
Total	53.9	115.30		
Housing[3]	325.0	695.50		

1 Based on domestic consumption and its share of losses, residential development would account for 51.85 percent of costs (See Table 8-1, Vol 2, SMP 1976. Costs derived from Table 8-3, Vol 2, SMP 1976). Cost increases made at 15 percent per annum for 5.75 years as indicated in Table IV-C.8.

2 Residential areas account for about 80 percent of all circulation area based on land use analysis.

3 Based on Table 13-6, the average cost per dwelling in 1975 costs was 1517 L.E. or at 37 L.E. m2 the average unit was 41 m2. In 1980 costs, the same dwelling unit would cost L.E. 3246.

SOURCE: NUPS Elaboration.

been made of infrastructure and housing costs which would likely be charged to households if full cost recovery were to be achieved. In the table, the costs of secondary and tertiary infrastructure (water supply, sewage, roads) and housing in both January 1975 and October 1980 prices are indicated. Furthermore, two alternatives (A and B) are presented. The first (A) assumes that the costs would be recovered through plot sales. The second (B) assumes that 50 percent of the capital costs for water supply and sewage would be recovered through user charges. In both of the alternatives it is assumed that costs of electrical supply would be recovered through user charges.

In the affordability analysis which follows, both alternatives are used to help determine appropriate average standards to meet median income household affordability. Based on a total residential area of 5,252 hectares in new development areas, alternative A would cost 2.19 per square meter while alternative B would cost L.E. 1.02 per square meter of developed land.

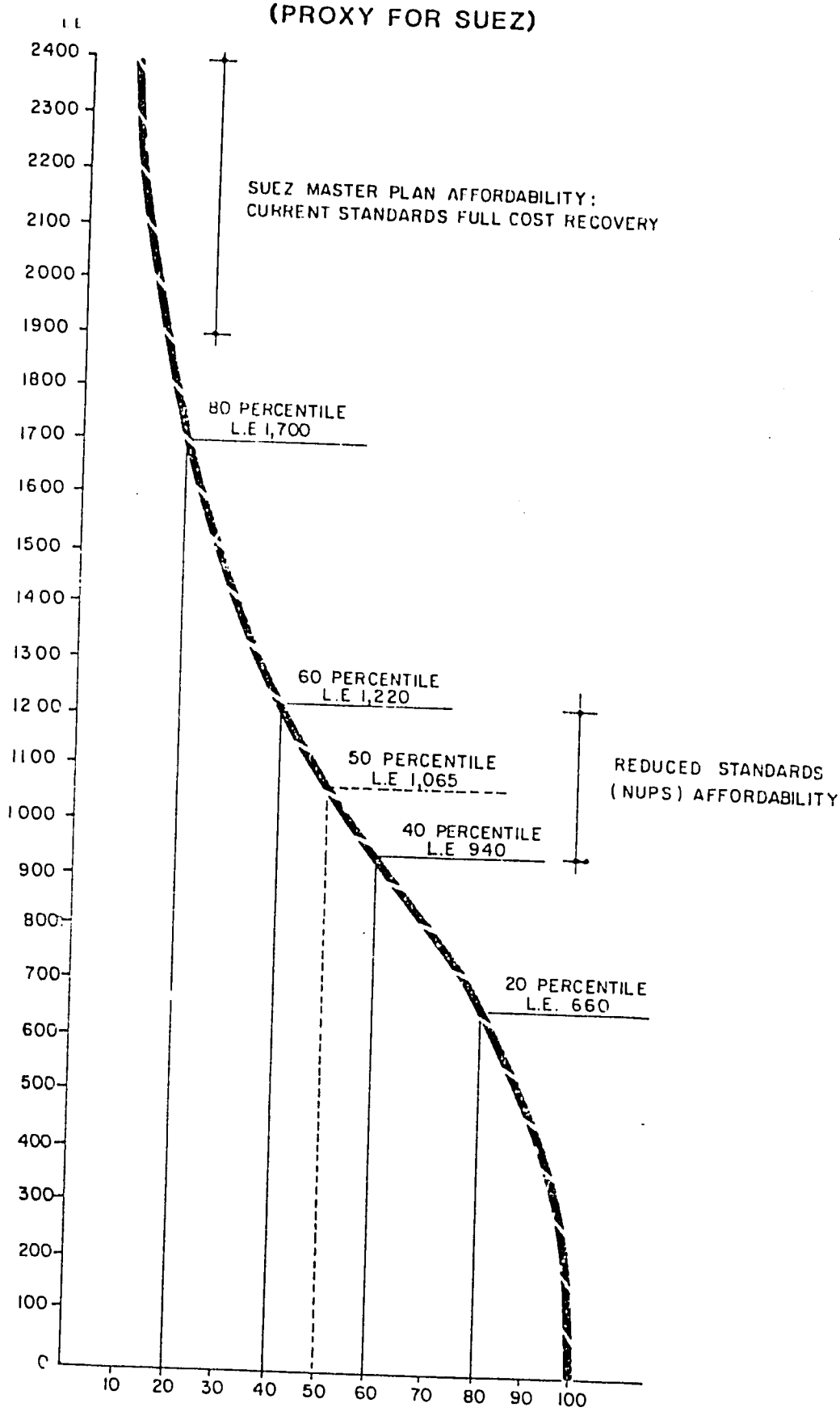
V. SUEZ MASTER PAN AFFORDABILITY ANALYSIS

In order to assess the affordability of the Suez Master Plan and to propose changes in development standards, Master Plan data was analyzed using the PADCO/BERTAUD model.[4] The model is designed to assess implications of changes in land use, residential development, dwelling unit, and infrastructure standards and costs. However, since analysis of the Master Plan revealed that plot sizes would range between 130 and 160 m2, these values were used throughout the analysis to show changes in affordability when other values were changed. Initially, it was found that given actual Master Plan land use and average residential and dwelling unit, standards, costs would only be affordable by households with monthly incomes ranging between L.E. 176 and L.E. 230 with a minumum charge for land.[5] (Figure IV-C.3) The goal of the affordability analysis, on the other hand, was to determine what changes in Master Plan standards must be made in order to reach households at the median income (L.E. 89 monthly) assuming full cost recovery for residential and dwelling unit development.[6] To do so, realistic changes in development standards based on the previous standards assessment were employed. These changes and results are discussed below.

According to an analysis carried out by the NUPS Team, minimum but adequate and affordable standards for median income households can be developed which will ensure full cost recovery. The following reduction in land use standards, densities, dwelling unit size, etc., would be required:

- Overall land use standards should be aimed at:
  - circulation space: 20 percent of total or less
  - open space standards: 4-6 percent or less

1980 URBAN INCOME DISTRIBUTION *
(PROXY FOR SUEZ)



* 1979 URBAN INCOME DISTRIBUTION INCREASED BY 7% (1979-1980)

Source: USAID income distribution based on CAPMAS 1974-1975 urban household expenditure survey adjusted for inflation
Household defined as one bear family

FIGURE IV-C.3

- community facilities: 4.5 m2 per person or less
- residential densities: 350-500 persons per hectare (note would be less when industry, etc., added)
- at least two households per plot should be envisaged

- Dwelling unit standards should be aimed at:
  - 2 dwelling units per plot (or more)
  - plot sizes ranging between 100 and 130 m2
  - dwelling unit size per plot of about 65 m2 or 32.5 m2 per household
- Cost standards:
  - land costs on the order of L.E. 3.5 m2
  - dwelling unit cost: L.E. 65 m2 reflecting informal private development costs
  - infrastructure costs: 1.02 m2 reflecting 50 percent payment for water and sanitation through user charger. (Table IV-C.8)

It should be noted that these standards apply to households at the median income level. Though overall land use standards would probably remain relatively unchanged, plot size, density and dwelling unit characteristics could be changed to meet the affordability of a wide range of income groups.

APPENDIX IV-C

NOTES

[1] *The Suez Master Plan called for 136 workers per hectare in light manufacturing while presently only about 65 workers per hectare is expected.*

[2] *See Suez Master Plan, Chapter III.E.*

[3] *SMP, Vol. 3, p. 34.*

[4] *The PADCO/Bertaud Model is based on the following formulas:*

$$f = \frac{k\left[\frac{I}{1200}\left(1-\frac{h}{100}\right)\right]}{1\left(1+\frac{I}{1200}\right)^{-12N}}$$

$$k = \frac{10{,}000\ i\ (e + c_1 + c_2)}{d} + a_1\ b_1 + a_2 + a_3 + \frac{a_4}{y}$$

$$d = \frac{100\ i\ (100 - m_1 - p)}{j + m_2\ i}$$

Where:

I = rate of interest (percentage interest per year)

N = recovery period (number of years)

h = downpayment

$\frac{10{,}000\ i}{d}$ = total amount of land used per household in square meters

e = price of land per square meter

c_1 = cost of on-site infrastructure per square meter

c_2 = cost of off-site infrastructure per square meter

a_1 = cost of construction per square meter

b = area of construction (m_2)

a_2 = connection cost (water, electricity)

a_3 = other features (septic tank, etc.)

a_4 = construction cost of communal facilities

y = number of families sharing the communal facilities

[5] *The financial terms employed assume full cost recovery terms land cost at L.E. 2/m^2, see Step 3 Step-by-Step Affordability Analysis.*

[6] *Income data from the 1975 CAPMAS income and expenditures data updated to 1979 by USAID and to 1980 by NUPS (see SMP).*

APPENDIX IV-D

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT

PORT SAID

APPENDIX IV-D

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT -- PORT SAID

I. GENERAL

The establishment of Port Said was associated with the construction of the Suez Canal in 1859. Its sister city, Port Fouad, on the other hand, was established in the 1920s as a residential area for the Suez Canal Authority and the site of shipbuilding and repair industries.

Port Said and Port Fouad are located on a sand spit along the Mediterranean Sea at the northern entrance to the canal on the west and east banks, respectively. Both settlements are surrounded by water: Port Said by the Mediterranean to the north, and Lake Manzala to the west and southwest; Port Fouad, by the Mediterranean and the Mahalla inundated salt pans to the east and southeast. Hence, neither settlement has potential for physical expansion on dry land. The only access to the settlements consists of a narrow coastal strip to the east and west and a southern corridor resulting from the digging of the Canal in the direction of Ismailia. Port Said was less severely damaged than the other Canal cities during hostilities in the region. Nevertheless, significant damage was done to the infrastructure networks, the shipyard, and the Canal which was closed in 1967 and not reopened until June 1975.

II. POPULATION

Port Said has traditionally been the most populous of the Canal cities, although prior to hostilities, its population was increasing less rapidly than that of Suez. In 1966, Port Said had a population of 283,000. The city was evacuated during the period 1969-1973 and did not regain its former size until about 1977.

The Port Said Master Plan (PSMP), completed in March 1976, set a year 2000 target population objective for the city of 750,000. It also projected populations of 384,000, 471,000, and 560,000 for the benchmark years of 1980, 1985, and 1990, respectively. Initial population growth, however, has been lagging somewhat behind the projected level: the estimated population in 1980 was 345,000.[1]

Due to perceived difficulties in reaching master plan population targets, the high costs of physical expansion, and expected difficulties in implementing rapid

population growth, NUPS has projected a year 2000 population on the order of 550,000 to 650,000.

III. DEVELOPMENT POTENTIAL

The economic vitality of Port Said has always been closely linked with that of the Suez Canal. Thus, the closing of the Canal, during and after the period of hostilities, was a serious setback for the city. Traditionally, Port Said has been an important harbour for marshalling ships through the Canal, a commercial and fishing port, and passenger transit point. Port Said's industrial base has generally consisted of shipbuilding and repair, textiles, and salt production while small-scale enterprises have accounted for about 70 percent of urban employment. Even before the Canal was closed temporarily in 1967, the prosperity of Port Said began to falter. This was caused by a lack of growth in ships using the Canal, a decrease in cargo and transit trade, decreasing Mediterranean fish catches due to the effects of the High Dam, and a decrease in cruise-boat tourism due to a rise in air travel.

The principal resources which may be exploited in the Port Said Region presently do not differ significantly from those in the past. These include: the Manalla salt flats, the coastal beaches and favorable climate, and fishing opportunities in Lake Manzalla and the Mediterranean. Planned and ongoing agricultural reclamation projects, however, will add another dimension to its available resources. Furthermore, the creation of a Free Zone in Port Said in 1976 provided a boost to its economic growth potential.

Port Said's greatest potential for development, however, is linked to its locational advantage at the northern entrance to the Canal and its unexploited international potential and local linkages with the northeast Delta and Sinai.

IV. DEVELOPMENT CONSTRAINTS

The principal development constraint in the Port Said Region is the lack of dry land for urban and agricultural development. Virtually all land must be reclaimed from Lake Manzalla. Development costs for urban land reclamation were estimated by the PSMP in 1975 at LE 35,000 per hectare or ten times that needed for agricultural reclamation per hectare. The PSMP recommended further feasibility studies for agricultural reclamation due to high soil salinity and lack of data on the quality of soil.[2]

Another possible development constraint for Port Said is the supply of bulk water. Currently Port Said is supplied by the Abassiya Canal. However, planned large-scale reclamation efforts west and east of the canal, and urban development requirements in the other Canal Cities, the eastern Delta and

New Communities northeast of Cairo, are all competing for water from the same sources.

Although infrastructure systems were badly damaged during the war, current service deficits are not viewed as a constraint since wide-ranging improvements are underway. Improved inter-regional linkages with the eastern Delta, however, are needed to improve marketability of products.

V. INDUSTRY

Port Said and Ismailia, unlike Suez, have predominantly service oriented economies with limited industrial potential. Port Said's large-scale industries are predominantly shipbuilding, textiles, and food processing. Small-scale industry in Port Said includes privately-owned leatherware, furniture and mechanical workshops. Thus, combined industrial employment accounted for only about 19 percent of the 74,600 jobs found in Port Said in 1980.

The 1980-19 industrial investment program is aimed at food processing and textiles and is expected to generate an additional 2,080 jobs. In addition, the Port Said Master Plan calls for the creation of three new industrial zones which are planned to create 3,140 new jobs.

Due to a lack of land and the cost of reclaiming new land, land consumptive, large-scale industries are inappropriate for Port Said. Therefore, future industrial employment should be directed towards internal markets and food processing, which could include fish farming and agricultural produce. Raw materials for these products could be obtained from reclamation areas and the northeast Delta.

VI. MAIN FEATURES OF THE PORT SAID MASTER PLAN

A. General

The Port Said Master Plan emphasized the potential of the port, labor intensive light manufacturing and shipbuilding, tourism, agricultural reclamation, the services sector and fishing (particularly in Lake Manzalla) as the key elements of economic development and employment generation. Among its key proposals include:

- Expansion of the port to 3 million tons by 1980 and 10 million tons by the year 2000.
- The development of resort facilities in coastal areas (65 hectares).

- Reclamation of 6,500 hectares on the west bank of the Canal for agricultural purposes and 12,500 hectares on the east bank (Sinai) after 1990.
- The establishment of a fruit and vegetable production area immediately to the south of Port Said (6,300 hectares).
- Improvement of fishing potential of Lake Manzalla (including fish farms).
- Establishment of free zone and other industrial estates for light manufacturing and storage (450 hectares).

Agricultural reclamation efforts constitute a fundamental element of the Master Plan. The areas deemed most suitable for reclamation were on the west bank of the Canal, west of El Tina and Qantara -- the northern portion of Lake Manzalla being retained for fishing and recreation.

Two potential schemes for development of agricultural areas were developed in the PSMP: large commercial estates expected to be the most economically viable and small holder schemes (i.e., 5 feddans plots) which could accommodate the largest population.

As of 1975, the port was near congestion level and studies were undertaken to temporarily remedy the situation. PSMP plans to create a new port with much greater capacity, however, were not expected to add significant employment due to an anticipated increase in port mechanization.

Port Said was established as a free city on the 1st of May 1976, primarily to increase employment and revitalize the local economy. As a free zone, Port Said was expected to attract transit goods as well as manufacturing industries wishing to capitalize on tax advantages and cheap labor. Port Said's potential as a trans-shipment center, vis-a-vis neighboring Arab countries, preferential access to European and American textile markets, and lack of port congestion were expected to be attractive to potential investors. It was expected that textiles, leather goods, plastics, furniture, and other light manufacturing industries would be developed.

However, to date, the free city status has primarily attracted transit activities (such as warehousing) which do not generate significant employment. The establishment of other free zones in Cairo, Alexandria, and Suez may have diminished industrial development opportunities in Port Said. Although the free zone has not reached expected employment levels, its special status has increased local revenues and led to local initiative and higher levels of funding for infrastructure.

Recently, a team of consultants was hired to review port development. Previously, the Suez Canal Authority opposed port development because of conflicts between local port and Canal traffic. With the completion of the canal by-pass, Canal congestion has been lessened and the Authority is no longer opposing port development in Port Said.

B. Employment

Employment projections for Port Said as projected by the PSMP are presented in Table IV-D.1. For the purposes of comparison, actual employment data for

TABLE IV-D.1

PSMP EMPLOYMENT PROJECTIONS (000)

SECTOR	1980 PROJECTED	1980 ACTUAL[1]	1985 PMSP	1985 NUPS[2]	1990 PSMP	1990 NUPS[2]	2000 PSMP	2000 NUPS[2]
1. Agriculture, Forestry and Fishing	9	2.4	14	-	17	-	19	-
2. Services (tertiary)	64	66.9	80	-	101	-	161	-
3. Manufacturing Industries								
. Free zone optimistic	2	14.3	5	-	9	-	20	-
pessimistic	0	-	2	-	4	-	10	-
. Other	14	-	19	-	25	-	45	-
Subtotal Industry and Services	89	83.6	115	132	147	158	235	245
4. Building and Construction	12	-	12	-	13	-	19	-
Utilities	4	-	5	-	6	-	8	-
TOTAL	105	83.6	132	132	166	158	262	245

1 Governorate data.

2 NUPS projections for mining, manfacturing and services.

SOURCE: NUPS Elaboration of PSMP and Port Said Governorate figures.

1980 and NUPS projections for manufacturing industries for the period 1985, 1990 and 2000 are also presented.

As noted in Table IV-D.1, PSMP employment projections were more optimistic than actual employment realized by 1980 with the exception of the tertiary sector. In addition, total PSMP employment projections exceed those projected by NUPS for 1985, 1990, and 2000 due partly to lower population projections by NUPS.

C. Physical Development

1. Region

Port Said Master Plan proposals for physical development and settlement of the Port Said Region are illustrated in Figure IV-D.1. The Plan calls for the establishment of inter-regional road and rail linkages with Mataria, Mansura, and Suez, in addition to Zagazig (and Cairo) and the Sinai. Reclamation and settlement of Lake Manzalla was initially proposed to proceed west of Qantara and El Tin and northwards over time. However, the northern part of Lake Manzalla is to be preserved for fishing. Further reclamation and settlement on the east bank of the Canal (Sinai) was not proposed until after 1990. Also, south of Port Said an area is suggested for the cultivation of fruits and vegetables for local consumption.

2. City

Physical growth in Port Said has been accommodated through southward expansion and infill of Lake Manzalla. Furthermore, prior and subsequent to the evacuation of the city, most of the population resided on the west bank of the Canal at Port Said. Only a minority, particularly those associated with the Suez Canal Authority, resided in Port Fouad.

The Port Said Master Plan also calls for planned urban expansion to take place on a northeast-southwest axis through reclamation of Lake Manzalla. A new port is to be created to the south of Port Said which will be bordered by the light manufacturing Free Zone. Coastal areas adjacent and west of Port Said are to be developed for tourism while similar areas east of Port Fouad are to be reserved for future development in the Sinai. (Figure IV-D.2)

An important stated objective of the Master Plan is to achieve a complementary interface between tourism and recreational areas, residential districts, industry, the port and Canal.

Another objective of the PSMP is to reduce residential densities in the existing city by the year 2000, and to accommodate most of the population in the new development areas southwest of the existing city. Nevertheless, due to the high cost of reclamation for physical expansion, residential densities of the order of 570 persons per hectare are planned.

Whether residential densities can be decreased, however, remains questionable. Recent feasibility studies have indicated, for example, that urban land reclamation may exceed PSMP estimates. Thus, maximum feasible densities must be maintained.

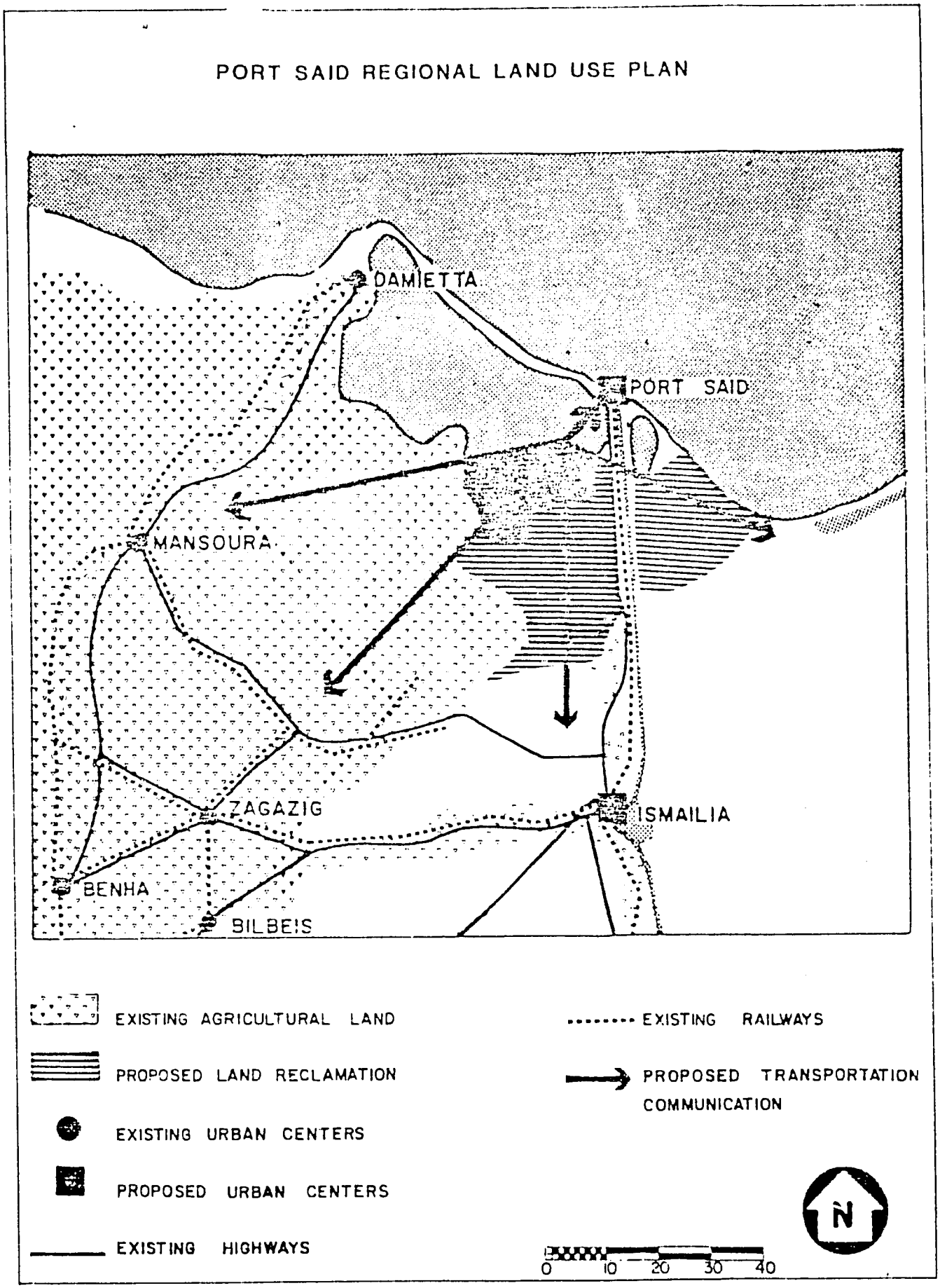
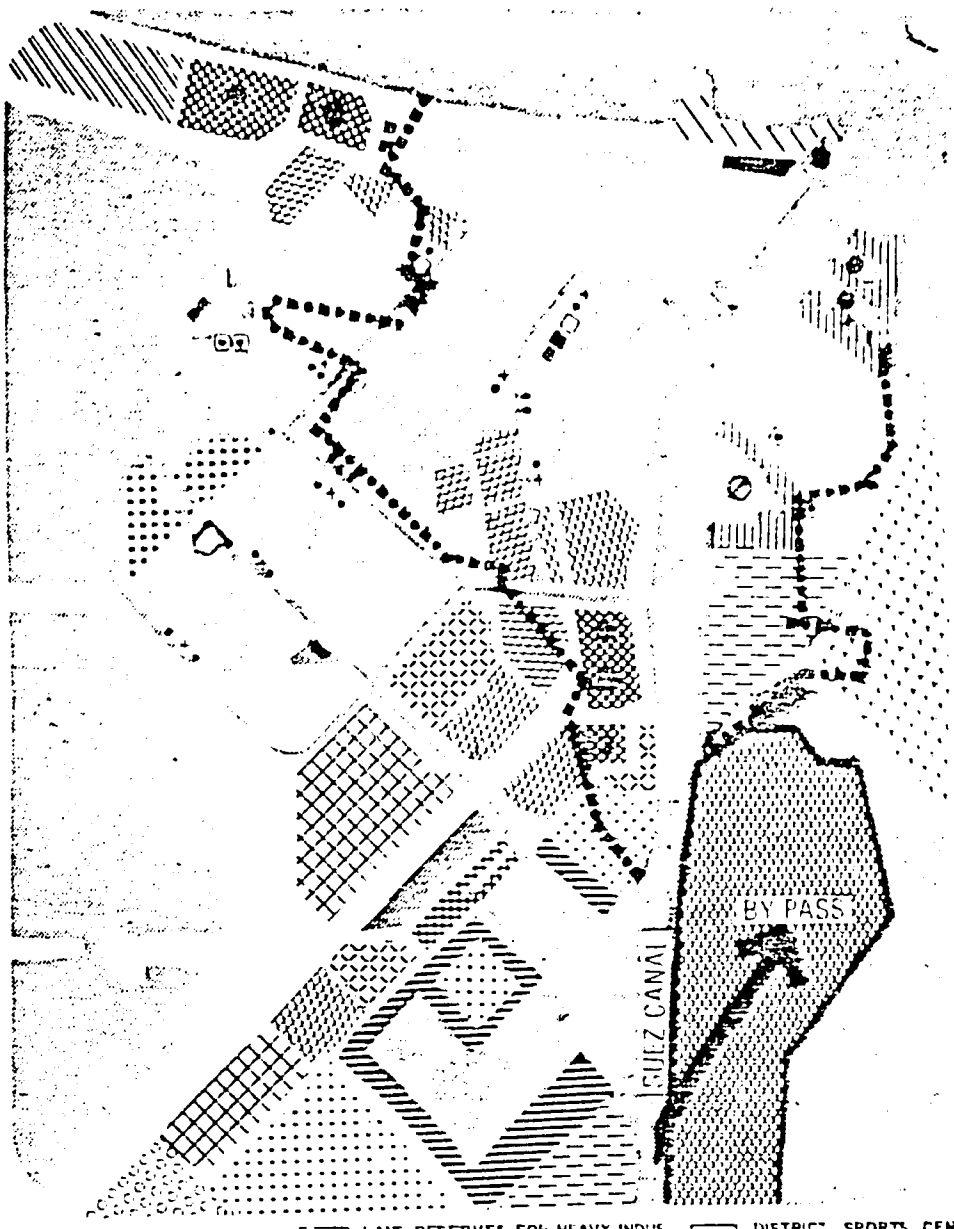

PORT SAID REGIONAL LAND USE PLAN
DAMIETTA
PORT SAID
MANSOURA
ZAGAZIG
ISMAILIA
BENHA
BILBEIS
EXISTING AGRICULTURAL LAND
PROPOSED LAND RECLAMATION
EXISTING URBAN CENTERS
PROPOSED URBAN CENTERS
EXISTING HIGHWAYS
EXISTING RAILWAYS
PROPOSED TRANSPORTATION COMMUNICATION
N
0 10 20 30 40

FIGURE IV-D.1

PORT SAID LAND USE PLAN



URBAN DEVELOPMENT
CIVIC, ADMINISTRATIVE AND MAJOR COMMERCIAL USES
RESERVE FOR CIVIC AND ADMINISTRATIVE USES POST 2000
UTILITIES
TOURISM
RESERVE FOR FUTURE TOURISM
FACILITIES ASSOCIATED WITH TOURISM
INDUSTRIAL ESTATES
WAREHOUSING AND STORAGE
RESERVE FOR FUTURE INDUSTRY
LAND RESERVES FOR HEAVY INDUSTRY, DEFENCE, PORT EXPANSION ETC
SALTWORKS
WATER RELATED INDUSTRIES
PORT AREA
RESERVE FOR PORT EXPANSION
TRANSPORT UNDERTAKINGS
MARGINAL LAND
AGRICULTURE
PRISON
CEMETERY
DISTRICT SPORTS CENTRE
HOSPITAL / POLYCLINIC
SECONDARY SCHOOL / HIGH EDUCATION
SEWAGE TREATMENT WORKS
WATER WORKS
MAIN ELECTRICITY SUBSTATION
SHIPYARD
FISHING HARBOURS
RAILWAY PASSENGER TERMINAL
PORT ADMINISTRATION AND MAINTENANCE

SOURCE : PROGRAMME OF RECONSTRUCTION AND DEVELOPMEN
MINISTRY OF HOUSING AND RECONSTRUCTION

0 1 2 3 KM

1978 LANDSAT URBAN EDGE

FIGURE IV-D.2

D. Infrastructure

The 1976 PSMP called for immediate improvements to the water supply system in order to increase capacity to about 84 million liters per day (Ml/d). It concluded that it may be possible to improve existing capacity to about 100 Ml/d. It also recommended that by the year 2000 capacity of the system should be increased to 300 Ml/d to support a population of 750,000.

In 1980, reconstruction efforts had brought the plant capacity up to 298 l/c/d with a surplus on the order of 70 l/c/d. NUPS proposals for Port Said are also based on these Master Plan proposals and by year the 2000 have included a standards of 381 l/c/d.

Sewerage systems at the time of the PSMP were in very poor condition due to war damage. Major improvements were recommended to upgrade the system to 75 Ml/d by 1980 and expand the system to 200 Ml/d by the year 2000. By 1980, however, the system had a capacity of only 82 l/c/d and was operating at a deficit of 161 l/c/d. NUPS investment proposals to the year 2000 are targeted to achieve the Master Plan standards of 282 l/c/d.

Major improvements of water supply and sewerage are currently underway, however, and new immediate action projects are to be in place by 1984.

Port Said is not served by the national grid for provision of electricity, but relies on diesel power plants which were expected to have a capacity of 35 MW by 1980. However, there are plans to connect Port Said to the Lower Egypt network. The 220 Kv bulk transmission line is expected by the PSMP to meet future demand until year 2000.

In 1976, Port Said had a capacity of 5,000 telephone lines, although plans were to increase the capacity by 10,000 by 1978. The PSMP expected that a capacity of 48,000 lines would be needed by the year 2000.

In 1980, Port Said had a density of 1.7 telephone lines per 100 population, significantly higher than the other canal cities. NUPS projected line density standard of 19.1 has been included in infrastructure investment provisions.

E. Investment

In Table IV-D.2, a comparison is made between the levels of investment for residential and industrial development proposed by the Port Said Master Plan and NUPS for the period 1986-2000. It is noteworthy that the NUPS investments forecasts are significantly higher than those of the Master Plan. This may be due to unrealized investment called for by the Plan. However, the substantial investment called for by NUPS also indicates the high priority of Port Said as a "Special Emphasis City."

F. Administration

In order to facilitate implementation and administration of the Port Said Master Plan, a development corporation was proposed. In addition, a special unit for industrial development was called for by the Plan. Until recently,

TABLE IV-D.2

PORT SAID CITY

COMPARISON OF MASTER PLAN AND NUPS PROPOSED LEVELS OF INVESTMENT FOR URBAN DEVELOPMENT, MANUFACTURING AND SERVICES

(1979 COSTS IN L.E. MILLIONS)

	PSMP 1976-1980	PSMP 1981-1985	PSMP 1986-1990	NUPS 1986-1990	PSMP 1991-2000	NUPS 1991-2000	TOTAL 1986-2000 PSMP	TOTAL 1986-2000 NUPS
Urban Development[1]	375	279	221	421.8	473	669.3	694	1,091.1
Industry (manufacturing and services)	105	122	151	179	228	626	379	805

1 Includes land reclamation in, housing, physical and social infrastructure. NUPS costs at modified standard, see chapter IV.

SOURCE: NUPS and PSMP figures.

however, all planning and implementation has been the responsibility of the Planning Department at the Governorate with the exception of those activities carried out by the Port Said Free Zone Authority and Suez Canal Authority.

Recently, however, a land development agency was created under the auspices of the Governorate. The agency, a quasi-autonomous unit, is to have the primary responsibility of implementing and administering future development of Port Said. It is to work closely with government functions to bring urban development under control through the acquisition or reclamation of land, the provision of services and the sale or lease of land, as required.

NOTES

APPENDIX IV-D

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT - PORT SAID

1 *According to a special census conducted in 1980, Port Said had a population of 345,000, as its population was on the order of 263,000 in 1976. (According to the last census) Port Said grew at an annual rate of about 6.8 percent between 1976 and 1980.*

2 *As Lake Manzalla has been a productive lake for fishing and habitat for wildlife, the environmental impact of reclaiming large areas of it for urban and agricultural development was considered a possible constraint by both the Ismailia and Port Said Master Plan Studies. Both Studies recommended studies in this regard.*

APPENDIX IV-E

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT

ISMAILIA

APPENDIX IV-E

SPECIAL EMPHASIS CITIES CITIES FOR GROWTH ENCOURAGEMENT — ISMAILIA

I. GENERAL

Like the other canal cities, Ismailia owes its livelihood to the Suez Canal. Ismailia is situated approximately midway between Port Said and Suez and is well connected to Cairo, Zagazig, and the eastern Delta by road, rail and waterways. Access to the Sinai is presently limited, although a ferry crossing exists at Qantara and a tunnel was recently constructed in the vicinity of Suez.

Environmentally, Ismailia enjoys amenities afforded by Lake Timsah, the Great Bitter Lake, and reclaimed arable areas along the Ismailia or Sweetwater Canal. These, coupled with spacious planted areas and green space within city boundaries, and the high quality of many residential districts, has provided Ismailia with a unique and attractive setting for urban development. Unlike Port Said, which is essentially land locked, Ismailia has a good deal of potential for horizontal expansion in desert areas to the west, north and south. Eastern growth beyond the Suez Canal, however, may also be feasible in the long-term. Ismailia's quality of environment, locational advantages, and opportunities for expansion made it an initial candidate as a major metropolitan countermagnet by the National Urban Policy Study. However, the Ismailia Master Plan noted that as Ismailia's economy is highly service oriented and environmental conditions preclude development of heavy industry, its potential as major competitor to Cairo and Alexandria for urban migrants was ruled out by NUPS in favor of Suez. Nevertheless, Ismailia does have significant development potential as a service center and social development pole for the Canal Region and Eastern Delta.

II. POPULATION

Between 1917 and 1966, Ismailia was a net receiver of migrants. Furthermore, during the periods 1947-1960 and 1960-1966, Ismailia grew at annual growth rates of 6.5 and 4 percent, respectively, indicating regular and sustained growth. During the evacuation of the canal region, a significant proportion of Ismailia's population took up residence in the Eastern Delta Governorates.[1]

Evacuees began to return to Ismailia in January 1974 and by December approximately 132,000 had returned. According to the Ismailia Master Plan, the city had regained a population of 175,000 by 1975. However, census data for 1976 indicated an urban population of only 147,000.

The IMP projected future urban populations for the benchmark years of 1980, 1985, 1990 and 2000 of 218,000, 275,000, 356,000, and 560,000, respectively. If the estimated 1975 population of 175,000 was used as a base year, the average annual projected growth rate for the period 1975-2000 would have to be 4.8 percent. However, if the actual 1976 population of 147,000 is used as the base year, the implied growth rate between 1976-2000 would be on the order of 5.7 percent per annum.

The National Urban Policy Study anticipates a year 2000 population in Ismailia ranging between 400,000 and 500,000. It is noteworthy that the anticipated 1976-2000 range in growth rates of 4.3 to 5.2 percent per annum are consistent with that of the IMP study when the 1975 population base is applied.

In addition to major urban growth in Ismailia City, the IMP projected major population growth in its agricultural hinterland, a large part of which is currently being reclaimed. A hierarchy of towns and villages ranging from regional subcenters, market service towns, and villages were planned for expansion or new town development. The IMP estimated that the population in these new or expanded settlements could be increased (from 43,000 in 1978 to 211,000 by the year 2000). In addition, the IMP anticipated population increases in existing (1975) agricultural areas and newly reclaimed areas of 220,000 and 263,000, respectively. Thus, the total population of the IMP study area, excluding Ismailia city, was expected to reach 694,000 by the year 2000.

Since then, the Ministry of Development has indicated that it expects at least 500,000 in these areas by the year 2000.[2] However, to date, no status reports on these developments are available.

III. DEVELOPMENT

The development potential of Ismailia is primarily a function of its locational advantages vis-a-vis the Suez Canal, Delta, Sinai and its agricultural hinterland. No major natural resources can be exploited in the region other than tourism. Yet, the opportunities for land reclamation are significant. The IMP estimated that up to 450,000 feddans (189,000 hectares) could potentially be reclaimed.[3]

The Ismailia area also has a strong infrastructure base and is well connected to both regional and national networks. For example, since the IMP was completed, road linkages to Cairo and Suez have been substantially upgraded and no increase in capacity is deemed necessary until after the year 2000.[4]

Ismailia is the seat of the Suez Canal Authority and the site of the Canal University which was created in 1974 — these functions, in part, led the IMP to propose Ismailia as an enhanced regional commercial, administrative and services center.

IV. DEVELOPMENT CONSTRAINTS

Ismailia's development will depend upon the availability and appropriate mix of investment to suit its specific needs. However, assuming peace continues to reign in the region, there are no major constraints to its development. However, as pointed out previously, environmental considerations rule out the development of heavy industry in the region, although light manufacturing and agro-related industries are appropriate.

Furthermore, although there are sufficient opportunities for urban expansion of Ismailia, there is a crucial need to harmonize or interface competing demands for agriculture, tourism, urban development, military, infrastructure, and canal functions. Presently, for example, a large military establishment to the west of Ismailia blocks possible growth in that direction.

Another possible development constraint for Ismailia is the supply of bulk water. Currently, the Ismailia or Sweetwater Canal supplies potable water to all of the Canal cities, some eastern Delta settlements, and ongoing reclamation projects in the region. Increased demand in new irrigated areas, new communities northeast of Cairo and in Ismailia's hinterland could conceivably pose a development constraint in the latter part of the century, particularly in light of possible national deficits in the Nile carrying capacity.[5]

V. INDUSTRY

As Ismailia's economy is primarily service oriented, there are few large or small-scale industries. Industrial employment in 1980 only constituted about 12 percent of total urban employment. Those large industries that exist are involved in food processing, the manufacture of electrical equipment and clay tiles. Small-scale industries in Ismailia include furniture-making, wearing apparel and steel fabrication.

Planned investments, furthermore, for the manufacture of dairy products, food canning, and metallics in the 1980-1984 industrial investment plan will not alter Ismailia's employment mix. Only about 860 jobs will be created.

However, continued exploitation of Ismailia's potential agricultural hinterland can be expected to expand its agro-industrial based activities

and provide additional industrial employment. Futhermore, during the NUPS planning horizon, increasing constraints on industrial development in the Delta will work in Ismailia's favor. Emphasis on production of goods for local consumption to meet its expanding population should also help in this regard.

VI. MASTER PLAN PROPOSALS

A. Main Elements

The main elements of the Ismailia Master Plan's strategy for economic development were concerned with the development and settlement of its agricultural hinterland and expansion of its service, commercial and industrial (light manufacturing) sectors. In essence these include:

- Reclamation and settlement of approximately 450,000 feddans (189,000 hectares) including infrastructure networks primarily in the Salhia district north of the Ismailia/Belbeis Road. Possible development areas on the west bank of the Canal were also identified, but not suggested for reclamation until after year 2000.

- Industrial development including light manufacturing, agro-industries, transportation, and small workshops and the expansion of industries already in place.

- Regional services for the Canal region and eastern Delta and agricultural hinterland.

The proposed strategy is designed to increase Ismailia's potential as a regional center for these activities, emphasizing the need for economic return on investments.

B. Employment

For the purpose of illustrating progress in meeting employment targets and differences in goals between the IMP and the NUPS studies, comparable employment projections and 1980 realized employment are presented in Table IV-E.1. Although NUPS estimates only include employment projections for mining, manufacturing, and services only, it is noteworthy that they are more ambitious than the IMP projections.

C. Physical Development (Ismailia Region)

Suggested physical development of the Ismailia region by the IMP includes the development and settlement of existing and newly reclaimed areas in a hierarchy of settlements illustrated in Figure IV-E.1. Tourism development was also suggested along the shores of Lake Timsah and the Great Bitter Lake.

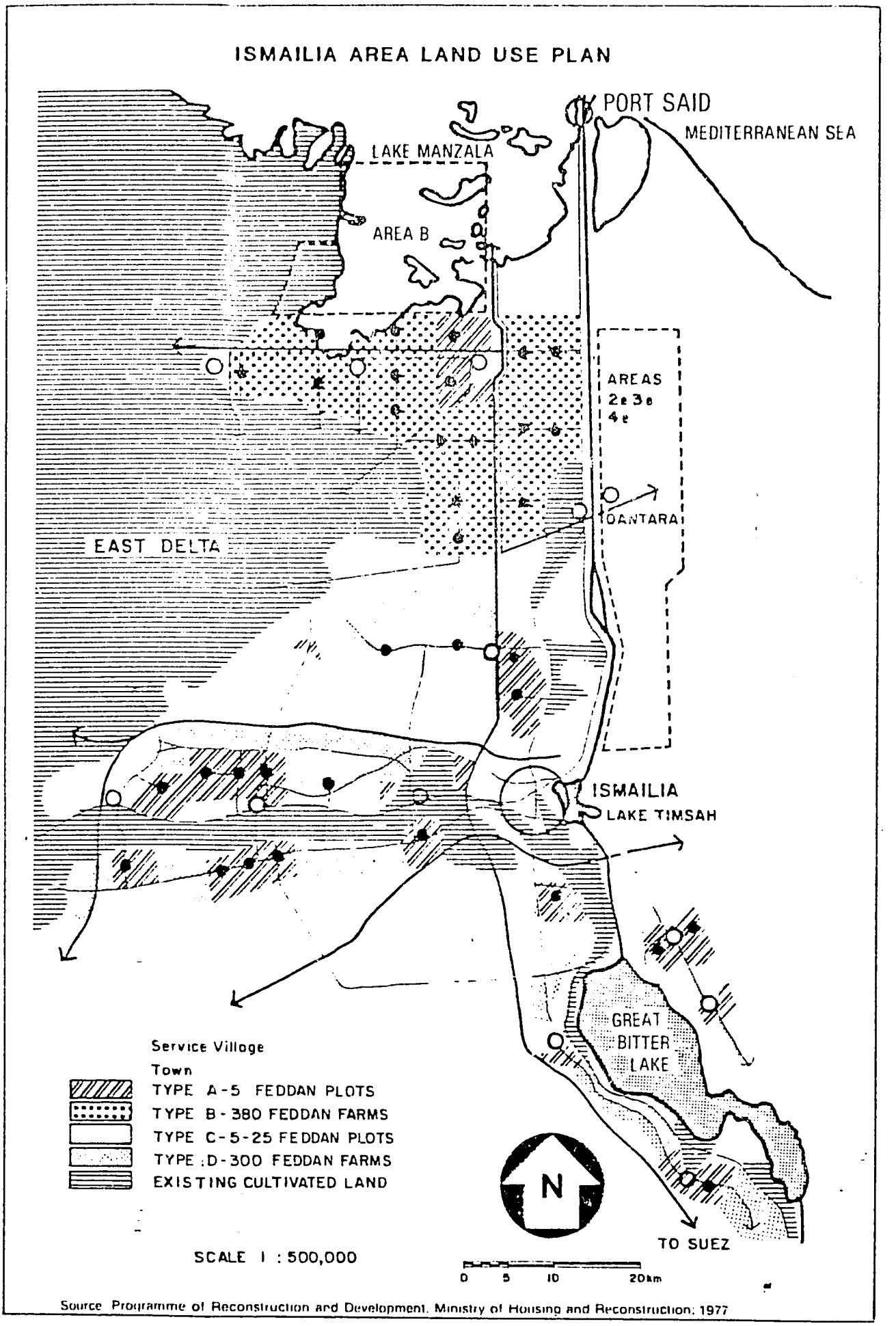
TABLE IV-E.1

IMP EMPLOYMENT PROJECTIONS COMPARED 1975-2000

COMPARED TO EMPLOYMENT STRUCTURE - 1980 AND NUPS INDUSTRIAL EMPLOYMENT PROJECTIONS

		IMP	Actual	IMP		NUPS	IMP	NUPS	IMP	NUPS
	1975	1980	1980	1985	1990	1990	1995	1995	2000	2000
NON BASIC										
Construction	4,500	6,700	-	8,800	11,500	-	15,000	-	20,000	-
Public Utilities	700	800	1,056	1,000	1,500	-	1,900	-	2,500	-
Transport	6,800	7,900	10,090	9,000	11,000	-	13,800	-	17,000	-
Commerce and Trade	6,000	6,900	6,248	8,700	11,900	-	16,100	-	21,300	-
Other Services	10,700	13,100	17,277	16,100	21,700	-	28,900	-	37,900	-
SUB TOTAL A	28,700	35,400	34,671	43,600	57,600	-	75,700	-	98,700	-
BASIC										
Agriculture	-	1,000	-	1,000	1,000	-	1,000	-	1,000	-
Manufacturing	-	5,900	4,670	8,300	12,000	-	16,300	-	23,000	-
Basic Services	-	18,600	-	16,400	34,400	-	39,600	-	46,200	-
SUB TOTAL B	NA	25,500	4,670	25,700	47,400	108,000	56,900	143,000	70,200	197,000
TOTAL A+B	28,700	60,900	39,341	69,300	105,000	108,000	132,600	143,000	168,900	197,000

SOURCE: NUPS and IMP figures.



Source Programme of Reconstruction and Development, Ministry of Housing and Reconstruction; 1977

FIGURE IV-E.1

Ismailia is to be the principal regional center in the area with regional centers in Qassassin (currently a thriving village) and Bahr El Bakr (a new settlement). In the planning horizon, development of the area is to be restricted to the west bank of the Suez Canal. However, after the year 2000, development is also to occur in the Sinai.

To support the proposed regional development plan, the IMP proposed a wide range of national and regional infrastructure improvements. However, new and improved road and rail linkages constitute the most important of these. Principal transportation recommendations included:

- Four lane highways between Ismailia, Port Said, Zagazig (a new Northern route) Cairo, and Suez.

- New railway line 10 km west of the Suez Canal between Cairo and Suez via Fayid. Improvement of the Ismailia/Zagazig line (Branch lines not linking major settlement are to be abandoned); tunnels linking the study area and the Sinai.

D. Physical Development -- Ismailia City

Three axes of growth have been adopted by the Ismailia City Master Plan: northeast, west and south. The Plan adopted is in the form of a "C" centered around Lake Timsah and incorporating existing green areas to retain the city's current character. The Plan calls for the creation of two major centers in addition to the existing center: a primary center to the west and a secondary center to the south. In addition, four smaller local centers are planned. The structure plan for future urban development is illustrated in Figure IV-E.2 Residential development is to occur around the Lake Timsah basin to the north and south primarily. A large industrial estate for light manufacturing has been proposed to the west near the suggested primary center and in proximity to national and regional communication stations. Other sites for small-scale manufacturing and workshops are to be distributed about the city. The suggested secondary center to the south is to accommodate newly created service establishments such as administration and commerce.

The Canal University Campus has been located to the north. Other social services are to be distributed within the urban area as are open space and recreational facilities. Particular emphasis for the latter has been given to Lake Timsah.

The urban area is to be encircled by motorways to the north, west and south. These are part of the regional network. A major multimodal interchange is to be located in proximity to the new primary center to the west. Other interchanges are also proposed on arterial streets which lead towards Lake Timsah. Transportation proposals of the Master Plan emphasize the use of public transport in favor of private vehicles. A rapid bus system is to link all central and industrial areas with residential districts, while concentric secondary roads form the basis for residential development.

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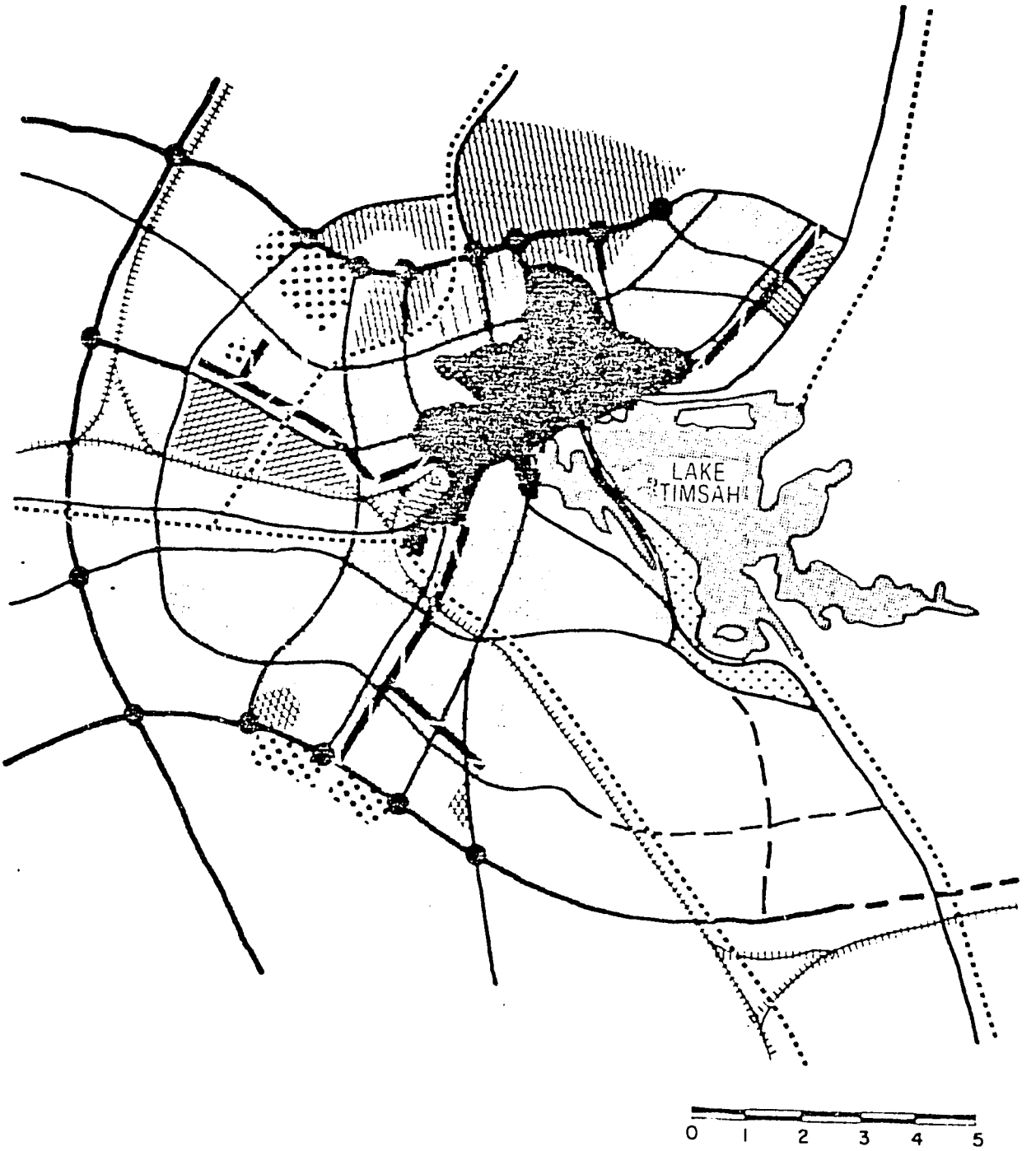
ISMAILIA CITY LAND USE PLAN



GENERAL URBAN AREA
AGRICULTURE
EDUCATION
CEMETERY
TOURISM
EXISTING AREA (1978)
INDUSTRY
RAPID TRANSIT
N

SOURCE PROGRAMME OF RECONSTRUCTION AND DEVELOPMENT
MINISTRY OF HOUSING AND RECONSTRUCTION

FIGURE IV-E.2

E. Infrastructure

At the time the Ismailia Master Plan was conducted in 1975-1976, major improvement and expansion of infrastructure systems were required. About 75 percent of households were connected to piped water but the IMP noted that the system was in poor condition and should be phased out over the planning period. The water supply plant had a capacity of 32,000 m^3 per day at the time but ongoing construction of a new plant with a capacity of 84,000 m^3 per day was expected to cover future demand until 1985.

By 1980, after construction of the plant, it had a capacity of 219 l/c/d and an excess capacity of 14 l/c/d.

The IMP recommended that the sewerage system put an end to discharges in Lake Timsah and the construction in the short-term of oxidation ponds. The study recommended that the current system be kept in operation but that a new system be developed for new development areas. In 1980, the sewerage system only had a capacity of 141 l/c/d and was operating at a deficit of 78 l/c/d.

With the assistance of USAID, technical studies have been completed to repair and expand water supply and sewerage systems in the Canal cities. Implementation is expected by 1983-1984. NUPS proposals for water and sewerage are based on these Master Plan standards, i.e., 381 l/c/d and 275 l/c/d, respectively.

The IMP also recommended the addition of 5 new substations with two double circuit line connections to the existing electricity system. Currently USAID and the Egyptian Electricity Authority are building a 300 MW power station to supply power for Ismailia and the National Grid. The plant is due to be commissioned in 1983.

Telecommunications was viewed by the IMP as essential to Ismailia's development as an important regional center for administration, commerce and services. In 1975, the IMP noted the need for a capacity of 4,000 lines and recommended at least 20,000 additional lines by the year 2000. In 1980, however, Ismailia's telephone line density was only 0.97 per 100 population or 1,900 lines -- considerably lower than the other Canal cities. NUPS has recommended that line densities be increased to 15.8 lines per 100 population by the year 2000. These recommendations are included in infrastructure investment cost.

F. Investment (Urban Development and Industry)

In Table IV-E.2, comparison is made between the levels of investment for residential and industrial development of the IMP and NUPS for the period 1986-2000. It is noteworthy that the NUPS investment forecasts are significantly higher than those of the IMP. This is partly due to the fact that initial IMP investments have not been realized. However, the NUPS estimates also indicate the level of priority assigned to Ismailia as a "Special Emphasis City."

TABLE IV-E.2

COMPARISON OF IMP PLANNED INVESTMENTS WITH THOSE OF NUPS FOR HOUSING, PHYSICAL AND SOCIAL INFRASTRUCTURE AND MANUFACTURING AND SERVICES

(INVESTMENT IN L.E. MILLIONS)

	IMP 1975-1980	IMP 1981-1985	IMP 1986-1990	NUPS 1986-1990	IMP 1990-2000	NUPS 1990-2000	TOTAL[1] 1985-2000 IMP	TOTAL[1] 1985-2000 NUPS
Housing	33.9	50	48.6	67.6	187	173.3	235.6	240.9
Physical Infrastructure	-	-	-	172.7	-	286.5	171.0	459.2
Social Infrastructure	-	-	-	70.4	-	176.0	91.8	246.4
Manufacturing and Services	-	-	-	161.0	-	629.0	118.5	790.0

[1] Except for the 1985-2000 figures, IMP estimates are not comparable to NUPS estimates and thus have not been included in the "total" column.

SOURCE: NUPS and IMP figures.

G. Administration

As was the case for Port Said, the Ismailia Master Plan called for the creation of a development corporation to implement and administer its proposals. However, until recently all planning and administration has been handled by the Governorate and the Ismailia Planning Department. The recent creation of a quasi autonomous land development agency under the auspices of the Ismailia Governorate aims at bringing land development under control in accordance with Master Plan objectives. To date, the Ismailia land development agency has funtioned the longest. It has benefitted from availability of well located governorate land already partially developed. Major improvements to project areas are underway and local support of the agency has been reasonably good.

NOTES

APPENDIX IV-E

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT - ISMAILIA

1 *Presumably ties were established with the Eastern Delta Governorates which will enhance the development potential of the entire region.*

2 *Program of Reconstruction and Development, Ministry of Housing and Reconstruction, March 1977.*

3 *Planned reclamation by the year 2000 in the Governorates of Ismailia, Sharkia and Sinai, all of which form part of the Ismailia Study area, include 19,000, 592,000 and 735,000 feddans, respectively. Resource: W. Weidemann, "Effect of Urbanization on the Agricultural Resource Base Status and Future Expectations," NUPS Working Paper, 1980, p. 28, Table 6.*

4 *National Transportation Investment Plan, NEDECO.*

5 *K.E. Haynes and D. Whittington, "International Management of the Nile - Stage Three," Geographical Review 71: 1981, 17-32; G. Guariso, K.E. Haynes, D. Whittington and Younis, "Energy, Agriculture and Water: A Multi-Objective Planning Analysis," Environment and Planning, A12, 1980, 369-79.*

APPENDIX IV-F

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT

ASSIUT

APPENDIX IV-F

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT -- ASSIUT

I. GENERAL

The city of Assiut is one of the oldest continually inhabited settlements in the world, having been established about 3,000 years ago. In the past century, Assiut was an important trading center with the Sudan and a prosperous textiles center. However, due to a loss of Sudanese trade and later dominance by the European textiles industries, Assiut declined.

The installation of the Nile barrage at Assiut which regulates irrigation in middle Egypt and feeds the Ibrahimiya Canal brought large areas under cultivation in the early 1900's and enhanced Assiut's function as a regional agricultural service center. The existence of long standing social and educational facilities in Assiut were further strengthened by the introduction of Assiut University in 1957 which has expanded into a major university comprising several faculties and 30,000 students. In addition, a branch of El Azhar University was recently established in Assiut.

Other recent developments in Assiut include the introduction of fertilizer and pharmaceutical industries to diversify its traditional agro-industrial base.

II. POPULATION

The population in Assiut Governorate is predominantly rural with the city of Assiut as the only major settlement in the Governorate. The Governorate had a population of about 1.7 million in 1976, of which only 21.8 percent was urban: 12.6 percent in Assiut alone with a population of 214,000. Assiut's population in 1980 is estimated at approximately 243,000.

During the period 1960-1976 the urban population of Assiut Governorate increased at a growth rate of 3.08 percent per annum (36.7 percent of the net increase being attributed to net in-migration). Assiut city, on the other hand, grew at a rate of 3.29 percent per annum during the same period; a major urban growth rate in Upper Egypt which was exceeded only by those of Luxor and Aswan between 1960 and 1976.

During the 1971-1976 period, the percentage of recent urban migrants from Assiut Governorate to Cairo, Suez, Alexandria and Port Said was about 3.7 percent of its total urban population.

III. DEVELOPMENT POTENTIAL

As Assiut Governorate is predominantly rural with a large base of cultivatable land (about 393,000 feddans or 165,000 hectares), its economic development has been primarily associated with agriculture and related products. Assiut City, the Governorate capital and its principal market and service center, is the largest settlement in Upper Egypt and is the unofficial cultural and social "capital" as well. Given these characteristics, Assiut City has considerable potential as an expanded social development pole for Upper Egypt and an industrial center for local and regional goods consumption. Thus, NUPS has selected Assiut as a special emphasis settlement to which higher levels of investment should be targeted to induce population growth. The NUPS year 2000 population targets for Assiut City is 600,000.

Currently, Assiut Governorate is a net importer of goods for local consumption. Despite the size of its local market, it does not have a sufficiently large industrial base to produce goods for its own needs. Thus, recent Government emphasis on food sufficiency and decentralization should, through increased investment, be geared to strengthen Assiut's industrial base.

In addition, Assiut is located approximately mid-way between Cairo and Aswan and has direct access to the New Valley. As a consequence, it has distinct locational advantages as a regional production and distribution center. It also has a strong regional infrastructure base with good access to markets in Upper Egypt and Cairo.

According to the Assiut Governorate, large quantities of marble, alabaster, shale, kaoline and building materials also exist in the Governorate which could be exploited.

IV. DEVELOPMENT CONSTRAINTS

The principal constraint for development of Assiut City and its region will be the difficulty in attracting private industrial investment. As a consequence, initial industrial investment will be predominantly public in nature, while assistance is given for the mobilization of private investment locally.

Currently, although Assiut enjoys an adequate level of regional infrastructure, its water and sewer utilities need considerable upgrading and expansion. However, as plans are underway for these improvements, they are not viewed as a primary development constraint in the planning period.

Physically, the development of Assiut City is constrained by prime arable land and the western desert plateau which forms a barrier to expansion. However, to the northwest about 5 kilometers from Assiut, possible development in a relatively flat desert plain with good access to regional infrastructure can occur. This area has been designated as the principal urban growth area for Assiut and was the subject of the El Shams New Town Study in 1980. (Figure IV-F.1)

Other potential desert areas, adjacent to the Nile Valley, were designated for possible residential and industrial development in the Assiut Regional Plan which was conducted in 1974. Although in the planning horizon, it is recommended that investment resources be concentrated in the Assiut expansion area in order to promote agglomeration economics and efficiencies in investment.

V. ASSIUT CITY (CURRENT STATUS)

A. Physical Characteristics

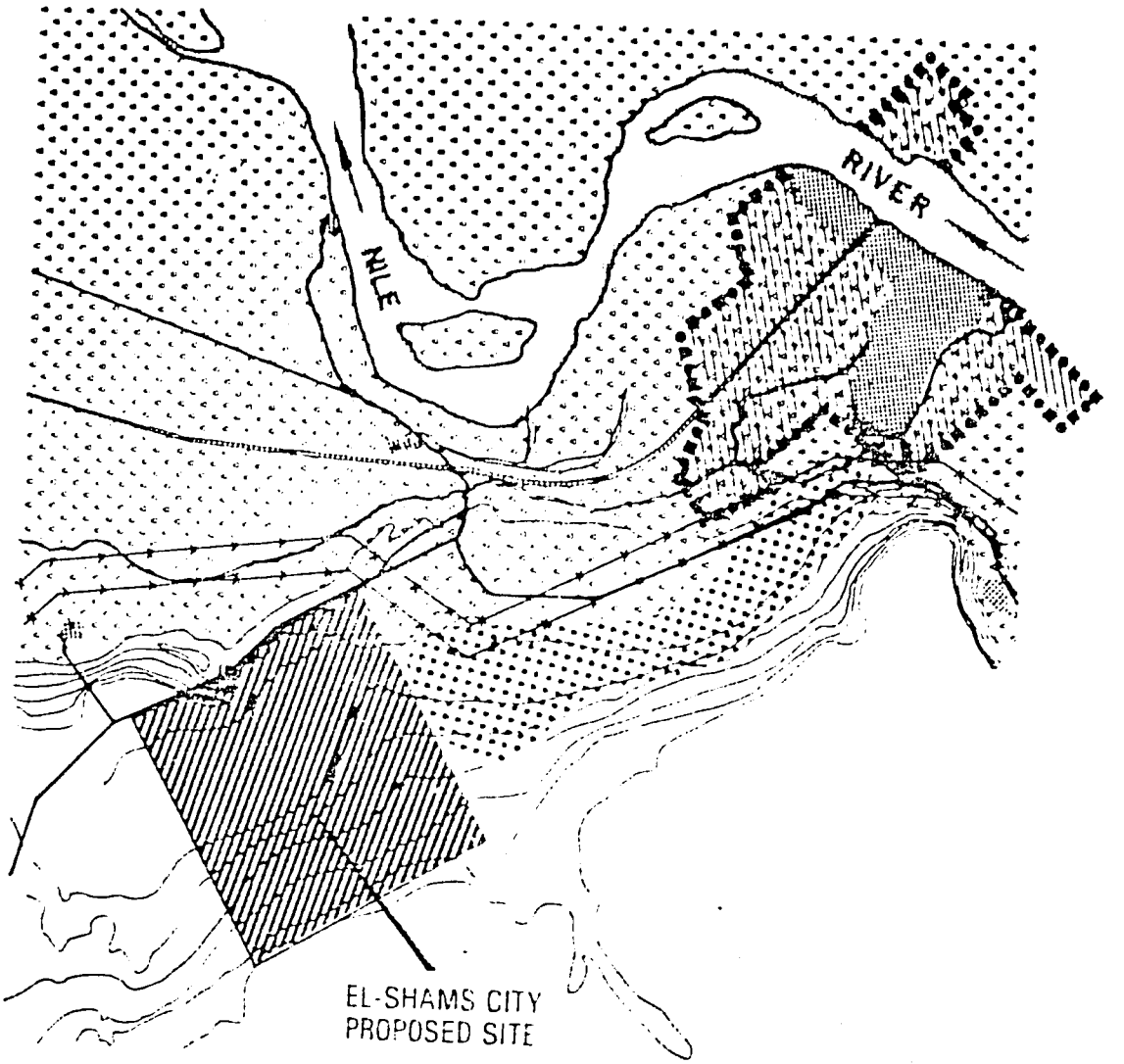
Physically, Assiut is composed of two distinct parts: the old historic city and the modern town to the east which was begun in the mid-1800's. Both parts of the city have been constructed upon agricultural land including relatively recent extensions such as the University of Assiut, El Azhar Univesity, and the new industrial area along the Nile. (Figure IV-F.2)

The old part of the city houses a population on the order of 60,000, with densities of about 800 persons per hectare. The remainder of Assiut's population is located in the modern city between the old city and the Nile and opposite the Ibrahimiya Canal. In 1976, Assiut had a population of 214,000 and an overall gross density, within city boundaries, of 220 persons; the medium high urban density range as defined by NUPS. Most of the potential for population absorbtion and development within city boundaries is in the new industrial zone. To date, the area is composed mainly of one- and two-storey structures consisting of dwelling units, small shops and industry. Given the large areas occupied by the universities and Girls College within urban boundaries, it is unlikely that higher densities can be achieved in other parts of the city.

B. Infrastructure

Building permit data from the Assiut Governorate indicate that formal sector residential permits have been increasing at an annual growth rate of 6 percent since 1977. This would appear to indicate that formal housing starts are keeping pace with household formation and that informal housing

ASSIUT URBAN EXTENSION AREAS



AGRICULTURE

ASSIUT CITY (Circa 1940)

PROPOSED ASSIUT EXTENSION

POSSIBLE LINEAR EXTENSION

MAIN HIGHWAY

OVERHEAD ELECTRICAL LINES

1978 LANDSAT URBAN EDGE

N

0 1 2 3 km

NOTE: AGRICULTURAL LAND LOST TO URBANIZATION (1940-1978)
SOURCE: EL-SHAMS CITY ASSIUT, EGYPT NEW TOWNPLAN (1980-2000)

FIGURE IV-F.1

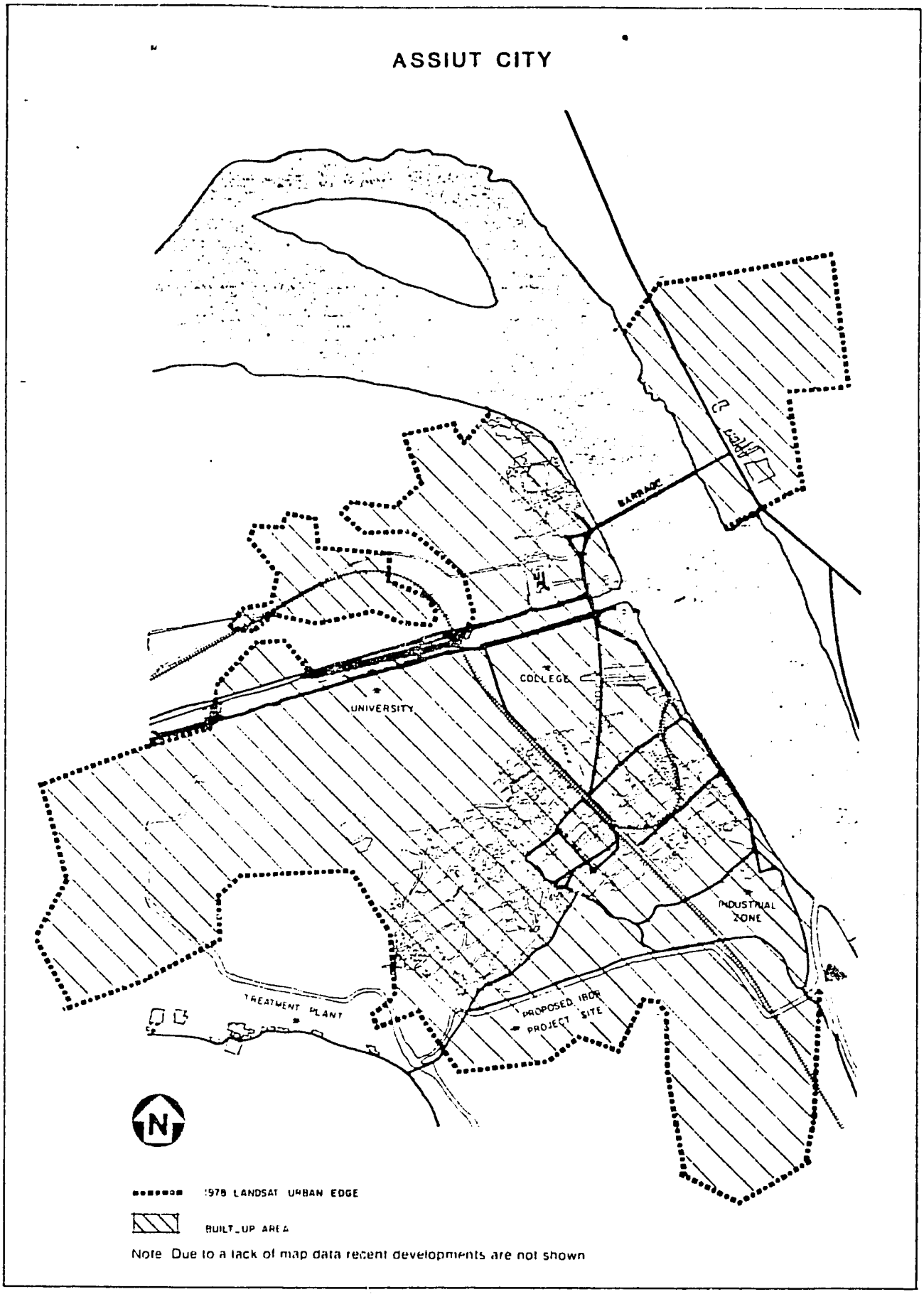

ASSIUT CITY
BARRAGE
COLLEGE
UNIVERSITY
INDUSTRIAL ZONE
TREATMENT PLANT
PROPOSED IBOR PROJECT SITE
N
1978 LANDSAT URBAN EDGE
BUILT_UP AREA
Note Due to a lack of map data recent developments are not shown

FIGURE IV-F.2

in Assiut is on a smaller scale than most other Egyptian cities (about two-thirds of housing starts). Although levels of infrastructure in Assiut are generally higher than other settlements in Upper Egypt, upgrading and improved levels of service are required, particularly for water, sewage and public transport systems. According to Governorate data, and using its estimated 1980 population of 243,000 as a base, the current water supply system has a plant capacity of 202 l/c/d and is operating at a deficit of about 9 l/c/d.[2] System losses are estimated at 50 percent. The sewerage system is still more inadequate. In 1980, it had a capacity of only 41 l/c/d and was operating at a deficit of 85.6 l/c/d. In addition, according to the IBRD, the treatment plant is inoperational and raw sewage from the plant is being used for irrigation, thus, posing a serious health hazard.

The number of inter- and intra-urban buses for public transport in Assiut is extremely limited; about .048 per 1,000 population in 1980. These standards are considerably lower than other settlements designated for growth emphasis (range: 0.17-0.2 per 1,000 population). NUPS, for example, has recommended a standard of 0.12 buses per 1,000 population in Assiut.

Telecommunications standards in Assiut City in 1980 were on the order of 1.4 lines per 100 population compared to the national urban average of 2.1 per 100. NUPS has recommended an improved standard of 9.7 per 100.

Social infrastructure standards in Assiut are generally adequate due to the presence of the university and a major medical facility. The ratio of 4.78 beds per 1,000 population,[3] for example, exceeds current ratios in other cities designated for special emphasis. This higher standard results from the region serving functions of Assiut's university hospital and its other health facilities.

Education standards, on the other hand, could use some improvement. According to Governorate data, the ratio of students per classroom in primary and preparatory, and general secondary schools in 1980 is 41.40, and 39, respectively. These figure are higher than the national urban average of about 35 students per classroom for these facilities.

A number of schemes are in progress which will improve the general level of infrastructure in Assiut. Recently, the IBRD agreed to finance an urban development project for the urgent repair and possible extensions to water supply and sewerage systems as well as the preparation of broad technical master plans. Staff training for project implementation, administration and maintenance were also included in the proposed program. In addition, a low income housing project and workshop area, south of the El Mallah Canal (on agricultural land) to house 14,000 is planned. Although these projects are as yet unimplemented, detailed technical studies are underway.

The standards of the proposed IBRD low income settlement contrast sharply with those of the proposed El Shams New Town discussed in the following Section IV. The IBRD project is aimed well below the median income level at an average cost per household of L.E. 1,460 (in 1980 prices).[4] The project is to consist of serviced plots ranging between 47-72 m^2 with utility cores and perimeter walls constructed only. Housing construction is

to take place on a self-help basis with building materials supplied for initial core-house units. In addition to community facilities, small industrial areas are to be provided.

C. Industry

The industrial employment structure in Assiut primarily revolves around the textile industry which constitutes 45 percent of industrial employment. Recently, Assiut's industrial base has been diversified from its traditional agro-based structure to include fertilizer and pharmaceutical industries. These now account for about 20 percent of Assiut's 1980 industrial employment.

Small-scale industries in Assiut account for 33 percent of industrial employment.

The 1980-1984 industrial investment plan will do little to improve Assiut's current industrial base: only L.E. 1.7 million is allocated for the rehabilitation and expansion of the textile industry. Furthermore, only an additional 200 jobs are expected to be created.

In the future, more investment emphasis should be placed on the development of the agricultural sector in Assiut's immediate region. Agro-based industries could be expanded to include ginning of cotton, edible oils, animal feed stuffs, soaps and detergents, ready made clothes, and canning industries. Upgrading of regional transportation linkages with the New Valley could also result in further expansion of the fertilizer industry through the provision of phosphates.

VI. ASSIUT EXTENSION AREA: EL SHAMS CITY

A. General

In 1980, a plan was developed for a new town, "El Shams City," approximately 6 kilometers northwest of existing Assiut City. The site, a relatively flat desert plain approximately 16 km2 in area, is the only feasible location in proximity to Assiut for urban development without encroaching on arable land. However, the plans for the city were designed to accommodate a population of only 100,000; significantly less than the NUPS year 2000 population increase projected for Assiut (increase 1976-2000: 336,000-386,000). This would imply that the additional population would have to be accommodated either through increasing the size of El Shams City, expansion of Assiut City onto arable land or population absorption within city boundaries. Absorption within city boundaries is not feasible since this would require more than doubling the gross density of Assiut from 220 persons per hectare to 513 persons per gross hectare. This would be impossible to achieve in light of the large areas occupied by institutional facilities and the high densities existing

in some parts of the city. The old town, for example, is estimated to have a density of roughly 1,600 persons per hectare. Thus, considerable loss of arable land will occur unless a greater population is accommodated in the site of El Shams City or in desert areas between it and the existing city.

B. Objectives

The principal objectives of the El Shams development are to increase Assiut's industrial base, improve housing and service conditions, and preserve arable land through desert development.

The plan aims at accommodating 100,000 persons by the year 2000 and the development of an industrial estate. Adjacent to the site approximately 375 hectares or 890 feddans are potentially to be reclaimed for agriculture. Residential development in El Shams City has been primarily oriented towards households with larger disposable incomes, managerial and professional classes. It is expected that the majority of low income and industrial workers would commute from Assiut.

The industry suggested by the El Shams plan includes woodworking, garments, rubber tires, machine shops, metal furniture, a paper mill, shoe factory and various agro-industries. In initial periods, building and construction industries are expected to generate substantial employment.

C. Employment Projections

In Table IV-F.1a, the composition of employment by sector for Assiut in 1980 is presented. Of particular note is the relatively low level of industrial employment and high levels of employment in services and finance.

In Table IV-F.1b, employment projections for El Shams City which is to support a population of 100,000 are presented. Although the plan did not rigorously assess employment requirements, it calls for an increase in industrial and construction sector employment vis-a-vis services, in percentage terms. However, when measured in jobs per 1,000 population, increases are noted only in construction, while industrial employment is at the same level and services are at a much lower level.

In Table IV-F.1c, NUPS employment projections for mining, manufacturing and services between 1985-2000 are presented. Accordingly, the NUPS employment projections are at a significantly higher level when measured in jobs per 1,000 persons in these sectors than either the current 1980 employment mix in Assiut or that suggested by the El Shams study. This illustrates NUPS emphasis on the creation of jobs, particularly in the industrial sector and the future role of Assiut as a Special Emphasis City.

On the basis of the above analysis, it may be concluded that a re-evaluation of the El Shams study is required to provide greater opportunities for job creation. As no other site in close proximity to Assiut City can be developed without causing loss of arable land, larger areas for industrial development must be created at the El Shams site. Furthermore, due to the increase in urban population projected by NUPS, the proposed size of El Shams and its interrelation with Assiut City also need to be reassessed.

TABLE IV-F.1

1980 EMPLOYMENT DATA AND PROJECTIONS FOR ASSIUT CITY COMPARISON 1980 DATA, EL SHAMS AND NUPS PROJECTIONS

a. Comparison of Employment
Assiut 1980

SECTOR	INDUSTRY	CONSTRUCTION	TRANSPORTATION	FINANCE	SERVICES	OTHERS	TOTAL
Employment	7,292	2,828	4,430	6,812	24,374	6,452	52,188
% of Total	14.0	5.4	8.4	13.1	46.7	12.4	100.0

Total Employment: 52,188

Est. Population : 241,500

El Shams City
b. Employment Projection by Phase (Cummulative)

Sector	Phase I	Phase II	Phase III	% of Total
Manufacturing	3,015	4,560	6,030	38.5
Services	1,200	2,200	3,200	18.7
Comm. Fac.	800	1,400	200-2,500	11.9
Agriculture	400	700	800	5.4
Construction	3,000	3,000	3,000	25.5
	8,415	11,860	15,030	100.0

Total Employment: 35,305
2000 Population : 100,000

NUPS Projections for
c. Mining, Manufacturing, and Services Employment (M, Man, S)

	1986-1990	1991-1995	1996-2000	Total Change 1986-2000
Additional Employment (M,Man,S)	32,000	50,000	83,000	165,000

Total (M,Man,S) Employment: 244,000
Total Population 2000 : 600,000

Comparison for Major Sector
Employment per 1000 Population
d. Assiut 1980, El Shams and NUPS Proposals

Employment per 1000 Population

	Construction (C)	Manufacturing (M)	Services (S)	Total[4] (M+S)
Assiut (1980)[1]	11.7	30.2	147.5	189.4
El Shams 2000[2]	90.0	136.1	108.0	334.1
NUPS 2000 [3]	-	-	-	420.8

1 Assiut 1980 : Services including services, transport and finance.

2 El Shams 2000: Services including services and community facilities.

3 NUPS 2000 : Projections combined for mining, manufacturing and service only.

4 Total : Manufacturing and services employment as interpreted above. The figures for NUPS as described in footnote 3.

SOURCE: NUPS, Assuit Governorate and El Shams City data.

D. Analysis of El Shams City Proposed Costs and Standards

As the site of the proposed El Shams City is deemed the most appropriate site for urban expansion in Assiut without ensuing loss of arable land, an analysis was undertaken of the development costs and standards which were proposed. Wherever possible, NUPS proposed standards and costs for future urban development of Assiut were compared with those proposed for El Shams City. Furthermore, for social infrastructure standards, comparisons were made with GOPP recommended standards.

- Housing

  In Table IV-F.2, the distribution of dwelling units by type, income group, and average dwelling unit cost is presented as proposed for El Shams. The table also indicates the per capita costs of housing by income group and building costs per square meter. In general the average building costs per square meter of L.E. 69.5/m^2 appear correct. Informal housing in Cairo for example costs about L.E. 58 per square meter in 1979 while formal housing costs about L.E. 70 per m^2. However, the expected building costs for low income housing (L.E. 40.1/m^2) appear too low.

- The costs of housing per dwelling unit and per capita, however, are very high. This is largely due to the proposed average dwelling unit sizes per income group: the average dwelling unit size for El Shams is about 100 m^2 at a cost of L.E. 6,983 per unit and L.E. 1,512 per capita. NUPS proposals for housing standards to meet the median income households, on the other hand, are based on a dwelling unit size of 36 square meters at a per capita cost of L.E. 592 and a dwelling unit cost of L.E. 2,842.[5]

- As NUPS proposals are based on full cost recovery for housing construction, differences between the NUPS costs and those of El Shams would have to be borne in significant Government subsidy. Also, as the El Shams distribution of dwelling units is oriented towards higher income groups there, the marketability of the units and the impact the proposals would have on meeting future housing needs is questionable. It has been demonstrated in Cairo and elsewhere that the lack of adequate opportunities for low income settlement has resulted in widespread loss of arable land due to informal housing development. Therefore, unless attention is given to housing requirements for low and lower middle income households in Assiut, the same phenomenon is likely to occur.

- Physical Infrastructure

  Physical infrastructure investment as proposed by the El Shams study is presented in Table IV-F.3. Also in Table IV-F.4, a comparison of El Shams and NUPS proposals regarding standards and per capita costs for physical infrastructure are presented. In every case, the cost estimates for infrastructure elements are lower in the El Shams estimate than the NUPS proposals despite the fact that higher standards for water supply and sewerage are proposed in the former. On the other hand, El Shams standards for telecommunications (2.9 lines/100 population) are lower than the NUPS proposal and only represent a marginal improvement

TABLE IV-F.2

EL SHAMS NEW TOWN - ASSIUT
DISTRIBUTION OF DWELLING UNITS BY HOUSING TYPE AND HOUSEHOLD INCOME AND DWELLING UNIT COST

Housing Types	Income Group Low D.U	Moderate D.U	High D.U	Total D.U	Percent (%)
Core House	1,910	-	-	1,910	9.6
Farmers House	90	-	-	90	0.5
Cluster House	-	1,328	-	1,328	6.6
Town House	-	1,872	1,099	2,971	14.8
Villas	-	-	358	358	4.3
Walk up Apartment	2,800	5,600	2,606	11,006	55.0
Hi-Rise Apartment	-	-	1,837	1,837	9.2
Total Units	4,800	8,800	6,400	20,000	100.0
Percent	24 %	44 %	32 %	100 %	
Total Investment(L.E. Millions)	12.39	49.18	78.09	139.65	
Av. Unit Cost per Income Group[1]	2,580	5,588	12,200	6,983	
Population Served	21,061	40,060	31,230	92,350	
Per Capita[2] Cost (1980 costs)	588	1,228	2,500	1,512	
Cost/m^2	40.1	54.8	97.4	69.5	
Av. Dwelling Unit Size m^2	64	102	125	100.4	

1 From P.113 table 90, El Shams New Town Study 1980.

2 From P.112 table 9C, El Shams New Town Study 1980.

SOURCE: NUPS Analysis of EL Shams City Study.

TABLE IV-F.3

EL SHAMS NEW TOWN

PHYSICAL INFRASTRUCTURE INVESTMENT

INFRASTRUCTURE ELEMENT	INVESTMENT[1] L.E. (000)	PER CAPITA[2] INVESTMENT L.E.
Water Supply and Distribution	5,300	53
Sewerage	5,500	55
Electricity	5,400	54
Telecommunications	3,400	34
Transport	2,200	22
Circulation	1,530	15
Other	1,200	12
TOTAL	24,530	245

1 From Table P 119 Table 96 El Shams New Town Plan 1980.

2 Based on a population of 100,000 in El Shams City.

SOURCE: NUPS Analysis of El Shams Study.

TABLE IV-F.4

COMPARISON OF EL SHAMS CITY AND NUPS ASSIUT PER CAPITA PHYSICAL INFRASTRUCTURE COSTS AND STANDARDS (IN 1980 PRICES)

	EL SHAMS PER CAPITA COST L.E.	EL SHAMS STANDARD	NUPS[1] PER CAPITA L.E.	NUPS STANDARD
Water Supply and Distribution	53	320 l/c/d	66	300 l/c/d
Sewerage	55	256 l/c/d	70.2	180 l/c/d
Electricity	54	027/kw/pc	160	Dist.only
Telecommunications	34	2.9 lines/ 100 pop.	191	10 lines/ 100 pop.
Transport	22	NA	NA	1.2 buses/10,000
Circulation	15.3	4.1 m^2/per Capita	79	6.7 m^2/per Capita
Other	12	NA	NA	NA
TOTAL	245.3		566.2	

1 Excludes regional construction cost factors.

SOURCE: NUPA and El Shams Study.

in Assiut's current standard of (1.4 lines/100 population). Consequently, as NUPS estimates are based on recent tenders and reflect differences in regional cost variation between Assiut and Cairo, the El Shams estimates appear to be grossly undervaluated while the standards need further refinement.

- Social Infrastructure

In Tables IV-F.5 and IV-F.6, El Shams social infrastructure standards for education and health are compared with the general standards proposed by GOPP. In each case the development standards proposed by El Shams are considerably higher than those proposed by the GOPP. El Shams and NUPS per capita cost comparison for social infrastructure are presented in Table IV-F.7.

- Residential development per capita costs for housing, physical and social infrastructure for El Shams with NUPS new development standards are presented in Table IV-F.7. As pointed out previously, El Shams housing standards costs per capita far exceed those proposed by NUPS. In addition, though physical and social infrastructure costs are lower than those proposed by NUPS, development costs for infrastructure appear to be exeedingly underestimated by the El Shams Study. However, despite the low estimated costs of social and physical infrastructure for the El Shams development, its total development costs per capita exceed those of NUPS. As NUPS estimates were based on affordability of median income households and reduced government subsidy, it is expected that the El Shams would prove very costly to implement and a serious drain on government resources. It is not surprising, therefore, that no direct action has been taken for its implementation.

- Industrial Investment

The El Shams City Plan called for an average per capita investment of L.E. 1,220 million for the creation of industrial employment (L.E. 20,227 per job). However, as previously noted, the number of industrial jobs which were planned will not alter Assiut's generally low level of industrial employment. NUPS investment proposals, on the other hand, call for an investment of LE 7,978 per job and a total investment L.E. 3,408 million. On this basis, it appears that there is little correlation in the El Shams Study between the number of jobs to be created and the level of investment per job. Furthermore, the level of investment per capita suggested by the El Shams Study is lower than that required in order to provide the number of jobs needed to induce the growth of Assiut.

E. Conclusions

The El Shams City Plan needs a complete re-evaluation in terms of the population to be served, the standards employed, and the amount of employment to be created. It does not provide a suitable basis for the urban expansion of Assiut. Given these conclusions, no further analysis of land budget standards, density, and the physical plan of the El Shams City was undertaken. In essence, it may be concluded that a full master plan for the development of Assiut is required.

TABLE IV-F.5

EDUCATION STANDARDS COMPARISON OF EL SHAMS CITY AND GOPP STANDARDS (SADAT CITY)

SCHOOL	SCHOOLS/POPULATION		AREA STANDARDS (m^2 PER CAPITA)		BUILDING STANDARDS (m^2 PER CAPITA)	
	EL SHAMS	GOPP	EL SHAMS	GOPP	EL SHAMS	SADAT CITY
Primary	1/4,000	1/5,000	0.9	1.57	9.1	2.5
Preparation	1/14,000	1/16,667	0.42	0.9	5.35	4.4
Secondary	1/28,000[1]	1/33,334[1]	0.27	0.75	6.9	6.0

[1] Both of these standard are high - most standards range between 1/50000 (Sadat City) to 1/82000 Ministry of Education)

SOURCE: General Organization for Physical Planning. Department of Development and Planning and Research Studies, "Directory I. Planning of Neighborhoods."

TABLE IV-F.6

HEALTH STANDARDS

COMPARISON OF EL SHAMS CITY GOPP STANDARDS

STANDARD	FACILITY	NO FACILITIES POPULATION	AREA OF FACILITIES (m^2 PER CAPITA)	COMMENTS
GOPP	General Clinic	1/28,000	.075	Ministry of Health Standard 1/40000
El Shams	Polyclinic	1/100,000	.025	Sadat City Standard 1/250000
GOPP	Secondary Health Centre	1/56,000	.011	GOPP Standard equivalent 5.36 beds/1000
El Shams	Ambulance Centre	1/100,000	.03	
GOPP	Child Care Centre	1/28,000	.075	
El Shams	District Health Centre	1/20,000	.025	
	Neighborhood Health Centre	1/7,142	.014	

SOURCE: General Organization for Physical Planning. Department of Development and Planning and Research Studies, "Directory I. Planning of Neighborhoods."

TABLE IV-F.7

COMPARISON OF PER CAPITA

RESIDENTIAL DEVELOPMENT COSTS

EL SHAMS CITY -

NUPS NEW DEVELOPMENT PROPOSALS FOR ASSIUT

	Per Capita Costs NUPS[1]		
		NUPS	
Development	El Shams	Base Cost	Adjusted Total Cost[2]
Housing	1512	481	592
Physical Infrastructure	245.3	499	614
Social Infrastructure	386.6	439	540

1 Cost based on development in Cairo.

2 Base costs were adjusted by regional cost factors to account for higher constructions costs in different locations. See Appendix V-A.C Table V-A.22.

NOTE: Total residential development costs for the NUPS new development proposals are lower than those of El Shams. However, is noted in footnote — to table —- El Shams estimates for physical infrastructure are deemed low as the standards employed are higher than those of NUPS. NUPS standards also assume a greater private sector role in housing and public sector emphasis on physical and social infrastructure.

SOURCE: NUPS and El Shams Study.

NOTES

APPENDIX IV-F

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT - ASSIUT

1 S. Loza, "Urbanization and Internal Migration," NUPS Working Paper, Table 10, p. 25.

2 This is based on a NUPS consumption standard for 1980 governorate capitals of 211 l/c/d. See the Appendices to Chapter VI.

3 Source: Assiut Governorate Planning Department.

4 The original IBRD estimated investment of L.E. 960 per household in 1977 was upgraded by 15 percent per year to reflect likely 1980 prices. See International Bank for Reconstruction and Development, "Arab Republic of Egypt, Egypt Urban Development Project," Staff Appraisal Report, June 6, 1978. Report No. 1976-EGT.

APPENDIX IV-G

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT-ASWAN

I. GENERAL

Aswan over the millenniums has been at the frontier of Egypt Nubia and the Sudan. It has always been of importance to the nation, as the last major Nile valley settlement or outpost of Egypt, and as a source of raw materials from mineral extraction. With the construction of the first dam at the turn of the century and the High Dam less than 20 years ago, the control of Nile flooding and the increased opportunities for irrigation and energy generation afforded by their construction renewed national interest in the region and its potential for development. Unfortunately, although construction of both dams led to a build up in population and an increased level of services in the region, each growth period was followed by a much reduced rate of population growth and momentum for development in the region. In the period subsequent to the construction of the High Dam, less attention was devoted to the region predominantly because of renewed hostilities in the Middle East. Consequently, social development objectives for the nation as a whole were delayed. With the coming of peace, major development efforts were shifted to the Canal Cities for reconstruction.

II. POPULATION

As pointed out previously, in recent years with the exception of the period during construction of the High Dam, the Aswan Governorate has experienced a loss of population due to out-migration. Therefore, prospective population growth rates for Aswan Governorate and Aswan City of 5.5 and 7 percent per annum for the intercensal years of 1960-1976 are misleading. In actuality, Aswan grew at a rate of 17.5 percent per annum during the period 1960-1966 (coinciding with the construction of the Dam) and only at a rate of 1.2 percent per annum during the period 1966-1976. The Governorate population, much affected by growth in Aswan City, showed a similar falling off in population growth rates: from 5.1 percent per annum during 1960-1966 to 1.8 percent per annum during 1966-76.

In the future, as a city designated for special growth emphasis, Aswan City will be encouraged to grow from 144,400 in 1976 to about 450,000 in the year

2000: a growth rate of about 4.9 percent per annum -- considerably above the city's more recent past performance.

The High Dam Lake Integrated Regional Development Plan for the Aswan Region has much more ambitious growth targets for the city and region. According to Governorate projections, the Aswan Governorate would attain a year 2000 population of 1,419,660 while the High Dam Region alone, excluding settlement north of Aswan, would attain a population on the order of 700,000. To achieve this objective, an investment program in 1979 costs on the order of L.E. 2.3 billion for the High Dam Region alone was developed for the period 1983-1997. This figure far exceeds NUPS total projections of investment for the region. (Table IV-G.1a, b and c)

A principal objective of the High Dam Lake Study (HDLS) is to attract migrants into the study area from other parts of the country. It noted that to do so, significant urban employment opportunities and promises of higher education and skill-specific incomes are needed. The NUPS recommended strategy for the region, however, is aimed specifically at reducing out-migration -- although a need will exist to attract some specialized migrants. Given the harsh climate and remoteness of the area, however, it is unlikely that urban migrants will be attracted in large numbers at affordable incentives.

TABLE IV-G.1a
PROJECTED EMPLOYMENT BY SECTOR
(1982-2000)

(UNIT: 000 PERSONS)

	1982	1987	1992	1997	2000	INCREASE (1983-2000)
Agriculture	0.8	4.6	12.4	20.1	22.5	21.7
Fishery	7.4	8.0	8.7	9.5	10.0	2.6
Min & Manuf.	9.5	14.1	26.7	42.5	55.0	45.5
Electricity	1.0	1.1	1.4	2.1	2.5	1.5
Construction	10.1	29.4	37.2	35.7	24.0	13.9
Services	25.9	34.7	52.4	90.4	134.3	108.4
TOTAL	54.7	91.9	138.8	200.3	248.3	193.6

NOTE: Does not include parts of Aswan Governorate north of Aswan.

SOURCE: High Dam Lake Integrated Regional Development Plan.

TABLE IV-G.1b

REQUIRED INVESTMENT

(1983-1997)

(L.E. MILLION IN 1979 PRICES)

	1983-1987		1987-1997		1983-1997	
Total Investment	487	(100.0)%	1,840	(100.0)%	2,327	(100.0)%
Agriculture	176	(36.1)	290	(15.8)	466	(20.0)
Fishery	6	(1.2)	20	(1.1)	26	(1.1)
Min./Manuf.	79	(16.2)	348	(18.9)	427	(18.4)
Electricity	5	(1.0)	61	(3.3)	66	(2.8)
Trans. & Comm.	43	(8.8)	133	(7.2)	176	(7.6)
Commty. Dev.	132	(27.1)	619	(33.6)	751	(32.3)
Others	46	(9.4)	369	(20.1)	415	(17.8)
Public Investment	451	(92.6)	1,431	(77.8)	1,882	(80.9)
Private Investment	36	(7.4)	409	(22.2)	445	(19.1)

NOTE: Does not include parts of Aswan Governorate north of Aswan.

SOURCE: High Dam Lake Integrated Regional Development Plan.

TABLE IV-G.1c

NUPS EMPLOYMENT AND PROJECTIONS FOR ASWAN CITY INVESTMENT [1]

	1985-1990 CITY	1991-1995 CITY	1996-2000 CITY	1985-2000 CITY
Direct Investment	L.E.148 million	L.E.198 million	L.E.326 million	L.E. 672 million
Employment	21,000 jobs	29,000 jobs	44,000 jobs	94,000 jobs
Intra-Urban Infrastructure[2]	118 million	105.2 million	111.6 million	334.8 million
TOTAL	L.E.266 million	L.E.303.2 million	L.E.437.6 million	L.E.1006.8 million

1 Inter-urban infrastructure costs not included.

2 Estimate II standards.

SOURCE: NUPS.

III. DEVELOPMENT POTENTIAL AND CONSTRAINTS

Numerous constraints have and will continue to work against large-scale development of the Aswan region. These include the generally harsh climate, the remoteness of the area, poor quality soil and fertility conditions, possible shortage of water due to increased demands in the rest of the country and the Sudan, local health conditions and the lack of infrastructure outside of the Nile Valley and south of Aswan.

Opportunities for development, on the other hand, include expanded mineral extraction (including the Red Sea Governorate), expansion of irrigated agriculture, improved fish production through better management, tourism, and greater exploitation of energy for industrial uses as non-hydro electric generating plants are developed in the rest of the country.

According to the High Dam study, the extent of mineral resources in the High Dam Lake region has not been fully surveyed. However, they have indicated that non-metallic minerals, in particular, appear promising. Opportunities for continued mineral exploitation exist east of Aswan, in the vicinity of Allaga, and in parts of the Red Sea Governorate in proximity to Kom Ombo.

The study notes that consumption of agricultural produce on a per capita basis is currently below national levels in the Aswan Governorate. There is a general shortage of vegetables and cereals and the area is dependent upon external sources for livestock and poultry. Furthermore, efforts at agricultural land reclamation are not likely to enable the Governorate to support its future population in the planning period. The Plan notes that the economic costs of water intake and conveyance will discourage large-scale agricultural reclamation. In addition, the quality of soil in the region is poor. The study recommends selective farming of cash crops by small holders on the western shore of the High Dam Lake to begin settlement of the district. In this area, the study estimated that 150,000 feddans could be reclaimed through upland (sprinkler) and foreshore developments. The former constitutes more than 80 percent of the proposed area to be reclaimed.

Land reclamation was expected, however, to cost an average of L.E. 3,240 per feddan while foreshore development which is less sophisticated and expensive would cost an average L.E. 2,000 per feddan. However, reclamation in this area is, as yet, unplanned. Other opportunities for land reclamation north of Aswan include Esna, El Saida, El Radisia and Wadi Aca, Aswan and Kom Ombo. These areas constitute an additional 102,000 feddans which are planned for development by the year 2000.[1]

The upland reclamation projects in the High Dam Lake area are likely to prove economically infeasible (the North Salhia project, for example, reclaimed at a cost of L.E. 3,698 per feddan was deemed uneconomical).[2] Generally, reclamation has not been found to be feasible if it requires pumping beyond

20 meters of elevation. As a consequence, other planned reclamation in the Aswan Governorate will likely be cut back somewhat.

About 7,000 fishermen work the High Dam Lake (making it the Governorate's largest industry). To date, the Lake yields about 37.6 kilograms per hectare annually which is low by international standards. The High Dam Lake Study suggests that with proper management annual yields as high as 150 kilograms per hectare could be obtained. However, they note that the diminishing size in fish caught indicates that the lake is being overfished. This apparently is caused by lack of management and control, interference with spawning seasons, the use of small mesh size nets, and spoilage due to irregular hauling and storage.

They note that fisheries management and stocking are urgently required. Other needed measures include improved hauling, storage, and port facilities at Aswan, adaptation of appropriate net meshes, more regular hauling service, and the identification of new exploitable species. They recommended that a Fisheries management center for control and raising of fish seedlings be established with possible fish culture in the future.[3]

IV. INDUSTRY

The industrial base in Aswan City currently consists of a single large industry: the Kema Fertilizer plant. The plant is a heavy consumer of hydro-electric power from the High Dam, thus, its location in Aswan. However, despite its large-scale, the plant has had little impact on employment in the region. It employs only about 3,000 workers and has not resulted in much diversification other than housing and training facilities related to the plant.

The 1980-1984 Industrial Investment Plan calls for the creation of an additional 9,150 jobs in Aswan primarily in mining but also in the manufacture of shale bricks and fish processing. This will not lead to a greater diversification of industry.

Aswan's industrial base, however, could be diversified when viewed in the broader context of its surrounding region. Improved fishery management and stocking of the High Dam Lake could result in higher yields and greater opportunities for fish processing. Animal feed industries might also be established.

The expansion of the paper pulp industry at Edfu and the fibre board industry at Kom Ombo could support furniture, construction products and other paper and paper board industries. Boat building industries using ferro-cement or fibreglass could be introduced through the use of industrial products from other areas in Egypt.

The mining of quartz and silica deposits could lead to the production of glass products, while kaolinitic clays could support a whiteware ceramic industry.

In addition, limestone, marble, and granite deposits in the region could be exploited more fully to produce a wide range of products for the construction sector.

Other mining activities in the Red Sea Governorate in proximity to Kom Ombo could support the development of industries in Aswan with a need to capitalize on the availability of power and water resources. These new industries are dependent, however, upon future national demand.

In the Aswan Governorate, the temples of Abu Simbel have significant drawing power for international tourism, particularly from Europe and North America. While other local attractions such as the agreeable winter climate, the temples of Philae and Kalabsha, the High Dam and Lake could be more fully exploited.

The High Dam Lake Plan aims at providing additional hotel facilities at international standards while promoting more local tourism to the region. In addition, a tourist center in Aswan, Folklore village in Abu Simbel, and cruise boats on the High Dam Lake are proposed.

V. INFRASTRUCTURE

Inter-regional transportation networks in the Aswan Governorate are primarily limited to the Nile Valley, while most intra-urban facilities are concentrated in Aswan. Almost all transport of goods and passengers is by road, the most important of which is the National A-2 or Cairo/Aswan Road (currently being reconstructed). Other planned improvements include the construction of a road connecting Edfu/Esna/Naja El Harimila to begin in 1982 and completion of the Aswan/Abu Simbel/Wadi Haifa Road. The latter will presumably replace waterway traffic on the High Dam Lake between the Sudan and Aswan and possibly lead to some settlement on the western shore of the Lake. The road from Edfu to Maisa Alam on the Red Sea coast is in poor condition but there are no plans currently for upgrading it.

The Cairo/Aswan rail line, currently a single track is to be dualled by 1988. Other rail facilities in the Governorate are limited to narrow guage systems for the exploitation of sugar cane (near Kom Ombo). The Nile waterway, other than the High Dam Lake is relatively non-exploited. The Aswan and Abu Simbel airports are capable of accommodating B-737's.

The High Dam Lake Plan recommends inter-regional transport networks to Berenice and the New Valley to promote Aswan as a southern development pole, although these are not programmed in the National Transportation Investment Plan for the year 2000.

Other transportation improvements recommended by the study include: feeder roads for agriculture and mining, specialized port facilities for

fisheries and tourism, simple quays and access roads for fishing villages, helioports and dirt runways for emergency air access, and intra-urban improvements for Aswan (including a new bridge).

Currently, Aswan is without a sewerage system and has water supply deficits. Only 44 percent of households are connected to the system. Detailed plans, however, are being prepared to implement a sewerage system and to expand treatment and supply of potable water (to 245 l/p/d). There are two municipal plants in Aswan, the most recent of which was constructed in 1980. Private waterworks also serve the High and Low Dam colonies as well as the Airport.

A regional water supply network extends north from Aswan to Mahamid. The network serves major towns along the river (which are predominantly located on the East bank) as well as Nasr City east of Kom Ombo. Waterworks at Kom Ombo and Daraw have a sufficient capacity to the year 2000 but require general upgrading. In addition to the regional network, municipal waterworks are located at Edfu, (on both the east and west bank) and Abu Simbel.

On the west bank, there is no regional network; ground water sources are used. Most villages are served by artesian wells, although some rely strictly on untreated water from the Nile.

The High Dam provides two 500KV lines from Aswan to Cairo, while Aswan is fed from a 33 KV bus bar from the Aswan Dam. A new substation has been recently completed in Aswan and another substation will not be required until 1990. About 66 percent of households are connected to electricity in Aswan.

Communications in Aswan, as in other remote parts of Egypt, are a fundamental development constraint. Currently there are only 2,000 lines in Aswan and few in other parts of the Governorate. However, plans are underway to add about 6,000 lines by 1983, mostly in Aswan.

VI. PHYSICAL DEVELOPMENT OF ASWAN

From the old city of Aswan, the primary directions of growth have been north towards Luxor along the Nile Valley, South towards the old dam, and along the High Dam Road. Other development has occurred in proximity to both dams. West Bank development via the Aswan Dam consists of Sahara City, the airport and military facilities.

Growth is severely limited by the topography. There are opportunities for expansion on the west bank between the Low and High Dams; a new development area was recommended there by the High Dam Lake Study.

LANDSAT Data for 1972 and 1978 indicated that there was general consolidation and infill along transportation corridors to the north and south of Aswan City. In addition, the built-up area of the old city increased by about 9 percent

during this period. However, LANDSAT coverage did not include development near the dams and on the western bank where significant growth is also taking place. (Figure IV-G.1).

VII. ADMINISTRATION

In the period during and preceeding construction of the dam, the Aswan region was the focus of an intense effort of integrated regional development. The Egyptian Government, the UNDP, and the Ford Foundation were heavily involved in these initial efforts. A regional planning unit was set up and centers were established for minerals, industry, human resources, agriculture and water resources. Each center was responsible for surveying, cataloging and evaluating resource potentials for its sector, as well as analyzing results and making plans for their efficient exploitation. In retrospect, the integrated project has had only marginal benefits in practical terms. Yet, many lessons were learned from the exercise.

According to the Ford Foundation project evaluation regarding the regional planning effort, the project was beset by the following difficulties:

- Management: loss of leadership, difficulties of recruitment, inadequate coordination among the center: frustrated attempts to gain cooperation among National Ministries.
- Probable jurisdictional rivalry.
- Problems of communications and coordination endemic to the region.
- Political constraints of the period (era of nationalization and hostilities).
- Dependence on central government budget allocations.
- Inadequate temporal and financial support.

Nevertheless, the evaluation concluded that the project was instrumental in the creation of a viable planning unit, attracting support for a number of important projects and laying the groundwork for many others. The evaluation further noted that longer and sustained support would have been required in order to achieve many of the ambitious objectives of the project.

On the basis of these issues, the importance of formulating a strategy for administering and implementing growth encouragement in Aswan is particularly important. Although NUPS has been unable to determine the most appropriate means of governorance for Aswan, the general recommendations suggested for Qena and Naga Hamadi in Chapter IV are valid.

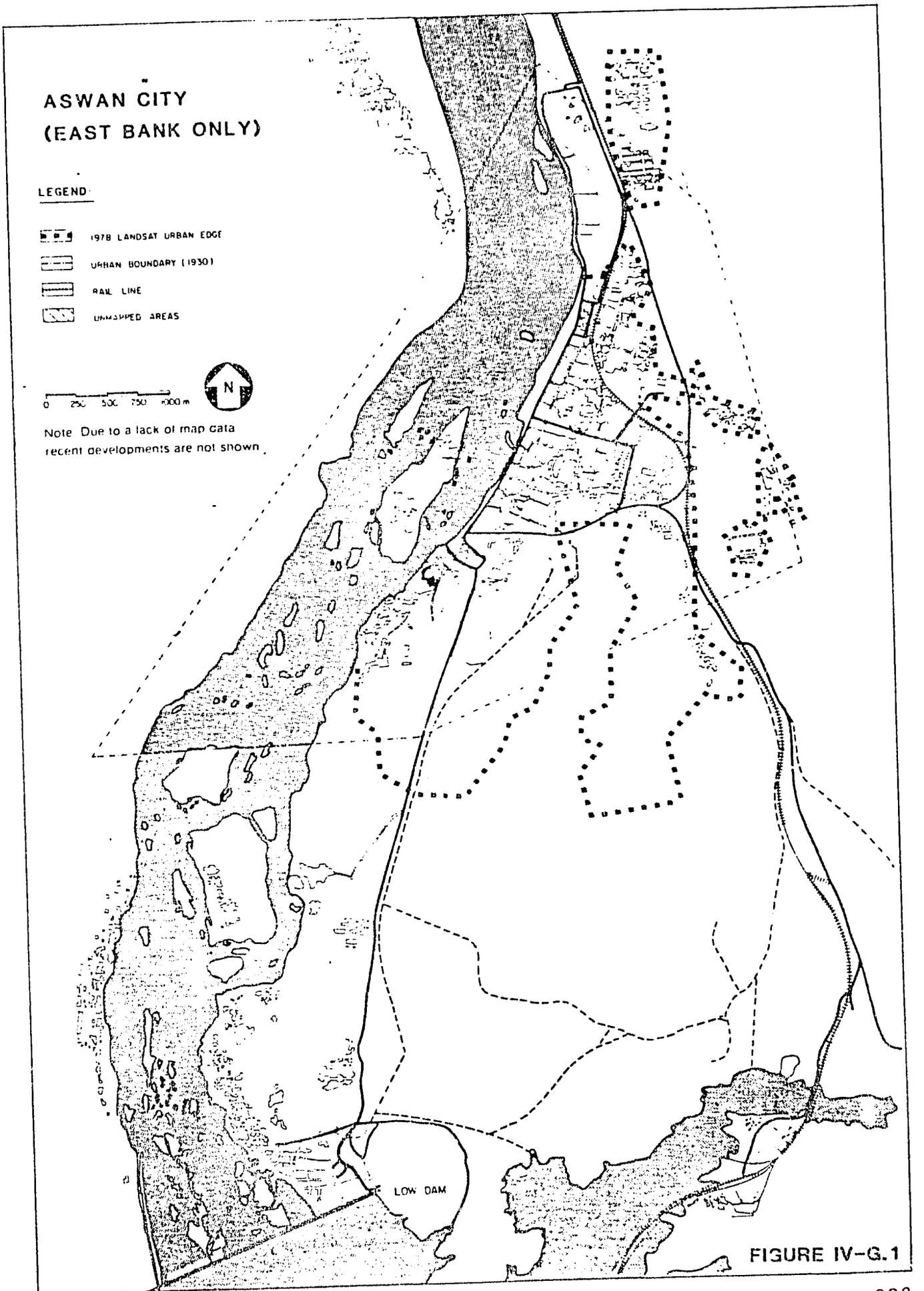

ASWAN CITY
(EAST BANK ONLY)
LEGEND
1978 LANDSAT URBAN EDGE
URBAN BOUNDARY (1930)
RAIL LINE
UNMAPPED AREAS
0 250 500 750 1000 m
N
Note Due to a lack of map data recent developments are not shown
LOW DAM

FIGURE IV-G.1

NC .ES

APPENDIX IV-G

SPECIAL EMPHASIS CITIES FOR GROWTH ENCOURAGEMENT - ASWAN

1 *The Ministry of Development has sponsored a study of the potential of reclamation in Wadi Kunkun which began in 1982.*

2 *W. Weidemann, NUPS Working Paper, "Effect of Organization on the Agricultural Land Resource Base: Status and Future Expectations," Table 3, p. 12.*

3 *Such a management center was opened in early 1982.*

APPENDIX V-A

STANDARDS AND COSTS OF SPATIAL TARGET GROUPS OF THE PREFERRED STRATEGY

APPENDIX V-A

STANDARDS AND COSTS OF SPATIAL TARGET GROUPS OF THE PREFERRED STRATEGY

I. INTRODUCTION

Two sets of projections of intra-urban infrastructure costs were developed for the Preferred Strategy. The first, labelled "Existing Proposals" was developed using standards of recent settlement projects such as the new towns, standards of water supply and sewerage from master plans for the Canal Cities, Greater Cairo and Alexandria, estimates of the costs of Greater Cairo's proposed subway system, and proposed standards for social infrastructure from new town master plans and estimates of existing levels of expenditures. These standards, with the exception of the subway, have been previously used to cost the different settlement alternatives. The second set of estimates was developed with the aim of reducing intra-urban infrastructure costs and requirements for public sector expenditures through greater private sector participation. This estimate which is called "Estimate II: Modified Standards" aims at greater private sector participation by setting standards of housing at levels which are roughly representative of standards which have been achieved between 1976 and 1981 by the private/informal sector in Greater Cairo. It also aims at greater inter-regional equity through improved standards of social facilities in non-special emphasis settlements.

Since preparing the cost estimates of six settlement alternatives, a further review of the telecommunications sector resulted in preparing a separate projection of telecommunications costs for the Preferred Strategy infrastructure costs. However, so that the Preferred Strategy could be compared with the other six alternative strategies studied by NUPS, telecommunications costs were included in the "Estimate I" costs. A second estimate of "Estimate I" costs was prepared which subtracted telecommunications costs out of the intra-urban infrastructure costs. These costs are now included in the estimates of inter-urban infrastructure costs. Both estimates of the 1986-2000 "Existing Proposals" costs and the "Estimate II: Modified Standards" costs of the intra-urban infrastructure of the Preferred Strategy are presented in Table V-A.1.

The following sections of this appendix describe the spatial target groups used to generate these costs and the sources of data for the standards of the cost estimates. A comparison of the major standards of the two cost projections are presented in Chapter V. Therefore, separate spatial target group tables were not prepared for the "Existing Proposals" estimates. However, these standards and costs are detailed throughout the appendix.

TABLE V-A.1

COMPARISON OF ESTIMATE I: EXISTING PROPOSALS AND ESTIMATE II: MODIFIED STANDARDS

INTRA-URBAN INFRASTRUCTURE COSTS OF PREFERRED STRATEGY
1986-2000

INTRA-URBAN INFRASTRUCTURE ESTIMATE	TOTAL CAPITAL COSTS (1986-2000) (L.E. MILLIONS)
Estimate I : Existing Proposals	43,950.7
Estimate Ia : Existing Proposals not of Telecommunications	37,270.7
Estimate II : Modified Standards	31,425.9

SOURCE: NUPS Elaboration.

II. SPATIAL TARGET GROUPS OF ESTIMATE II OF THE PREFERRED STRATEGY

Chapter V presented the concept that packages of housing and intra-urban infrastructure standards could be developed to implement the spatial objectives of the national urban policy. It also pointed out that these packages could also be used to achieve greater inter-regional equity. Basic levels of infrastructure could be provided in every region to alleviate existing deficits.

Five major spatial target groups have been developed to illustrate the concept of how packages of housing and intra-urban infrastructure can be designed to implement national urban policy:

- Major Metropliton Areas (Greater Cairo and Alexandria).
- Special Emphasis Settlements (Suez, Assiut, Qena, Naga Hamadi and Aswan).
- Non-Special Emphasis Settlements:
  - High Density Settlements
  - Governorate Capitals
  - Other settlements with 1976 population greater than 50,000

Remote Area Settlements.

Secondary Cities less than 50,000.

Examples of each of these spatial target groups are illustrated in Figures V-A.1 through V-A.14. For each of the spatial target groups, an example settlement was chosen to demonstrate how per capita costs were developed. Complete estimates of all the major settlements housing and intra-urban infrastructure costs are shown at the end of this appendix. Due to the importance which the Government has placed on Ismailia and Port Said, separate sets of standards have been developed for them, although they do not constitute a separate spatial target group. These are shown in Figures V-A.13 and V-A.14.

The spatial target group housing and intra-urban infrastructure packages contain the following information: settlement gross densities, population, land requirements, housing standards, physical infrastructure, social infrastructure, total housing and infrastructure costs, and an affordability analysis. As mentioned in Chapter V, the land requirements are based on assumptions that roughly 65 percent of the settlement total area within its boundaries can be private or saleable land. In all of the housing and intra-urban infrastructure analysis, we have assumed that land is a potential source of revenue for financing future urban development whether it be through sales or some form of taxation. Therefore, we have not treated its costs as a component of intra-urban infrastructure cost. As is later discussed in the section on circulation, for most settlements we have assumed that about 20 percent of the settlement's area is for circulation and the remaining 15 percent is used for other public uses.

The physical standards shown on the spatial target group tables are explained in the following sections of this appendix, however, some explanation is necessary about the per capita costs shown in the spatial target group figures. The first set of per capita costs labelled "Indicative Per Capita Costs" are the per capita capital costs of providing housing and intra-urban infrastructure to serve new populations. The second set of costs are the total capital costs for serving new populations plus the capital costs of upgrading or strengthening existing infrastructure. Since these total costs serve the entire population of the settlement, they have been divided by the total population at the end of the period to indicate the level of total budgetary outlays necessary to finance both existing and new infrastructure at the standards shown in the spatial target group package. Due to different compositions of existing populations and new populations, these costs can vary widely from settlement to settlement even though the same basic standards have been suggested for each. The adjusted total costs of the figures are the base costs multiplied times regional construction cost factors. As a comparison of the level of investment required for both rehabilitation of existing areas and construction of new areas at the standards shown, Part VII shows the per capita costs of both existing and new areas. A note should be added here as to how these costs were calculated, since they were calculated as outputs of the individual housing and infrastructure components. The total capital costs of existing areas were calculated by dividing the portion of the adjusted total costs due to rehabilitation by the population existing at the beginning of the period (as is shown in tables, this is the 1985 population). The remaining portion of the total adjusted capital costs divided by the change in population during the period is then the per capita costs of new areas.

FIGURE V-A.1

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: MAJOR METROPOLITAN AREAS
EXAMPLE SETTLEMENT: GREATER CAIRO

I.

GROSS DENSITIES 300 PERSON/HECTARES	POPULATION	EXISTING (1985)	9,707,000
		INCREASE (1986-1990)	1,922,000

II.

LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
PRIVATE	65%		
--RESIDENTIAL	(45%)		
--NON RESIDENTIAL	(20%)		
PUBLIC	35%		
TOTAL	100%		

III.

HOUSING			
AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2 000	INDICATIVE PER CAPITA COST 2/ L.E. 410	L.E. 90.5

IV.

PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
WATER	584 l/c/d	99.0 (MASTER PLAN PROJECTIONS)	L.E. 27.1
SANITATION	462 l/c/d	100.4 (MASTER PLAN PROJECTIONS)	L.E. 32.7
ELECTRICITY	DISTRIBUTION ONLY	16.7	L.E. 2.1
CIRCULATION	23% or 6.7 m^2/CAPITA	68.4	L.E. 11.7
TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	-
TRANSPORTATION	[illegible] 5.0	57.0	L.E. 9.5
OTHERS	PROVISIONAL ESTIMATE	10	L.E. 2.5
TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 85.6

V.

SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
EDUCATION	MODIFIED ALEXANDRIA STANDARD "UNIVERSITY"	81	L.E. 37.1
HEALTH 4/	URBAN AVERAGE 2.5 BEDS/ 1,000 Table V-A.13	258	L.E. 67.2
SOCIAL AFFAIRS, ADMINISTRATION/OTHERS	30% of SADAT CITY MASTER PLAN Table V-A.14	128	L.E. 22.2
TOTAL: SOCIAL INFRASTRUCTURE			L.E. 123.5

VI.

TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA		
	BASE COSTS	L.E. 299.6
	ADJUSTED TOTAL COSTS 5/	L.E. 299.6
	PERCENT REHABILITATION	30.2%

VII.

AFFORDABILITY AND COST RECOVERY 6/				
	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,227.1
		PORTION NOT AFFORDABLE	PERCENTAGE	10.5%
	EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 109.1
		PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
	ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 0.49 /M2
		EXISTING AREAS	TOTAL COSTS	L.E. 0.60 /M2
	TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 128.70

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section II) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.2

INTRA-URBAN [illegible] INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: MAJOR METROPOLITAN AREAS
EXAMPLE SETTLEMENT: ALEXANDRIA

I.	GROSS [illegible]S DENSITY [illegible]IES 187	PERSON/HECTARES	POPULATION	EXISTING (1985)	3,042,000
				INCREASE (1986-1990)	678,000

II.	LAND [illegible] REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVA[illegible]VATE	65%		
	--RE[illegible]ESIDENTIAL	(45%)		
	--N[illegible]ON RESIDENTIAL	(20%)		
	PUBL[illegible]IC	35%		
	TOT[illegible]L	100%		

III.	HOU[illegible]ING			
	AVE[illegible]AGE AREA [illegible] UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 93.3

IV.	PH[illegible]ICAL INFRA[illegible]RUCTURE	PHYSICAL STANDARD	INDICATIVE PER.CAPITA COST 2/ L.E.	
	[illegible]TER	385 l/c/d	73.0	L.E. 33.7
	[illegible]NITATION	322.41/c/d	91.9	L.E. 53.0
	[illegible]ECTRICI[illegible]	DISTRIBUTION ONLY	69.9	L.E. 14.6
	[illegible]RCULATI[illegible]	20% or 10.7m^2/CAPITA	95.4	L.E. 18.2
	[illegible]ELECOMMUNICA[illegible]ONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	[illegible]RANSPORTA[illegible]ON	BUSES/10,000 4.0	45.6	L.E. 8.0
	[illegible]HERS	PROVISIONAL ESTIMATE	10	L.E. 2.6
	[illegible]AL: PHYS[illegible]AL INFRASTRUCTURE			L.E. 157.2

V.	[illegible]IAL INFRA[illegible]RUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	[illegible]DUCATION	MODIFIED ALEXANDRIA STANDARD "UNIVERSITY"	81	L.E. 37.9
	[illegible]EALTH 4/	4.5 BEDS/1,000 See Table V-A.13	258	L.E. 68.1
	[illegible]AL AFFAIRS [illegible] [illegible]INISTRATION [illegible]ERS	30% OF SADAT CITY MASTER PLAN, Table V-A.14	128	L.E. 24.4
	[illegible]AL: SOCIAL [illegible]RASTRUCTURE			L.E. 130.4

VI.	[illegible]AL HOUSING [illegible] INFRASTRUCTURE CAPITAL COSTS [illegible] CAPITA	BASE COSTS	L.E. 153.6
		ADJUSTED TOTAL COSTS 5/	L.E. 178.7
		PERCENT REHABILITATION	24.5%

VII.	[illegible]FFORDABILITY AND COST [illegible]OVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,982.0
			PORTION NOT AFFORDABLE	PERCENTAGE	44.9%
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 143.6
			PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 2.29 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 0.49 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 888.9

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ Not infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V. Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ These costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V. Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ [illegible] areas or new settlement areas.
8/ [illegible] of upgrading or capital rehabilitation of existing infrastructure.
9/ [illegible] level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of [illegible] cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.3

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROWTH STANDARDS AND CAPITAL COST PACKAGES: HIGH GROWTH AREAS
EXAMPLE SETTLEMENT: SUEZ

I.	GROSS DENSITIES 300 PERSON/HECTARES	POPULATION	EXISTING (1985)	312,000
			INCREASE (1986-1990)	126,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%		
	--RESIDENTIAL	(45%)		
	--NON RESIDENTIAL	(20%)		
	PUBLIC	35%		
	TOTAL	100%		

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,008	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 135.1

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	353 l/c/d	89	L.E. 53.9
	SANITATION	282 l/c/d	78	L.E. 47.3
	ELECTRICITY	DISTRIBUTION ONLY	131.8	L.E. 45.3
	CIRCULATION	20% or 6.7 m^2/CAPITA	68.4	L.E. 20.1
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	BUSES/10,000 2.0	22.8	L.E. 6.1
	OTHERS	PROVISIONAL ESTIMATE	10	3.6
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 176.3

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	DOUBLE ALEXANDRIA STANDARD Table V-A.11	82	L.E. 44.1
	HEALTH 4/	4.5 BEDS/1,000 See Table V-A.13	258	L.E. 92.7
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	AT SUEZ MASTER PLAN STANDARDS Table V-A.16	112	L.E. 33.0
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 169.6

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 481.1
		ADJUSTED TOTAL COSTS 5/	L.E. 659.3
		PERCENT REHABILITATION	24.4%

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,733.5
			PORTION NOT AFFORDABLE	PERCENTAGE	36.7
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 225.5
			PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 2.61 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 1.24 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 636.0

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section II) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.4

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: SPECIAL EMPHASIS SETTLEMENTS
EXAMPLE SETTLEMENT: ASSIUT

I.

GROSS DENSITIES 300 PERSON/HECTARES	POPULATION	EXISTING (1985)	295,000
		INCREASE (1986-1990)	80,000

II.

LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
PRIVATE	65%		
--RESIDENTIAL	(45%)		
--NON RESIDENTIAL	(20%)		
PUBLIC	35%		
TOTAL	100%		

III.

HOUSING			
AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 105.6

IV.

PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
WATER	300 l/c/d	66	L.E. 37.1
SANITATION	180 l/c/d	61	L.E. 34.3
ELECTRICITY	DISTRIBUTION ONLY	139	L.E. 39.5
CIRCULATION	20% or 6.7m²/CAPITA	68	L.E. 15.1
TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
TRANSPORTATION	BUSES/10,000 1.2	13	L.E. 2.5
OTHERS	PROVISIONAL ESTIMATE	5	L.E. 1.5
TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 130.0

V.

SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
EDUCATION	MODIFIED ALEXANDRIA STANDARD "UNIVERSITY"	81	L.E. 39.6
HEALTH 4/	4.5 BEDS/1,000 Table V-A.13	258	L.E. 75.3
SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% OF SADAT CITY MASTER PLAN, Table V-A.15	43	L.E. 9.5
TOTAL: SOCIAL INFRASTRUCTURE			L.E. 124.4

VI.

TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 360.0
	ADJUSTED TOTAL COSTS 5/	L.E. 475.7
	PERCENT REHABILITATION	32.0%

VII.

AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,517.4
		PORTION NOT AFFORDABLE	PERCENTAGE	33.1%
	EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 193.2
		PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
	ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 1.90 /M2
		EXISTING AREAS	TOTAL COSTS	L.E. 1.07 /M2
	TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 502.7

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.5

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: SPECIAL EMPHASIS SETTLEMENTS
EXAMPLE SETTLEMENT: DEWA

I.	GROSS DENSITIES 80 PERSON/HECTARES	POPULATION	EXISTING (1985)	128,000
			INCREASE (1986-1990)	28,000
II.	LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%		
	--RESIDENTIAL	(45%)		
	--NON RESIDENTIAL	(20%)		
	PUBLIC	35%		
	TOTAL	100%		
III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 92.17
IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	300 l/c/d	92.4	L.E. 50.3
	SANITATION	180 l/c/d	74.1	L.E. 49.8
	ELECTRICITY	DISTRIBUTION ONLY	147.6	L.E. 38.2
	CIRCULATION	20% or 25.0m²/CAPITA	174.0	L.E. 32.7
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	BUSES/10,000 0.5	5.7	L.E. 1.1
	OTHERS	PROVISIONAL ESTIMATE	5	L.E. 1.0
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 173.1
V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	ALEXANDRIA STANDARD	41	L.E. 19.1
	HEALTH 4/	4.5 BEDS/1,000 Table V-A.13	258	L.E. 67.5
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% of SADAT CITY MASTER PLAN Table V-A.15	43	L.E. 8.1
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 94.7
VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS		L.E. 359.5
		ADJUSTED TOTAL COSTS 5/		L.E. 432.3
		PERCENT REHABILITATION		27.1%
VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS / PORTION NOT AFFORDABLE	TOTAL COSTS / PERCENTAGE: L.E. 1,763.15 / 42.5%
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS / PORTION NOT AFFORDABLE	TOTAL COSTS / PERCENTAGE: L.E. 143.55 / 0.0%
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS: L.E. 0.86 /M2
			EXISTING AREAS	TOTAL COSTS: L.E. 0.21 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY		L.E. 748.53

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section II) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.6

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: SPECIAL EMPHASIS
EXAMPLE SETTLEMENT: NAGA HAMADI

I.

GROSS DENSITIES 300 PERSON/HECTARES	POPULATION	EXISTING (1985)	95,000
		INCREASE (1986-1990)	22,000

II.

LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
PRIVATE	65%		
--RESIDENTIAL	(45%)		
--NON RESIDENTIAL	(20%)		
PUBLIC	35%		
TOTAL	100%		

III.

HOUSING			
AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 95.6

IV.

PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
WATER	300 l/c/d	66.0	L.E. 36.2
SANITATION	180 l/c/d	60.9	L.E. 41.4
ELECTRICITY	DISTRIBUTION ONLY	148.6	L.E. 39.7
CIRCULATION	20% or 6.7 m^2/CAPITA	41.2	L.E. 13.4
TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
TRANSPORTATION	BUSES/10,000 0.5	5.7	L.E. 1.1
OTHERS	PROVISIONAL ESTIMATE	5.0	L.E. 1.0
TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 132.5

V.

SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
EDUCATION	ALEXANDRIA STANDARD	41	L.E. 19.4
HEALTH 4/	4.5 BEDS/1,000	258	L.E. 69.5
SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% OF SADAT CITY MASTER PLAN ESTIMATES Table V-A.14	43	L.E. 8.4
TOTAL: SOCIAL INFRASTRUCTURE			L.E. 97.3

VI.

TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 325.4
	ADJUSTED TOTAL COSTS 5	L.E. 381.0
	PERCENT REHABILITATION	26.5%

VII.

AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,488.6	
		PORTION NOT AFFORDABLE	PERCENTAGE	31.8	
	EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 122.5	
		PORTION NOT AFFORDABLE	PERCENTAGE	0.0%	
	ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 1.93	/M2
		EXISTING AREAS	TOTAL COSTS	L.E. 0.68	/M2
	TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 474.0	

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.7

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: SPECIAL EMPHASIS
EXAMPLE SETTLEMENT: ASWAN

I.	GROSS DENSITIES 210 PERSON/HECTARES	POPULATION	EXISTING (1980)	275,000
			INCREASE (1980-1990)	51,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%		
	--RESIDENTIAL	(45%)		
	--NON RESIDENTIAL	(20%)		
	PUBLIC	35%		
	TOTAL	100%		

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 83.02

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	300 l/c/d	76	L.E. 40.8
	SANITATION	180 l/c/d	66	L.E. 35.2
	ELECTRICITY	DISTRIBUTION ONLY	143	L.E. 39.0
	CIRCULATION	20% or 4.5 m^2/CAPITA	88	L.E. 14.5
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	[illegible] 1.2	13	L.E. 2.2
	OTHERS	PROVISIONAL ESTIMATE	5	L.E. 0.8
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 127.6

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	ALEXANDRIA STANDARDS	41	L.E. 18.5
	HEALTH 4/	2.5 BEDS/1,000 Table V-A.13	258	L.E. 62.1
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% OF SADAT CITY MASTER PLAN ESTIMATES Table V-A.15	43	L.E. 7.1
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 87.7

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 298.3
		ADJUSTED TOTAL COSTS 5/	L.E. 361.9
		PERCENT REHABILITATION	39.7%

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,395.9
			PORTION NOT AFFORDABLE	PERCENTAGE	27.3%
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 170.2
			PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 1.06 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 0.67 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 381.3

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section II) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.8

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: DELTA REGIONAL SERVICE CENTERS
EXAMPLE SETTLEMENT: TANTA

I.

GROSS DENSITIES 179 PERSON/HECTARES	POPULATION	EXISTING (1985)	375,000
		INCREASE (1986-1990)	59,000

II.

LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
PRIVATE	65%		
--RESIDENTIAL	(45%)		
--NON RESIDENTIAL	(20%)		
PUBLIC	35%		
TOTAL	100%		

III.

HOUSING			
AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,256	INDICATIVE PER CAPITA COST 2/ L.E. 468	L.E. 83.84

IV.

PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
WATER	351 l/c/d	103	L.E. 53.5
SANITATION	189 l/c/d	69	L.E. 36.2
ELECTRICITY	DISTRIBUTION ONLY	142	L.E. 31.0
CIRCULATION	20% or 9.7 m^2/CAPITA	98	L.E. 142.2
TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
TRANSPORTATION	BUSES/10,000 3	34	L.E. 5.0
OTHERS	PROVISIONAL ESTIMATE	10	L.E. 1.4
TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 141.3

V.

SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
EDUCATION	MODIFIED ALEXANDRIA	81	L.E. 35.5
HEALTH 4/	5.79 BEDS/1,000 (Existing Standard Table V-A.13	322	L.E. 71.6
SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	30% of SADAT CITY MASTER PLAN COSTS Table V-A.14	128	L.E. 18.5
TOTAL: SOCIAL INFRASTRUCTURE			L.E. 125.6

VI.

TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 350.7
	ADJUSTED TOTAL COSTS 5/	L.E. 588.0
	PERCENT REHABILITATION	43.7

VII.

AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 2,436.4
		PORTION NOT AFFORDABLE	PERCENTAGE	55.0%
	EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 297.2
		PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
	ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 3.19 /M2
		EXISTING AREAS	TOTAL COSTS	L.E. 1.00 /M2
	TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 1,339.0

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.9

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: HIGH DENSITY SETTLEMENT
EXAMPLE SETTLEMENT: DAMANHOUR
(SHOWS COSTS IF NOT HORIZONTAL EXPANSION OCCURS)
SEE ALSO Table V-7

I.	GROSS DENSITIES 611 PERSON/HECTARES	POPULATION	EXISTING (1985)	271,000
			INCREASE (1986-1990)	23,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%		
	--RESIDENTIAL	(45%)		
	--NON RESIDENTIAL	(20%)		
	PUBLIC	35%		
	TOTAL	100%		

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,256	INDICATIVE PER CAPITA COST 2/ L.E. 468	L.E. 58.2

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	300 l/c/d	28.7	L.E. 14.0
	SANITATION	165 l/c/d	39.7	L.E. 19.9
	ELECTRICITY	DISTRIBUTION ONLY	148.9	L.E. 25.1
	CIRCULATION	20% or 6.7 m^2/CAPITA	32.9	L.E. 2.8
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	BUSES/10,000 0.5	5.7	L.E. 0.5
	OTHERS	PROVISIONAL ESTIMATE	5.0	L.E. 0.4
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 62.2

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	ALEXANDRIA STANDARD	41	L.E. 16.4
	HEALTH 4/	4.0 BEDS/1,000 Table V-A.13	228	L.E. 38.9
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	CAIRO GOVERNORATE STANDARDS Table V-A.17	13	L.E. 1.1
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 56.4

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 176.8
		ADJUSTED TOTAL COSTS 5/	L.E. 388.9
		PERCENT REHABILITATION	55.4%

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 2,218.6
			PORTION NOT AFFORDABLE	PERCENTAGE	50.5%
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 233.6
			PORTION NOT AFFORDABLE	PERCENTAGE	0.0%
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 7.18 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 2.68 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 2,212

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section II) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.10

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: NON-SPECIAL EMPHASIS
EXAMPLE SETTLEMENT: GOVERNORATE CAPITAL - BENI SUEF

I.	GROSS DENSITIES 168.3 PERSON/HECTARES	POPULATION	EXISTING (1985)	153,000
			INCREASE (1986-1990)	21,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS	PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%	
	--RESIDENTIAL	(45%)	
	--NON RESIDENTIAL	(20%)	
	PUBLIC	35%	
	TOTAL	100%	

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 68.83

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	237 l/c/d	54.09	L.E. 27.65
	SANITATION	142 l/c/d	62.38	L.E. 31.88
	ELECTRICITY	DISTRIBUTION ONLY	148.75	L.E. 30.81
	CIRCULATION	20% or 11.9m²/CAPITA	102.45	L.E. 13.27
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	BUSES/10,000 0.2	2.3	L.E. 0.56
	OTHERS	PROVISIONAL ESTIMATE	2.0	
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 104.16

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	ALEXANDRIA STANDARD Table V-A.11	41	L.E. 17.57
	HEALTH 4/	4.0 BEDS/1,000 Table V-A.13	228	L.E. 47.57
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	CAIRO GOVERNORATE STANDARDS Table V-A.18	7	L.E. 0.91
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 66.04

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 239.03
		ADJUSTED TOTAL COSTS 5/	L.E. 654.49
		PERCENT REHABILITATION	46.2 %

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 2,915.91
			PORTION NOT AFFORDABLE	PERCENTAGE	65.2 %
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 324.10
			PORTION NOT AFFORDABLE	PERCENTAGE	0.0 %
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 3.85 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 1.08 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 1,900.7

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and an opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.11

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: NON-SPECIAL EMPHASIS
EXAMPLE SETTLEMENT "OTHERS" - BELBEIS

I.

GROSS DENSITIES 208.0 PERSON/HECTARES	POPULATION	EXISTING (1981)	100,000
		INCREASE (1986-1990)	4,000

II.

LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
PRIVATE	65%		
--RESIDENTIAL	(45%)		
--NON RESIDENTIAL	(20%)		
PUBLIC	35%		
TOTAL	100%		

III.

HOUSING			
AVERAGE AREA/UNIT 35 M2	AVERAGE UNIT COST: L.E. 1,750	INDICATIVE PER CAPITA COST 2/ L.E. 390	L.E. 33.75

IV.

PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
WATER	167 l/c/d	18.5	L.E. 8.6
SANITATION	100 l/c/d	52.8	L.E. 32.5
ELECTRICITY	DISTRIBUTION ONLY	151.7	L.E. 20.4
CIRCULATION	20% or 9.6 m^2/CAPITA	88.6	L.E. 4.3
TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
TRANSPORTATION	BUSES/10,000 0.1	1.1	L.E. 0.1
OTHERS	PROVISIONAL ESTIMATE	1	
TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 65.9

V.

SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
EDUCATION	ALEXANDRIA STANDARD	41	L.E. 15.4
HEALTH 4/	2.5 BEDS/1,000 Table V-A.13	149	L.E. 20.1
SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	SMALL NON-SPECIAL EMPHASIS SETTLEMENTS TABLE V-A.19	3	L.E. 0.1
TOTAL: SOCIAL INFRASTRUCTURE			L.E. 35.6

VI.

TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 135.2
	ADJUSTED TOTAL COSTS 5/	L.E. 255.0
	PERCENT REHABILITATION	51.9 %

VII.

AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 3,185.7
		PORTION NOT AFFORDABLE	PERCENTAGE	65.6 %
	EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 137.8
		PORTION NOT AFFORDABLE	PERCENTAGE	0.0 %
	ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 6.49 /M2
		EXISTING AREAS	TOTAL COSTS	L.E. 0.54 /M2
	TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 2,088.2

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.12

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: REMOTE AREAS
EXAMPLE SETTLEMENT: RED SEA
(SAFAGA, HUGADA, QOSEIR & RAS GHARIB)

I.	GROSS DENSITIES	PERSON/HECTARES	POPULATION	EXISTING (1985) 84,000
				INCREASE (1986-1990) 9,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS	PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%	
	--RESIDENTIAL	(45%)	
	--NON RESIDENTIAL	(20%)	
	PUBLIC	35%	
	TOTAL	100%	

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 59.33

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	167 l/c/d	41.45	L.E. 20.66
	SANITATION	100 l/c/d	64.32	L.E. 41.10
	ELECTRICITY	DISTRIBUTION ONLY	150.82	L.E. 28.13
	CIRCULATION	20%	645.67	L.E. 69.80
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	--
	TRANSPORTATION	BUSES/10,000 0.3	3.4	L.E. 0.89
	OTHERS	PROVISIONAL ESTIMATE	5	
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 160.58

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	Table V-A.12	41	L.E. 16.93
	HEALTH 4/	4.0 BEDS/1,000 Table V-A.13	228	L.E. 42.66
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	MODIFIED CAIRO GOVERNORATE Table V-A.17	13	L.E. 1.38
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 60.96

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 280.97
		ADJUSTED TOTAL COSTS 5/	L.E. 1,877.88
		PERCENT REHABILITATION	31.6 %

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS PORTION NOT AFFORDABLE	TOTAL COSTS	L.E.13,269.3
				PERCENTAGE	92.3 %
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS PORTION NOT AFFORDABLE	TOTAL COSTS	L.E. 657.37
				PERCENTAGE	28.8 %
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 3.33 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 0.06 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E.12,254

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III and an opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.13

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: CANAL CITY
EXAMPLE SETTLEMENT: ISMAILIA

I.	GROSS DENSITIES	PERSON/HECTARES	POPULATION	EXISTING (1985) 291,000
				INCREASE (1986-1990) 59,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS	PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%	
	--RESIDENTIAL	(45%)	
	--NON RESIDENTIAL	(20%)	
	PUBLIC	35%	
	TOTAL	100%	

III.	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 87.8

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	381 l/c/d	108.3	L.E. 58.2
	SANITATION	275 l/c/d	80.4	L.E. 43.2
	ELECTRICITY	DISTRIBUTION ONLY	142.4	L.E. 35.1
	CIRCULATION	20% or 8.2 m^2/CAPITA	79.1	L.E. 14.0
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	L.E. --
	TRANSPORTATION	BUSES 10,000 2.0	22.8	L.E. 2.0
	OTHERS	PROVISIONAL ESTIMATE	10	1.8
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 156.3

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	MODIFIED ALEXANDRIA	81	L.E. 37.2
	HEALTH 4/	4.5 BEDS/1,000 Table V-A.13	258	L.E. 64.9
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% SADAT CITY MASTER PLAN ESTIMATES	43	L.E. 7.6
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 109.8

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 353.9
		ADJUSTED TOTAL COSTS 5/	L.E. 963.0
		PERCENT REHABILITATION	40.9 %

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 3,373.7
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. 67.7
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 472.2
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. 0.0 %
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 7.76 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 2.18 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 2,276.2

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

FIGURE V-A.14

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: CANAL CITY
EXAMPLE SETTLEMENT: PORT SAID

I.	GROSS DENSITIES 70* PERSON/HECTARES	POPULATION	EXISTING (1985)	438,000
			INCREASE (1986-1990)	46,000

II.	LAND REQUIREMENTS	PHYSICAL STANDARDS	PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%	
	--RESIDENTIAL	(45%)	
	--NON RESIDENTIAL	(20%)	
	PUBLIC	35%	
	TOTAL	100%	

III. -	HOUSING			
	AVERAGE AREA/UNIT 36 M2	AVERAGE UNIT COST: L.E. 2,006	INDICATIVE PER CAPITA COST 2/ L.E. 418	L.E. 71.5

IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	353 l/c/d	116.9	L.E. 60.2
	SANITATION	282 l/c/d	92.1	L.E. 47.4
	ELECTRICITY	DISTRIBUTION ONLY	141.6	L.E. 29.7
	CIRCULATION	20% or 28.6 m^2/CAPITA	192.6	L.E. 26.4
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	L.E.
	TRANSPORTATION	BUSES/10,000 2.0	22.8	L.E. 3.5
	OTHERS	PROVISIONAL ESTIMATE	10	1.0
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 168.2

V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	ALEXANDRIA STANDARD	41	L.E. 17.7
	HEALTH 4/	4.5 BEDS/1,000	258	L.E. 55.4
	SOCIAL AFFAIRS, AND ADMINISTRATION/OTHERS	10% SADAT CITY MASTER PLAN ESTIMATES Table V-A.19	43	L.E. 5.9
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 79.0

VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA	BASE COSTS	L.E. 318.8
		ADJUSTED TOTAL COSTS 5/	L.E. 776.5
		PERCENT REHABILITATION	46.6

VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 3,258.0
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. 66.3 %
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 416.4
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. 0.0 %
		ANNUAL LAND PAYMENT/M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 2.16 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 0.55 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 2,160.5

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables V.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter V, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table V.A.22 in Appendix V.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter V, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

The affordability analysis shown on Part VII of the figures was based on assumptions that household disposable incomes will continue to rise in real terms at a growth rate of 3.85 percent per annum.

Two different assumptions about the impact of this increase in household incomes and savings were made to illustrate its importance on a household's ability to afford a set of housing and infrastructure standards:

- The first assumption illustrates the impact of a policy which pursues high standards in an economic climate where household incomes and savings grow slowly. Therefore, to illustrate this, Estimate I costs were tested against a household's incomes and savings where the base incomes remain at the 1979 level throughout the planning period.

- The second assumption illustrates the impact of a policy which pursues more affordable standards in an economic climate where household incomes and savings are growing more rapidly. To illustrate this policy, Estimate II costs expressed in 1979 prices were measured against a household's affordability when its base incomes and savings are increased in real terms to 1985, 1990, and 1995 bases.

Since NUPS housing and infrastructure costs are expressed on a per capita basis, both household savings and incomes were also expressed on a per capita basis using 1981 Greater Cairo household sizes since surveys of Greater Cairo were the source of household incomes and savings. These two assumptions about household incomes and savings are shown in Table V-A.2:

TABLE V-A.2

PER CAPITA HOUSEHOLD INCOME AND SAVINGS ASSUMPTIONS

PERIOD	ESTIMATE	HOUSEHOLD INCOMES (L.E.) I	HOUSEHOLD INCOMES (L.E.) II	HOUSEHOLDS SAVINGS[1] (L.E.) I	HOUSEHOLDS SAVINGS[1] (L.E.) II
1979 base		208	208	453	453
1986-1990		208	251	453	547
1991-1995		208	303	453	602
1996-2000		208	366	453	622

1 As is discussed in Chapter IV, household savings were projected to increase between 1979 and 1990 at an annual growth rate of 3.85 percent and thereafter at 1.93 percent.

SOURCE: NUPS.

These two assumptions about household incomes and savings have major impacts on subsidy requirements for intra-urban infrastructure financing. To illustrate the difference, the subsidy requirements for Greater Cairo's housing and intra-urban infrastructure including construction of a subway are shown in Table V-A.3.

The affordability analysis was derived from a variable payment mortgage formula. This affordability projection represents the combined effect of increasing household savings plus the present worth of annual payments made by households having rising incomes on the household sector's ability to afford increasing portions of the capital costs of intra-urban infrastructure and housing. The formula used is as follows:

$$\text{Household Affordability} = \left[\frac{(A)(\%HSG)(RI)}{\left(\frac{(1+I)^n (1-p)}{(1+I)^n - (1+p)^n} \right)} + SAV \right] \left[\frac{1}{INV} \right]$$

Where: A = Annual household income

%HSG = Percent of household income which can be spent on housing and intra-urban infrastructure

RI = Regional Wage Index (See Chapter V, Section II)

I = Opportunity cost of capital

n = Life of investment

p = Percent annual growth rate of household incomes

SAV = Household savings

INV = Investment in housing and intra-urban infrastructure.

SOURCE: Variable Payment formula and NUPS analysis.

A second more static analysis of affordability has been used to measure affordability of the Suez Master Plan in Appendix D in which no allowance was made for increasing household incomes as is typically done in project analysis. However, since NUPS macro-economic projections indicate the likelihood of real household income growth, such an analysis would not provide an assessment of likely increased capacity of households to afford greater portions of the total capital costs of housing and infrastructure in later periods of NUPS. Therefore, the affordability formula shown above was developed to show this capacity. This formula shows the present worth of 1980 household incomes only.

The next to last rows of Figures V-A.1 to V-A.14 show one possible mechanism for recovery of the non-housing costs of intra-urban infrastructure. As was mentioned earlier, land costs have not been included in the costs of housing and intra-urban infrastructure because land has been treated as a possible source of revenue for financing intra-urban infrastructure investment. This section of the figures illustrates the size of the annual level payments which

TABLE V-A.3

SUBSIDY REQUIREMENTS FOR GREATER CAIRO'S HOUSING AND INTRA-URBAN INFRASTRUCTURE

ESTIMATE I: EXISTING PROPOSALS

PERIOD	TOTAL CAPITAL COSTS[1] (LE.MILLIONS)	PER CAPITA CAPITAL COST IN NEW AREAS (LE./CAPITA)	PERCENT NOT AFFORDABLE (%)	TOTAL SUBSIDY REQUIRED FOR NEW AREAS (LE./MILLIONS)	SUBSIDY PER CAPITA NEW AREAS (LE./CAPITA)
1. Incomes and savings remain at the same base					
1986-1990	4,700	1,810.0	49.7	1,729	899
1991-1995	5,218	1,794.0	49.3	1,988	883
1996-2000	5,965	1,796.0	49.3	2,322	886
2. Incomes and savings rise in each period					
1986-1990	4,700	1,809.0	39.3	1,366	711
1991-1995	5,218	1,492.0	29.3	1,183	526
1996-2000	5,965	1,796.3	20.8	968	369

1 Telecommunications are excluded.

SOURCE: NUPS.

would be necessary to recover the non-subsidized, affordable portions of the capital costs of intra-urban infrastructure through either lease payments or property taxes. In calculating these payments, it has been assumed that housing costs will be financed through other mechanisms, whether through the private or public sectors. Since the affordability analysis presented above does not discriminate among recovery mechanisms (direct, indirect, or taxes) the payments shown in the table are affordable to households. The methodology for calculating these payments is presented in Appendix V-B.

The total per capita capital cost subsidy requirements in the final portion of the table are the amounts of intra-urban infrastructure investment which must be financed through other sectors. Although we have not distributed these subsidies among different types of infrastructure, since any type of infrastructure can be financed through the household sector, it is likely that these subsidized costs will probably be used to finance social infrastructure. This is because most components of physical infrastructure can be financed through some form of user charge, lease payments or property taxes as suggested above. However, it is frequently more difficult to finance social infrastructure through these mechanisms. Therefore, they will probably be financed through transfers from other sectors. However, it should be emphasized that these subsidy requirements can be reduced through appropriate choices of standards. Also as is shown in Estimate II of housing and intra-urban infrastructure costs of the Preferred Strategy, greater measures of inter-regional equity can be achieved through selecting standards which are more or less affordable to relatively high income regions, such as Greater Cairo. If appropriate mechanisms for utilizing the resources represented by household savings can be developed, households in these regions can generate surplus savings which can be used to reduce overall subsidy requirements in other regions.

The following sections of this appendix discuss the standards used for both estimates of the housing and intra-urban infrastructure costs of the Preferred Strategy. These standards should not be viewed as absolute standards, but as targets around which individual programs and projects can be designed. At the program and project level, there is scope for variation in these target standards. However, the target standards and their indicative per capita costs should be viewed as a means for evaluating program and project level proposals.

III. STANDARDS OF SPATIAL TARGET GROUPS

A. Housing

The Government of Egypt has recently devoted considerable effort to studying and seeking solutions to housing problems. This has resulted in preparation of a National Housing Policy Statement of 1979 and experiments in several different housing solutions ranging from sites and services projects to new towns and satellite communities. The following is a sampling of average standards which are

representative of a range of housing solutions. While these standards and costs represent averages targeted at median household income levels, they are intended to represent a range of housing solutions at a variety of costs. These different average standards were used to trace through the implications of adopting different housing policies such as high standards, low cost recovery policies to policies aimed at greater private sector participation and reduced public sector spending. For example, in Estimate I of the Preferred Strategy Costs, standards of housing for Suez are high; as a result of these and other high standards, roughly 56 percent of the total costs are not affordable. However, in Estimate II, where greater cost recovery and private sector participation are sought, lower standards result in the non-affordable portion of costs being reduced to 37 percent.

The highest standard shown in Table V-A.4 is the average standard of housing provisions of the 10th of Ramadan First Stage, i.e., 74 square meter flats having average per capita costs of L.E. 1,040. These housing provisions range from core housing having built-areas of 15 square meters to luxury villas and town houses having built-areas of 135 square meters. The 10th of Ramadan standards were chosen over other new town standards because many of the units proposed by the master plan have been built and, thus, unit costs can be reliably projected and because the building conditions of 10th of Ramadan are typical of many urban desert locations.

The next two standards shown on Table V-A.4 have been derived from the National Housing Plan of 1979. The standard with an indicative per capita cost of L.E. 552 was derived from the minimum standard of the Plan, a flat having 45 square meters. However, to provide more flexibility in construction and design, the flat was costed at L.E. 61 per square meter rather than the suggested Plan cost of L.E. 58 per square meter. The second standard shows the impact of increasing the minimum National Housing Plan standards by 25 percent so the per capita costs are L.E. 690.

The standard derived from the indicative per capita cost of L.E. 418 was that of informal housing construction of Greater Cairo during 1979. During the 1976 to 1981 period, the informal sector in Greater Cairo built an average of 68,000 dwelling units per year or a total of 340,000 dwelling units. This dwelling unit construction rate represents a potential investment in housing and land of L.E. 2.2 billion in all urban areas in Egypt. As a result of informal sector building, the median dwelling unit was 3.35 rooms or roughly 36 square meters. (See Chapter V-II). The L.E. 418 per capita cost was used for most of the reduced subsidy projections of capital costs of the Preferred Strategy to trace through the impact of a housing policy which aims at maximum private sector financing of intra-urban infrastructure. At this level of expenditure, NUPS projections of household income and savings are adequate to finance all housing costs, plus portions of other intra-urban infrastructure.

An attempt to follow an urban policy of providing housing at roughly the same standards or estimated value of existing housing is suggested by the lowest indicative per capita cost, L.E. 390. This cost was derived from the estimated value of rehabilitating the existing housing stock as presented in Appendix I of the Draft Final Report of the Construction Industry Study. The unit areas shown in Table V-A.4 are roughly equivalent to the average unit areas of an

TABLE V-A.4

DWELLING UNIT STANDARDS USED TO COST HOUSING REQUIREMENTS OF THE PREFERRED STRATEGY

(1979 L.E. PRICES)

INDICATIVE PER CAPITA COST (LE./CAPITA)	UNIT AREA (m2)	UNIT COST (LE./m2)	TOTAL UNIT COST (LE.)	REMARKS
1042	74	70	5,180	Average cost of housing of 10th of Ramadan.
690	50	69	3,450	Minimum flat of National Housing Plan of 1979 increased by 25 percent.
552	45	61	2,760	Minimum-sized or "economic" flat of National Housing Plan.
418	36	55.7	2,006	Average cost of informal sector housing in Greater Cairo.
390	35	55.7	1,950	Average "value" of existing urban housing according to data from Appendix 1 of the Draft Final Report of Construction Industry Study.
468	36	62.7	2,256	Delta redevelopment cost based on Tanta case: includes compensation for existing dwellings.
890	45	95	4,890	Delta redevelopment: High Standard/Public Sector Finance.

SOURCE: NUPS.

existing low standard. In the absence of other data, this value was selected to represent the average investment of the existing housing stock.

Two standards were used for encouraging redevelopment of deteriorated core areas of Delta settlements. The first is based on data developed during the Illustrative Development Project focused on Tanta. Analysis of "kism" data coupled with ground surveys indicates that 16 percent of Tanta's 1980 population lives in dwelling units that are seriously deteriorated and should be replaced. In one project area consisting of 50,850 people (roughly 10,550 dwelling units), it was assumed that compensation would have to be paid to existing owners and tenants to enable them to find temporary quarters during redevelopment and to compensate them for the disruption in their lives that might occur during redevelopment. This compensation was based on 30 percent of the value of new construction of flats of similar space standards (surveys conducted by the Governorate indicate that the average built-area per family in the redevelopment area is 33 square meters). This would result in an average compensation per dwelling unit of L.E. 710. In redeveloping the area, it was assumed that the land would remain in private ownership, thus, no land purchase prices were included. The project area presently has a net density of 428 persons per hectare and consists of mainly one-storey buildings. If the redevelopment averaged 2.5 floors, roughly 23,470 new units could be constructed, 12,920 units designated for new population while 10,550 would be targeted for the existing population. If this redevelopment cost were applied against Tanta's total population projected for the 1986-1990 period and the average cost of informal housing in Greater Cairo used to project other housing costs, i.e., L.E. 418 per capita, then the total cost of providing housing for Tanta's new population during the period (117,200) plus redeveloping the decayed areas (50,800 population) is L.E. 468 per capita.

The second redevelopment standard proposed for Delta settlements assumed that compensation would have to be paid to existing tenants equalling 60 percent of the value of minimum per capita cost of a 45 square meter flat proposed by the National Housing Plan. Since this standard was developed before more detailed information about the general condition of housing in Tanta was available, it assumed that this compensation would add about L.E. 388 per capita to the costs of National Housing Plan redevelopment costs of L.E. 552 per capita. Thus, total redevelopment costs would be in the range of L.E. 890 per capita.

B. Physical Infrastructure Costs

The costs of providing physical infrastructure (such as water, sewerage and road networks) vary with changes in gross densities, population size and the consumption standard used to design the system. Lower settlement densities require longer networks, thus, higher costs, to serve similar populations than do settlements with more compact forms and higher densities. It is fairly evident also that higher consumption standards result in higher per capita cost than lower standards because networks must utilize larger sized units and treatment plants must be similarly scaled to handle larger capacities.

We have attempted to predict the impact on the per capita costs of water, sewerage and circulation of different settlement densities and consumption standards by using functional relationships developed from data supplied for the Provincial Water Supplies Project, and standards and costs of recent settlement projects

currently being implemented in Egypt. The water supply costs are the most comprehensive since they result from surveys of most major settlements in Egypt conducted during the Provincial Water Supplies Project. The functional relationships which result from the analysis of the data supplied by these projects is shown in Figures V-A.15 through V-A.17. As the figures show, per capita costs vary considerably with changes in standards and gross densities. These costs themselves are presented as a means of evaluating different settlement densities and consumption patterns prior to detailed feasibility studies or detailed information about the condition of existing infrastructure networks. (See also Section 9).

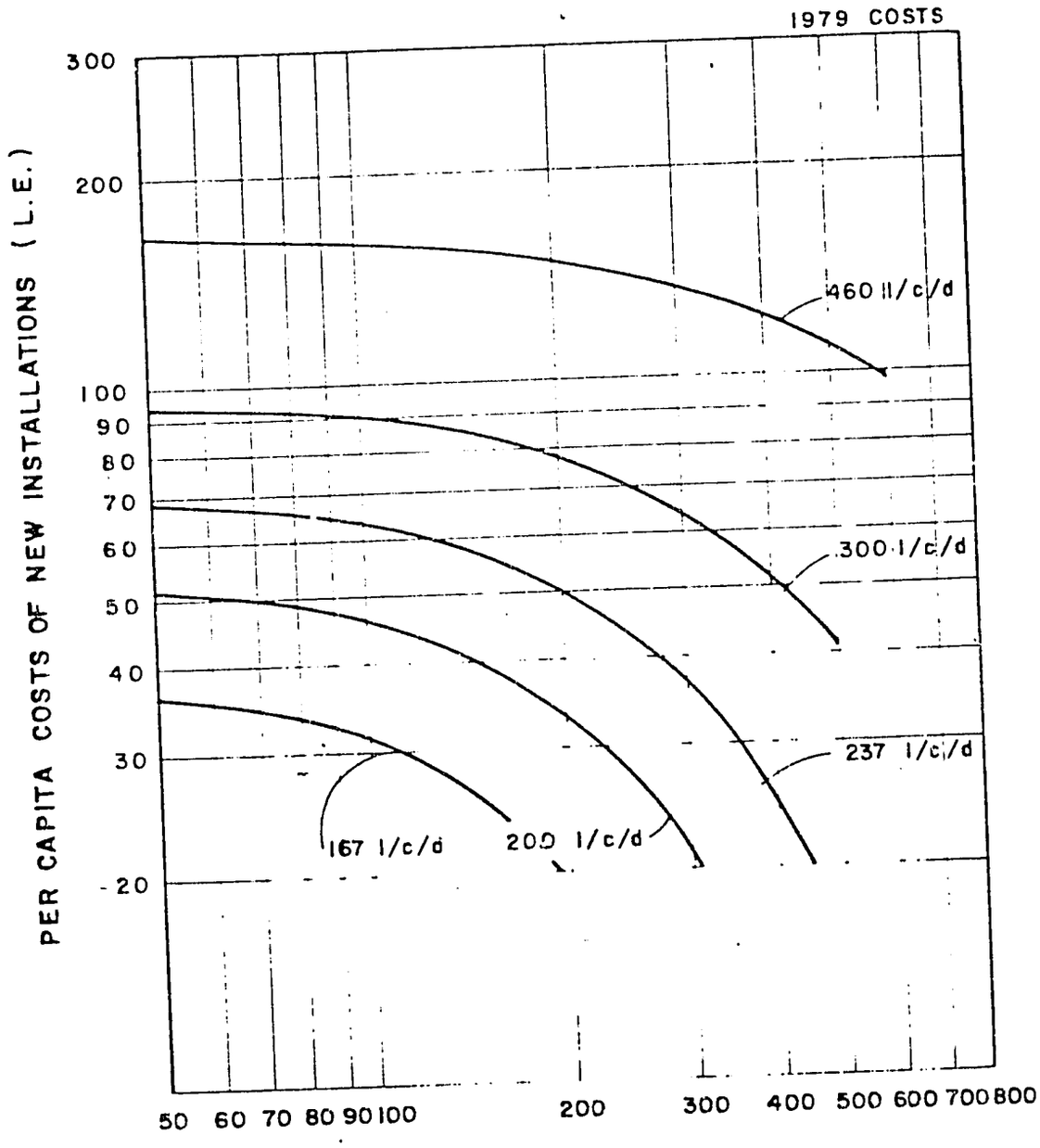
The costs of electrical distribution systems were found to vary more significantly with population size than density at the settlement level due to the requirements for investments in transformers, substations, and intra-urban medium to high voltage networks. Overall, since the A.R.E. relies on the Unified Power Grid for bulk generation and distribution of its electrical power, settlement distribution costs and consumption standards are more a function of national electrical power standards than are other intra-urban infrastructure which function entirely at the settlement level. Thus, most costs of electrical power generation and bulk distribution have been treated at the inter-urban level and are shown in Chapter VI. Data on existing settlement level electrical power loading has proven difficult to obtain due to the complexity of the power network. Many settlements are served by more than one distribution source. Further, there is not a nationwide settlement level study of power requirements (the power sector master plans have focussed their attention on nationwide power demands and power consumption statistics are only available from the EEA at the governorate level). We have requested more detailed settlement level data from the Egyptian Electrical Authority and the Ministry of Power, however, this type of information would require a special study of settlement distribution systems. Thus, it could not be supplied to the project. Therefore, based on data of electrical power distribution systems of recent settlement projects shown in the "Urban Standards and Costs Working Paper," Figure V-A.18 shows the order of magnitude variation in per capita costs of intra-urban electrical distribution systems according to variations in population size. (See also Section 1.)[1]

Telecommunications data which was used to cost inter-urban infrastructure is shown in Chapter VI. Since the bulk of the projected revenues which the telecommunications sector study estimates will be necessary to finance future operations and expansion of the telecommunications network will be non-residential (94 percent derived from business subscribers, telegram and telex services, international services and other non-residential services), all of the costs of telecommunications networks have been excluded from the intra-urban "Modified Standard" version of the infrastructure costs of the Preferred Strategy. Since these costs were included in the costing of the other settlement alternatives, they have, however, been included in Estimate I of the Preferred Strategy. This was done so that the costs of the Preferred Strategy could be compared directly with the costs of the other settlement alternatives. These costs have been shown in Chapter II and are detailed in the tables at the end of this appendix.

The spatial target group intra-infrastructure packages show the costs of water and sewerage systems at standards which range from the national average consumption

INDICATIVE PER CAPITA COST OF WATER SUPPLY

AT DIFFERENT GROSS DENSITIES AND CONSUMPTION RATES



GROSS DENSITIES (PERSONS/HECTARE)

FIGURE V-A.15

INDICATIVE PER CAPITA COSTS OF SEWERAGE SYSTEMS

AT DIFFERENT GROSS DENSITIES AND TOTAL SEWERAGE FLOWS

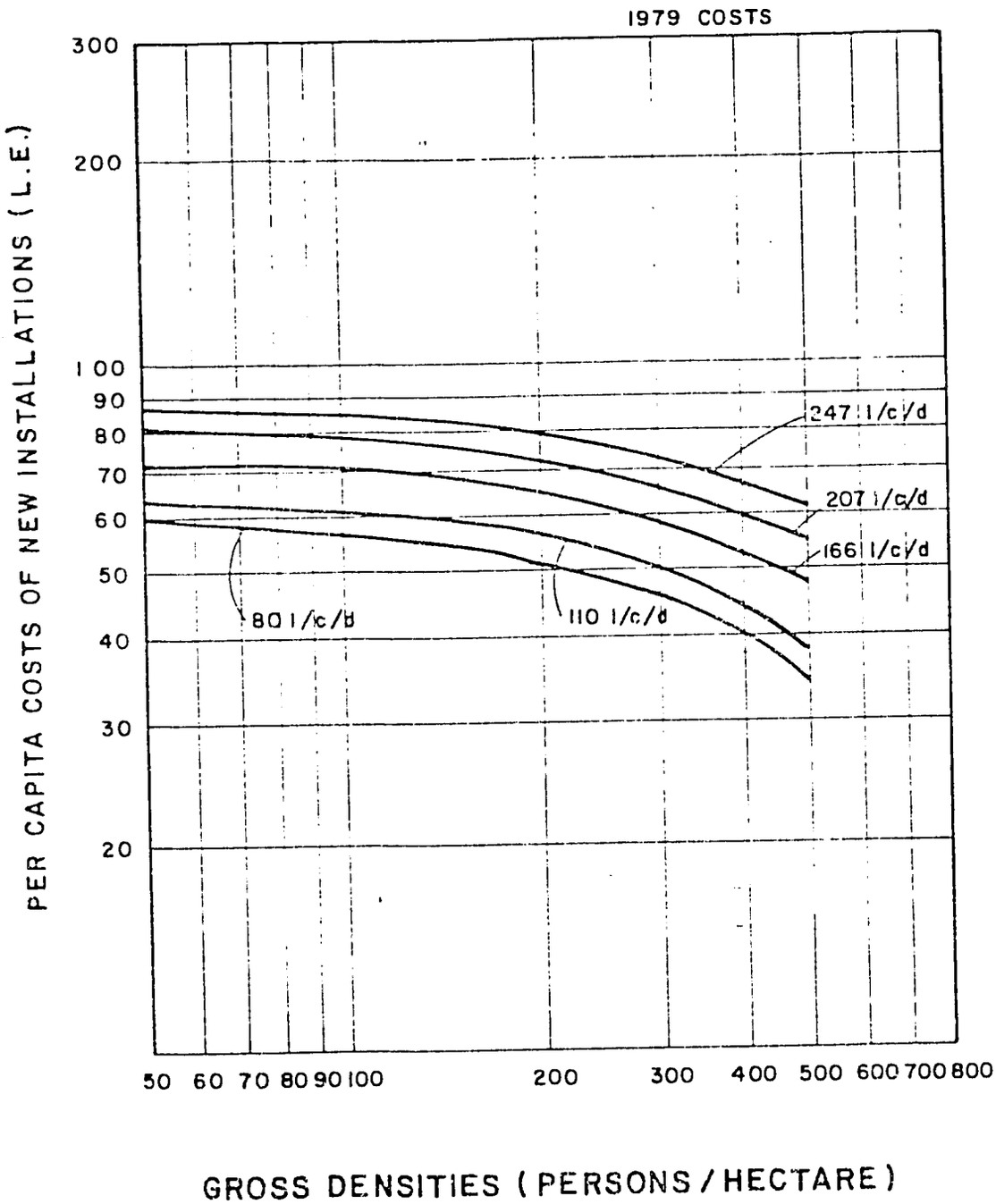


FIGURE V-A.16

INDICATIVE PER CAPITA CIRCULATION COSTS AT DIFFERENT GROSS DENSITIES AND LAND REQUIREMENTS

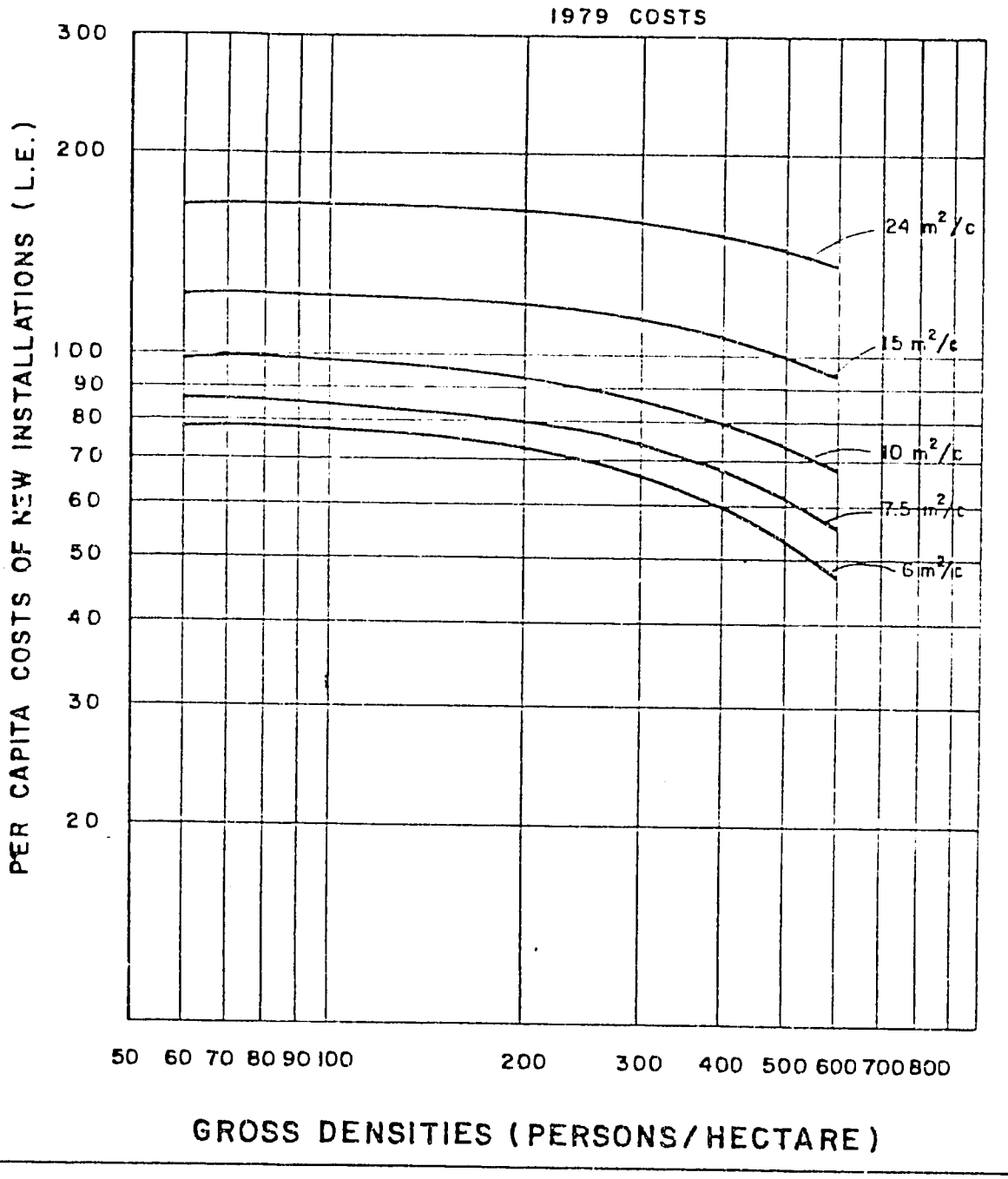


FIGURE V-A.17

INDICATIVE PER CAPITA COSTS OF INTRA-URBAN ELECTRICAL DISTRIBUTION SYSTEMS

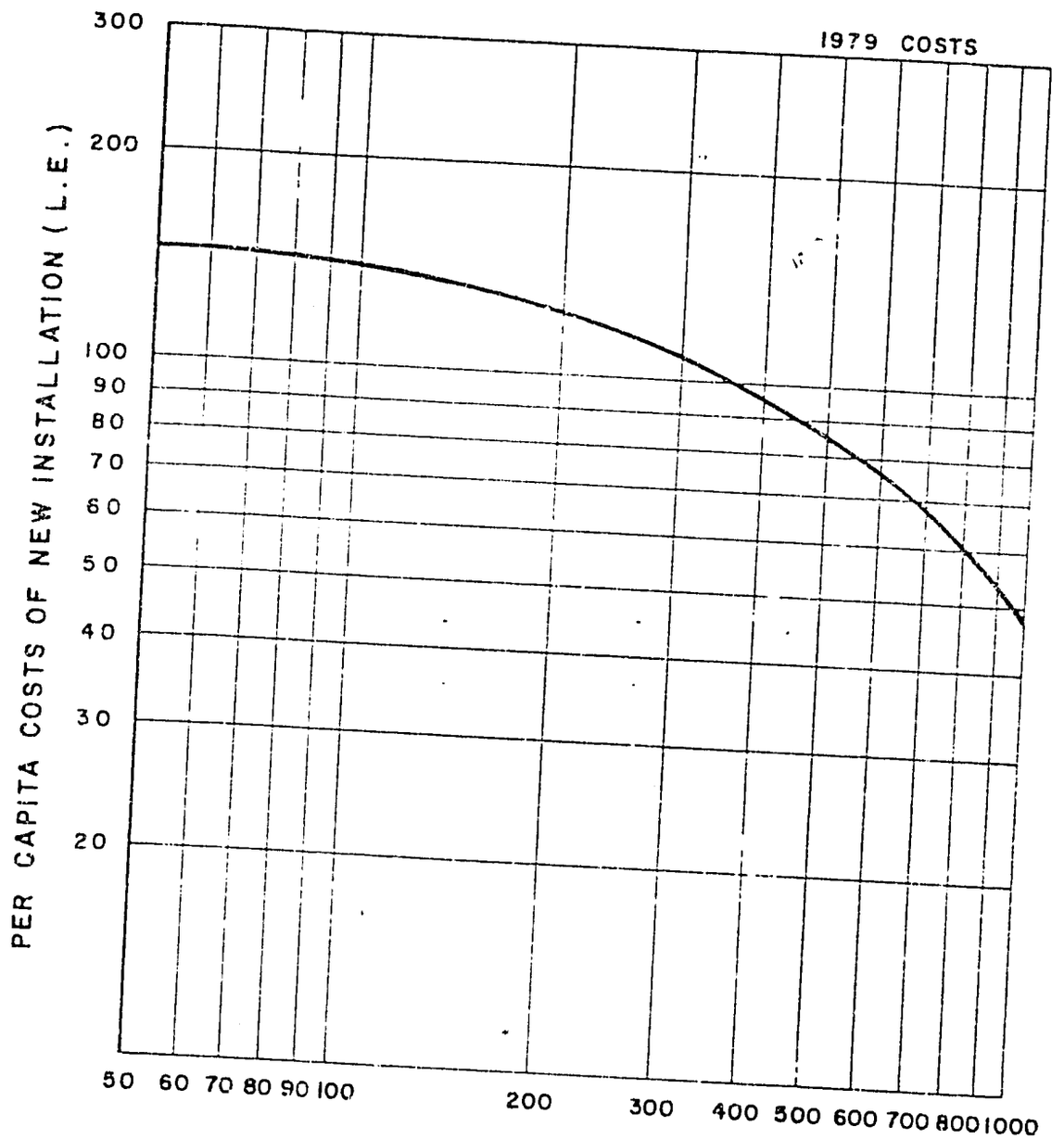


FIGURE V-A.18

standards of major settlements (excluding the Canal Cities, Alexandria and Greater Cairo) to those of Greater Cairo. These standards and their sources are shown in Table V-A.5. Except for settlements where master plans have been prepared, sewerage standards were based on 80 percent of water consumption standards net of allowances for losses and standpipe consumption. The table shows generally how standards were applied to different categories of cities. However, applying the rule, some modifications were made for special conditions found in some settlements. For example, the standards of high density settlements in the Delta were increased to the level of the special emphasis settlements to allow for greater demands which might be created on water and sewerage systems by more dense settlements. Also, in previous infrastructure estimates where existing standards in individual settlements are greater than those proposed for the settlement's spatial target group, the higher standard was maintained. In the reduced subsidy estimate of intra-urban infrastructure costs, costing was maintained at the standards proposed for the spatial target group. Thus, as the per capita costs which result are lower, some of the settlement's excess production capacity could be used to maintain an intermediate standard. This, however, happened in only three Delta settlements.

The magnitude of the costs required to expand Greater Cairo's water and sewerage systems have led many to conclude that it is more expensive to expand existing utilities than it is to construct completely new facilities. This appears correct because frequently the costs of rehabilitating the existing system are added to costs of expanding the system to serve new population growth. The costs also appear higher because the costs of rehabilitating the existing system include the costs of strengthening capacities to serve existing populations at higher standards and frequently to add new population to built-areas already served by the utilities. A more accurate comparison of the cost of expanding an existing system with the costs of building a new system is made by comparing only the costs of adding new population to the existing system and assuming that the cost of rehabilitation of the existing system would have to be incurred regardless of whether or not the existing system is expanded. With such a comparison, the costs of expanding Greater Cairo's water and sewerage systems compare favorably with those of the new towns, even at similar standards. Greater Cairo with a water master plan service population of 16 million has a projected consumption standard of 584 liters/capita/day and estimated unit costs of L.E. 99 per capita for adding new population to the system. Sadat City, 10th of Ramadan and the 6th of October, which have considerably lower year 2000 populations, have consumption standards of 436 to 480 liters/capita/day, but have per capita construction costs of L.E. 209 to 193. (See Table V-A.6)

Circulation costs are based on the costs of constructing road networks at different densities and per capita land requirements shown in the NUPS "Urban Development Standards and Costs" working paper (October 1980). These are summarized in Table V-A.7. Since relatively little data exists about actual land use in Egypt's settlements, the land requirements for circulation were fixed at 20 percent of total settlement area. This percentage corresponds to estimates of Fayoum's circulation component which is roughly 6.0 meters per capita or 19.6 percent of its 1980 area (Development and Plannification Project of Fayoum City, University, the Development & Technology Planning Research Center, 1980). Table V-A.7 shows that both Sadat City and 6th of October have achieved lower percentages of circulation

TABLE V-A.5

STANDARDS OF WATER AND SEWERAGE SYSTEMS USED TO COST THE PREFERRED STRATEGY

SPATIAL TARGET GROUP	CONSUMPTION WATER (l/c/d)	STANDARD SEWERAGE (l/c/d)	REMARKS
Major Metropolitan			
- Greater Cairo	584	382	Water and sewerage standards are from Water and Wastewater Master Plans for Greater Cairo and Alexandria. Per Capita costs were derived directly from those master plans.
- Alexandria	385	322	
Special Emphasis Suez Canal			
- Suez	353	282	Water and sewerage standards were derived from water and wastewater master plans prepared for the Suez Canal cities.
- Ismailia	353	282	
- Port Said	381	275	
Delta Regional Service Centers	351	189	Standards supplied by Planning Department of Local Council of Tanta.
Other Special Emphasis	300	180	Intermediate standard for water supply. Sewerage at 80 percent water standards net of losses and standpipes (roughly 60% of total water consumption).
Others			
- Governorate Capitals	237	142	Water at standards proposed by Provincial Water Supplies Project for larger provincial cities. Sewerage at 80 percent of water standard net of losses and standpipe consumption.
- Others	167	100	National average water standard excluding Greater Cairo, Alexandria and the Canal Cities. Sewerage at 80 percent of water standards net of losses and standpipes.
Settlements Less Than 50,000	129	-	Sanitation to be provided by individual households.

SOURCE: Water and Wastewater Master Plans for Greater Cairo and Alexandria.

Planning Department of the Local Council of Tanta.

TABLE V-A.6

COST COMPARISONS OF OFEXPANDING GREATER CAIRO'S WATER AND SEWERAGE SYSTEMS WITH CONSTRUCTING NEW WATER AND SEWERAGE SYSTEMS IN NEW TOWNS

SETTLEMENT	YEAR	SERVICE POPULATION ('000s)	CONSUMPTION STANDARD (l/c/d)	COST PER CAPITA (L.E.)	COST PER UNIT PRO-DUCTION (L.E./m3/d)	REMARKS
10th of Ramadan						
- Water		150	480	117	243.8	On-site costs only.
- Sewerage		150	340	136	400.0	
Sadat City						
- Water	2000	500	436	209	472.5	
- Sewerage	2000	500	360	94	261.1	Oxidation ponds lower costs.
6th of October						
- Water	2000	350	460	193	419.6	On-site costs only.
- Sewerage	2000	350	304	180	592.1	
Greater Cairo						
- Water	2000	15,959	584	46	169.0	Average capacity in year 2000.
- Rehabilitation	1982	9,654	584	19.8	169.5	Existing capacity increased.
- New Population	2000	6,305	584	99.0	169.5	New capacity.
- Sewerage	2000	14,220	320	70.0	313.1	Average capacity in year 2000.
- Rehabilitation	1980	7,342	320	41.5	313.1	Existing capacity increased.
- New Population	1000	6,880	320	100.4	313.1	New capacity.

SOURCES: Master Plans and tender documents for 10th of Ramadan, Sadat City and 6th of October and Water and Wastewater Master Plans for Greater Cairo.

TABLE V-A.7

CIRCULATION STANDARDS OF RECENT SETTLEMENT PROJECTS

GROSS DENSITY (PERSONS/ HECTARE)	PER CAPITA LAND CONSUMPTION (m2/PERSON)	CIRCULATION PROPORTION OF TOTAL AREA (%)	PER CAPITA COST (1979 LE/ CAPITA)	REMARKS
76	30.5	23	176	10th of Ramadan (1978 estimated updated to 2979).
72	24.7	18	212	6th of October Master Plan first stage.
79	21.6	17	147	6th of October Master Plan final stage.
133	12.6	17	128	Sadat City Master Plan: first stage contractor prices.
103	12.6	13	135	Sadat City Master Plan: Final Report.
396	6.0	20	48	El Hakr Demonstration Project Ismailia.
812	1,5	24	23	Helwan New Community (USAID) Demonstration Project August 1980 estimates.
Others				
238	14	33	N.A.	GOPP standard for community of 28,000.
326	6	19.6	N.A	Fayoum Development and Planniflcation Project.

SOURCE: NUPS Analysis of Various Master Plans (See Remarks This Table).

in their master plans. However, it is difficult for existing cities to achieve standards much lower than 20 percent. Greater Cairo, for example, has 25 percent of its area devoted to circulation.[2]

Throughout NUPS work, we have suggested increased gross densities as a mechanism for both reducing arable land loss and more efficiently using urban infrastructure investment. However, increasing densities will increase demands on transport systems. Therefore, we have suggested increased funding of intra-urban transport in settlements which are expected to have very rapid population growth or, as in the case of Greater Cairo, currently have over-burdened public transport systems. In the Greater Cairo case, we are suggesting increases in the public bus fleet from roughly 3 buses per 10,000 to 5 buses per 10,000[3] during the 1986-1990 period. After the 1986-1990 period, due to the increase in population in Greater Cairo, public transport standards have been further upgraded to 10 buses/10,000 (the 1980 level of public and private buses combined in Greater Cairo). It is assumed, but not included in the estimates, that private buses will also continue to increase. As is shown in Table V-A.8, increases in the public bus fleet have been suggested for other special emphasis settlements as well.

The standards and unit costs used to cost the transport component of intra-urban infrastructure are also shown in Table V-A.8. The costs of bus service are based on the costs of 52 seat buses having carrying capacities of roughly 80 persons including standees. The unit per capita costs shown include estimates of the costs of repair and service facilities, but not the costs of spare parts. Spare parts and tires are treated as a component of capital rehabilitation costs and are discussed later. Due to the needs to replace depreciated units plus expand the fleet to meet new population demands, the unit cost of the buses was increased by a factor of 1.59 using assumptions which are shown in the five-year phasing of new bus additions of the Sadat City Master Plan.

Congestion is frequently quoted as a result of large city size. However, in Greater Cairo's case, size is not the only source of the problem. About 25 percent of Greater Cairo's total urbanized area is road space. However, the practical traffic carrying capacity is about 25 percent less than that achieved in developed countries where maintenance standards are higher and driver/vehicle performance is better. According to the World Bank, "the severe transport infrastructure problems of Greater Cairo. . . are not attributable to a lack of total space devoted to road use, excessive vehicle densities or low vehicle occupancy rates, but are more a function of the high percentage of unsurfaced roads in the city's secondary and tertiary network; bottlenecks in the existing primary road network and in its repair and maintenance; rapid, unmanaged growth of private car ownership; and the absence of parking restraint and other traffic management measures." As a result of these problems, Cairo has one of the highest accident rates in the world at 80 fatalities and 600 injuries per 10,000 vehicles. This level is 20 times higher than that of the United Kingdom or of the United States.[4]

A separate review of the Greater Cairo's public transport condition was made due to the magnitude of the investments being suggested for Greater Cairo. Its present public transport system consists of public buses, trolley. buses

TABLE V-A.8

- PROPOSED INTRA-URBAN TRANSPORT STANDARDS OF THE PREFERRED STRATEGY

SPATIAL TARGET GROUP AND EXAMPLE SETTLEMENTS	1980 EXISTING STANDARD (BUSES/10,000)	2000 PROPOSED STANDARD (BUSES/10,000)	PER CAPITA COST (L.E./CAPITA)[1]
Major Metropolitan			
- Greater Cairo[2]	2.07	5.0	57.0
- Alexandria[3]	3.50	4.0	45.6
Special Emphasis			
- Suez[4]	1.7	2.0	22.8
- Assiut[4]	0.4	1.2	13.4
- Qena[5]	0.4	1.2	13.4
- Naga Hamadi[5]	0.4	1.2	13.4
- Aswan	N.A.	1.2	13.4
Other Canal			
- Port Said[4]	2.0	1.2	13.4
- Ismailia[4]	2.0	1.2	13.4
Delta Regional Service Centers			
- Tanta[6]	2.4	3.0	34.2
High Density Settlements			
- Damanhour	N.A.	0.5	5.7
Governorate Capitals			
- Beni Suef	N.A.	0.2	2.3
Non-Special emphasis			
- Belbeis	N.A.	0.1	1.1
Remote Areas			
- Hurgdaga	N.A.	0.3	3.4

1 Per capita costs include provisions for repair and service facilities and replacement rate for buses which equals 1.59 new units per operating unit. Costs are based on 52 seat bus with carrying capacity of 80.0. (Source: Sadat City Master Plan. Also Egypt National Transport Plan. Annex IV. Roads and Highway Transport, 1981. Per capita costs were found by multiplying the unit standard times the weighted unit costs of buses and dividing that amount by the service population(i.e., 10,000 units).

2 Greater Cairo's total public bus fleet was 2,347 units in 1981 but on a typical day only 68 percent are operational. The standard shown represents the effective operational fleet or roughly 1,596 units. (The World Bank. Staff Appraisal Report, Egypt. Greater Cairo Urban Development Project. April 1981. P.7.) After 1990, in Estimate II Greater Cairo's standard was increased to 10 buses/10,000.

3 Alexandria's register and public bus fleet was 1,020 units in 1979. However, the Egypt National Transport Plan (Annex IV) estimates that only 900 are operational. The standard shown represents the effective operational fleet. (Egypt National Transportation Study. Annex IV. P.3.4. 1981.)

4 Interim Report. National Transportation Investment Program. Phase II. NEDECO prepared for the Transport Planning Authority of the Ministry of Transport. 1981. The standards shown include inter-urban and intra-urban bus fleets.

5 Planning Department of the Governorate of Qena. 1981.

6 Governorate Information Office. Governorate of Gharbia. 1981 standard probably includes inter-urban bus fleet registered in Tanta.

SOURCE: See Footnotes 1 through 6.

and tram services operated by the Cairo Transport Authority (the Greater Cairo Bus Company was established as a subsidiary of the Greater Cairo Transport Authority to operate special bus services), suburban trams operated by the Heliopolis Metro Company (a subsidiary of the Heliopolis Development Authority), and suburban trains operated by the Egyptian State Railways. The status of the fleet and its composition in 1978 are shown in Table V-A.9.

As noted in the table, since this review of the Greater Cairo's public transport was made, 400 Ward buses have been added to the bus fleet. However, due to the age of the existing fleet, roughly 991 units have been retired since the 1978 study. Thus, by 1981, its total fleet was roughly 2,347 units of which 1,597 are operational on a daily basis. (This, as is shown on Table V-A.8, yields an effective operational fleet of roughly 2.07 units per 10,000 population.) However, in 1978, buses comprised the backbone of Greater Cairo public transport as they carried roughly 77 percent of the total daily passengers.

All three transport authorities operate at substantial losses due to the low fares charged to passengers. In the Heliopolis Metro Company, losses are financed by land sales of the Heliopolis Development Authority. The other two public transport systems rely on subsidies from government to cover their losses. Part of the rationale of establishing the Greater Cairo Bus Company was to operate higher class bus services in an effort to charge closer to economic fares for the service. However, the rapid deterioration of the fleet and political opposition to the higher fares have lead transport authorities to modify this policy and emphasize lower fare, lower quality transport to low income, high density areas. Overall, the continued policy of deficit operation of Greater Cairo's transport authorities has lead to frequent cash flow difficulties making adequate maintenance difficult and timely replacement of the fleet impossible. Thus, as is shown in the table, large portions of the fleet are non-operational and as a result, operational units tend to operate at excess capacities.

Given these transport related problems in Greater Cairo, the World Bank in conjuction with the Governorates of Cairo and Giza and Cairo Transport Authority (CTA) have developed a US $93 million project aimed at improving traffic engineering and maintenance in selected primary and secondary routes, traffic enforcement, institutional development (training of governorate and CTA staff and preparing improved master planning and project programming processes for Greater Cairo), upgrading of four lower income areas (consisting of refuse removal, improvements to circulation systems, and provision of street cleaning and solid waste disposal), and public transport (improvements to bus overhaul centers, installation of maintenance equipment and staff training). This expenditure over the 1982-1986 period aims at a low cost, traffic management oriented approach towards Greater Cairo's transport problems. Its traffic engineering and road maintenance component (US $43 million or roughly US $4.43 per capita) represents about 50 percent of the Governorate's planned expenditure on roads.

Transport planning officials have developed several other proposals for improving transport conditions in Greater Cairo: expansion of the bus fleet (the CTA plans to retire the trolley bus fleet due to its age and rely entirely on diesel buses), further expansion of the tram systems and construction of a subway. Although full feasibility studies should be prepared to fully

TABLE V-A.9

GREATER CAIRO'S PUBLIC TRANSPORT IN 1978

VEHICLE TYPE	FLEET SIZE	VEHICLES OPERATED DAILY	PERCENT OF FLEET OPERATED DAILY (%)	INDICATIVE SERVICE LEVELS: TOTAL PASSENGERS PER DAY ('000s)	INDICATIVE SERVICE LEVELS: PASSENGERS PER OPERATIONAL VEHICLE PER DAY
I. Cairo Transport Authority[1]					
Buses	2,938	1,230	42	3,297	2,680
Trolley Buses	100	73	73	113	1,548
Trams[2]	409	123	30	391	1,589
TOTALS	3,447	1,426	41	3,804	2,456
II. Heliopolis Metro Company					
Trams[3]	221	181	82	108	298
III. Egyptian State Railways: Helwan: Bab El Louk Line					
Three Car Train Sets					
Nominal[4]	22	18	82	230	4,259
Actual	50	18	36	230	4,259
IV. Egyptian State Railways: Ramses - El Marg Line					
Three and Five Coach Diesel Trains[5]	N.A.	182	N.A.	120	149

1 Bus totals exclude 400 Ward buses which were not commissioned at the time of the Study. By November 1979, of the 400 buses commissioned, 280 were operational, but the subsidiary of CTA intended to increase this number to 320 by 1980.

2 Trams consist of two-car sets. Passengers per vehicle per day calculated on this basis.

3 Trams consist of two- and three-car sets. Passengers per vehicle per day shown on this basis.

4 The actual fleet size consists of 50 trains, however, only 22 are operational and 4 are kept in reserve. Passengers per day per vehicle calculated on basis of three-car trains. In late 1980, all of these defective units have been replaced by 50 new train sets.

5 The line operates 182 trains daily consisting of 45 three-unit trains, 15 four-unit trains and 122 five-unit trains. In mid 1980, 37 new diesel train sets were added to the line.

SOURCE: Kirby, Ronald F., "Public Transport in Cairo, Report on World Bank Mission to Cairo," October - November 1978, The Urban Institute, 1979; and NEDECO, Egypt National Transport Study. Annex V, Railways, 1981. P. 8.3.

explore each of these options and determine a comparable basis for benefit/cost analysis, these proposals do present major policy options whose impacts on the Preferred Strategy can be indicated. The first option has already been presented: that of increasing Greater Cairo's public bus fleet to 5 buses per 10,000 by 1990 and to 10 buses per 10,000 thereafter. This proposal is the lowest capital cost option and was developed because buses now carry roughly 77 percent of the total daily passengers using public transport in Greater Cairo. Thus, through better planning of routes, more coordination between transit authorities and traffic control authorities over the use of public rights-of-way, and better maintenance of the fleet through a movement to more economic pricing, the proportion of public bus users could be expanded. As is shown in Table V-A.8, this option has an indicative per capita cost of L.E. 57 for the 1986-1990 period and L.E. 114 per capita after that. This option also assumes that privately owned public transport vehicles will continue to expand as they have in the past.

Another approach to transport problems of major metropolitan areas is presented by the plans which the Transport Planning Authority of the Ministry of Transport has for the construction of a combined underground subway and surface rail system in Greater Cairo. The first stage of system for which tenders are being sought is very roughly estimated to cost L.E. 523 million.[5] This stage consists of eight kilometers of subway which will link Ramses Station with the Bab El Louk Station and electrification of 14 kilometers of surface rail line between Ramses Station and El Marg. If both are implemented over the 1986-1990 period, the transport component of the "Modified Standard" estimate of Greater Cairo's intra-urban infrastructure cost will increase from L.E. 57 to L.E. 333 per capita (an increase of roughly L.E. 277 per capita).[6] The Cairo Transport Authority also has plans to extend the present 40 kilometers of metro by another 100 kilometers and adding another 400 three-car train sets to its stock by 1985. This would require an investment of roughly L.E. 125 million when combined with the estimated replacement value of the existing stock (L.E. 68 million). This would require an indicative level of per capita spending of L.E. 20 (measured against the 1985 NUPS projected population). At this standard of 1.72 tram cars/10,000 for the combined systems, the light rail system could have a carrying capacity of 3,179 passengers per car per day if speeds were increased and modal conflicts reduced. Thus, if this level of spending were continued and combined with an expansion of the subway at levels indicative of the first phase per capita costs, and if bus transport were increased to a standard of 5 buses per 10,000, then a total of L.E. 354 per capita ould be required to maintain this level of expansion of Greater Cairo's public transport systems. The implications of these two options are shown in Table V-A.10.

A third option for Greater Cairo public transport would be to build only the first stage of the proposed subway including electrification of the El Marg line. Under this scenario, the subway construction would be phased over the 1983-1990 period to reduce annual per capita costs to roughly L.E. 170. As was proposed in the Master Plan estimates, extension of the surface rail system (trams) would continued at a standard of 1.7 new vehicles (in three-car sets) per 10,000 and buses would be added to the fleet at a standard of 5 units per 10,000. These three transport modes would require a per capita investment of roughly L.E. 247 over the 1986-1990 period. After 1990, however, new additions to the public transport fleet would rely on surface rail at a standard of 1.7 vehicles per 10,000 and buses at a

TABLE V-A.10

COMPARISON OF IMPACT WHICH DIFFERENT TRANSPORT OPTIONS HAVE ON TOTAL COSTS AND SUBSIDY REQUIREMENTS FOR GREATER CAIRO INTRA-URBAN INFRASTRUCTURE COSTS

ESTIMATE	TOTAL INTRA-URBAN INFRASTRUCTURE CAPITAL COSTS (L.E. MILLIONS)	TOTAL COSTS PER CAPITA NEW AREAS (L.E.)	PORTION OF COSTS NOT AFFORDABLE BY HOUSEHOLD SECTOR (%)	TOTAL CAPITAL COST SUBSIDY (L.E. MILLIONS)	TOTAL SUBSIDY PER CAPITA (L.E.)
1986-1990					
Modified Standards[1] (No Subway)	3,446	1,241	11.4	273	142
Modified Standards[2] (With Subway)	4,002	1,538	27.5	845	440
Master Plan Standards[3] (With Subway)	4,700	1,810	45.6	1,366	711
Modified Standard[4] (Trams and Buses)	3,829	1,675	34.4	1,107	576
1991-1995					
Modified Standards[1] (No Subway)	3,881	1,282	1.1	32	14
Modified Standards[2] (With Subway)	4,397	1,500	15.5	522	232
Master Plan Standards[3] (No Subway)	5,713	1,794	29.3	1,183	526
Modified Standard[4] (trams and Buses)	4,011	1,337	25.0	155	69
1996-2000					
Modified Standards[1] (No Subway)	4,402	1,274	(25.6)*	(854)	(526)
Modified Standards[2] (With Subway)	5,001	1,492	(7)*	(283)	(108)
Master Plan[3] (With Subway)	5,965	1,796	20.6	968	369
Modified Standard (Trams and Buses)	4,582	1,315	(21.7)*	(747)	(285)

* Indicates possible surplus.

1 Transport component consists of standards of 5 public buses per 10,000 during the 1986-1990 period and 10 public buses per 10,000 thereafter.

2 Transport component consist of per capita expenditures for subways at levels projected for the 1986-1990 period throughout the 15-year period and public buses at a standard of 5/10,000.

3 Transport component the same as Footnote 2, except that the expansion of the "Metro" (tram system) is also included.

4 Transport component consists of first phase of subway phased over the 1983-1990 period, trams or light rail at a standard of 1.72 tram cars/10,000 and 5 buses/10,000 in 1990. After that, no subway is provided, but light rail is maintained at the same standard and buses are increased to 10 units/10,000.

SOURCE: MUPS Analysis.

standard of 10 units per 10,000 and would incur a cost of roughly L.E. 189 per capita. In all three periods, this option would require capital investments which are substantially less than construction of the full subway network at per capita costs equivalent to those of the Estimate I (master plan standards). However, as with the other two proposals, this option should be submitted to further feasibility study prior to embarking on it. A summary of its impact on total Greater Cairo investment requirements for intra-urban infrastructure is shown in Table V-A.10.

The other "Physical Infrastructure" component of intra-urban physical infrastructure costs consists of a "lump-sum" estimate of site specific costs which cannot be easily estimated such as solid waste infrastructure not covered by operations and maintenance costs of intra-urban infrastructure, and other unspecified costs. As is shown in the "Urban Standards and Costs Report," these costs can vary widely. For example, they are roughly L.E. 6 per capita in the Suez Demonstration Project to L.E. 15 per capita for solid waste alone for Sadat City to roughly L.E. 60 per capita in the Helwan New Community project for solid waste, site preparation and street lighting.[7] Since many of these facilities may already exist to some extent in most existing settlements, we have included provisions for this type of costs ranging from L.E. 10 per capita in Greater Cairo and other special emphasis settlements where higher costs are likely to be encountered due to rapid population growth rates or larger populations to L.E. 1.00 in smaller, non-special emphasis settlements where population growth rates are slower and, thus, demands for these services less.

C. Social Infrastructure

The standards of social infrastructure, particularly health and education, are important elements in developing settlement policy due to the emphasis which Egyptian families place on them. Many senior and managerial level personnel have refused to move their families from Cairo and Alexandria to even the Canal Cities because of the lack of desired education and health facilities. Further, although Greater Cairo and Alexandria predominate, urban Egypt already has a relatively high level of social infrastructure. For example, its upper level educational facilities attract students from other countries throughout the Middle East and other parts of Africa.

Nevertheless, policy decisions in these categories of infrastructure are needed to determine levels of investment required to expand these services to meet the needs of new population and to rehabilitate existing facilities. In particular, investment in social infrastructure has an important role in inter-regional considerations. While it may not be possible to encourage high levels of industrial investment in all settlements, basic levels of social infrastructure investments can be used to ensure adequate standards of living in all settlements.

Estimating the requirements for expansion and rehabilitation of social infrastructure is more difficult than physical infrastructure because comprehensive settlement level studies of the conditions of social infrastructure are not available as they are for many components of physical infrastructure and because the ministries responsible for the provision of social infrastructure do not use cost accounting methodology to reflect the remaining useful life of their facilities.

1. Education

Settlement level provision of various types of educational facilities are shown in Table V-A.11. This table compares data from Alexandria, Sadat City Master Plan and other settlements to give a comparison of standards in different settlements. The cost data in the table was derived from two sources: the Sadat City data was updated from the Master Plan using a 15 percent annual inflation factor, while the cost data used for estimating the replacement costs for other settlements comes from unpublished Ministry of Education estimates of construction costs for different types of schools. This comparison of standards suggests that there is a fairly wide range of standards. However, the highest standards in existing settlements are found in Assiut and Tanta, both of which have a university and have been selected by NUPS as special emphasis settlements. It should be noted that the unit costs used by the Ministry of Education for budgetary purposes are considerably lower than those of Sadat City (chosen for this illustration because its per capita cost for school facilities are lower than other new towns, although in many cases its standards are similar). These estimated replacement costs were shown to give an illustration of the type of investment which might exist in different settlements if they were replaced at the unit costs of the Ministry of Education.

Since secondary level schools are located in urban settlements, they tend to serve rural populations as well as urban populations. This is illustrated by comparing the actual enrollment figures of secondary schools with the proportion of settlement population which is actually at school age. This estimate of the region-serving function of secondary schools was made by comparing 1980 Ministry of Education enrollment rates at the governorate level for different types of secondary schools with 1980 estimated school age populations. This yields the actual proportion of the school age population going to school. For six sample governorates, this mean is 31.2 percent of the secondary school age population. When this percentage of a settlement's school age population, representing the proportion of the school age population likely to be in school, is compared with Ministry of Education actual enrollment figures for secondary schools at the settlement level, the following ratios of actual enrollment to settlement school age population result:

TYPE OF FACILITY	REGIONAL FACTOR
Primary	1.00
Preparatory	1.00
General Secondary	1.50
Commercial Secondary	2.00
Industrial Secondary	3.80
Agricultural Secondary	5.40

TABLE V-A.11

COMPARISON OF EDUCATION STANDARDS IN SELECTED SETTLEMENTS AND ESTIMATED REPLACEMENT VALUE OF THOSE FACILITIES: PER CAPITA AND PER STUDENT

STANDARD/ SETTLEMENT	PRIMARY	PREPARATORY	SECONDARY GENERAL	SECONDARY TRADE & COMMERCE	SECONDARY INDUSTRIAL	SECONDARY AGRICULTURAL	TOTALS	REMARKS
Sadat City								
Service Population	5,000	15,625	50,000	83,333	125,000	500,000		Source: Sadat City Master Plan costs have been updated by a 15 percent annual construction cost inflation factor.
Students/Facility	832	913	906	955	975	680		
Students/Classroom	35	35	30	25	32	30		
Cost/Unit(L.E.)	277,800	529,000	945,217	992,000	1,289,150	5,557,000		
Cost/Student(L.E.)	333	579	1,043	1,038	1,322	8,172	12,487	
Cost/Capita(L.E.)	55.6	33.9	18.9	11.9	10.3	11.1	141.7	
Regional Factor	-	-	-	-	-	-		
Alexandria (At Governorate And Ministry Of Education Standards)								
Service Population	4,510	13,130	83,777	62,000	62,000	N.A.		The data for Alexandria's schools comes from two sources: number of students per classroom and enrollement in secondary commercial, industrial and agricultural schools from publications of technical departments of the Ministry of Education; other data is from unpublished statistics of the Ministry. The service populations include public and private schools.
Students/Facility	494	499	952	795	1028	2001		
Students/Classroom	N.A.	N.A.	N.A.	26	29	48		
Cost/Unit[1] (L.E.)	26,000	43,500	86,975	104,350	217,350	104,350		
Cost/Student(L.E.)	52.6	87	91	131	211	52	625	
Cost/Capita(L.E.)	5.8	3.2	1.0	1.7	3.5	0.4	15.7	
Regional Factor	-	-	1.0	0.9	0.9	0.6		
Fayoum (At Existing Standards)								
Service Population	5,406	13,129	45,950	91,900	91,900	183,793		Source: Planniification and development project of the city of Fayoum, Cairo University Development and Technology Planning Center, 1980
Students/Facility	707	778	3115	1926	1270	1667		
Students/Classroom	43	40	102	36	34	36		
Cost/Unit[1] (L.E.)	26,000	43,500	86,957	104,350	217,350	104,350		
Cost/Student(L.E.)	37	55	27	73	171	63	427	
Cost/Capita(L.E.)	4.8	3.3	1.9	1.1	2.4	0.6	14.1	
Regional Factor	-	-	-	-	-	-	-	
Assiut (Existing Standards)								
Service Population	2,064	9,369	22,145	81,200	81,200	243,600		Source: Planning Department of the Governorate of Assiut
Students/Facility	396	632	692	690	1,606	1,947		
Students/Classroom	41	40	39	26	36	38		
Cost/Unit[1] (L.E.)	26,000	43,500	86,957	104,350	217,350	104,350		
Cost/Student(L.E.)	66	69	126	151	135	54	601	
Cost/Capita(L.E.)	12.6	4.6	3.9	1.3	2.7	0.4	25.5	
Regional Factor	-	-	N.A.	1.6	11.9	9.9		

TABLE V-A.11 (CONTINUED)

COMPARISON OF EDUCATION OF EDUCATION STANDARDS IN SELECTED SETTLEMENTS AND ESTIMATED REPLACEMENT VALUE OF THOSE FACILITIES PER CAPITA AND PER STUDENT

STANDARD/ SETTLEMENT	PRIMARY	PREPARATORY	SECONDARY GENERAL	SECONDARY TRADE & COMMERCE	SECONDARY INDUSTRIAL	SECONDARY AGRICULTURAL	TOTALS	REMARKS
Suez (Existing Standards)								
Service Population	3,798	1,6250	6,5000	65,000	130,000	-		Source: Planning Department of Governorate of Suez. There are no agricultural secondary schools in Suez.
Students/Facility	489	727	729	828	988	-		
Students/Classroom	39	36	37	33	34	-		
Cost/Unit[1] (L.E.)	26,000	43,500	86,957	104,350	217,400	-		
Cost/Student (L.E.)	53	60	120	126	220	-	579	
Cost/Capita (L.E.)	6.9	2.7	1.3	1.6	1.7	-	14.2	
Regional Factor	-	- -	-	1.5	1.8	-		
Tanta (Existing Standards)								
Service Population	2,038	5,880	25,621	44,836	59,783	179,350		Source: Planning Department of Local Council of Tanta
Students/Facility	392	456	660	922	1087	1087		
Students/Classroom	92	41	38	37	34	35		
Cost/Unit[1] (L.E.)	26,000	43,500	86,957	104,350	217,400	104,350		
Cost/Student (L.E.)	66	95	191	158	236	95	842	
Cost/Capita (L.E.)	12.8	7.4	3.4	2.3	3.6	5.8	35.3	
Regional Factor	-	-	-	2.0	4.0	5.0		
Beni Suef (Existing Standards)								
Service Population	3,040	11,862	32,350	65,350	43,567	65,350		Source: Governorte Planning Department
Students/Facility	413	742	961	927	1423	1,114		
Students/Classroom	39	40	8	35	35	33		
Cost/Unit[1] (L.E.)	26,000	43,500	86,957	104,350	217,400	104,350		
Cost/Student (L.E.)	62	58	90.5	113	153	94	571	
Cost/Capita (L.E.)	8.6	3.7	2.7	1.6	5.0	1.6	23.2	
Regional Factor	-	-	-	-	-	-		
Qena (Existing Standards)								
Service Population	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		Source: Planning Department of Qena Governorate. Data on service populations and schools is only available at governorate not settlement level.
Students/Facility	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		
Students/Classroom	37	42	40	33	35	30		
Cost/Unit (L.E.)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		
Cost/Student (L.E.)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		
Cost/Capita (L.E.)	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-	
Regional Factor	-	-	1.2	1.6	7.9	9.8	-	

[1] Costs are from unpublished cost targets used by the Ministry of Education. The 1980 prices supplied have been adjusted to 1979 prices using a 15 percent inflation factor.

SOURCE: See "Remarks" for this Table.

The selection of proposed standards can be done in two ways: (1) an absolute standard based on projected education targets can be developed and then costed, or (2) an existing standard which represents a reasonably high service level can be adopted as a target for other settlements with lower standards. We have adopted the latter course and chosen Alexandria education standards as a basis for determining a modified standard. This was done because Alexandria has relatively high standards, thus, if there were a policy of achieving greater inter-regional equity, bringing education standards in other settlements to the Alexandria standard would be one way of achieving that goal. However, since Alexandria's schools generally serve only Alexandria (its regional indexes are 1.00 or less), the Alexandria standard was modified to account for the region serving functions of the secondary school facilities of other settlements.[8] The costs per educational facility shown in Table V-A.12 are higher than the Ministry of Education budgetary targets to allow higher standards and to more closely reflect building costs.

A further estimate of investment requirements of the education sector (primary through secondary) as a whole indicates that it is likely that current investment levels cannot maintain current standards such as those shown in Table V-A.12. The Ministry of Education has a stock of about 10,270 school buildings of which about 42 percent are rated as being in "bad condition" or requiring "massive rehabilitation." Based on NUPS urban population projections and the school standards shown in Table V-A.12, an additional 6,360 new facilities will be required to educate the expected new urban population by the year 2000. This requirement for new construction and rehabilitation of existing facilities is expected to require an annual investment of L.E. 1.60 per capita over the period (1980-2000). However, current ministry investment from the investment portion of the national budget is only about L.E. 0.51, a shortfall of about 68 percent. (See Table V-A.29 at the end of this Appendix.)

While developing detailed manpower studies is outside the scope of work of NUPS, a number of the policy choices affecting educational services which should be considered were indicated by the Human Resources Study of the Canal Region:

- Redirecting education policy towards providing a greater emphasis on basic literacy skills, particularly among females.
- Further emphasis on providing technical level education needed for future industrialization.
- Refocusing higher level education towards providing managerial, administrative and technical skills likely to be needed by future industrial and commercial enterprises.

2. Health Provisions

Developing profiles on the health sector is more difficult than on the education sector because 11 different ministries and semi-autonomous organizations, as well as the private sector, are involved in providing health services. The most comprehensive study of the sector was done by the Ministry of Health in its 1978 Health Profile of Egypt.[9] While it discusses health provision and financing, it does not provide much disagregated data at the settlement level.[10]

TABLE V-A.12

ALEXANDRIA "MODIFIED STANDARD"
(1979 L.E. PRICES)

FACILITY	SERVICE POPULATION[1]	STUDENTS PER FACILITY[1]	UNIT COST (1,000's)[2]	NUMBER OF FACILITIES REQUIRED[3]	REGIONAL FACTOR[3]	COST PER CAPITA (L.E.)[3]	COST PER URBAN STUDENT (L.E.)[4]
Primary	4,510	994	47.0	110	1.0	10.3	47
Preparatory	13,130	499	65.2	38	1.0	5.0	145
Secondary							
General	84,290	952	173.9	6	1.5	3.1	274
Trade and Commerce		795	260.9	4	2.0	4.2	656
Industrial	62,000	1,028	434.8	3	5.8	9.9	2,453
Agricultural		2,001	652.2	1	5.4	7.0	1,760
TOTAL	163,930	-	-	162	-	39.5	5,335

1 The number of students per secondary trade and commerce, industrial and agricultural secondary schools comes from data from the technical education department of the Ministry of Education.

2 Unit costs come from the following: primary and prepratory schools from the Governorate of Cairo consisting of 14 classroom units designed for 35 students. The unpublished Ministry of Education costs in 1980 prices for the other facilities are:

General Secondary	L.E. 200,000
Commercial Secondary	250,000
Industrial Secondary	500,000
Agricultural Secondary	750,000

3 Based on a settlement population of 500,000.

4 Estimated by multiplying unit costs times regional factors and dividing by the student population in the student population in the facility.

SOURCE: NUPS Analysis of Ministry of Education Unpublished Statistics and Cairo Governate Data.

Urban Egypt presently has a relatively high standard of health care facilities as indicated by a 1978 urban standard of 4.59 hospital beds per 1,000 population. (This standard results from dividing Egypt's total stock of 80,400 hospital beds in 1978 by the 1978 urban population.) However, at the national level (urban andd rural combined), the overall provision is about 2 beds per 1,000 population. These statistics in themselves are not an indication of urban/rural disparities except for remote regions, as most rural areas have access to urban facilities. Furthermore, due to the lack of associated infrastructure and sufficient catchment populations, it would be difficult to provide secondary health care facilities in rural areas.[11] As a result, for purposes of NUPS projections, it was assumed that future secondary health care facilities will continue to be provided in urban areas, but that these facilities will continue to serve both urban and rural populations.

A variety of standards were reviewed to cost urban health facilities required for new urban population:

- Standards proposed by the General Organization for Physical Planning of one 300 bed hospital per 56,000 population or an indicative standard of 5.6 beds/1,000 at an estimated 1979 cost of L.E. 346 per capita.[12]

- An estimate of the current level of health funding for new infrastructure (roughly L.E. 29 per capita, described later in this section).

- Intermediate standards ranging from 4.5 beds/1,000 to 2.5 beds/1,000 (shown in Table V-A.13.) These latter standards aim at maintaining the current level of health care facilities in most major settlements which have major region-serving functions. In other smaller settlements where access to either governorate capitals or other larger urban settlements is possible, more basic levels of urban health care have been suggested. The costs used to project these health care investment requirements were derived from updated costs of the Sadat City Master Plan and are roughly indicative of per unit investment targets of the Ministry of Health.

Estimates of the current levels of investment in health care facilities were made in two ways:

- An estimate of the current value of the stock was made using budgetary data from the health budgets of the urban governorates for repair and maintenance of health facilities.

- A review of the actual investment made by the Ministry of Health, the curative organizations, the university hospitals and the health insurance organizations as shown in the 1979 health profile study.

The first estimate was based on the relationships between requirements for maintenance of the net value of existing plant and maintenance expenditure found to exist for other infrastructure components where detailed studies of infrastructure financing has been made. These relationships indicate that between 0.003 to 0.25 percent of the net value of the plant should be spent annually on maintenance. Thus, if these relationships are true for other infrastructure, then the investment in maintenance of health facilities in the urban governments yields an average investment value of those facilities of L.E. 29 per capita.

TABLE V-A.13

HEALTH CARE FACILITIES FOR SETTLEMENT SIZE OF 500,000

FACILITY	INDICATIVE STANDARD[1]	NUMBER OF UNITS REQUIRED	1980 UNIT COST (L.E.000's)	TOTAL COST (L.E. MILLIONS)	TOTAL COST PER CAPITA 1979 PRICES
I. 4.59 Beds/1,000 Urban Population (National Urban Average Standard 1978)[2]					
Primary	1/40,000	13	228	2.96	
Polyclinics	1/250,000	2	2,850	5.71	
Secondary	4.59/1,000	2,295	60.9	140.00	
Total				148.70	258.6
II. 4.0 Beds/1,000 Urban Population (12.9 % Reduction in Secondary Health Care Facilities)[3]					
Primary	1/35,430	15	228	3.40	
Polyclinics	1/250,000	2	2,850	5.70	
Secondary	4/1,000	2,000	60.9	121.8	
Total				130.9	227.6
III. 5.79 Beds/1,000 (Tanta Standard)					
Primary	1/40,000	13	228	2.96	
Polyclinics	1/250,000	2	2,850	5.70	
Secondary	5.79/1,000	2,895	60.9	176.3	
Total				184.9	322
IV. 3.83 Beds/1,000 (20% Reduction in Urban Average Standards)					
Primary	12/40,000	16	228	3.6	
Polyclinics	1/250,000	2	2,850	5.7	
Secondary	3.83/1,000	1,915	60.9	116.6	
Total				125.9	219
V. 2.5 Beds/1,000 (Secondary Cities Non-Governorate Capitals)					
Primary	12/40,000	13	228	2.9	
Polyclinics	1/250,000	2	2,850	5.7	
Secondary	2.5/1,000	1,250	60.9	76.1	
Total				84.8	147
VI. 0.51 Beds/1,000 (Health Care at Indicative Investment Levels of Ministry of Health)					

1 Facilities per unit population for primary facilities and polyclinics and beds per 1,000.

2 Found by dividing Egypt's total stock of 80,400 hospitals beds in 1978 by the 1978 urban population. These standards were used to project future requirements by assuming that urban facilities would continue to serve both urban and rural populations.

3 Shows a reduction in hospital beds accompanied by an increase in primary health care facilities.

SOURCE: NUPS.

The second estimate of existing health financing of new infrastructure was derived from the 1978 budgetary expenditures of the major health organizations providing primary and secondary health services. Their total investment (capital) expenditure was L.E. 26 million in 1978 (expressed in 1979 prices) or a total national level per capita expenditure of L.E. 1.53. However, if as is suggested by the requirements for capital rehabilitation of the existing stock shown in the health care projections at the end of this Appendix, roughly 30 percent of that expenditure was devoted to rehabilitation of existing stock and the remainder was spent on new infrastructure serving new population, then the total capital expenditure for new urban population would have been in the range of L.E. 28.44 per capita. At this level of capital investment, roughly 0.51 hospital beds/1,000 population could be provided in primary and secondary health care facilities as is shown in Part I of Table V-A.13. Neither of these investment estimates represents the replacement value of the existing stock of 80,394 hospital beds which in 1978 was roughly equal to L.E. 4.3 billion or roughly L.E. 243 per capita (1979 prices).

Since these national level health care investment figures are lower than investment required to maintain even national standards of 2.2 beds per 1,000 in secondary cities, we have suggested a higher level of health care financing in secondary cities in the "Modified Standards" estimate of intra-urban infrastructure costs. This increase in health care standards has the impact of slightly increasing intra-urban infrastructure costs in secondary cities in the Delta and the Remote Areas in the "Modified Standards" estimate of intra-urban infrastructure costs over the master plan estimate of costs.

As reported by the "Health Sector Profile of Egypt," the 1978 investment in new facilities by major health sector organizations is approximately L.E. 1.53 per capita. However, to maintain Egypt's current stock of health care facilities at their 1979 replacement value, provide for innovations in new technology and expand those facilities to accommodate new urban populations, an estimated annual investment of L.E. 13.51 per capita is required. Details of these calculations are shown in the Table V-A.26 at the end of this appendix.

Although these calculations lack refinement due to insufficient information about the condition of existing health care facilities, they do suggest a need to study policy options to reduce investment requirements:

- As is suggested by the Ministry of Health Planning Department, a greater emphasis on primary health care facilities might lessen the need to maintain secondary health care standards at their current levels. To investigate these possiblities, the Ministry of Health and USAID have jointly initiated a study of health care facilities, policies and programs aimed at developing health strategy and medium-term health objectives.

- A greater movement towards regionalization of secondary health care facilities might allow retirement of some under-utilized facilites, particularly since improvements in transport and communications networks could provide better access to these facilities. As an illustration of how this regionalization might occur, we have suggested that the Tanta standard of 5.79 beds/1,000 population be maintained to allow Tanta to expand its region-serving functions.

- Changes in health care requirements suggests that some types of facilities such as "fever" hospitals are no longer necessary and could be refitted into general hospitals.

- A greater share of the burden of financing health care investment needs could be shifted towards beneficiaries through insurance schemes and private contributions.

3. Social Services and Administration

Social services and administration encompass a wide range of urban services such as social services, public service units such as post offices, public safety, religious facilities, recreational facilities and other types of facilities. Due to the varied nature of these services, provision of them both quantitatively, and in terms of the variety of services provided, varies considerably from one settlement to another. As a result, the investment levels proposed for one settlement can vary considerably to another. To illustrate the range and, thus, cost implications of provision of different types of social and administrative services, NUPS has used the following standards to cost this component of social infrastructure:

- The updated version of the social services (excluding education, health and national or regional services functions) component of the 1979 Master Plan of Sadat City yields a per capita cost of L.E. 429.

- A modified version of the Sadat City Master Plan provides an investment target of 30 percent of Master Plan costs.

- Targets similar to above but with standards reduced to 10 percent of the Sadat City Master Plan.

- A modified version of the Suez Master Plan having a per capita cost of L.E. 112 in 1979 prices.

- Variation of the standards proposed by the Cairo Governorate for its projects of up to 250,000 population. In the last case, costs range from L.E. 13 to 3.00 per capita, the latter being estimated for smaller non-special emphasis settlements. (Tables V-A.14 through V-A.19)

As with other types of social infrastructure, it was assumed that higher levels of provisions of social and administrative infrastructure would be necessary in settlements with fast growing populations or with very large populations. However, in modifying the standards proposed by master plans, it was assumed that existing settlements already have region-serving and settlement-wide serving facilities. Therefore, these facilities were subtracted from the master plan proposals for new towns.

4. Social Infrastructure in Settlements with Populations Less Than 50,000

Table V-A.20 shows a distribution of education, health and social and administrative intra-urban infrastructure for small secondary settlements having populations less than 50,000. For these settlements, a basic level of social

TABLE V-A.14

SOCIAL INFRASTRUCTURE STANDARDS I
MODIFIED SADAT CITY STANDARDS (SERVICE POPULATION OF 500,000)
COSTS AT 30% OF MASTER PLAN

ITEM	NUMBER OF UNITS	1977 TOTAL COST (LE.MILLIONS)	1979 PER CAPITA COST (LE)
1. Public Service			
- Telephone & Telegraph	6	0.360	
- Telex	2	0.021	
- Neighborhood Postal Center	100	0.060	
- Postal Center	6	0.108	
SUBTOTAL		0.552	1.46
2. Open Space and Recreation			
- Neighborhood Sports Area	100	5.300	
- District Youth Centers	14	13.482	
SUBTOTAL		18.782	49.70
3. Social Services			
- Neighborhood Social Units	100	2.000	
- Kindergartens	100	1.000	
- District Social Unit	16	4.000	
- Major Social Units	2	2.000	
- Others (non specified care units)	5	2.550	
SUBTOTAL		11.550	30.60
4. Religious Services			
- Small Neighborhood Mosques	67	2.680	
- Large Neighborhood Mosques	33	3.300	
- District Mosques	6	3.000	
- City Mosques	2	1.903	
- Moslem Cemetary	1	0.056	
- Small Church	2	1.100	
- Central Church	1	2.200	
- Christian Cemetary	1	0.036	
SUBTOTAL		14.275	37.80
5. Public Safety			
- District Public Center	16	2.400	
- Sector Public Center	2	0.600	
- Traffic Control Units	3	0.135	
SUBTOTAL		3.135	8.29
6. GRAND TOTAL		48.294	127.90

SOURCE: NUPS Modification to Sadat City Master Plan.

TABLE V-A.15

SOCIAL INFRASTRUCTURE STANDARDS II

MODIFIED SADAT CITY STANDARDS (SERVICE POPULATIONS OF 500,000)

COSTS AT 10% OF MASTER PLAN

ITEM	NUMBER OF UNITS	1977 TOTAL COST (L.E.MILLIONS)	1979 PER CAPITA COSTS
1. Public Service			
(As Before)		0.552	1.46
2. Open Space & Recreation			
- Local Sports Areas	50	2.650	7.00
3. Social Services			
Neighborhood Units	100	1.500	
Kindergartens			
District Social Units	8	2.000	
City Social Units	1	1.000	
SUB TOTAL		4.500	11.90
4. Religious & Services			
- Local Mosques	67	2.680	
- Major Mosques	3	1.500	
- City Mosques	1	0.950	
- Churches		1.100	
SUB TOTAL		6.230	16.50
5. Public Safety			
- District Centers	10	1.500	
- Sector Centers	2	0.600	
- Traffic Control Units	3	0.135	
		2.235	5.90
6. TOTAL		16.170	42.80

SOURCE: NUPS Modification to Sadat City Master Plan.

TABLE V-A.16

SOCIAL INFRASTRUCTURE STANDARDS III

SUEZ MASTER PLAN MODIFIED SOCIAL INFRASTRUCTURE

(500,000 SERVICE POPULATION)

ITEM	STANDARD	TOTAL NUMBER OF UNITS	COST(L.E. MILLIONS) 1976 PRICES	1979 PER CAPITA COST
1. Religious Facilities				
Local Mosque	1/5,000	100	12.50	
Friday Mosque	1/40,000	13	2.34	
Main Mosque	1/160,000	3	0.54	
SUB TOTAL			15.38	53.80
2. Public Service				
Post Office	1/5,000	100	2.90	
District Post Office	1/80,000	6	2.10	
SUB TOTAL			5.00	17.49
3. Social Services				
Social Welfare Unit	1/10,000	50	5.80	
and Community Center	1/10,000			
SUB TOTAL			5.80	20.29
4. Public Safety				
Police Station	1/40,000	13	0.30	
First Aid Center	1/20,000			
District Police	1/160,000	3	1.30	
SUB TOTAL			1.60	5.6
5. Recreation & Sports Center	1/160,000	3	4.01	14.03
6. TOTAL			31.79	111.21 Say 112.00

SOURCE: Suez Master Plan. Prepared for the Ministry of Housing and Reconstruction, Advisory Committee for Reconstruction and United Nations Development Programme. Final Report. Sir William Halcrow & Partners, Robert Matthew, Johnson-Marshall & Partners. Economic Consultants Ltd. and Hamed Kaddah & Associates, March 1976.

TABLE V-A.17

SOCIAL INFRASTRUCTURE STANDARDS IV
MODIFIED CAIRO GOVERNORATE STANDARDS

BASED ON 500,000 POPULATION

ITEM	STANDARD	NUMBER OF UNITS	1977 L.E. PRICES (L.E. MILLIONS)	1979 L.E. PER CAPITA
1. Social Units	1/42,000	12	0.24	
Police				
- Main Station	1/250,000	2	0.30	
- Substation	1/83,000	6	0.27	
Telegraph & Post Office	1/62,500	8	0.05	
Mosque	1/7,500	67	2.68	
Church	1/250,000	2	1.10	
2. SUB TOTAL			4.64	12.2
Open Space and Parks (L.E. 0.309/capita)		NA	0.15	
Community Center	1/50,000	10	0.24	
3. TOTAL			5.03	13.3

SOURCE: NUPS Modification of Planning Department, Cairo Governate Standards and Costs.

TABLE V-A.18

SOCIAL INFRASTRUCTURE STANDARDS V
MODIFIED CAIRO GOVERNORATE STANDARDS
(NON-SPECIAL EMPHASIS SETTLEMENTS)

SERVICE POPULATION 500,000

ITEM	STANDARD	1977 TOTAL COSTS (L.E. MILLIONS)	1979 COST PER CAPITA
Social Units	1/42,000	0.24	
Main Police Station	1/250,000	0.30	
Sub Police Station	1/83,000	0.27	
Telegraph-Post Office	1/62,000	0.05	
Religious Facilities			
- Mosques	1/15,000	1.34	
- Churches	1 unit	0.55	
SUB TOTAL		2.75	7.3

SOURCE: NUPS Modification of Planning Department, Cairo Governate Standards and Costs.

TABLE V-A.19

SOCIAL INFRASTRUCTURE STANDARDS VI
SMALL NON-SPECIAL EMPHASIS SETTLEMENTS
(SETTLEMENT SIZE 160,000)

ITEM	STANDARD	1977 COST (L.E. MILLIONS)	1979 COST PER CAPITA
Social Units	1/60,000	0.06	
Police Stations	1/250,000	0.15	
Telegraph/Post Office	1/62,000	0.03	
Community Center	1/60,000	0.07	
SUB TOTAL		0.31	2.56 Say 3.00

SOURCE: NUPS Modification of Planning Department, Cairo Governate Standards and Costs.

TABLE V-A.20

SOCIAL INFRASTRUCTURE FOR SETTLEMENTS LESS THAN 50,000

(CATCHMENT POPULATION 36,000)

	SERVICE POPULATION	NUMBER OF FACILITIES REQUIRED	1979 COST PER CAPITA
1. Education Facility[1]			
Primary	4,510	8	10.4
Preparatory	13,130	3	5.4
2. Health			
Primary	1/40,000	1	7.0
3. Social Service & Administration			
Social Unit			
First Aid Center	40,000	1	0.6
Police Station	40,000	1	1.7
Post Office	40,000	1	0.2
TOTAL			25.3

1 It was assumed that secondary schools are provided in larger settlements.

SOURCE: NUPS.

infrastructure has been proposed, since these settlements generally have access to larger settlements where more complete urban services can be found.

Housing standards for these settlements were set at the average unit size found in Tanta's core areas since this represents the only actual data (other than for Beni Suef, to which they are similar) about average unit sizes in settlements outside major metropolitan areas. These units average 33 square meters and were costed at the unit costs found in a Cairo Governorate low income housing project, L.E. 35 per square meter (1979 prices). These yield an average per capita cost of housing of L.E. 231. Since the densities are low in most of these settlements, as is evidenced by visual inspection of LANDSAT data, it was assumed that sanitation requirements can be met through private systems such as pit latrines, rather than municipal systems. Many settlements, particularly in the Delta, already have access to piped water. Thus, it was assumed that programs of extending water supply to small settlements would be continued, but at standards of 130 liters per capita per day. Further, since the Rural Electrification Program is now extending tertiary systems to rural areas and small settlements, provisions have been included for continued electrification of these settlements. These costs were developed using the cost data shown on Figure V-A.19. Table V-A.21 shows the distribution of these infrastructure provisions.

Since incomes are likely to be lower in smaller settlements having only agricultural employment opportunities, it was assumed that regional wage indexes for these areas would be similar to the median rural wages found in the 1974-1975 Labor Force Survey. (See Chapter V). These indexes expressed as a proportion of Greater Cairo's median wage are:

SETTLEMENT ZONE	REGIONAL INCOME INDEX
Lower Egypt and Canal	0.770
Upper Egypt	0.617
Remote Areas	0.617

The same index was used to weight per capita household savings since it was assumed that savings would also be lower in smaller settlements. These result in the following per capita household savings:

SETTLEMENT ZONE	PER CAPITA HOUSEHOLD SAVINGS
1986-1990	
Lower Egypt and Canal	437
Upper Egypt and Remote Areas	351
1991-1995	
Lower Egypt and Canal	480
Upper Egypt and Remote Areas	386
1996-2000	
Lower Egypt and Canal	528
Upper Egypt and Remote Areas	424

FIGURE V-A.19

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: POPULATION LESS THAN 50,000
EXAMPLE SETTLEMENT: DELTA SETTLEMENTS*

I.	GROSS DENSITIES 30	PERSONS HECTARES	POPULATION	EXISTING (1980)	1,648,000
				INCREASE (1980-1990)	242,000
II.	LAND REQUIREMENTS	PHYSICAL STANDARDS			PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	[illegible]			
	--RESIDENTIAL	(45%)			
	--NON RESIDENTIAL	(20%)			
	PUBLIC	35%			
	TOTAL	100%			
III.	HOUSING				
	AVERAGE AREA PER UNIT 33 M2	AVERAGE UNIT COST L.E. 1,555	INDICATIVE PER CAPITA COST 2/ L.E. 231		L.E. 66.9
IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2 L.E.		
	WATER	130 l/c/d	21.7		L.E. 5.18
	SANITATION	l/c/d	NONE		L.E. --
	ELECTRICITY	DISTRIBUTION ONLY	115.4		L.E. 30.3
	CIRCULATION	201 or 40 m² CAPITA	100.1		L.E. 27.8
	TELECOMMUNICATIONS 3		INCLUDED IN INTER-URBAN INFRASTRUCTURE		L.E. --
	TRANSPORTATION	[illegible]	NO PROVISION		L.E. --
	OTHERS	PROVISIONAL ESTIMATE	1.00		0.14
	TOTAL: PHYSICAL INFRASTRUCTURE				L.E. 64.0
V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2 L.E.		
	EDUCATION	PRIMARY & PREPARATORY	15.8		L.E. 6.8
	HEALTH 4	PRIMARY HEALTH ONLY	7.0		L.E. 1.5
	SOCIAL AFFAIRS, AND ADMINISTRATION OTHERS	BASIC SERVICES (TABLE V-A.19)	2.6		L.E. 0.3
	TOTAL: SOCIAL INFRASTRUCTURE				L.E. 8.7
VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA		BASE COSTS		L.E. 139.9
			ADJUSTED TOTAL COSTS 5/		L.E. 323.1
			PER CENT REHABILITATION		30.0 %
VII.	AFFORDABILITY AND COST RECOVERY 6	NEW AREAS 7	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 1,773.3
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. 51.4
		EXISTING AREAS 8	TOTAL PER CAPITA COSTS	TOTAL COSTS	L.E. 110.0
			PORTION NOT AFFORDABLE	PERCENTAGE	L.E. -- %
		ANNUAL LAND PAYMENT M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS	TOTAL COSTS	L.E. 0.49 /M2
			EXISTING AREAS	TOTAL COSTS	L.E. 0.11 /M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY			L.E. 911.7

Totals may not add due to rounding.
* Includes 50 settlements classed as urban by the 1976 Census.
1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables IV.A.23 & 24.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter IV, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table IV.A.22 in Appendix IV.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter IV, Section III) and on opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for saleable land which recovers the non-subsidized portion capital costs net of housing cost at an opportunity cost of capital of 12 percent over a 30 year recovery period.

TABLE V-A.21

INTRA-URBAN INFRASTRUCTURE COSTS FOR SETTLEMENTS WITH LESS THAN 50,000 POPULATION

SETTLEMENT ZONE[1]	1986 - 1990				1991 - 1995				1995 - 2000			
	TOTAL COST (L.E. MILLIONS)	AVERAGE PER CAPITA COST[2] (L.E.)	TOTAL SUBSIDY (L.E. MILLIONS)	SUBSIDY/ CAPITA[3] (L.E.)	TOTAL COST (L.E. MILLIONS)	AVERAGE PER CAPITA COSTS[2] (L.E.)	TOTAL SUBSIDY (L.E. MILLIONS)	PER CAPITA SUBSIDY[3] (L.E.)	TOTAL COST (L.E. MILLIONS)	AVERAGE PER CAPITA COSTS[2] (L.E.)	TOTAL SUBSIDY (L.E. MILLIONS)	PER CAPITA SUBSIDY[3] (L.E.)
Delta	509.5	269.6	148.1	611.6	518.2	238.1	96.6	337.8	505.3	203.6	(28.3)	(92.3)
North Upper Egypt	233.8	359.7	104.5	1,431.4	236.2	322.2	97.3	1,171.8	232.8	283.6	67.5	767.0
South Upper Egypt	417.8	358.9	179.0	860.6	440.2	309.8	145.9	568.0	445.5	259.3	44.3	149.1
Canal	17.8	329.0	4.1	338.1	19.3	279.5	0.9	62.7	22.1	248.9	(7.5)	(372.6)
TOTAL	1,178.9	313.7	435.7	115.9	1,213.9	275.9	340.7	77.4	1,205.7	235.9	76.0	14.9

1 Settlement populations are found in Appendix Table I-A.1.

2 Found by dividing total costs by end period population.

3 Total subsidies are for new populations only and exclude rehabilitation costs of infrastructure serving existing population.

SOURCE: NUPS.

D. Regional Cost Modifiers

The Intra-Urban Cost Packages so far have focused on urban standards and costs irrespective of regional location. However, distance from sources of construction inputs and the difficulty in providing infrastructure due to local conditions, such as the lack of non-saline water, influence costs. Therefore, two indices have been developed to modify these average costs to account for such regional differences. (Table V-A.22)

The first regional cost modifier is a regional construction cost index developed from unpublished 1980 regional and sectoral construction output data from the Ministry of Planning and the regional distribution of cement sales in 1980 from the Cement Sales Office of the Ministry of Development. Since for a given sector, the volume of cement used to construct a unit of construction is constant, and the prices of cement are fixed, variations in the ratio of the cement value as represented by the total value of cement supplied to a governorate to the value of construction output due to cement are indicators of regional variations in construction costs. The value of construction output due to cement was determined for each governorate by sector according to constants developed for each major sector to determine national cement requirements to the year 2000. These sectorial constants are shown in the main report of the "Draft Final Report of the Construction/Contracting Industry Study, CIS, 1980," prepared by the General Organization for Housing, Building and Planning Research, October 1980.

The regional construction cost indices which resulted show the relative efficiency of the construction sector in each of the governorates. A governorate with a high index number (the inverse of the ratio of output due to cement value to the value of cement supplied to governorate in fixed prices) indicates that the costs of constructing a given volume of construction are likely to be higher than in a governorate which has a lower index number. Since a large proportion of the remote area governorates' total construction output is often dominated by single large projects (such as a railroad) which utilize relatively little cement and, thus, distort output calculated from the sectoral constants, only the output due to housing, public buildings and private sector construction was used in their indices.

The second index shows the relative access which different governorates have to non-saline ground water. This index was developed from data supplied in the Provincial Water Supplies Project and is used to regionally adjust the cost of water supply only. It is the result of surveys conducted by the water supply project throughout Egypt. Governorates having access to non-saline ground water generally have lower water supply costs than those which do not, because less investment in treatment plants and overall networks is required. For example, Damietta which has only saline ground water must draw all of its water supplies from the Nile, which by the time it reaches Damietta requires treatment. However, Minia, which has a relatively low index number, has access to both ground water and Nile water, thus, Minia's water supply costs are lower than those of Damietta.

E. Ongoing Information Requirements of National Urban Policy for Intra-Urban Infrastructure Investment

The indices which were constructed to indicate the regional differences in the construction costs were developed from available national level data sources.

TABLE V-A.22

REGIONAL COST MODIFIERS

GOVERNORATE	REGIONAL CONSTRUCTION	REGIONAL POTABLE WATER
Greater Cairo	1.00	1.00
Giza (outside Greater Cairo)	2.20	2.02
Alexandria	1.31	1.35
Port Said	1.92	2.44
Ismailia	2.20	2.44
Suez	1.18	2.44
Behaira	2.14	1.35
Kafr El Sheikh	3.21	1.95
Dakahlia	3.22	1.88
Damietta	2.25	2.40
Sharkia	1.78	1.93
Gharbia	1.58	1.40
Menoufia	3.52	1.44
Qalyubia	1.17	1.00
Beni Suef	2.58	1.53
El Fayoum	2.98	2.21
Minia	3.07	2.07
Assiut	1.23	1.72
Sohag	2.86	3.28
Qena	1.03	2.23
Aswan	1.01	2.47
Red Sea	4.51	7.56
New Valley*	4.51	2.77
Sinai, North*	4.51	7.51
Sinai, South*	4.51	1.88
Matruh*	4.51	5.14

* Construction data is insufficient, therefore the Red Sea index was used as a proxy for all remote areas.

SOURCE: NUPS Elaboration of Data From Various Sources(Ministry of Planning; Cement Sales Office, Ministry of Development; General Organization for Housing, Building and Planning Research.

The indices indicate fairly large variations between governorates. However, combined on a regional basis, they represent a fairly consistent pattern of what might be expected in regional variations in constructions costs:

ZONE	REGIONAL CONSTRUCTION INDICES
Greater Cairo	1.00
Alexandria	1.33
Canal	1.83
Delta	2.43
North Upper Egypt	3.17
South Upper Egypt	2.48
Remote Areas	5.92

The variations generally represent differences in regional distributions of population and, therefore, likely agglomeration economies which might reduce construction costs. For example, the combination of industrial and tourism investment in South Upper Egypt combined with settlements with large populations account for it having an index which is lower than North Upper Egypt where much less industrial investment and relatively little tourism investment has occurred.

Since these indices were used to modify the costs of intra-urban infrastructure costs or, in fact, to modify their allocation, the need for ongoing collection of current construction and other regional cost data is emphasized. For NUPS estimates we have not made assumptions about possible variations in the composition of these indices due to changes in population distribution or employment mix in later periods. However, these changes are likely to have an impact on regional construction cost variation. Therefore, to more accurately reflect the implications which these changes might have on investment budgets, ongoing collection and dissemination of regional variations in costs will be an important tool in implementing national urban settlement strategies.

F. Unused Capacity in Existing Intra-Urban Infrastructure

The primary component of intra-urban infrastructure excess or unused capacity is in unoccupied housing units. However, most of this excess capacity probably exists in Greater Cairo due to the very rapid expansion of the housing stock by the informal sector during the 1976-1981 period. This has lead to a vacancy rate about 5.5 percent of the occupied housing stock. However, not all these vacant units are available to the market. Some are being held off the market for members of the owner's family, while the distribution of vacant units does not always lead to ideal locations of units in terms of places of work or other social facilities. Furthermore, some are luxury units not affordable to most Egyptians. We have not developed separate projections for using these vacant units since it is normal for a portion of the housing stock to be vacant at any one time unless there really are serious shortages. Rather, in our projections of affordability, we have assumed that the savings represented by investment in dwelling units could be mobilized by the government so that some of the investment now going into informal housing could be diverted to other sectors more deserving of investment, at least for the immediate term. The mechanisms for doing so are further discussed in Section II of Chapter V of the NUPS Final Report.

It is fairly hard to conceive of excess capacity existing in other intra-urban infrastructure, particularly physical infrastructure, since practically all settlements now have deficits in their water supply systems, and those with sewerage systems have even larger deficits. However, at the local level excess capacity may exist. For example, upon further examination of the water supply in Tanta, it was found that while the treatment plant produces roughly a capacity of 315 liters/capita/day, the actual standard of water supply is 422 liters/capita/day. The extra 107 liters/capita/day comes from wells. However, the quality of that well water is unknown.

In all of the NUPS projections, we have assumed that existing infrastructure has not reached its service life and, thus, can be more intensively used. This has been done in two ways: first, by increasing the density of the settlement, existing infrastructure is used more intensively; and secondly, by assuming that in most settlements, components of social infrastructure are probably adequate to serve larger populations. However, to more intensively use infrastructure most systems require some capital improvements to upgrade service levels. Therefore, we have proposed both rehabilitation of existing infrastructure and strengthening of its service capacity to allow it to provide higher levels of service to existing population and provide for new populations. The rates used for these projections are shown in the next section.

The assumptions regarding social infrastructure excess capacity are somewhat different. Since both have region-serving functions, it was assumed that existing health and education stock could be upgraded to extend its useful life. However, a rationalization of higher level service functions has been suggested for major health and education services whereby some settlements have been designated to receive higher standards of facilities due to their broader region-serving functions. In other settlements, modified standards have been proposed which provide basic levels of health and education services. Regarding "other social infrastructure," except for very fast growing settlements such as Suez, it has been assumed that city-wide social and administrative infrastructure is adequate to serve new populations as long as it receives ongoing maintenance. Thus, only local level infrastructure has been proposed for most settlements. In faster growing settlements and very large settlements such as Greater Cairo and Alexandria, it was assumed that more complete social and administrative services will be necessary due to the size of the populations being added.

G. Phasing of Rehabilitation and Rehabilitation Requirements

The total costs of the intra-urban infrastructure estimates of the Preferred Strategy include provisions for rehabilitation of existing infrastructure stock under the assumption that the useful life of that stock has not been reached, and that through capital rehabilitation its life can be extended. Thus, the costs of new infrastructure are targeted for the expected urban population increase. This estimate came from the requirements for rehabilitation of different master plans for those systems, or it was assumed that the useful life of infrastructure is represented by its depreciable life. Thus, in order to maintain that infrastructure at a level of service equal to that of new infrastructure, capital rehabilitation should equal the annual depreciation expense of that infrastructure.

However, due to the very large costs of providing not only rehabilitation of existing infrastructure, but new sewerage systems in some settlements lacking sewerage, it was assumed that these investments would have to be phased over the entire planning period. This phasing of rehabilitation and investment in new sewerage facilities was based on the following assumptions: due to the magnitude of construction required, it is unlikely that the volume of construction for rehabilitation plus new infrastructure to serve new population could be constructed in one period alone, therefore, it was assumed that feasibility studies would be done during the 1980-1985 period and the bulk of construction would occur in later periods. This phasing of rehabilitation and strengthening of existing infrastructure is shown in Table V-A.23. The constants (expressed as percentages of new construction costs) are shown in Table V-A.24. Due to the need for ongoing capital investment for maintenance of infrastructure, lower constants are used to project maintenance requirements of infrastructure built during later periods.

TABLE V-A.23

PHASING CONSTANTS FOR REHABILITATION OF EXISTING STOCK AND CONSTRUCTION OF NEW SEWERAGE SYSTEMS

PERIOD	PHASING OF REHABITATION OF EXISTING INFRASTRUCTURE STOCK[1] (%)	PHASING OF NEW SEWERAGE IN SETTLEMENTS LACKING SEWERAGE SYSTEMS (%)
1980-1985	15	15
1986-1990	60	60
1991-1995	20	20
1996-2000	5	5

1 Water and sewerage phasing of other rehabilitation shown on Table V-A.25.

SOURCE: NUPS.

TABLE V-A.24

CONSTANTS USED TO PROJECT INFRASTRUCTURE COSTS OF REHABILITATION OF EXISTING STOCK

INFRASTRUCTURE	Per Capita Costs of Infrastructure for Existing Populations as a Proportion of Per Capita Costs Infrastructure Costs for New Populations: STOCK EXISTING BEFORE 1980-85 PERIOD	REHABILITATION OF STOCK BUILT DURING LATER PERIODS	REMARKS
Water and Sewerage	74%	3%	Based on unpublished estimates of costs of strengthening existing systems from Provincial Water Supplies Project and depreciation allowances shown in master plans for major metropolitan systems.
Circulation	1%	0.5%	Estimates from Egypt National Transport Study.
Electricity	20%	10%	Early period has provisions for expansion of service, while later period assumes an average service life of 10 years.
Other Physical Infrastructure	20%	10%	Assumption similar to electricity.
Housing	50%	5%	The first period estimate is based on data presented in the Appendices to the Draft Final Report of the Construction Industry Study (Appendix I). The later period estimate is based on an assumed reduced need for renewal due to 1980 -1985 renewal efforts.
Education	35%	2%	Based on estimates of rehabilitation requirements resulting from 1977 survey of educational facilities. Later period rehabilitation assumes only minor rehabilitation necessary.
Health	10%	10%	Assumes that 10 percent of existing stock will be rehaibilitated in each period and that stock added in later periods has an average life of 10 years due to large investment requirements in equipment.
Other Social Infrastructure	2%	1%	Assumed relationships.

SOURCE: NUPS.

H. Target Group: Disadvantaged Persons in Greater Cairo

The spatial target groups focused on implementing national urban policy objectives through selecting standards appropriate to spatial priorities. However, in Chapter IV, we discussed disadvantaged groups as another target group who legitimately require assistance from the Government. It has already been shown how some settlements may require greater subsidies due to lower regional incomes to implement even basic levels of housing and intra-urban infrastructure standards. In addition to these spatially related disadvantaged groups, there also exists low income populations within settlements who are disadvantaged and may require program assistance.

Although disaggregated data about households is not available regarding incomes and housing conditions, we have identified two possible measures of disadvantaged groups using Greater Cairo and Alexandria *kism* data and World Bank urban poverty estimates. The first was done by reviewing room occupancy rates in Greater Cairo and Alexandria *kisms* and determining those *kisms* which have room occupancy rates which are higher than the average room occupancy rates for the settlement as a whole. Then by determining the number of persons which could be accommodated by the total number of rooms in the *kism*, if the *kism* had average room occupancy rates, the total number of overcrowded persons in the *kism* was determined. In 1976, Greater Cairo had 17 *kisms* which had room occupancy rates higher than the Greater Cairo average room occupancy rate of 1.8 persons per room. The excess population (overcrowded population) in these *kisms* was roughly 348,000. In Alexandria, where the average room occupancy rate is 1.9 persons per room, six *kisms* have room occupancy rates which are greater than the average. These *kisms* have excess population of 148,000. While using *kism* data is only a crude approximation of the total number of persons living in overcrowded conditions (the use of sub-*kism* data would be better, but it is not available), it does give an order-of-magnitude of the problem. Furthermore, reducing the room occupancy rates in these *kisms* would reduce the average settlement room occupancy rate.

A second criteria for determining disadvantaged groups might well be the World Bank defined Urban Poverty Criteria, a measure of absolute poverty based on incomes, access to urban services, employment and other criteria, which suggests that households at the 30th percentile fall into the urban poverty group.

As an illustration of how disadvantaged groups within an urban area might be served, the following project has been developed. Recent studies of informal housing, plus LANDSAT data about the physical growth of Greater Cairo suggest that the process of deconcentration is already occurring. Roughly 60 percent of the recent movers in Greater Cairo were lifetime citizens of Greater Cairo and not migrants. However, the bulk of this internal migration occurred in the north and south of Cairo onto arable land. Therefore, one possible way to change this trend would be the development of low income housing programs aimed at disadvantaged groups within Cairo. However, for these to be successful, they need to be established in close-in desert locations where households can maintain existing community ties. The following program illustrates how such a program might be designed. (Figure V-A.20)

At gross densities of 300 persons per hectare, individual plot sizes can be developed which average 180 square meters if ultimately an average of 2.5 floors

FIGURE V-A.20

INTRA-URBAN INFRASTRUCTURE INDICATIVE SPATIAL TARGET GROUP STANDARDS AND CAPITAL COST PACKAGES: SHELTER PROGRAM FOR DISADVANTAGED GROUPS IN GREATER CAIRO

I.	GROSS DENSITIES 300	PERSON/HECTARES	POPULATION	1985 348,000
II.	LAND REQUIREMENTS	PHYSICAL STANDARDS		PER CAPITA COSTS OF NEW DEVELOPMENT AND CAPITAL REHABILITATION OF EXISTING INFRASTRUCTURE OF SETTLEMENT 1/
	PRIVATE	65%		
	--RESIDENTIAL	(45%)		
	--NON RESIDENTIAL	(20%)		
	PUBLIC	35%		
	TOTAL	100%		
III.	HOUSING			
	AVERAGE AREA/UNIT 30 M2	AVERAGE UNIT COST: L.E. 1,050	INDICATIVE PER CAPITA COST 2/ L.E. 218	L.E. 218.0
IV.	PHYSICAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	WATER	300 l/c/d	22.0	L.E. 22.0
	SANITATION	120 l/c/d	50.7	L.E. 50.7
	ELECTRICITY	DISTRIBUTION ONLY	90.4	L.E. 90.4
	CIRCULATION	20% or 6.7 m^2/CAPITA	73.3	L.E. 73.3
	TELECOMMUNICATIONS 3/		INCLUDED IN INTER-URBAN INFRASTRUCTURE	L.E. —
	TRANSPORTATION	BASE: 10,000 5	57	L.E.
	OTHERS	PROVISIONAL ESTIMATE	10	67.0
	TOTAL: PHYSICAL INFRASTRUCTURE			L.E. 303.4
V.	SOCIAL INFRASTRUCTURE	PHYSICAL STANDARD	INDICATIVE PER CAPITA COST 2/ L.E.	
	EDUCATION	SIMILAR TO GREATER CAIRO	41	L.E. 141
	HEALTH 4/	SIMILAR TO GREATER CAIRO	258	L.E. 258
	SOCIAL AFFAIRS, AND ADMINISTRATION OTHERS	MODIFIED FOR CAIRO GOVERNORATE (See TABLE V-A.13)	13	L.E. 13.0
	TOTAL: SOCIAL INFRASTRUCTURE			L.E. 312.0
VI.	TOTAL HOUSING AND INFRASTRUCTURE CAPITAL COSTS PER CAPITA		BASE COSTS	L.E. 833.4
			ADJUSTED TOTAL COSTS 5/	L.E. 833.4
			PERCENT REHABILITATION	— %
VII.	AFFORDABILITY AND COST RECOVERY 6/	NEW AREAS 7/	TOTAL PER CAPITA COSTS / TOTAL COSTS	L.E. 833.4
			PORTION NOT AFFORDABLE / PERCENTAGE	L.E. 21.23 %
		EXISTING AREAS 8/	TOTAL PER CAPITA COSTS / TOTAL COSTS	L.E. N.A.
			PORTION NOT AFFORDABLE / PERCENTAGE	
		ANNUAL LAND PAYMENT M2 WHICH RECOVERS NON-SUBSIDIZED PORTIONS OF CAPITAL COST NET OF HOUSING COSTS 9/	NEW AREAS / TOTAL COSTS	L.E. 0.75 M2
			EXISTING AREAS / TOTAL COSTS	L.E. — M2
		TOTAL PER CAPITAL COST SUBSIDY: NEW AREAS ONLY		L.E. 176.5

Totals may not add due to rounding.

1/ All prices in 1979 L.E. Assumptions about rehabilitation and its phasing are shown in Tables IV.A.21 & 22.
2/ New infrastructure costs only.
3/ Except for comparison with total costs of other alternatives shown in Master Plan Standards Packages Telecommunications have been included in inter-urban infrastructure costs. See Chapter IV, Section III.
4/ Standards and capital costs shown include provisions for urban primary health care facilities in addition to secondary health care facilities.
5/ Base costs multiplied times regional construction cost factors. See Table IV.A.22 in Appendix IV.A.
6/ Based on median per capita household incomes and savings (see affordability analysis in Chapter IV, Section II) and an opportunity cost of capital of 12 percent, and a recovery period of 30 years.
7/ Infill areas or new settlement areas.
8/ Costs of upgrading or capital rehabilitation of existing infrastructure.
9/ Annual level payment per square meter for suitable land which recovers [illegible] housing cost at an opportunity cost of capital of 12 percent [illegible] costs period.

are built. If single family dwellings are built, roughly 72 square meter plots could be allocated. Figure V-A.20 illustrates the other type of standards which could be developed. Since the community would be low income residents, lower standards of water supply could be provided than for Greater Cairo as a whole since consumption would be less. Similarly, since the community would benefit from other administrative facilities, only basic social service and community facilities are suggested. However, to provide linkages with the rest of Greater Cairo, bus transport has been proposed at the same standards as the rest of Greater Cairo.

A more basic standard of housing has been suggested for the program since it is aimed at disadvantaged groups. This standard consists of 30 square meter units costed at the unit costs which the Cairo Governorate achieved in 1979 when it constructed a low income housing project, i.e., L.E. 35 per square meter.

Since this program is aimed at disadvantaged groups, household per capita incomes are shown at the 30th percentile of household incomes (roughly L.E. 150 per capita in 1979 prices). Again, since the distribution of savings is not known, it was assumed that savings per household is in the same ratio as income at the 30th percentile is to income at the 50th percentile or 72 percent of median per capita household savings at the 50th percentile.

Although the table shows the program as a whole, it could be built in several locations throughout Greater Cairo. For example, portions of it could be built in the Nasr Extension area, the Helwan area, and in the low income housing sites proposed near to the El Obour and 6th of October satellite cities. By encouraging existing Cairo residents to move to these areas, they could form the nucleus around which new migrants to Greater Cairo could be attracted to these sites. Sociological studies of new Cairo migrants indicate that there is a strong likelihood that they will attach themselves to already established groups from parts of Egypt from which the migrants came. Therefore, by encouraging existing Cairo residents to move to these areas, there is a much stronger chance that the pattern of growth in Greater Cairo can be shifted to more desirable locations.

I. Functional Relationships Used to Project NUPS Intra-Urban Infrastructure Costs

The following functional relationships were used to generate the curves shown in Figures V-A.15 through V-A.18. These relationships were derived from data of recent construction projects showing gross density of the projects, consumption standards and per capita costs. These relationships were calculated using a multiple linear regression program using two independant variables. Since mathematically, the linear equations which result could estimate per capita costs which are zero or less, the data used to generate the relationships were used to limit projections (i.e., the x or y values). These functional relationships and their data limits are shown below:

1. Water Supply (Figure V-A.15):

$$z = -29.99 + (-0.12)x + 0.44y$$

Where: x = gross density
y = water consumption standard (l/c/d)
z = per capita costs
Correlation Coefficient ($R^2 = 0.90$)

Limits: y = 237 where x = 600

2. Sanitation (Figure V-A.16):

$$z = 48.34 + (-0.06)x + (0.17)y$$

Where: x = gross density
y = sewerage flow (l/c/d)
z = per capita costs
Correlation Coefficient ($R^2 = 0.87$)

Limits: No limits were reached due to density limitations shown in Equation 1.

3. Circulation (Figure V-A.17):

$$z = 52.56 + (-0.06)x + (5.05)y$$

Where: x = gross density
y = m^2 per capita of circulation (based on an assumed 20 percent of settlement area devoted to circulation)
z = per capita costs
Correlation coefficient ($R^2 = 0.90$)

Limits: No limits were reached due to density limitations in Equation 1.

4. Electricity Distribution (Figure V-A.18):

$$y = 152.39\ e^{(-1.15 \times 10^{-3})x}$$

Where: x = service population ('000s)
y = per capita costs
Correlation Coefficient ($R^2 = 0.77$)

Limits: No limits were reached as population change did not exceed 3 million.

J. Supporting Tables

The following tables are back-up tables which were developed to support conclusions shown in the main text or contain back-up data which was used in the analysis, but were not directly referred to in the text.

TABLE V-A.25

SOCIAL AND ADMINISTRATIVE FACILITIES OF SADAT CITY MASTER PLAN

FACILITY	NUMBER OF UNITS	UNIT COST (L.E. THOUSANDS)	TOTAL COSTS (L.E. THOUSANDS)	TOTAL COSTS PER CAPITA 1979(L.E.)
Social Services				
Neighborhood Social Unit	100	20	2,000	
Kindergarten	100	10	1,000	
District Social Unit	16	250	4,000	
Sector Social Unit	2	1,000	2,000	
Ex-Prisoners Halfway House	2	75	150	
Residence For Homeless Boys	2	60	120	
Residence For Homeless Girls	2	60	120	
Residence For Homeless Elderly	2	60	120	
Social Service Center	1	2,100	2,100	
Phychiatric Center	1	4,000	4,000	
Mental Retardation Center	1	2,000	2,000	
Center For Handicapped	1	600	600	
Other Care Centers	5	510	2,550	
TOTAL SOCIAL SERVICES	235		20,760	54.9
Cultural Facilities				
District Cultural Palace	16	1,830	29,280	
Center Cultural Palace	1	17,710	17,710	
Science & Technology Museum	1	875	875	
Natural History Museum	1	1,750	1,750	
Observatory	1	700	700	
TOTAL CULTURAL SERVICES	20		50,320	133.1
Religious Services				
Neighborhood Mosque I	67	40	2,680	
Neighborhood Mosque II	33	100	3,300	
District Mosque	4	500	2,000	
City Mosque	2	varies	3,823	
Moslem Cemetary	1	56	56	
Church	2	550	1,100	
Central Church	1	2,200	2,200	
Christian Cemetary	1	36	36	
TOTAL RELIGIOUS	111		15,195	40.2
Public Safety				
District Public Safety Center	16	150	2,400	
Sector Public Safety Building	2	300	600	
Industrial Public Safety Building	1	300	300	
Public Safety Headquarters	1	600	600	
Police & Fire Academy	1	750	750	
Traffic Control Units	3	45	135	
Courts	3	2,500	7,500	
Prison	1	750	750	
TOTAL PUBLIC SAFETY	28		13,035	34.5

TABLE V-A.25 (CONTINUED)

SOCIAL AND ADMINISTRATIVE FACILITIES OF SADAT CITY MASTER PLAN

FACILITY	NUMBER OF UNITS	UNIT COST	TOTAL COSTS (1977)	TOTAL COSTS PER CAPITA 1979
Public Service				
City Hall	1	6,250	6,250	
Sector Utilities Office	2	56	112	
Central Utilities Office	1	225	225	
Neighborhood Communications	10	6	60	
Telephone & Telegraph	6	60	360	
Telex	2	12	24	
Central Communications	1	16,875	16,875	
Neighborhood Post Office	10	6	60	
Postal Center	6	18	108	
Main Post Office	1	750	750	
District Political Offices	16	12	192	
Political Party Headquarters	1	60	60	
Printing Office	1	90	90	
Abbattor	1	225	225	
TOTAL PUBLIC SERVICE	59		25,391	67.2
Open Space and Recreation				
Neighborhood Sports Arena	100	53	5,300	
District Youth Center	14	1,100	15,400	
City Sports Complex	1	15,120	15,120	
Botanical Gardens	1	625	625	
Malahy	1	245	245	
Hostel	1	300	300	
Regional Theme Park	1	360	360	
TOTAL OPEN SPACE AND RECREATION	119		37,350	98.8
National and Regional Government				
Vistors Center	1	100	100	
Development Authority	1	750	750	
Regional Support Offices	1	375	375	
Exhibition Hall	1	225	225	
National Government Offices	N.A.	N.A.	102,698	
Others	N.A.	N.A.	29,100	
TOTAL NATIONAL AND REGIONAL GOVERNMENT	4		133,248	352.5
TOTAL Sadat City Social and Administrative Facilities	576		295,299	781.2

SOURCE: Sadat City Master Plan, Vol. 3, September 1977.

TABLE V-A.26

HEALTH INVESTMENT REQUIRED TO MAINTAIN 1980 STANDARDS OVER THE PERIOD 1980-2000

PERIOD	ITEM	TOTAL INVEST. REQUIRED (L.E. MILLIONS)	TOTAL INVESTMENT/ CAPITA (L.E.)
A. 1980-1985: NEW URBAN POPULATION: 3.8 MILLION			
	I. Secondary Health Care		
	I) Rehabilitation of existing stock 80,400 beds (4.42 beds/1,000 pop.). Replacement value L.E. 4,540 million. Rehabilitation of 10% of stock	454	
	II) New additions required 3.8 million new population at 4.42 beds/1,000 equals 16,796 beds	949	
	III) Total Secondary Health Care	1403	
	II. Primary Health Care		
	I) Rehabilitation of existing stock 455 units (1 unit/40,000) Replacement value L.E.104 million. Rehabilitation at 10%	10	
	II) New additions required 3.8 million new population at 1 unit/40,000 equals 95 units	22	
	III) Total primary health care	32	
	III. Total Urban Health Care	1435	
	Total urban health care per capita (mid-period population)		69.67
	Average annual per capita investment		13.93

TABLE V-A.26 (CONTINUED)

PERIOD	ITEM	TOTAL INVEST. REQUIRED (L.E. MILLIONS)	TOTAL INVESTMENT/ CAPITA
B.	1985-1990: NEW URBAN POPULATION: 4.1 MILLION		
	I. Scondary Health Care		
	Rehabilitation of existing stock 97,196 beds Replacement Value L.E. 5,494 million Rehabilitation of 10 percent of stock	549	
	II) New additions required 4.1 million new population at 4.42 beds/1,000 equals 18,122 beds	1,025	
	III) Total secondary health care	1,574	
	II. Primary Health Care		
	I) Rehabilitation of existing stock 550 units (1 unit/40,000). Replacement value L.E. 125 million Rehabilitation of 10% of stock	13	
	II) New additions required 4.1 million new population at 1 unit/40,000 equals 102.5 units	23.3	
	III) Total primary health care	36	
	III. Total Urban Health Care	1,610	
	Total urban health care per capita (mid-period population)		65.58
	Average annual per capita investment		13.12

TABLE V-A.26 (CONTINUED)

PERIOD	ITEM	TOTAL INVEST. REQUIRED (L.E. MILLIONS)	TOTAL INVESTMENT/ CAPITA (L.E.)
C.	1990-1995: NEW URBAN POPULATION: 4.8 MILLION		
	I. Secondary Health Care		
	I) Rehabilitation of existing stock 115,318 beds Replacement value L.E. 6,518 million Rehabilitation of 10% of stock	652	
	II) New additions required 4.8 million new population at 4.42 beds/1,000 equals 20,160 beds	1,199	
	III) Total secondary health care	1,851	
	II. Primary Health Care		
	I) Rehabilitation of existing stock 652.5 units Replacement value L.E. 149 million Rehabilitation at 10%	15	
	II) New additions required 4.8 million new population 1 unit/40,000 equals 120 units	27	
	III) Total Primary Health Care	42	
	III. Total Urban Health Care	1,893	
	Total urban health care per capita (mid-period population)		65.05
	Average annual per capita investment		13.01

TABLE V-A.26 (CONTINUED)

PERIOD	ITEM	TOTAL INVEST. REQUIRED (L.E. MILLIONS)	TOTAL INVESTMENT/ CAPITA (L.E.)
D. 1995-2000: NEW URBAN POPULATION: 5.6 MILLION			
	I. Secondary Health Care		
	I) Rehabilitation of existing stock 136,543 beds Replacement value L.E. 7,717 million Rehabilitation of 10 percent of stock	717	
	II) New additions required 5.6 million new population 4.42 beds/1,000 equals 24,752	1,399	
	III) Total Secondary Health Care	2,116	
	II. Primary Health Care		
	I) Rehabilitation of existing stock 772.5 units Replacement value L.E. 176 million Rehabilitation of 10% stock	18	
	II) New additions required 5.6 million new population 1 unit/40,000 equals 140 units	32	
	III) Total Primary Health Care	50	
	III. Total Urban Health Care	2,166	
	Total urban health care per capita (mid period population)		63.16
	Average annual per capita investment		12.63

SOURCE: NUPS Analysis of Ministry of Health Data.

TABLE V-A.27

INDICATIVE PER CAPITA INVESTMENT IN URBAN SCHOOL BUILDINGS IN 1980

TYPE OF FACILITY	TOTAL NUMBER OF BUILDINGS	VALUE OF SCHOOL BUILDINGS ACCORDING TO CONDITION (L.E. MILLIONS)			TOTAL VALUE (L.E. MILLIONS)
		GOOD	BAD	REQUIRE MASSIVE REHABILITATION	
Primary	8,027	240	209	288	737
Preparatory	1,550	75	24	69	168
General Secondary	339	49	8	23	80
Secondary Trade and Commerce	179	33	1	2	36
Industrial Secondary	117	42	2	3	47
Agricultural Secondary	55	38	1	1	40
TOTAL	10,267	477	245	386	1,108
TOTAL PER CAPITA					59.25[1]

1 Based on a 1980 population of 18.7 million.

SOURCE: Unpublished survey of the condition of school facilities in urban areas of the Ministry of Education (1977). Values are those of NUPS based on estimated unit costs of new facilities from Ministry of Education data (1980).

TABLE V-A.28

PROJECTED REQUIREMENTS FOR NEW URBAN SCHOOLS 1980 - 2000
(COSTS IN 1979 L.E. MILLIONS)

TYPE OF EDUCATION FACILITY	1980 - 1985		1985 - 1990		1990 - 1995		1995 - 2000	
	REQUIRED NEW SCHOOLS	TOTAL COST	REQUIRED NEW SCHOOLS	TOTAL COST	REQUIRED NEW SCHOOLS	TOTAL COST	REQUIRED NEW SCHOOLS	TOTAL COST
Primary Schools	925	49.9	997	53.9	1,168	63.1	1,362	73.5
Preparatory Schools	285	21.7	312	23.4	365	27.4	426	32.0
Secondary General	45	9.1	49	9.8	57	11.4	67	13.4
Secondary Commercial	32	8.0	33	8.3	38	9.5	45	11.3
Secondary Industrial	24	12.0	25	12.5	29	14.5	34	17.0
Secondary Agricultural	8	6.0	8	6.1	10	7.5	11	8.3
TOTAL	1,319	106.7	1,424	114.0	1,667	133.4	1,945	155.5

SOURCE: NUPS Elaboration of Unpublished Ministry of Education Survey (1977).

TABLE V-A.29

EDUCATION REQUIREMENTS TO MAINTAIN CURRENT STANDARDS TO THE YEAR 2000

DESCRIPTION	TOTAL INVEST. REQUIRED (L.E. MILLIONS)	PER CAPITA INVESTMENT (L.E.)
A. 1980-1985: URBAN POPULATION INCREASE: 3.8 MILLION		
I. Rehabilitation of existing facilities[1]	201	
II. New facilities	107	
III. Total investment	308	
Total investment per capita (mid period population 20.6 million)		14.95
Average annual investment		2.99
B. 1986-1990: URBAN POPULATION INCREASE: 4.1 MILLION		
I. Rehabilitation of existing stock		
i) Replacement value of 1980 stock LE.1,309 million		
ii) Value of new stock 107 million		
iii) Total replacement value LE.1,416 million		
iv) Rehabilitation at 2%	28	
II. New facilities	114	
III. Total investment	142	
Total investment per capita (mid period population 24.6)		5.77
Average annual per capita investment		1.15

TABLE V-A.29 (CONTINUED)

EDUCATION REQUIREMENTS TO MAINTAIN CURRENT STANDARDS TO THE YEAR 2000

DESCRIPTION		TOTAL INVEST. REQUIRED (L.E. MILLIONS)	PER CAPITA INVESTMENT (L.E.)
C. 1990-1995: URBAN POPULATION INCREASE: 4.8 MILLION			
I. Rehabilitation of existing stock			
i) Stock from previous period	LE. 1,416 million		
ii) New stock	114 million		
iii) Total replacement value	1,530 million		
iv) Rehabilitation at 2%		31	
II. New facilities		133	
III. Total investment required		164	
Total investment per capita (mid period population 29.0)			5.66
Average annual investment			1.13
D. 1995-2000: URBAN POPULATION INCREASE: 5.6 MILLION			
I. Rehabilitation of existing stock			
i) Stock from previous period	LE. 1,530 million		
ii) New stock	133 million		
iii) Total replacement value	1,663 million		
iv) Rehabilitation at 2%		33	
II. New facilities		156	
III. Total investment required		189	
Total investment per capita (mid period population 34.2)			5.53
Average annual per capita investment			1.11

1 The Preferred Strategy, these costs have been phased over the entire planning period. See Table V-A.16.

SOURCE: NUPS Elaboration of Unpublished Ministry of Education Survey (1977).

TABLE V-A.30

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1986-1990

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION PROPORTION (%)
I. METROPOLITAN AREAS																
Greater Cairo	315.1	380.8	147.0	24.7	1,041.2[4]	1,909.7	1,661.1	430.9	746.4	258.4	1,435.7	5,006.5	430.5	5,006.5	430.5	24.7
Alexandria	125.5	537.9	67.6	54.1	209.7	994.6	572.8	141.2	253.4	90.7	485.2	2,052.6	551.8	2,746.4	738.3	32.8
SUB TOTAL	440.5	918.7	215.6	78.8	1,250.9	2,904.3	2,233.9	572.1	999.8	349.1	1,920.9	7,059.1	-	7,752.9	505.1	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	25.5	20.7	6.8	19.8	38.2	111.2	147.5	56.0	94.4	55.4	145.8	404.2	922.9	517.1	1,180.7	18.1
SOUTH UPPER EGYPT																
Assiut	13.0	12.0	5.7	14.8	24.8	71.8	65.4	14.8	29.5	10.6	55.7	190.9	509.0	267.1	599.0	29.3
Nag Hamadi	4.2	4.8	1.5	4.6	6.8	22.1	18.5	2.3	8.1	2.9	13.3	53.8	460.2	60.8	519.9	21.8
Qena	7.8	7.6	5.1	6.0	8.7	35.3	23.7	5.9	10.5	3.8	20.2	79.2	509.0	91.5	586.9	24.5
Aswan	15.3	14.5	4.7	11.1	15.9	57.4	44.7	8.0	20.3	6.9	33.2	137.2	420.9	158.4	485.7	25.7
SUB TOTAL	65.0	60.5	25.9	56.5	94.0	299.8	299.5	65.0	121.6	79.4	266.2	865.4	-	1,078.9	741.5	-
III. OTHER CANAL																
Port Said	33.4	25.5	13.2	14.9	20.2	105.3	47.4	8.9	27.8	8.9	45.5	198.2	394.8	473.6	942.1	41.0
Ismailia	18.2	15.4	4.0	12.5	15.9	68.0	40.6	13.0	22.7	7.9	43.7	153.2	837.7	394.2	1,126.3	34.1
SUB TOTAL	51.5	38.9	18.1	27.2	38.6	174.2	88.0	21.9	50.5	16.8	89.2	351.4	-	867.2	1,017.8	-
IV. DELTA																
Regional Centers																
Tanta	23.2	15.7	6.2	13.5	18.6	77.1	69.5	15.4	24.9	8.0	48.3	194.8	449.7	322.4	742.9	37.5
Mansoura	22.0	14.9	6.5	13.2	19.1	75.6	69.5	14.6	24.5	8.2	47.3	192.4	480.9	661.7	1,704.3	38.4
SUB TOTAL	45.2	30.6	12.7	26.7	37.6	142.8	138.7	30.0	49.4	16.3	95.6	387.1	-	1,004.1	1,206.9	-
Others																
Mahalla	12.0	11.8	4.6	12.8	16.3	57.5	27.7	11.3	2.5	5.0	18.9	104.2	231.5	172.2	382.7	41.9
Zagazig	5.2	6.2	1.4	7.2	7.0	27.0	13.6	6.9	1.4	2.2	10.5	51.1	172.5	99.5	336.1	32.6
Damanhour	6.1	5.7	0.8	7.4	7.8	25.6	14.3	7.0	1.5	2.3	10.8	50.7	172.3	110.2	379.8	49.6
Kafr El Dawar	4.4	5.7	0.8	8.8	7.5	27.2	15.8	4.5	1.6	2.3	12.4	57.5	155.9	126.4	342.5	44.0
Shebin El Kom	5.6	4.7	0.8	3.5	2.9	17.4	5.1	3.5	0.7	0.9	5.2	28.5	178.8	109.3	683.3	65.5
Damietta	2.1	4.1	3.0	4.8	6.8	21.0	10.8	3.6	1.0	2.1	6.7	38.4	289.0	93.1	699.8	29.4
Banha	4.7	4.6	1.9	3.8	4.2	19.1	7.5	3.3	0.7	1.3	5.4	32.0	233.4	37.4	273.1	47.9
Kafr El Sheikh	8.9	5.0	0.7	2.6	1.8	19.0	4.3	2.8	0.5	0.6	3.8	27.1	218.7	114.2	920.9	74.6
Mit Ghamr	1.0	3.6	0.7	2.6	2.4	10.3	4.8	2.5	0.5	0.7	3.8	18.8	171.1	63.3	575.9	38.9
Belbeis	0.9	3.4	0.4	2.1	1.5	8.3	3.5	2.3	0.4	0.5	3.2	15.0	144.3	28.2	271.2	47.5
Dekrnis	1.3	3.5	1.6	5.1	4.1	15.7	6.7	2.4	0.5	1.3	4.3	24.6	264.3	28.8	309.2	24.4
Idku	2.2	4.3	21.0	2.7	2.7	33.5	5.0	2.5	0.5	0.8	3.8	42.4	607.0	92.6	888.6	23.9
Mahalla	0.3	2.8	0.5	2.4	2.3	8.3	4.4	2.2	0.5	0.7	3.4	16.0	172.6	52.6	563.2	35.2
Dessouk	1.7	3.0	0.5	1.8	1.4	8.5	3.1	1.8	0.3	0.4	2.5	14.0	176.1	50.2	628.0	45.0
Menouf	3.0	3.0	0.5	1.0	1.4	7.7	3.5	2.0	0.4	0.4	2.8	13.8	152.8	49.8	553.0	45.2

TABLE V-A.30 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1986-1990

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA (L.E.)	ADJUSTED TOTAL COSTS (L.E. MILLIONS)	TOTAL COSTS PER CAPITA (L.E.)	REHABILITATION PROPORTION ($)
Abu Kabir	1.9	2.4	0.3	1.7	1.6	7.7	3.0	1.7	0.3	0.4	2.5	13.1	172.4	26.4	347.8	47.2
Zeita	1.2	2.9	1.4	2.2	2.6	10.2	4.4	1.9	0.4	0.8	3.1	17.7	236.4	28.8	383.8	29.4
Belbas	3.5	2.5	0.5	1.9	1.7	10.1	3.3	1.7	0.4	0.5	2.6	15.9	215.2	61.3	828.5	46.4
SUB TOTAL	61.7	132.2	42.3	72.7	34.3	334.7	141.0	69.9	14.3	23.2	105.4	581.0	-	1,344.1	469.6	-
				-												
V. NORTH UPPER EGYPT																
Beni Suef	4.8	5.6	2.3	5.4	6.7	24.7	15.8	3.06	9.4	2.9	15.3	55.8	320.8	150.6	865.5	38.2
Fayoum	7.0	8.4	3.7	8.8	11.9	39.7	27.3	4.83	15.7	5.2	25.7	92.7	348.4	301.4	1,133.0	33.6
Minia	5.8	6.9	2.8	6.9	8.9	31.3	20.8	3.93	12.2	3.8	20.0	72.1	324.8	240.4	1,083.0	36.9
Mallawy	3.0	4.1	1.1	3.2	3.8	15.2	9.2	1.83	5.5	1.7	9.0	33.3	317.5	112.2	1,068.3	31.4
SUB TOTAL	20.6	25.0	9.8	24.5	31.3	110.9	73.1	13.70	42.8	13.5	70.0	253.9	-	804.6	1,049.0	-
VI. SOUTH UPPER EGYPT																
Sohag	2.0	5.1	1.1	4.3	4.9	17.3	8.6	3.8	0.9	1.5	5.1	32.0	207.7	104.3	677.0	32.1
Ishnia	1.6	2.7	0.7	2.2	2.6	9.7	4.4	1.8	0.4	0.8	3.0	17.0	240.0	59.2	833.3	30.5
Girga	0.8	2.4	0.9	2.1	2.5	8.8	4.3	1.7	0.4	0.8	2.9	16.0	235.1	51.0	750.1	27.6
Luxor	4.1	7.2	1.5	5.0	5.5	23.4	9.9	4.4	1.0	1.7	7.1	40.4	220.6	46.8	255.7	34.0
SUB TOTAL	8.5	17.4	4.2	13.6	15.5	59.2	27.1	11.7	2.6	4.8	19.1	105.4	-	261.3	548.9	-
VII. REMOTE AREAS																
Matruh	1.5	3.0	2.7	2.1	2.5	.6	4.1	1.8	0.4	0.7	2.9	18.6	247.6	111.2	1,482.6	30.5
New Valley	1.4	3.4	3.1	2.3	2.6	13.0	4.6	2.0	0.5	0.8	3.3	20.9	251.5	107.1	1,291.1	29.9
Red Sea	2.0	3.9	6.5	2.6	2.9	17.8	5.2	2.3	0.5	0.9	3.7	26.6	289.9	176.7	1,900.2	27.5
Sinai	1.0	1.6	3.9	2.6	4.5	13.6	6.3	1.4	0.5	1.4	3.3	23.2	594.5	133.0	3,408.8	11.3
SUB TOTAL	6.1	11.8	16.2	9.6	12.3	56.0	20.2	7.5	1.9	3.8	13.2	89.3	-	528.0	1,820.7	-
VIII. TOTAL METROPOLITAN AREAS ONLY												7,059.1	459.9	7,752.9	505.1	26.7
IX. GRAND TOTAL (INCLUDING TELECOMMUNICATIONS)												9,692.5	424.3	13,637.0	597.0	28.3

1 Costs include provisions for new populations plus rehabilitation of existing stock.

2 Found by dividing total costs by end period population (See Table I-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index (Table V-A.22) and adding that amount to total base costs. Then that amount is multiplied times the Regional Construction Cost Index.(Table V-A.22).
Table V-A.22.

4 Greater Cairo transport component includes provisions for a subway.

SOURCE: MSPS.

TABLE V-A.31

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1991-1995

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE						HOUSING	SOCIAL INFRASTRUCTURE				TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
	WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL		EDUCATION	HEALTH	OTHERS	TOTAL					
I. METROPOLITAN AREAS																
Greater Cairo	270.5	298.2	175.4	17.8	1,220.3[4]	1,980.2	1,935.7	460.6	880.5	302.9	1,644.0	5,577.9	401.9	5,577.9	401.9	21.5
Alexandria	120.9	514.9	61.3	53.4	251.4	606.1	588.6	153.1	305.5	108.7	567.3	1862.0	410.8	2494.6	550.4	23.4
SUB TOTAL	391.4	813.1	234.7	71.3	1,471.7	2,586.3	2,642.3	613.7	1,186.0	411.6	2,213.2	7,439.9	-	8,072.5	438.5	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	19.8	17.4	12.0	24.4	52.2	126.9	201.7	43.4	74.7	75.7	193.7	522.3	856.1	649.9	1,065.4	13.8
South Upper Egypt																
Assiut	9.6	10.7	7.1	18.0	30.7	76.1	82.0	16.5	35.5	13.3	65.4	223.4	470.3	283.3	596.4	18.3
Naga Hamadi	2.5	3.1	1.9	5.7	8.3	21.7	22.7	2.5	10.0	3.6	16.1	60.5	420.1	65.8	656.9	19.3
Qena	4.5	4.5	4.3	6.8	9.6	29.7	26.8	6.2	12.0	4.2	22.4	78.8	421.4	86.8	464.3	22.8
Aswan	6.7	7.6	4.3	12.7	18.1	49.3	51.3	6.4	23.4	7.8	37.6	138.2	359.8	149.5	389.5	23.6
SUB TOTAL	43.4	43.1	29.6	67.5	119.0	303.7	384.3	31.7	155.5	104.6	335.2	1,023.1	-	1,235.3	686.3	-
III. OTHER CANAL																
Port Said	17.4	12.3	12.0	16.5	22.2	80.3	52.5	9.2	31.0	9.6	49.8	182.6	319.3	398.6	696.9	31.4
Ismailia	10.2	8.9	5.0	14.3	21.5	59.8	47.7	15.9	26.9	9.3	50.0	157.6	376.1	381.4	910.4	24.1
SUB TOTAL	27.5	21.2	16.9	30.6	43.7	140.1	100.2	23.1	57.8	18.9	99.9	340.2	-	780.0	797.1	-
IV. DELTA																
Regional Centers																
Tanta	12.0	8.3	5.8	15.3	21.4	62.8	79.9	16.2	28.7	9.3	54.2	197.0	392.6	318.8	635.1	29.9
Mansoura	11.8	8.1	6.1	15.2	22.2	63.4	81.1	15.5	28.6	9.6	53.7	198.2	420.8	671.7	1,426.0	27.1
SUB TOTAL	23.8	16.4	11.9	30.5	43.6	126.2	161.0	31.7	57.4	18.9	107.9	395.2	-	990.5	1,018.0	-
Others																
Mahalla	4.8	5.1	4.1	15.3	17.7	45.0	29.5	10.4	2.8	5.5	18.6	93.1	208.7	150.1	336.5	29.9
Zagazig	2.7	2.9	1.5	7.2	6.5	20.7	13.2	6.8	1.4	2.0	10.2	44.2	140.2	83.0	263.5	49.5
Damanhour	4.1	3.7	1.7	3.8	7.4	24.5	14.3	6.9	1.5	2.3	10.7	49.5	156.7	109.0	545.2	46.4
Kafr El Dawar	5.0	4.4	1.9	9.0	8.2	28.5	16.6	8.6	1.8	2.5	12.9	58.0	147.5	127.8	325.2	50.1
Shebin El Kom	2.2	1.9	0.7	3.6	2.8	11.2	6.5	3.6	0.7	0.9	5.2	22.7	135.0	83.2	495.3	56.8
Damietta	1.0	2.4	2.9	5.9	8.4	20.6	13.2	3.9	1.2	2.6	7.7	41.4	239.0	96.5	602.9	22.5
Banha	2.1	2.2	1.7	4.1	4.5	14.7	5.2	3.4	0.8	1.4	5.6	26.5	158.6	33.3	220.[illegible]	38.1
Kafr El Sheikh	3.0	1.7	0.4	2.2	1.0	8.2	3.2	2.6	0.4	0.3	3.3	14.7	117.0	56.5	448.7	81.2
Mit Ghamr	0.3	1.4	0.6	2.6	2.1	7.0	7.5	2.5	0.5	0.6	3.6	15.1	130.4	49.6	427.9	46.4
Belbeis	0.3	1.2	0.3	1.9	0.9	4.5	2.8	2.2	0.4	0.3	2.8	10.2	95.6	18.6	175.0	66.3
Qalyub	0.5	1.7	1.5	3.2	5.8	10.5	8.5	2.4	0.6	1.2	4.2	21.1	201.6	24.8	235.9	27.7
Idku	0.9	1.8	17.1	2.6	2.4	24.9	4.8	2.4	0.5	0.8	3.6	33.3	299.9	71.9	648.0	27.4
Matarla	0.1	1.1	0.4	2.2	1.8	5.6	3.8	2.1	0.4	0.6	3.0	12.4	126.3	40.2	410.6	46.8

TABLE V-A.31 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1991-1995

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

SETTLEMENT	(L.E. MILLIONS) PHYSICAL INFRASTRUCTURE WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
Dessouk	0.7	1.3	0.6	2.0	1.7	6.3	3.5	1.9	0.4	0.6	2.6	12.6	147.8	42.5	499.7	43.5
Menouf	0.3	1.2	0.5	2.1	1.7	5.9	3.7	2.1	0.4	0.5	3.0	12.7	133.3	45.1	474.6	46.0
Abu Kabir	1.0	1.1	0.3	1.8	1.4	5.6	3.0	2.1	0.3	0.4	2.5	11.1	159.2	21.4	268.0	48.6
Zefta	0.6	1.5	1.4	2.6	3.2	9.3	5.4	2.0	0.5	1.0	3.5	18.1	213.0	29.0	340.9	27.0
Belkas	1.6	1.1	0.6	2.0	2.0	7.2	3.8	1.8	0.4	0.6	2.8	13.8	172.5	48.9	610.8	40.2
SUB TOTAL	31.3	37.6	38.0	75.8	77.8	260.2	146.3	67.2	14.9	38.8	106.0	512.5	-	1,151.5	365.8	-
V. NORTH UPPER EGYPT																
Beni Suef	2.2	2.7	2.1	5.8	7.0	19.8	16.9	5.1	10.2	3.0	16.3	53.0	270.6	139.8	713.4	32.9
Fayoum	3.2	4.3	3.2	9.7	12.9	33.3	30.0	5.0	17.4	5.6	28.0	91.3	297.3	283.4	923.5	28.6
Minia	2.6	3.4	2.5	7.6	9.5	25.6	22.7	4.0	13.5	4.1	21.6	70.0	277.6	223.3	886.2	31.4
Mallawi	1.2	1.8	0.8	3.2	3.6	10.7	0.7	1.8	5.5	1.5	8.9	20.2	174.5	66.1	570.4	34.9
SUB TOTAL	9.2	12.2	8.6	26.3	33.1	89.4	70.3	13.9	46.6	14.3	74.8	234.5	-	712.6	929.1	-
VI. SOUTH UPPER EGYPT																
Sohag	0.9	2.4	1.1	4.5	4.9	13.8	8.9	3.6	0.9	1.5	6.1	28.9	170.8	88.6	524.0	34.2
Ikhmim	0.7	1.3	0.7	2.4	2.9	7.9	4.9	1.8	0.5	0.9	3.2	16.0	200.6	50.4	630.0	29.8
Gerga	0.3	1.1	0.8	2.2	2.6	7.0	4.5	1.7	0.4	0.8	2.9	14.4	189.5	45.2	568.5	29.8
Luxor	1.7	3.2	1.4	5.4	5.9	17.6	10.6	4.5	1.1	1.8	7.4	35.6	176.8	38.8	192.8	34.0
SUB TOTAL	3.6	8.0	4.0	14.5	16.2	46.3	28.9	11.8	4.7	5.0	19.7	94.9	-	221.0	464.3	-
VII. REMOTE AREAS																
Matruh (Marsa Matruh)	0.7	1.1	2.3	2.2	2.3	8.6	4.2	1.8	0.4	0.7	3.0	15.7	192.0	63.5	1018.2	36.8
New Valley (Kharga)	0.7	1.2	2.4	2.3	2.3	8.9	4.6	2.0	0.4	0.7	3.1	16.4	181.7	79.4	882.4	39.1
Red Sea(Hurgada, Safaga)	0.9	1.4	5.5	2.8	2.9	13.4	5.3	2.3	0.5	0.9	3.7	22.5	220.7	127.9	1253.9	33.1
Sinai, (El Arish)	0.8	1.6	2.9	4.0	6.9	16.1	9.8	1.9	0.8	2.1	4.8	30.7	494.7	160.8	2593.8	8.9
SUB TOTAL	3.0	5.2	13.1	11.2	14.5	47.0	23.7	7.9	2.2	4.4	14.6	85.3	-	451.6	1557.2	-
VIII. TOTAL METROPOLITAN AREAS ONLY												7,439.9	404.1	8,072.5	438.5	21.7
IX. GRAND TOTAL (INCLUDING TELECOMMUNICATIONS)												10,125.2	375.0	13,595.0	503.5	23.0

Note: Totals may not add due to rounding

1 Costs include provisions for new populations plus rehabilitation of existing stock

2 Found by dividing total costs by end period population (See Table I-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index (Table V-A.22) and adding that amount to total base costs. Then that amount is multiplied times the Regional Construction Cost Index (Table V-A.22).

4 Greater Cairo transport component includes provisions for a subway.

SOURCE: MUPS.

TABLE V-A.32

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1995-2000

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[7] (L.E.)	REHABILITATION PROPORTION (%)
I. METROPOLITAN AREAS																
Greater Cairo	281.9	296.5	202.2	11.6	1,425.5[4]	2,215.8	2,287.3	494.3	1,034.3	353.3	1,881.8	6,386.9	387.0	6,384.9	387.0	20.0
Alexandria	137.5	146.6	59.1	50.7	299.4	695.9	824.3	167.1	366.7	129.7	663.4	2,113.7	384.3	2,831.9	514.9	27.3
SUB TOTAL	419.4	443.1	271.3	62.3	1,880.1	2,908.9	3,111.6	661.5	1,401.0	483.0	2,545.2	8,498.6	-	9,216.8	418.9	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	23.3	20.4	16.8	32.0	72.3	164.5	281.3	54.5	104.1	105.6	264.0	710.6	856.1	879.1	1,059.1	17.0
SOUTH UPPER EGYPT																
Assiut	9.3	9.1	8.9	21.8	38.4	87.4	102.6	18.8	44.5	16.6	79.9	270.0	450.0	340.3	567.3	17.3
Naga Hamadi	2.4	2.3	2.2	6.6	9.6	23.1	26.4	2.7	11.7	4.2	18.6	68.0	388.7	73.1	417.6	19.8
Qena	3.4	3.2	3.6	16.1	11.8	38.1	32.7	6.8	13.6	5.1	26.5	97.3	397.0	96.8	429.3	21.6
Aswan	5.2	5.2	4.8	14.4	20.7	50.3	58.8	6.7	26.9	8.9	42.5	151.7	337.1	181.0	337.8	29.9
SUB TOTAL	43.7	40.1	36.2	90.9	155.3	346.2	501.8	89.3	201.9	140.4	431.6	1,297.6	-	1,548.9	673.4	-
III. OTHER CANAL																
Port Said	12.0	8.6	10.1	18.3	24.8	73.7	58.8	9.6	34.9	10.7	55.2	187.7	288.8	393.5	605.3	27.7
Ismailia	8.5	7.5	5.8	16.6	25.2	63.6	56.5	15.0	31.7	10.9	57.6	177.5	355.1	417.7	835.3	25.1
SUB TOTAL	20.5	16.0	15.9	34.9	50.0	137.3	115.1	24.6	66.6	21.8	112.8	365.3	-	811.2	705.4	-
IV. DELTA																
Regional Centers																
Tanta	8.0	5.7	5.3	16.8	23.1	58.9	81.4	16.8	31.8	10.0	58.5	204.9	356.3	328.7	571.8	29.4
Mansoura	8.4	6.0	5.7	17.1	24.8	62.0	91.4	16.2	32.5	10.7	59.5	212.8	386.9	709.2	1,289.3	25.4
SUB TOTAL	16.5	11.6	11.0	33.9	47.9	120.9	172.8	33.0	64.3	20.7	118.0	417.7	-	1,037.9	922.6	-
Others																
Mahalla	5.4	544.4	4.4	19.5	19.9	45.7	33.0	11.8	3.2	5.8	20.8	99.5	176.0	159.3	281.9	30.9
Zagazig	1.4	1.5	1.5	7.6	6.9	18.9	14.0	6.9	1.5	2.1	10.5	43.4	129.5	79.5	237.9	49.9
Damanhour	2.5	2.1	1.9	8.2	8.0	22.5	19.6	7.1	1.6	2.5	11.1	49.2	144.6	107.0	314.6	41.7
Kafr El Dawar	2.4	2.4	1.8	9.0	7.7	23.3	16.3	8.9	1.8	2.4	12.7	52.2	125.9	113.6	273.7	47.8
Shebin El Kom	0.9	0.8	0.6	3.6	2.6	8.4	6.0	3.6	0.7	0.8	5.1	[illegible]	111.2	69.8	399.1	56.5
Damietta	0.3	1.7	2.2	6.7	9.4	29.3	14.9	4.1	1.3	2.9	8.3	53.5	229.8	98.8	519.9	21.8
Benha	1.2	1.2	1.4	4.3	4.6	12.8	8.4	3.4	0.8	1.4	5.7	26.9	162.8	31.4	190.5	33.8
Kafr El Sheikh	1.3	0.7	0.6	2.9	1.6	6.7	4.0	2.7	0.3	0.5	3.7	14.4	110.5	50.1	385.3	42.1
Mit Ghamr	0.1	0.5	0.4	2.4	1.9	4.9	3.8	2.4	0.5	0.5	3.3	12.0	99.7	38.8	323.1	39.2
Belbeis	0.1	0.5	0.4	2.2	1.5	4.7	3.6	2.3	0.4	0.5	3.2	11.3	104.2	20.7	188.2	37.9
Qalyub	0.2	1.0	1.2	3.8	4.8	10.9	7.9	2.6	0.7	1.5	4.8	23.6	196.9	27.6	230.4	25.9
Idku	0.6	0.9	17.2	3.0	3.0	24.7	5.2	2.9	0.6	0.9	4.0	34.4	287.0	74.1	617.7	25.1
Matarla	0.1	0.6	0.5	2.5	2.4	6.1	4.7	2.2	0.5	0.7	3.4	14.2	134.8	45.8	435.2	42.0
Dessouk	0.5	0.5	0.6	2.0	1.7	5.2	3.6	1.9	0.4	0.5	2.8	11.6	128.9	38.3	425.2	45.7
Menouf	0.1	0.5	0.5	2.2	1.8	5.8	3.8	2.1	0.4	0.5	3.0	11.9	119.0	42.1	420.6	49.1
Abu Kabir	0.5	0.5	0.4	1.2	1.7	5.1	3.5	1.8	0.4	0.5	2.7	11.3	133.4	21.1	247.5	44.8
Zefta	0.3	0.8	1.2	2.6	3.2	8.1	5.6	2.0	5.2	1.0	8.2	21.7	254.9	34.4	405.2	30.8
Belkas	0.7	0.4	0.4	2.0	1.7	5.2	3.5	1.7	0.4	0.5	2.6	11.4	134.1	38.7	455.3	44.5
SUB TOTAL	16.2	20.3	37.1	87.0	87.8	247.2	157.7	59.6	20.9	25.5	116.0	512.1	-	1,091.1	392.8	-

TABLE V-A.32 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1995-2000

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS (40 LARGEST URBAN SETTLEMENTS)

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION PROPORTION (%)
V. NORTH UPPER EGYPT																
Beni Suef	1.2	1.7	1.8	6.4	7.7	18.7	18.7	5.2	11.2	3.3	17.6	55.2	259.8	144.0	654.4	31.1
Fayoum	2.3	3.2	3.5	11.2	15.1	35.2	35.0	5.5	20.5	6.5	32.1	102.3	288.3	313.1	882.0	26.8
Minia	1.6	2.3	2.5	8.6	10.8	25.9	25.7	4.2	15.5	4.7	24.2	75.8	264.9	258.0	832.1	29.0
Mattawy	0.8	1.1	1.0	3.7	4.2	10.7	10.4	1.9	6.3	1.8	10.0	31.2	241.5	98.4	762.5	52.5
SUB TOTAL	5.9	8.3	8.7	29.8	37.8	90.5	89.7	14.6	53.2	16.3	84.1	264.4	-	793.5	911.0	-
VI. SOUTH UPPER EGYPT																
Sohag	0.5	1.2	1.1	4.8	4.9	12.6	9.2	3.8	0.9	1.5	6.2	28.0	152.1	83.5	454.0	36.2
Tahta	0.5	0.8	0.7	2.7	3.2	7.8	5.5	1.9	0.5	1.0	3.4	16.7	185.9	50.8	564.4	28.6
Girga	0.1	0.7	0.7	2.6	3.2	7.3	5.4	1.8	0.5	1.0	3.3	16.0	186.5	46.5	540.6	27.9
Luxor	1.0	1.7	1.4	5.8	6.2	16.1	11.4	4.6	3.1	1.9	7.6	33.1	159.7	37.5	170.3	54.6
SUB TOTAL	2.1	4.3	4.0	15.9	17.5	43.9	31.4	12.1	5.1	5.4	20.6	93.9	-	218.3	415.0	-
VII. REMOTE AREAS																
Matruh (Marsa Matruh)	0.4	0.7	2.1	2.4	2.6	8.3	4.7	1.9	0.5	0.8	3.2	16.2	179.5	80.4	893.8	32.8
New Valley (Kharga)	0.5	0.8	2.6	2.9	3.2	10.0	5.7	2.2	0.6	1.0	3.7	19.4	193.7	91.3	912.8	50.1
Red Sea (Hurghada, Safaga)	0.5	0.7	3.9	2.7	2.7	10.5	5.1	2.2	0.5	0.8	3.6	19.2	174.8	100.6	914.8	35.4
Sinai (El Arish)	0.3	1.9	2.5	6.4	11.4	22.6	16.1	7.8	1.3	3.5	7.6	46.3	462.7	217.5	2,174.9	7.0
SUB TOTAL	1.7	4.1	11.3	14.4	19.9	51.4	31.6	9.1	2.8	6.1	18.0	101.0	-	489.8	1,457.7	-
VIII. TOTAL METROPOLITAN AREAS ONLY												8,498.6	386.3	9,216.8	418.9	20.1
IX. GRAND TOTAL (INCLUDING TELECOMMUNICATIONS)												11,544.7	362.0	15,207.5	476.9	21.2

1 Costs include provisions for new populations plus rehabilitation of existing stock.

2 Found by dividing total costs by end period population (See Table I-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index (Table V-A.22) and adding that amount to total base costs. Then that amount is multiplied times the Regional Construction Cost Index (Table V-A.22).

4 Greater Cairo transport component includes provisions for a subway.

Source: MHPS.

TABLE V-A.33

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1986-1990

ESTIMATE II: MODIFIED STANDARDS

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
I. METROPOLITAN AREAS																
Greater Cairo	315.1	360.8	148.0	24.7	135.3	1,003.8	1,006.3	430.9	746.3	258.4	1,435.6	3,445.7	295.3	3,445.7	296.3	30.8
Alexandria	125.3	197.0	67.6	54.1	39.4	483.2	347.0	141.2	253.4	90.7	485.2	1,315.5	355.5	1,780.7	478.7	24.5
SUB TOTAL	440.4	557.8	215.6	78.8	274.7	1,487.0	1,353.3	572.1	999.7	349.1	1,920.8	4,761.2	-	5,226.4	340.3	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	23.6	20.7	8.8	19.8	4.2	77.2	59.2	19.5	40.6	16.5	76.4	212.8	455.8	291.2	564.9	24.7
South Upper Egypt																
Assiut	13.9	12.9	5.7	14.8	1.5	48.7	39.6	14.8	28.3	3.6	46.7	135.0	360.0	178.4	475.7	32.0
Naga Hamadi	4.2	4.8	1.6	4.6	0.2	15.5	11.2	2.3	8.1	1.0	11.4	38.1	325.4	44.6	381.0	24.5
Qena	7.8	7.8	5.1	5.0	0.3	27.0	14.4	3.0	10.5	1.3	14.8	56.1	359.8	67.7	434.3	27.1
Aswan	13.3	11.5	4.7	11.1	1.0	41.6	27.1	6.0	20.3	2.3	28.6	97.3	298.3	118.0	361.9	32.7
SUB TOTAL	62.8	57.7	25.9	56.3	7.2	210.0	151.5	45.8	107.8	24.4	177.9	539.3	-	699.9	409.7	-
III. OTHER CANAL																
Port Said	33.4	23.5	13.2	14.9	2.2	87.3	35.9	17.6	27.8	2.9	48.4	171.6	341.8	421.8	840.3	48.3
Ismailia	18.0	15.4	4.9	12.3	2.0	52.6	30.7	6.6	22.7	2.7	32.0	115.3	329.3	310.9	888.4	37.2
SUB TOTAL	51.4	38.9	18.1	27.2	4.2	139.9	66.6	24.2	50.5	5.6	80.4	286.9	-	732.7	860.0	-
IV. DELTA																
Regional Centers																
Tanta	23.2	15.7	6.2	13.3	2.8	61.3	36.4	15.4	31.1	8.0	54.5	152.2	350.7	255.2	588.0	61.7
Mansoura	22.0	14.9	6.5	13.2	3.8	59.4	36.5	14.6	30.6	6.2	53.4	149.2	373.1	542.9	1,357.2	49.4
SUB TOTAL	45.2	30.6	12.7	26.7	6.6	120.7	72.9	30.0	61.7	16.2	107.9	301.4	-	798.1	957.0	-
Others																
Mahalla	17.1	14.3	4.6	12.8	0.6	49.4	33.2	7.8	20.7	0.7	29.3	111.9	248.6	187.5	416.7	48.8
Zagazig	9.4	8.4	1.6	7.2	0.3	26.8	16.3	4.8	11.1	0.3	16.2	59.3	200.3	121.1	409.3	61.1
Damanhour	9.5	8.6	1.8	7.4	0.3	27.2	17.1	4.8	11.4	0.3	16.6	60.9	207.2	137.5	467.8	58.9
Kafr El Dawar	6.7	9.6	1.7	8.4	0.1	26.5	16.4	5.9	13.0	0.2	19.0	62.0	168.0	137.7	373.1	54.3
Shebin El Kom	3.5	4.4	0.9	3.5	0.0	12.2	5.5	2.5	5.3	0.1	7.9	26.6	166.2	99.0	618.6	68.9
Damietta	4.3	4.7	3.0	4.9	0.1	17.0	11.5	2.5	7.5	0.2	10.2	38.7	209.9	100.6	756.2	37.3
Banha	4.1	4.4	1.9	3.8	0.1	14.2	9.0	2.3	5.8	0.1	8.2	30.5	222.4	35.7	260.3	57.9
Kafr El Sheikh	3.4	5.7	0.7	2.6	0.1	10.4	4.8	1.9	5.9	0.1	5.8	20.8	167.6	76.9	620.5	37.9
Mit Ghamr	1.0	2.8	0.7	2.6	0.1	7.1	4.7	1.8	2.5	0.1	4.4	16.2	147.2	54.9	498.9	41.1
Belbeis	0.9	3.4	0.4	2.1	0.1	6.9	3.5	1.6	2.1	0.1	3.7	14.1	135.2	26.5	259.0	51.2
Qalyub	1.3	2.8	1.6	3.1	0.1	8.9	6.6	1.7	3.1	0.1	4.9	20.4	219.0	23.8	256.2	40.2
Idku	2.2	3.3	21.9	2.7	0.1	30.0	5.0	1.7	2.6	0.1	4.4	39.4	378.6	85.9	825.9	55.2
Matarla	0.0	2.1	0.1	2.4	0.1	5.6	4.4	1.5	2.3	0.1	3.9	13.7	146.9	44.9	483.2	58.0
Dassouk	1.0	2.1	0.1	1.8	0.1	5.4	3.0	1.3	1.7	0.1	3.0	11.5	143.5	39.5	497.1	47.9
Menouf	0.9	2.5	0.0	1.9	0.1	5.9	3.2	1.4	1.9	0.1	3.3	12.1	134.0	43.8	484.9	70.7

TABLE V-A.33 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1986-1990

ESTIMATE II: MODIFIED STANDARDS

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE						HOUSING	SOCIAL INFRASTRUCTURE				TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	% REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
	WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL		EDUCATION	HEALTH	OTHERS	TOTAL					
Abu Kabir	0.0	1.7	0.0	1.7	0.1	4.0	3.0	1.2	1.7	0.1	2.9	9.9	129.5	18.0	236.4	65.1
Zefta	1.2	2.3	1.3	2.2	0.1	7.1	4.4	1.3	2.2	0.1	3.5	15.0	199.8	24.4	326.0	47.5
Belkas	0.7	1.9	0.5	1.8	0.1	5.0	3.3	1.2	1.8	0.1	3.0	11.2	152.0	38.3	517.0	59.9
SUB TOTAL	67.2	92.6	42.7	72.9	1.5	269.0	154.7	47.2	100.7	1.9	150.2	574.2	-	1,296.3	452.9	-
V. NORTH UPPER EGYPT																
Beni Suef	4.8	5.5	2.3	5.4	0.1	18.1	12.0	3.1	8.3	0.1	11.5	41.6	239.0	113.9	654.5	46.2
Fayoum	7.0	8.4	3.7	8.8	0.2	28.0	20.6	4.8	13.9	0.3	19.0	67.6	254.2	226.7	852.2	41.3
Minia	5.8	7.0	2.8	7.0	0.1	22.6	15.8	3.9	10.8	0.2	14.9	53.3	239.9	182.6	822.4	44.9
Mallawi	0.8	2.7	1.0	3.2	0.1	7.8	6.5	1.8	3.2	0.1	5.0	19.3	184.1	62.0	590.6	45.2
SUB TOTAL	13.6	23.6	9.8	21.4	0.4	76.5	54.9	13.6	36.2	0.5	50.4	181.8	-	585.2	763.0	-
VI. SOUTH UPPER EGYPT																
Sohag	2.9	4.2	1.1	4.3	0.1	12.6	9.2	2.6	6.6	0.1	9.3	31.1	202.0	108.1	702.0	51.4
Ikhmim	0.6	1.9	0.7	2.1	0.1	5.4	4.3	1.2	2.1	0.1	3.4	13.1	184.6	41.4	583.1	45.8
Gerga	0.8	1.9	0.9	2.1	0.1	5.7	4.3	1.2	2.1	0.1	3.3	13.3	196.0	43.4	638.5	44.9
Luxor	4.1	5.3	1.5	5.0	0.1	15.9	9.9	3.1	5.0	0.1	8.1	33.9	185.4	40.2	219.5	54.0
SUB TOTAL	8.4	13.3	4.2	13.5	0.1	39.6	27.7	8.1	15.6	0.2	24.1	91.4	-	233.1	489.7	-
VII. REMOTE AREAS																
Matruh	1.5	2.4	2.7	2.1	0.1	8.7	4.3	1.3	3.1	0.1	4.5	17.6	234.1	106.6	1,421.9	47.5
New Valley	1.6	2.6	3.1	2.3	0.1	9.8	4.9	1.4	3.5	0.1	5.1	19.7	237.6	102.0	1,228.6	46.6
Red Sea	1.9	3.8	6.5	2.6	0.1	14.9	5.5	1.6	4.0	0.1	5.7	26.1	280.9	174.6	1,877.9	31.6
Sinai	1.0	1.6	3.9	2.6	0.1	9.2	6.8	1.0	4.0	0.2	5.1	21.1	541.0	123.5	3,166.8	13.7
SUB TOTAL	6.0	10.4	16.2	9.6	0.4	42.6	21.5	5.3	14.6	0.5	20.4	84.5	-	506.7	1,747.2	-
VIII. TOTAL METROPOLITAN AREAS ONLY												4,761.2	310.2	5,226.4	340.5	29.1
IX. GRAND TOTAL												6,820.7	298.6	10,078.4	441.2	33.2

1 Costs include provisions for new populations plus rehabilitation of existing stock.

2 Found by dividing total costs by end period population (See Table 1-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index (Table V-A.22) and adding that amount to total base costs. Then that amount is multiplied times the Regional Construction Cost Index (Table V-A.22).

NOTE: Totals may not add due to rounding.
Costs include rehabilitation plus new construction.

SOURCE: NUPS.

TABLE V-A.34

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1991-1995

ESTIMATE II: MODIFIED STANDARDS

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE						HOUSING	SOCIAL INFRASTRUCTURE				TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
	WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL		EDUCATION	HEALTH	OTHERS	TOTAL					
I. METROPOLITAN AREAS																
Greater Cairo	270.5	298.2	173.2	17.8	293.4	1,607.3	1,183.6	460.6	880.5	302.9	1,644.0	3,880.8	279.6	3,880.8	279.6	25.6
Alexandria	136.0	110.8	65.9	53.4	47.2	413.4	417.2	153.1	305.5	108.7	567.3	1,305.0	332.1	2,027.0	447.3	22.4
SUB TOTAL	406.5	409.0	239.3	71.2	340.6	2,020.7	1,600.8	613.7	1,186.0	411.6	2,211.3	5,385.8	-	5,907.8	320.9	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	19.8	17.4	12.0	25.4	5.8	8.04	81.1	23.3	55.7	22.6	101.5	263.0	431.1	344.0	564.0	16.8
South Upper Egypt																
Assiut	9.6	8.9	7.1	18.0	1.9	45.5	49.6	16.6	35.5	4.5	56.5	151.7	319.3	195.1	410.8	24.6
Naga Hamadi	2.8	2.5	1.9	5.7	0.3	132	13.7	2.5	10.0	1.2	13.7	40.6	281.9	45.3	314.6	25.0
Qena	4.5	3.7	4.3	6.8	0.3	19.5	16.2	3.1	12.0	1.4	16.6	52.3	279.8	59.5	318.4	28.4
Aswan	6.7	6.2	4.3	12.7	1.1	30.9	31.1	6.4	23.4	2.6	32.4	94.3	245.6	105.2	274.0	31.4
SUB TOTAL	43.4	38.7	29.6	68.6	9.4	189.5	191.7	51.9	136.6	32.3	220.7	601.9	-	749.1	416.2	-
III. OTHER CANAL																
Port Said	19.4	12.3	12.0	16.5	2.5	60.6	39.8	18.2	31.0	3.2	52.4	152.7	267.0	341.2	596.5	38.3
Ismailia	10.2	8.9	4.9	14.3	23.8	62.1	36.2	7.1	26.8	3.1	37.0	135.3	322.8	329.8	787.1	29.9
SUB TOTAL	27.6	21.2	16.9	30.8	26.3	122.7	76.0	25.3	57.8	6.3	89.4	288.0	-	571.0	677.1	-
IV. DELTA																
Regional Centers																
Tanta	12.0	8.3	5.8	15.3	3.2	44.6	42.0	16.2	35.9	9.3	61.4	147.9	294.7	241.3	480.7	34.6
Mansoura	10.0	7.0	5.5	13.8	3.3	39.6	40.2	12.6	32.5	9.5	54.6	134.5	352.6	218.9	590.0	29.9
SUB TOTAL	22.0	15.3	11.3	29.1	6.5	84.2	82.2	28.8	68.4	18.8	115.0	282.4	-	460.2	473.0	-
Others																
Mahalla	7.9	6.9	4.3	14.2	0.6	33.8	35.7	8.1	23.0	0.8	31.9	102.4	202.4	166.8	329.7	40.0
Zagazig	4.0	3.5	1.5	7.2	0.2	16.4	15.8	4.7	11.1	0.3	16.1	48.4	153.5	92.7	294.2	56.7
Damanhour	4.1	3.7	1.7	7.6	0.3	17.4	17.2	4.8	11.7	0.3	16.9	51.4	162.6	113.1	357.8	52.9
Kafr El Dawar	2.9	4.1	1.9	9.0	0.1	18.0	17.7	6.0	13.9	0.2	20.1	55.8	142.0	121.6	309.5	56.7
Shebin El Kom	1.3	1.7	0.7	3.6	0.1	7.5	6.7	2.5	5.5	0.1	8.1	22.2	132.2	80.2	477.4	63.1
Damietta	2.4	2.7	2.9	5.9	0.1	14.0	14.1	2.7	9.2	0.2	12.1	40.2	251.3	98.0	612.3	28.6
Benha	1.9	2.1	1.7	4.1	0.1	9.9	8.7	2.4	6.3	0.1	8.8	27.4	181.5	32.1	212.3	44.7
Kafr El Sheikh	1.1	1.3	0.4	2.2	0.1	5.0	3.4	1.8	3.3	0.1	5.1	13.5	107.1	46.7	370.9	83.9
Mit Ghamr	0.3	1.1	0.6	2.6	0.1	4.6	4.5	1.7	2.5	0.1	4.3	13.4	115.1	43.9	378.6	60.3
Belbeis	0.3	0.9	0.3	1.9	0.1	3.5	2.8	1.5	1.8	0.1	3.4	9.5	89.7	17.4	164.1	81.2
Qalyub	0.5	1.3	1.3	3.2	0.1	6.3	6.5	1.7	3.2	0.1	4.9	17.7	168.5	20.7	197.2	38.3
Idku	0.9	1.4	17.1	2.6	0.1	22.1	4.8	1.7	2.6	0.1	4.3	31.1	280.6	67.3	606.6	33.1
Mataria	0.1	0.8	0.4	2.2	0.1	3.6	3.8	1.4	2.1	0.1	3.6	10.9	111.4	35.5	362.7	60.7

TABLE V-A.34 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1991-1995

ESTIMATE II: MODIFIED STANDARDS

(L.E. MILLIONS)

SETTLEMENT	PHYSICAL INFRASTRUCTURE						HOUSING	SOCIAL INFRASTRUCTURE				TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
	WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL		EDUCATION	HEALTH	OTHERS	TOTAL					
Dessouk	0.4	0.9	0.6	2.0	0.1	3.9	3.5	1.3	1.9	0.1	3.3	10.7	125.4	35.4	417.1	56.8
Menouf	0.3	0.9	0.5	2.1	0.1	3.9	3.7	1.4	2.1	0.1	3.5	11.2	117.6	39.8	419.4	59.9
Abu Kabir	0.1	0.7	0.3	1.6	0.1	2.9	3.0	1.2	1.7	0.1	2.9	8.9	111.1	16.0	200.0	61.3
Zefta	0.6	1.2	1.4	2.6	0.1	5.8	5.3	1.4	2.6	0.1	4.0	15.2	178.8	24.4	287.0	37.0
Belkas	0.3	0.8	0.6	2.0	0.1	3.7	3.8	1.2	2.0	0.1	3.3	10.8	134.5	35.4	442.5	50.5
SUB TOTAL	29.4	36.0	38.2	76.6	1.3	182.1	162.0	47.5	106.5	1.9	156.6	500.7	-	1,087.0	351.4	-
V. NORTH UPPER EGYPT																
Beni Suef	2.2	2.7	2.1	5.8	0.1	12.9	12.8	3.1	9.0	0.2	12.3	37.9	193.6	100.9	514.9	39.7
Fayoum	3.2	4.3	3.2	9.7	0.2	20.5	22.7	5.0	15.4	0.3	20.7	63.9	208.3	202.0	658.0	35.0
Minia	2.6	3.4	2.5	7.6	0.1	16.2	17.2	4.0	11.9	0.2	16.2	49.6	196.8	160.8	638.1	38.2
Mallawi	0.2	1.2	0.8	3.2	0.0	5.5	6.3	1.8	3.2	0.0	5.0	16.9	145.3	52.4	452.0	43.9
SUB TOTAL	8.2	11.6	8.6	26.3	0.4	55.1	59.0	13.9	39.5	0.7	54.2	168.3	-	516.1	592.1	35.5
VI. SOUTH UPPER EGYPT																
Sohag	1.4	2.0	1.1	4.5	0.1	9.1	9.5	2.6	6.9	0.1	9.7	28.2	167.0	89.7	530.9	46.4
Ikhmim	0.2	0.9	0.7	2.4	0.1	4.2	4.9	1.3	2.4	0.1	3.7	12.8	160.1	37.8	472.2	39.8
Gerga	0.3	0.9	0.8	2.2	0.1	4.2	4.4	1.2	2.2	0.1	3.4	12.1	159.1	36.6	481.5	40.8
Luxor	1.7	2.4	1.4	5.4	0.1	10.9	10.6	3.1	5.4	0.1	8.6	30.1	149.6	33.1	164.8	46.3
SUB TOTAL	3.6	6.2	4.0	14.5	0.1	28.4	29.4	8.2	16.9	0.2	25.4	83.2	-	197.2	374.9	-
VII. REMOTE AREAS																
Matruh	0.7	1.1	2.3	2.2	0.1	6.4	4.5	1.3	3.3	0.1	4.7	15.5	189.3	82.5	1,005.2	43.0
New Valley	0.7	1.2	2.4	2.[illegible]	0.1	6.6	4.7	1.4	3.5	0.1	5.0	16.2	180.4	78.9	876.6	45.5
Red Sea	0.9	1.4	5.5	2.0	0.1	10.6	5.7	1.6	4.2	0.1	5.9	22.2	217.6	126.5	1,239.8	38.5
Sinai	0.8	1.6	2.9	4.0	0.2	9.4	10.4	1.5	6.1	0.3	7.7	27.6	444.8	146.8	2,368.5	11.0
SUB TOTAL	3.1	5.3	13.1	11.3	0.5	33.0	25.3	5.6	17.1	0.6	23.3	81.5	-	434.7	1,293.8	-
VIII. TOTAL METROPOLITAN AREAS ONLY												5,385.8	292.5	5,907.8	320.9	24.8
IX. GRAND TOTAL												7,391.8	273.8	10,023.1	371.2	27.3

1 Costs include provisions for new populations plus rehabilitation of existing stock.

2 Found by dividing total costs by end period population (See Table I-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index shown on Table V-A.22 and adding that amount to total base costs. Then that amount is multiplied times the Regional Construction Cost Index (Table V-A.22).

NOTE: Totals may not add due to rounding.
Costs include rehabilitation plus new construction.

SOURCE: MHPS.

TABLE V-A.35

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1986-2000

ESTIMATE II: MODIFIED STANDARDS

SETTLEMENT	(L.E. MILLIONS) PHYSICAL INFRASTRUCTURE: WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL	HOUSING	SOCIAL INFRASTRUCTURE: EDUCATION	HEALTH	OTHERS	TOTAL	TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[7] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
I. METROPOLITAN AREAS																
Greater Cairo	281.9	296.5	202.2	12.0	342.2	1,487.6	1,385.7	494.3	1,034.3	353.3	1,881.8	4,402.2	266.8	4,402.2	266.8	24.1
Alexandria	116.4	95.7	74.3	50.7	56.3	393.4	499.3	167.1	366.7	129.7	663.4	1,749.4	318.1	2,354.7	428.1	216
SUB TOTAL	398.3	392.2	276.5	62.7	398.5	1,881.0	1,885.0	661.4	1,401.0	483.0	2,545.2	6,151.6	-	6,756.9	507.1	-
II. SPECIAL EMPHASIS																
Canal Zone																
Suez	23.3	20.4	16.8	37.0	8.1	100.5	113.1	29.1	77.7	31.5	138.3	351.9	414.0	454.8	535.0	16.0
South Upper Egypt																
Asslut	9.3	8.6	8.9	1.8	2.3	30.9	62.2	18.8	44.5	0.6	63.8	177.0	294.9	229.9	376.5	22.7
Naga Hamadi	2.4	2.2	2.2	6.6	0.3	13.7	16.0	2.7	11.7	1.4	13.8	45.5	259.9	49.9	284.9	24.3
Qena	3.4	3.0	3.6	8.2	0.4	18.6	19.8	3.4	14.6	1.7	19.8	58.1	258.4	64.2	285.5	25.0
Aswan	5.2	4.8	4.8	14.4	1.3	30.5	35.6	6.7	26.9	3.0	36.7	102.8	228.5	111.6	242.1	29.7
SUB TOTAL	43.6	39.0	36.3	83.0	12.4	214.2	246.7	60.7	175.4	38.2	274.4	735.3	-	906.4	394.1	-
III. OTHER CANAL																
Port Said	12.0	8.6	10.1	18.3	2.7	51.7	44.6	19.0	34.9	3.6	57.4	153.7	236.4	328.1	504.7	34.1
Ismailia	8.5	7.5	5.8	16.6	2.8	41.2	42.6	7.6	31.7	3.7	43.0	126.8	253.6	306.0	612.1	29.7
SUB TOTAL	20.5	16.1	15.9	34.9	5.5	92.9	87.2	26.6	66.6	7.3	100.4	280.5	-	634.1	551.4	-
IV. DELTA																
Regional Centers																
Tanta	8.0	5.7	5.3	13.8	3.4	39.3	45.9	16.8	39.7	10.0	66.4	151.6	263.6	244.6	425.4	32.5
Mansoura	8.4	6.0	5.7	17.1	3.7	40.9	48.0	16.2	40.6	10.7	67.5	156.4	284.4	527.6	959.2	29.4
SUB TOTAL	16.4	11.7	11.0	33.9	7.1	80.2	93.9	33.0	80.3	20.7	133.9	308.0	-	772.2	684.4	-
Others																
Mahalla	5.1	4.5	4.4	15.3	0.7	29.9	39.5	8.2	25.0	0.8	34.[illegible]	103.4	183.1	166.6	294.9	37.7
Zagazig	2.1	1.8	1.6	7.6	0.2	13.3	16.7	4.8	11.7	0.3	16.8	46.9	140.1	86.9	259.5	53.1
Damanhour	2.3	2.1	1.9	8.2	0.3	14.7	18.6	4.9	12.7	0.4	15.0	51.3	150.8	111.5	327.9	48.5
Kafr El Dawar	1.4	2.0	1.8	9.0	0.1	14.3	17.4	5.9	14.0	0.2	20.1	51.8	124.7	11.8	269.4	57.2
Shebin El Kom	0.5	0.7	0.6	3.6	0.1	5.4	6.4	2.5	5.4	0.1	8.0	19.8	113.4	70.6	403.6	54.4
Damietta	1.4	2.0	2.2	6.7	0.1	12.4	15.9	2.9	10.5	0.2	13.6	41.9	22[illegible].4	98.6	519.1	27.7
Benha	1.0	1.2	1.4	4.3	0.1	8.0	9.0	2.4	6.6	0.1	9.1	26.2	158.5	30.6	185.5	43.6
Kafr El Sheikh	0.5	0.5	0.6	2.5	0.1	4.1	4.5	1.9	3.8	0.1	5.7	14.1	108.7	46.8	360.1	59.5
Mit Ghamr	0.1	0.4	0.4	2.4	0.1	3.2	3.8	1.7	2.3	0.1	4.0	11.1	92.1	35.8	298.6	58.8
Belbeis	0.1	0.4	0.4	2.2	0.1	3.1	3.6	1.6	2.2	0.1	3.8	10.6	96.0	19.0	172.6	66.8
Qalyub	0.2	0.9	1.2	3.8	0.1	6.1	7.9	1.8	3.8	0.1	5.6	19.7	164.0	23.0	191.8	33.8
Idku	0.6	0.8	17.2	3.0	0.1	21.6	5.7	1.8	3.0	0.1	4.8	32.1	267.5	69.1	575.9	28.7
Matarie	0.8	0.5	0.5	2.5	0.1	3.7	4.6	1.5	2.5	0.1	4.1	12.4	117.8	40.1	381.5	51.4
Dessouk	0.2	0.4	0.6	2.0	0.1	3.2	3.6	1.3	2.0	0.1	3.3	10.1	112.7	33.1	368.2	55.4
Manouf	0.1	0.4	0.5	2.2	0.1	3.2	3.8	1.4	2.2	0.1	3.6	10.7	105.6	37.7	377.0	58.7
Abu Kabir	0.1	0.2	0.4	2.0	0.1	2.8	3.5	1.2	1.9	0.1	3.2	10.0	112.0	17.0	200.4	54.8

TABLE V-A.35 (CONTINUED)

PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE COSTS PERIOD 1996-2000

ESTIMATE II: MODIFIED STANDARDS

SETTLEMENT	(L.E. MILLIONS) PHYSICAL INFRASTRUCTURE						HOUSING	SOCIAL INFRASTRUCTURE				TOTAL BASE COSTS[1]	BASE COSTS PER CAPITA[2] (L.E.)	ADJUSTED TOTAL COSTS[3] (L.E. MILLIONS)	TOTAL COSTS PER CAPITA[2] (L.E.)	REHABILITATION COSTS AS A PROPORTION OF TOTAL COSTS (%)
	WATER	SEWERAGE	CIRCULATION	POWER	OTHERS	TOTAL		EDUCATION	HEALTH	OTHERS	TOTAL					
Zafta	0.3	0.7	1.2	2.6	0.1	4.9	5.4	1.4	2.6	0.1	4.0	14.3	167.3	22.7	267.5	34.9
Belkas	0.1	0.3	0.4	2.0	0.1	2.9	3.5	1.2	1.9	0.1	3.2	9.5	112.1	30.9	363.6	54.5
SUB TOTAL	16.9	20.0	39.3	81.9	1.5	156.8	173.2	48.4	114.1	2.0	165.0	495.9	-	1,051.8	314.4	-
V. NORTH UPPER EGYPT																
Beni Suef	1.2	1.7	1.8	6.4	0.1	11.2	14.1	3.2	9.9	0.2	13.3	38.6	175.6	101.3	460.4	37.5
Fayoum	2.3	3.2	3.5	11.2	0.2	20.3	26.5	5.3	17.9	0.4	23.6	70.4	198.3	217.9	613.9	31.7
Minia	1.6	2.3	2.5	8.6	0.2	15.2	19.5	4.2	13.5	0.3	18.0	52.7	184.1	167.1	584.1	35.2
Mallawi	0.1	0.8	1.0	3.7	0.0	5.6	7.3	1.9	3.7	0.1	5.6	18.5	143.7	57.3	444.4	39.9
SUB TOTAL	5.2	8.0	8.8	29.9	0.5	52.3	67.4	14.6	45.0	0.9	60.5	180.2	-	543.0	549.1	-
VI. SOUTH UPPER EGYPT																
Sohag	0.8	1.1	1.1	4.8	0.1	7.9	9.8	2.6	7.3	0.1	10.0	27.7	150.8	84.6	459.8	45.5
Iklimim	0.1	0.6	0.7	2.7	0.1	4.2	5.5	1.3	2.7	0.1	4.0	13.7	151.9	39.7	441.3	37.2
Gerga	0.1	0.6	0.7	2.6	0.1	4.1	5.4	1.3	2.6	0.1	3.9	13.4	156.0	39.0	453.4	36.0
Luxor	1.0	1.4	1.4	5.8	0.1	9.7	11.3	3.2	5.8	0.1	9.1	30.1	136.8	32.3	146.7	43.6
SUB TOTAL	2.0	3.7	3.9	15.9	0.1	25.9	32.0	8.4	18.4	0.2	27.0	84.9	-	195.6	337.2	-
VII. REMOTE AREAS																
Matruh	0.4	0.7	2.1	2.4	0.1	5.7	5.1	1.3	3.7	0.1	5.1	15.9	176.7	79.3	881.2	39.7
New Valley	0.5	0.8	2.6	2.9	0.1	6.9	6.1	1.5	4.3	0.1	6.0	18.9	189.0	89.2	891.7	36.6
Red Sea	0.5	0.7	3.9	2.7	0.1	7.9	5.5	1.5	4.1	0.1	5.8	19.2	174.8	100.6	914.4	41.9
Sinai	0.3	1.9	2.6	6.4	0.3	11.5	17.2	1.9	10.1	0.5	12.5	41.2	412.1	194.7	1,946.6	10.1
SUB TOTAL	1.7	4.1	11.2	14.4	0.6	32.0	33.9	6.2	22.2	0.8	29.4	95.2	-	463.8	1,159.5	-
VIII. TOTAL METROPOLITAN AREAS ONLY												6,151.6	279.6	6,756.9	307.1	23.4
IX. GRAND TOTAL												8,331.6	261.3	11,324.4	355.1	25.4

1 Costs include provisions for new populations plus rehabilitation of existing stock.

2 Found by dividing total costs by end period population (See Table I-A.1 for end period populations).

3 Found by multiplying water costs times 1 minus Regional Water Index (Table V-A.22). Then that amount is multiplied times the Regional Construction Cost Index. Index (Table V-A.22).

4 Greater Cairo transport component includes provisions for a subway.

NOTE: Totals may not add due to rounding.
Costs include rehabilitation plus new construction.

SOURCE: MUPS.

TABLE V-A.36

AFFORDABILITY OF PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE INVESTMENT COSTS

ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS: INCLUDES TELECOMMUNICATIONS

SETTLEMENT	1986 - 1990[1]					1991 - 1995[1]					1996 - 2000[1]				
	% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E. MILLONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)		
	NEW	EXISTING	NEW	EXISTING	TOTAL	NEW	EXISTING	NEW	EXISTING	TOTAL	NEW	EXISTING	NEW	EXISTING	TOTAL
	POPULATIONS		AREAS	AREAS		POPULATION		AREAS	AREAS		POPULATIONS		AREAS	AREAS	
I. METROPOLITAN AREAS															
Greater Cairo	53.6	0.0	2,020.7	0.0	2,020.7	53.2	0.0	2,330.3	0.0	2,330.3	49.3	0.0	2,720.2	0.0	2,720.2
Alexandria	66.7	0.0	1,231.7	0.0	1,231.7	61.5	0.0	1,175.6	0.0	1,175.6	61.2	0.0	1,380.5	0.0	1,380.5
SUB TOTAL	-	-	3,252.4	0.0	3,252.4	-	-	3,505.9	0.0	3,505.9	-	-	4,100.7	0.0	4,100.7
II. SPECIAL EMPHASIS															
A.Canal Zone															
Suez	73.0	0.0	308.95	0.0	308.95	72.1	0.0	403.8	0.0	403.8	71.8	0.0	554.5	0.0	554.5
B.South Upper Egypt															
Assiut	63.6	0.0	117.3	0.0	117.3	63.7	0.0	147.4	0.0	147.4	62.7	0.0	176.4	0.0	176.4
Naga Hamadi	61.1	0.0	29.1	0.0	29.1	57.3	0.0	30.4	0.0	30.7	55.8	0.0	32.9	0.0	32.9
Qena	66.0	0.0	45.7	0.0	45.7	61.1	0.0	41.0	0.0	41.0	57.8	0.0	43.8	0.0	43.9
Aswan	63.6	0.0	74.8	0.0	74.8	51.4	0.0	65.7	0.0	65.7	55.1	0.0	68.0	0.0	68.0
SUB TOTAL	-	-	575.9	0.0	575.9	-	-	688.3	0.0	688.3	-	-	321.1	0.0	321.1
III. OTHER CANAL															
Port Said	79.2	0.0	220.9	0.0	220.9	76.7	0.0	209.8	0.0	209.8	75.1	0.0	213.6	0.0	213.6
Ismailia	79.4	1.3	206.1	1.7	207.8	77.7	0.0	219.1	0.0	219.1	77.1	0.0	247.6	0.0	247.6
SUB TOTAL	-	-	427.0	1.7	428.7	-	-	428.9	0.0	428.9	-	-	461.2	0.0	461.2
IV. DELTA															
A.Regional Centers															
Tanta	73.4	0.0	147.9	0.0	147.9	72.4	0.0	162.0	0.0	162.0	71.8	0.0	169.0	0.0	169.0
Mansoura	87.6	34.1	391.7	79.9	471.6	86.8	0.0	425.1	0.0	425.1	86.4	0.0	457.2	0.0	457.2
SUB TOTAL	-	-	539.6	79.9	619.5	-	-	587.1	0.0	587.1	-	-	626.2	0.0	626.2
B.Others															
Mahalla	54.0	0.0	54.4	0.0	54.4	51.6	0.0	54.3	0.0	54.3	51.3	0.0	56.4	0.0	56.4
Zagazig	59.5	0.0	28.1	0.0	28.1	58.8	0.0	24.6	0.0	24.6	57.7	0.0	24.8	0.0	24.8
Damanhour	62.5	0.0	34.9	0.0	34.9	65.8	0.0	38.4	0.0	38.4	65.3	0.0	41.1	0.0	41.1
Kafr El Dawar	71.7	0.0	50.8	0.0	50.8	65.8	0.0	42.0	0.0	42.0	66.3	0.0	39.3	0.0	39.3
Shebin El Kom	80.7	0.0	30.4	2.3	32.7	79.8	0.0	28.7	0.0	28.7	79.0	0.0	24.0	0.0	24.0
Damietta	69.6	0.0	45.7	0.0	45.7	67.3	0.0	50.4	0.0	50.4	64.9	0.0	50.4	0.0	50.4
Benha	39.3	0.0	7.7	0.0	7.7	38.3	0.0	7.9	0.0	7.9	36.9	0.0	7.4	0.0	7.4

TABLE V-A.36 (CONTINUED)

AFFORDABILITY OF PREFERRED STRATEGY INTRA-URBAN INFRASTRUCTURE INVESTMENT COSTS
ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS: INCLUDES TELECOMMUNICATIONS

SETTLEMENT	1986 - 1990[1]					1991 - 1995[1]					1996 - 2000[1]				
	% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E. MILLONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)		
	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATION	EXISTING POPULATION	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL
Kafr El Sheikh	84.3	36.3	24.5	30.9	55.4	85.1	0.0	10.4	0.0	10.4	80.8	0.0	15.4	0.0	15.4
Mit Ghamr	83.5	0.0	32.3	0.0	32.3	79.5	0.0	21.1	0.0	21.1	77.0	0.0	12.2	0.0	12.2
Belbeis	75.4	0.0	11.2	0.0	11.2	71.0	0.0	4.4	0.0	4.4	58.9	0.0	5.2	0.0	5.2
Qalyub	45.7	0.0	10.0	0.0	10.0	39.2	0.0	7.0	0.0	7.0	30.8	0.0	6.1	0.0	6.1
Idku	89.7	0.0	63.0	0.0	63.0	87.8	0.0	45.8	0.0	45.8	85.3	0.0	47.3	0.0	47.3
Mataria	81.3	0.0	27.7	0.0	27.7	78.7	0.0	16.8	0.0	16.8	76.0	0.0	20.2	0.0	20.2
Dessouk	86.8	0.0	24.0	0.0	24.0	81.1	0.0	19.5	0.0	19.5	78.1	0.0	16.3	0.0	16.3
Menouf	86.7	0.0	23.7	0.0	23.7	81.3	0.0	19.8	0.0	19.8	78.8	0.0	16.9	0.0	16.9
Abou Kabir	73.9	0.0	10.3	0.0	10.3	66.9	0.0	7.4	0.0	7.4	61.1	0.0	7.1	0.0	7.1
Zafta	64.2	0.0	13.1	0.0	13.1	57.1	0.0	12.1	0.0	12.1	61.8	0.0	14.7	0.0	14.7
Belkas	86.2	0.0	28.3	0.0	28.3	81.3	0.0	23.8	0.0	23.8	78.8	0.0	16.9	0.0	16.9
SUB TOTAL	-	-	520.1	33.2	553.3	-	-	434.4	0.0	434.4	-	-	421.7	0.0	421.7
V. NORTH UPPER EGYPT															
Beni Suef	81.0	0.0	75.4	0.0	75.4	80.3	0.0	75.3	0.0	75.3	79.7	0.0	49.0	0.0	49.0
Fayoum	84.0	12.8	168.2	12.9	181.1	87.5	0.0	240.5	0.0	240.5	82.4	0.0	188.8	0.0	188.8
Minia	84.5	15.3	128.2	13.5	141.7	83.5	0.0	128.0	0.0	128.0	83.1	0.0	140.4	0.0	140.4
Mallawy	86.9	0.0	66.9	0.0	66.9	78.5	0.0	33.8	0.0	33.8	83.6	0.0	55.8	0.0	55.8
SUB TOTAL	-	-	438.7	26.4	465.1	-	-	477.6	0.0	477.6	-	-	434.0	0.0	434.0
VI. SOUTH UPPER EGYPT															
Sohag	82.2	0.0	58.2	0.0	58.2	78.4	0.0	45.7	0.0	45.7	76.3	0.0	40.7	0.0	40.7
Ikhmim	83.7	0.0	34.4	0.0	34.4	78.6	0.0	27.8	0.0	27.8	76.8	0.0	27.9	0.0	27.9
Gerga	81.8	0.0	30.2	0.0	30.2	77.8	0.0	23.6	0.0	23.6	74.9	0.0	25.1	0.0	25.1
Luxor	53.7	0.0	16.6	0.0	16.6	40.9	0.0	10.5	0.0	10.5	34.9	0.0	8.6	0.0	8.6
SUB TOTAL	-	-	139.4	0.0	139.4	-	-	107.6	0.0	107.6	-	-	102.3	0.0	102.3
VII. REMOTE AREAS															
Matruh	92.4	22.3	71.4	7.6	79.0	88.9	5.4	46.9	1.7	48.6	87.6	0.0	47.3	0.0	47.3
New Valley	91.0	9.2	68.4	3.0	71.3	87.8	0.0	42.5	0.0	42.5	86.8	0.0	55.4	0.0	55.4
Red Sea	94.1	33.0	120.5	16.0	136.6	91.2	14.9	78.0	6.3	84.3	89.7	0.0	58.3	0.0	58.3
Sinai	89.3	38.1	105.4	5.7	111.1	86.8	0.0	127.2	0.0	127.2	84.2	0.0	170.3	0.0	170.3
SUB TOTAL	-	-	365.7	32.3	398.0	-	-	294.6	8.0	302.6	-	-	331.3	0.0	331.3
VIII. GRAND TOTAL	-	-	6,258.8	173.5	6,432.3			6,524.4	8.0	6,532.4			6,798.5	0.0	6,798.5

1 See Section II(this Appendix) for methodology for calculating affordability.

SOURCE: NUPS.

TABLE V-A.37

PREFERRED STRATEGY HOUSING AND INTRA-URBAN INFRASTRUCTURE CAPITAL COSTS
ESTIMATE I: EXISTING PROPOSALS (NET OF TELECOMMUNICATIONS)

(1979 L.E. PRICES)

	1986 - 1990 PERIOD				1991 - 1995 PERIOD				1996 - 2000 PERIOD			
	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)
I. METROPOLITAN AREAS												
Greater Cairo	4,699.6	404.1	1,728.0	40.4	5,218.2	367.0	1,988.2	42.1	5,965.4	361.5	2,321.8	43.2
Alexandria	2,422.4	691.2	907.7	37.5	2,104.0	4,642.0	785.0	37.3	2,363.1	429.6	911.7	38.6
SUB TOTAL	7,122.0	464.0	2,633.7	39.3	7,322.2	397.7	2,773.2	40.6	8,328.5	378.6	3,233.5	41.0
II. SPECIAL EMPHASIS												
A. Canal Zone												
Suez	470.4	1,074.0	262.3	55.8	585.8	960.3	339.7	57.9	788.7	927.0	469.1	59.0
B. South Upper Egypt												
Assiut	213.2	568.5	83.4	39.1	240.7	506.7	104.8	43.5	286.9	478.2	123.0	42.9
Naga Hamadi	52.6	449.6	20.9	39.8	55.8	387.5	20.4	36.6	61.3	350.3	21.0	34.3
Qena	80.9	518.6	35.1	43.4	74.7	399.5	28.9	38.7	81.7	363.1	29.1	35.6
Aswan	138.4	424.5	54.8	39.6	126.5	329.4	42.7	33.8	134.4	299.7	41.4	30.8
SUB TOTAL	955.5	676.7	456.5	47.8	1,083.5	601.9	536.5	49.5	1,353.0	588.3	679.7	50.2
III. OTHER CANAL												
Port Said	421.5	839.6	168.8	40.1	340.5	595.3	151.7	44.6	328.1	504.8	148.2	45.2
Ismailia	345.4	986.9	159.0	46.0	323.8	772.8	161.5	49.9	349.6	599.2	179.5	51.3
SUB TOTAL	766.9	900.1	327.8	42.7	664.3	670.3	313.2	47.2	697.7	580.3	327.7	48.4
IV. DELTA												
A. Regional Centers												
Tanta	284.0	654.4	109.5	38.6	274.5	546.8	117.7	42.9	279.7	414.4	120.0	42.9
Mansoura	604.7	1,511.7	394.6	65.3	581.7	1,235.0	335.1	57.6	607.0	1,103.6	355.0	58.5
SUB TOTAL	888.7	1,065.6	504.1	56.7	856.2	880.0	452.8	52.9	886.7	788.2	475.0	53.6
B. Others												
Mahalla	136.0	302.2	18.2	13.4	109.9	217.2	14.1	12.8	115.7	204.8	12.8	11.1
Zagazig	77.8	262.8	6.4	8.2	61.2	194.9	2.8	4.6	56.4	168.4	1.7	3.0
Damanhour	83.2	283.0	7.9	9.5	81.5	257.3	10.7	13.2	77.0	226.5	11.1	14.4
Kafr El Dawar	95.8	259.6	20.2	21.1	95.0	241.7	9.2	9.7	80.6	194.2	6.3	7.8
Shebin El Kom	88.7	554.4	12.1	13.6	61.9	368.6	7.4	12.0	48.7	278.3	2.9	6.0
Damietta	74.3	558.6	26.9	36.2	73.7	460.6	27.6	37.5	72.7	382.6	24.3	33.4
Benha	29.9	218.2	0.2	0.7	25.1	166.2	(0.3)	(1.2)	22.8	138.2	(1.2)	(5.3)

TABLE V-A.37 (CONTINUED)

PREFERRED STRATEGY HOUSING AND INTRA-URBAN INFRASTRUCTURE CAPITAL COSTS

ESTIMATE I: EXISTING PROPOSALS (NET OF TELECOMMUNICATIONS)

(1979 L.E. PRICES)

	1986 - 1990 PERIOD				1991 - 1995 PERIOD				1996 - 2000 PERIOD			
	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)	TOTAL COST[1] (L.E. MILLION)	PER CAPITA COST (L.E.)	TOTAL SUBSIDY[2] (L.E. MILLION)	PERCENTAGE NOT AFFORDABLE BY HOUSEHOLD INCOME (%)
Kafr El Sheikh	100.5	810.5	41.7	41.5	44.9	356.3	(1.2)	(2.7)	36.7	282.3	2.0	5.4
Mit Ghamr	49.3	448.2	18.3	37.1	35.8	308.6	7.3	20.4	26.1	207.1	(0.5)	(1.9)
Balbeis	21.9	210.6	4.9	22.4	13.0	122.6	(1.2)	(9.2)	14.2	129.1	(1.3)	(9.1)
Qalyub	22.6	243.0	3.8	16.8	18.5	176.2	0.7	3.8	20.1	167.5	(1.4)	(7.0)
Idku	82.9	797.1	53.5	64.5	62.5	563.1	36.4	54.7	63.3	527.5	36.5	57.7
Matarla	40.0	630.1	15.1	37.7	28.6	291.8	5.2	18.2	32.2	306.7	6.6	20.5
Dessouk	40.8	510.0	14.6	35.8	32.0	376.5	9.0	28.1	27.4	304.4	5.4	19.7
Menouf	38.6	428.9	12.5	32.4	32.7	344.2	7.4	22.6	29.2	292.0	4.0	13.7
Abou Kabir	21.4	281.6	5.3	24.8	16.2	202.5	2.2	13.6	15.7	184.7	1.7	10.8
Zefta	23.0	306.7	7.3	31.7	22.0	258.8	5.1	23.2	27.0	284.2	7.3	27.0
Belkas	51.6	697.3	18.6	36.0	38.0	475.0	12.9	33.9	28.2	331.8	6.4	22.7
SUB TOTAL	1,078.3	376.8	287.5	26.7	852.4	275.6	155.3	18.2	794.0	237.4	124.6	15.7
V. NORTH UPPER EGYPT												
Beni Suef	127.0	729.9	51.8	40.8	114.2	582.6	49.7	43.5	115.7	525.9	20.7	17.9
Fayoum	255.8	961.6	75.5	29.5	232.7	758.0	189.8	81.6	254.0	715.5	129.7	51.1
Minia	203.8	918.0	105.1	51.6	182.9	725.8	87.6	47.9	192.2	672.0	94.6	49.2
Mallawy	95.7	911.4	50.4	52.7	49.5	426.7	17.2	34.7	79.4	615.5	36.8	46.3
SUB TOTAL	682.3	889.6	282.8	41.4	579.3	655.1	294.3	50.8	641.3	647.8	281.8	43.9
VI. SOUTH UPPER EGYPT												
Sohag	83.5	542.2	37.4	44.8	66.7	394.7	23.8	35.7	60.5	328.8	17.7	29.3
Tkhmim	48.9	688.7	24.1	49.3	38.8	485.0	16.2	41.7	37.8	420.0	14.9	39.4
Gerga	40.9	601.5	20.1	49.1	32.5	427.6	12.9	39.7	33.8	393.0	12.4	36.7
Luxor	38.1	208.2	7.9	20.7	29.4	146.3	1.1	3.7	27.4	124.5	(1.3)	(5.3)
SUB TOTAL	211.4	444.1	89.5	42.3	167.4	318.2	54.0	32.3	159.5	275.0	43.5	27.3
VII. REMOTE AREAS												
Matruh	95.5	1,273.3	63.3	66.3	67.0	817.1	32.1	47.9	62.0	688.9	28.9	46.6
New Valley	89.5	1,078.3	53.7	60.0	62.0	688.9	25.1	40.5	69.7	697.0	33.8	48.5
Red Sea	156.9	1,687.1	116.8	74.4	107.1	1,050.0	63.5	59.3	79.9	726.4	37.6	47.1
Sinai	1,113.2	2,902.6	91.3	80.6	130.2	2,100.0	96.6	74.2	167.3	1,673.0	120.1	71.8
SUB TOTAL	455.1	1,569.3	325.1	71.4	366.3	1,090.2	217.3	59.3	379.9	947.2	220.4	58.2
VIII. GRAND TOTAL	12,160.2	523.4	5,171.3	46.0	11,891.6	440.4	5,136.3	42.9	13,219.6	414.5	5,851.3	43.6

1 Total costs are the totals shown in the detailed infrastructure tables for Estimate I minus telecommunications.

2 See Section II this Appendix for methodology for estimating subsidies.

SOURCE: MUPS.

TABLE V-A.38

AFFORDABILITY OF PREFERRED STRATEGY HOUSING AND INTRA-URBAN INFRASTRUCTURE INVESTMENT COSTS
ESTIMATE II: MODIFIED STANDARDS

SETTLEMENT	1986 - 1990[1]					1991 - 1995[1]					1996 - 2000[1]				
	% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E. MILLONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)			% NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E. MILLIONS)		
	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATION	EXISTING POPULATION	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL
I. METROPOLITAN AREAS															
Greater Cairo	11.4	0.0	272.7	0.0	272.7	1.1	0.0	31.4	0.0	31.4	- 25.6	0.0	- 854.5	0.0	-854.5
Alexandria	44.9	0.0	602.7	0.0	602.7	34.7	0.0	543.9	0.0	543.9	14.5	0.0	268.4	0.0	268.4
SUB TOTAL	-	-	875.4	0.0	875.4	-	-	575.3	0.0	575.3	-	-	- 586.1	0.0	-586.1
II. SPECIAL EMPHASIS															
A. Canal Zone															
Suez	37.4	0.0	82.6	0.0	82.6	23.9	0.0	68.4	0.0	68.4	- 0.5	0.0	- 1.9	0.0	-1.9
B. South Upper Egypt															
Assiut	33.1	0.0	40.2	0.0	40.2	20.8	0.0	30.5	0.0	30.5	- 6.1	0.0	- 10.7	0.0	-10.7
Naga Hamadi	31.8	0.0	10.4	0.0	10.4	6.0	0.0	2.0	0.0	2.0	- 22.4	0.0	- 8.4	0.0	-8.4
Qena	42.5	0.0	21.0	0.0	21.0	15.2	0.0	6.5	0.0	6.5	- 17.5	0.0	- 8.4	0.0	-8.4
Aswan	27.3	0.0	19.4	0.0	19.4	6.3	0.0	4.5	0.0	4.5	- 23.6	0.0	- 18.8	0.0	-18.8
SUB TOTAL	-	-	173.6	0.0	173.6	-	-	111.9	0.0	111.9	-	-	- 48.2	0.0	-48.2
III. OTHER CANAL															
Port Said	67.8	0.0	147.7	0.0	147.7	57.9	0.0	121.9	0.0	121.9	40.9	0.0	88.4	0.0	88.4
Ismailia	65.8	0.0	124.3	0.0	124.3	64.5	0.0	158.4	0.0	158.4	41.7	0.0	94.8	0.0	94.8
SUB TOTAL	-	-	272.0	0.0	272.0	-	-	280.3	0.0	280.3	-	-	183.2	0.0	183.2
IV. DELTA															
A. Regional Centers															
Tanta	55.0	0.0	79.0	0.0	79.0	45.4	0.0	71.7	0.0	71.7	27.4	0.0	45.2	0.0	45.2
Mansoura	79.3	15.0	256.5	32.8	289.4	44.9	0.0	73.2	0.0	73.2	65.3	0.0	243.0	0.0	243.0
SUB TOTAL	-	-	335.5	32.8	368.4	-	-	144.9	0.0	144.9	-	-	288.2	0.0	288.2
B. Others															
Mahalla	41.7	0.0	40.0	0.0	40.0	29.2	0.0	29.2	0.0	29.2	7.0	0.0	7.3	0.0	7.3
Zagazig	51.2	0.0	24.2	0.0	24.2	40.0	0.0	16.0	0.0	16.0	19.8	0.0	8.1	0.0	8.1
Damanhour	55.8	0.0	31.9	0.0	31.9	47.7	0.0	25.4	0.0	25.4	31.6	0.0	18.1	0.0	18.1
Kafr El Dawar	50.9	0.0	25.1	0.0	25.1	42.2	0.0	22.2	0.0	22.2	24.7	0.0	11.8	0.0	11.8
Shebin El Kom	71.5	0.0	22.0	0.0	22.0	65.8	0.0	19.5	0.0	19.5	54.5	0.0	13.7	0.0	13.7
Damietta	61.7	0.0	38.9	0.0	38.9	51.1	0.0	35.7	0.0	35.7	31.1	0.0	22.2	0.0	22.2
Benha	15.0	0.0	2.5	0.0	2.5	- 0.1	0.0	- 9.8	0.0	-9.8	- 32.9	0.0	- 5.7	0.0	-5.7

TABLE V-A.38 (CONTINUED)

SETTLEMENT	1986 - 1990[1] % NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E. MILLONS)			1991 - 1995[1] % NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)			1996 -2000[1] % NOT AFFORDABLE BY HOUSEHOLD INCOMES		TOTAL SUBSIDY REQUIREMENTS (L.E.MILLIONS)		
	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATION	EXISTING POPULATION	NEW AREAS	EXISTING AREAS	TOTAL	NEW POPULATIONS	EXISTING POPULATIONS	NEW AREAS	EXISTING AREAS	TOTAL
Kafr El Sheikh	72.8	0.0	14.7	0.0	14.7	66.3	0.0	5.0	0.0	5.0	54.1	0.0	7.7	0.0	7.7
Mit Ghamr	63.8	0.0	13.6	0.0	13.6	56.4	0.0	9.8	0.0	9.8	41.9	0.0	4.7	0.0	4.7
Belbeis	65.6	0.0	8.4	0.0	8.4	22.4	0.0	0.7	0.0	0.7	-3.3	0.0	-0.2	0.0	-0.2
Qalyub	-0.1	0.0	-16.2	0.0	-16.2	-19.0	0.0	-2.4	0.0	-2.4	-61.2	0.0	-9.3	0.0	-9.3
Idku	84.7	0.0	48.6	0.0	48.6	80.3	0.0	36.2	0.0	36.2	70.1	0.0	34.6	0.0	34.6
Matarla	61.2	0.0	12.1	0.0	12.1	54.7	0.0	7.7	0.0	7.7	41.1	0.0	8.0	0.0	8.0
Desscuk	66.1	0.0	8.5	0.0	8.5	58.7	0.0	9.0	0.0	9.0	44.6	0.0	6.6	0.0	6.6
Menouf	66.7	0.0	8.8	0.0	8.8	60.4	0.0	9.6	0.0	9.6	47.5	0.0	7.4	0.0	7.4
Abu Kabir	30.1	0.0	1.9	0.0	1.9	18.2	0.0	1.1	0.0	1.1	-6.4	0.0	-0.5	0.0	-0.5
Zefta	31.6	0.0	4.1	0.0	4.1	17.2	0.0	2.6	0.0	2.6	-10.7	0.0	-1.6	0.0	-1.6
Belkas	64.3	0.0	9.9	0.0	9.9	56.7	0.0	9.9	0.0	9.9	41.8	0.0	5.9	0.0	5.9
SUB TOTAL	-	-	299.0	0.0	299.0	-	-	227.4	0.0	227.4	-	-	138.8	0.0	138.8
. NORTH UPPER EGYPT															
Beni Suef	65.2	0.0	39.9	0.0	39.9	57.8	0.0	35.2	0.0	35.2	43.5	0.0	27.5	0.0	27.5
Fayoum	71.0	0.0	94.4	0.0	94.4	63.6	0.0	83.4	0.0	83.4	51.9	0.0	77.2	0.0	77.2
Minia	71.8	0.0	72.2	0.0	72.2	64.8	0.0	64.4	0.0	64.4	53.2	0.0	57.6	0.0	57.6
Mallawy	64.1	0.0	21.8	0.0	21.8	56.4	0.0	16.6	0.0	16.6	43.8	0.0	15.1	0.0	15.1
SUB TOTAL	-	-	228.3	0.0	228.3	-	-	199.6	0.0	199.6	-	-	177.4	0.0	177.4
. SOUTH UPPER EGYPT															
Sohag	71.0	0.0	37.4	0.0	37.4	63.6	0.0	30.6	0.0	30.6	51.5	0.0	23.8	0.0	23.8
Ikhmim	63.9	0.0	14.3	0.0	14.3	54.2	0.0	12.4	0.0	12.4	40.2	0.0	10.0	0.0	10.0
Gerga	66.0	0.0	15.8	0.0	15.8	56.9	0.0	12.3	0.0	12.3	40.2	0.0	10.0	0.0	10.0
Luxor	6.6	0.0	1.2	0.0	1.2	-18.0	0.0	-3.2	0.0	3.2	-55.5	0.0	-10.1	0.0	-10.1
SUB TOTAL	-	-	68.7	0.0	68.7	-	-	52.1	0.0	52.1	-	-	33.7	0.0	33.7
I. REMOTE AREAS															
Matruh	87.3	37.2	48.9	18.8	67.7	82.6	0.0	38.9	0.0	38.9	75.1	0.0	35.9	0.0	35.9
New Valley	85.1	26.2	46.3	12.4	58.8	81.0	0.0	34.8	0.0	34.8	73.6	0.0	41.6	0.0	41.6
Red Sea	92.4	28.9	110.3	15.9	126.2	86.5	0.0	67.3	0.0	67.3	79.6	0.0	46.5	0.0	46.5
Sinai	85.7	33.5	91.4	5.7	97.1	79.5	0.0	103.9	0.0	103.9	67.6	0.0	118.4	0.0	118.4
SUB TOTAL	-	-	296.9	52.8	349.8	-	-	244.9	0.0	244.9	-	-	242.4	0.0	242.4
II.GRAND TOTAL	-	-	2,549.4	85.6	2,635.0	-	-	1,836.4	0.0	1,836.4	-	-	297.7	0.0	297.7

NOTE: Negative subsidies show a surplus of household savings.

1 See Section II this Appendix for methodology for calculating affordability.

SOURCE: NUPS.

TABLE V-A.39

ESTIMATED VALUE OF INFORMAL HOUSING BUILT IN 50 GREATER CAIRO ENUMERATION DISTRICTS

1976-1981

YEAR	TOTAL NUMBER OF DWELLING UNITS[1]	NEW UNITS ADDED TO STOCK	INFORMAL SECTOR SHARE[2]	ESTIMATED FREE MARKET UNIT VALUES OF LAND AND CONSTRUCTION: LAND (LE/m2)[3]	CONSTRUCTION[4] (LE/m2)	ESTIMATED TOTAL VALUE OF INFORMAL HOUSING: TOTAL[5] (L.E.THOUSANDS)	DWELLING UNIT ONLY (L.E. THOUSANDS)
1976	10,047	-	-	-	-	-	-
1977	10,576	529	397	34.3	37.5	812	536
1978	11,133	557	418	42.9	46.1	984	694
1979	11,719	586	439	53.8	57.0	1,379	901
1980	12,336	617	463	67.4	70.0	1,800	1,168
1981	12,986	650	488	84.4	85.0	2,327	1,493
TOTAL	-	2,939	2,205	-	-	7,302	4,792

1 1976 and 1981 totals from Table 3-1 Informal Housing in Egypt. Intervening years projected using the annual growth rate between those periods of 5.3 percent. The totals are for the 50 enumeration districts where the CAPMAS sponsored sample surveys were conducted.

2 Estimated to be 75 percent of dwelling units constructed. Informal Housing in Egypt. p.25.

3 Free market times series data projected using 1968 base average of L.E. 4.50/m2 and annual growth rate in land prices of 25.3 percent (Table 8-3), Informal Housing in Egypt.

4 Free market times series projected using 1971 base year average construction cost of L.E. 11/m2 and annual growth rate in construction costs of 22.7 percent (Table 8-2, Informal Housing in Egypt).

5 Projection based on assumed 66 percent of informal housing in new areas(see NUPS Final Report, Chapter V.38) and an average number of dwelling units per building of 2.87 (Tables 3-1 and 3-2, Informal Housing in Egypt). Average plot sizes were assumed to be the Cairo median for new areas 88 m2 (P 36), Informal Housing in Egypt, while dwelling unit sizes are based on the Cairo median of 3.35 rooms/household or approximately 36 m2/dwelling unit.

SOURCE: NUPS Analysis Using Sources Cited in Above Notes.

TABLE V-A.40

ESTIMATE OF TOTAL VALUE OF INFORMAL HOUSING IN ALL URBAN AREAS OUTSIDE OF GREATER CAIRO (1976-1981)

(CURRENT PRICES)

EAR	TOTAL NUMBER OF DWELLING UNITS[1] ('000s)		NEW UNITS ADDED TO STOCK ('000s)		INFORMAL SECTOR SHARE[2] ('000s)		TOTAL VALUE OF INFORMAL HOUSING (L.E. MILLIONS) ALEXANDRIA[3] DWELLING			ALEXANDRIA AND OTHER URBAN DWELLING		
	ALEXANDRIA	OTHER URBAN	ALEXANDRIA	OTHER URBAN	ALEXANDRIA	OTHER URBAN	LAND	UNITS	TOTAL	LAND	UNITS	TOTAL
976	477	1,467										
977	497	1,510	19	43	14	33	10	19	29	51	64	115
978	516	1,553	20	43	15	34	13	25	38	57	94	151
979	537	1,598	21	45	15	35	17	33	50	93	105	198
980	558	1,645	22	47	17	37	23	43	66	106	159	265
981	580	1,693	23	47	17	38	28	53	81	171	169	340
TOTALS			105	225	79	177	91	173	264	478	591	1,069
AVERAGES PER YEAR PER DWELLING UNIT (L.E.)			21	45	16	35	1,152	2,190	3,342	1,867	2,309	4,176

Totals may not add due to rounding.

Alexandria 1976 total number of dwelling units from 1976 Census of Housing (CAPMAS).
Alexandria dwelling units in later years projected using the 4.0 percent annual growth rate in housing experienced between 1966 and 1976 (CAPMAS, 1966 and 1976 Census of Housing). Other urban from 1976 total number of dwelling units in urban areas in Egypt net of Greater Cairo and Alexandria dwelling units (CAPMAS Census of Housing 1976). Other years projected from the annual growth in dwelling units between 1966 and 1976 (2.9 percent) experienced in urban areas when Greater Cairo and Alexandria figures are substracted.

Informal sector share in Alexandria assumed to be the same as Greater Cairo or 75 percent of new additions, while other urban informal sector share assumed to be the same as Beni Suef or 78 percent.

Time series costs for Alexandria from Greater Cairo estimates, while other urban costs are from Beni Suef time series of dwelling unit and land costs, as are shown in the Informal Housing in Egypt, Draft Final Report quoted in the footnotes to Table V-A.39.

SOURCE: NUPS Analysis Using Sources Cited in Above Notes.

NOTES

APPENDIX V-A

STANDARDS AND COSTS OF SPATIAL TARGET GROUPS OF THE PREFERRED STRATEGY

1 It should be noted that limits were imposed on these functional relationships to avoid per capita costs becoming zero. These limits were those of the original data used to generate the relationships, i.e., densities less than 50 persons per hectare or greater than 500 persons per hectare were not used with standards which would yield zero results.

2 The World Bank, Staff Appraisal Report, Egypt, Greater Cairo Urban Development Project, April 1981, p.5.

3 A major component of the Second Urban Project of the World Bank is technical assistance to the Cairo Transport Authority in studying the role of various types of intra-urban transport vehicles, requirements for maintenance, operational control of vehicles, administrative and financial procedures and other staff training. This project is aimed at improving the performance of the Authority's fleet and determining future requirements more accurately.

4 The World Bank, Egypt, Greater Cairo Urban Development Project, April 1981, pp. 5 and 6.

5 These estimates are derived from roughly L.E. 53 million per kilometer for construction of the underground subway and L.E. 108 million for electrification of the El Marg line. More precise estimates have been made by the Transport Planning Authority, but they have not been released because the Authority is involved in negotiations of tenders.

6 This per capita cost is based on the new population to be added during the 1986-1990 period (1,922,000).

7 Costs for the Suez Demonstration Project are from Suez Cabanon Project, Sadat City from its Master Plan and the Helwan New Community from estimates prepared in October 1980 (all costs are shown in 1979 prices).

8 Data about secondary schools in Alexandria comes from two sources in the Ministry of Education. The service population data and total number of general and technical level (including commercial, industrial and agricultural secondary schools) secondary schools come from unpublished data of the Ministry. It included government and private schools. More disaggregated data about commercial, industrial and agricultural technical schools are available for government schools from published data of the technical school department of the Ministry. However,

these data excluded private schools. Therefore, per capita costs of commercial and industrial secondary schools in Alexandria were estimated by assuming that the general data supplied about all technical schools are representative of both public and private schools. More disaggregated data were requested from the governorate, but they have not been supplied to the project.

As was noted in the Second Round Alternatives, disaggregated settlement level data for lower level schools are not available because the Ministry of Education is in the process of computerizing its data, and until the process is complete it cannot make the data available.

9 Arab Republic of Egypt, Ministry of Health, Health Profile of Egypt. "Study on Health Financing and Expenditure in Egypt." Publication No. 10, April 1980.

10 A jointly funded project of USAID and the Ministry of Health due to be initiated in early 1982 aims at providing more information about the quality of health care provided and, thus, presumably the condition of facilities throughout Egypt.

11 Secondary health care facilities are those where intensive or sustained (longer than one or two hours per day) medical services are provided; for these examples they include hospitals and all service units attached to hospitals. Primary health care facilities provide both preventive and creative health care, but the latter is provided on an out-patient basis. Clinics are an example of the latter.

12 General Organization for Physical Planning. Department Development and Planning Research Study, "Directory I. Planning of Neighborhoods."

APPENDIX V-B

OPERATIONS AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE

APPENDIX V-B

OPERATIONS AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE

I. INTRODUCTION

The operation and maintenance of intra-urban infrastructure require large ongoing expenditures to, first, operate the systems and secondly, to provide adequate levels of maintenance to keep service levels up to their design capacities. Over the life of the infrastructure, these expenditures generally exceed the initial capital invested. However, projections of total requirements for operation and maintenance are fairly complex as largely independent variables are involved, such as estimates of costs of actual operations of the systems (largely salaries and intermediate inputs), the size of the population served, the construction standards of initial installations, the standards of maintenance (lower levels of maintenance generally result in higher operations costs due to lost efficiencies within the system), and finally, the degree of cost recovery.

Higher degrees of cost recovery affect operation costs in two ways:

- Reductions in demand for infrastructure services generally result since users are more aware of the actual costs of the service and tend to reduce wastage and conserve on the use of the service.

- Public authorities mandated with operation of the systems generally have greater resources which can be used to maintain the service levels of the systems.

The Egyptian budgetary system divides operation and maintenance (marginal or variable) costs into two major components:

- Salaries of governmental personnel involved in operating urban infrastructure (BAB 1).

- Current expenses (BAB 2) including expenses for intermediate inputs such as fuel and chemicals for operating a water treatment plant, routine maintenance (requirements for major rehabilitation and replacement of equipment have been treated as an investment expense and are included in NUPS estimates of intra-urban infrastructure costs), taxes and fees paid to other departments of government, travel expenses, etc.

The public utilities (identified in the budget as economic authorities or service authorities) which operate on a capital budgeting basis also include

provisions for debt servicing and depreciation in their current expenses. However, as the revenues generated by most of the local public utilities are smaller than their requirements for operations and maintenance expense, these deficits are normally met by budgetary grants or subsidies from the central Government budget. Other components of intra-urban infrastructure also rely on revenues from beneficiaries of services provided, such as charges for health services, but these constitute only a small portion of total revenues required to meet their marginal costs. The bulk of those marginal costs are met through budgetary grants from central Government or other local government revenue sources not tied directly to the provision of intra-urban infrastructure services.

Seven major components of operating and maintenance expense of intra-urban infrastructure were considered to project future trends of operation and maintenance costs: water supply, sanitation, transport, health, education, social affairs and other local government expenses (intra-urban electricity infrastructure operations and maintenance costs have been included in inter-urban infrastructure costs).[1] The major component of the "other local government expenses" is the headquarters budget which has a variety of subcategories such as transport and communications (a separate fund for public transport not directly covered by special transport authorities, and routine maintenance of roads and bridges), industry (comprised of slaughter houses and markets), electricity for street lighting and traffic signals, public utilities (including fees paid to public utilities by local government), cleanliness and refuse collection and municipal establishments, public services and other special expenditures.

Historical data of operation and maintenance costs were derived from budgetary data supplied by the planning departments of local councils or governorates, central government budgets (for the urban governorates only),[2] and the management tariff studies for water and sewerage utilities in Cairo, Alexandria, and the Canal Cities and data from the "Health Profile of Egypt."[3] It should be noted that all of these data are planned expenditure. Unlike the budgets of many countries, Egypt's budgets do not show the previous year's actual expenditures against the current year's planned expenditure. Attempts to get an actual expenditure from the Ministry of Finance were not successful as the Ministry has refused to supply them to the project.

II. GROWTH IN PER CAPITA OPERATIONS AND MAINTENANCE

There are significant variations in per capita expenditures on operation and maintenance of intra-urban infrastructure among different settlements. For example, the average per capita investment in operation of water supply in the urban governorates is projected to be L.E. 4.41, while it averages only L.E. 0.41 in other settlements of rural governorates (Table V-B.1). While the standards of service levels and population size somewhat explain these differences, e.g., settlements with larger populations and higher service levels such as Cairo and Alexandria have larger requirements for operation and maintenance than smaller

TABLE V-B.1

PER CAPITA EXPENDITURES IN TOTAL OPERATIONS AND MAINTENANCE IN URBAN INFRASTRUCTURE

Settlement	1980 POPULATION (000's)	PER CAPITA EXPENDITURES IN OPERATIONS AND MAINTENANCE (BAB 1 + BAB 2) (L.E.) WATER	SEWERAGE	TRANSPORT	HEALTH	EDUCATION	SOCIAL AFFAIRS	ALL OTHER LOCAL EXP.
Cairo[1]	5,643.0[2]	2.37[3]	2.05	7.20[3]	6.40	9.27	10.52	4.39
Alexandria[1]	2,578.5[2]	4.89[3]	1.37	2.58[5]	5.77	9.68	0.36	4.80
Port Said[1]	345.0[2]	3.98	2.04	NA	6.68	16.93	1.88	45.02[6]
Ismailia[1]	370.3[2]	8.02	2.70	NA	5.40	10.45	0.78	14.33
Suez[1]	260.0[2]	2.77[4]	1.14[4]	NA	6.87	9.52	0.87	14.36
AVERAGE[7]		4.41	1.90	4.87	6.22	11.17	2.88	16.58
El Mahalla[5]	332[2]	NA	NA	0.05	4.46	10.59	0.27	NA
Tanta[5]	317[2]	0.63	0.55	0.29	16.92	17.03	0.34	NA
Assiut[5]	243[2]	0.26	0.19	0.80	8.55	36.85	0.10	NA
Beni Suef[5]	131[2]	0.35	0.50	0.10	17.29	30.01	1.96	NA
Qena[5]	106[2]	0.62	NA	NA	3.06	32.79	NA	NA
AVERAGE[7]		0.41	0.47	0.31	10.06	25.45	0.67	NA
10 Settlement Combined AVERAGE[7]		2.65	1.34	1.84	8.14	18.31	1.90	NA

N.A. Not available

1 Budgetary data from 1980/1981 National Budget & NUPS analysis

2 NUPS trend population projections. Port Said and Suez are from governate planning departments.

3 Water and transport budgets are from 1980/1981 budgets of water, sewerage and transport authorities for Greater Cairo and Alexandria. For these components, Greater Cairo population was used to calculate per capita costs.

4 Suez water and sewerage per capita costs derived from 1980/1981 budgetary data supplied by the Planning Department of the Suez Governorate.

5 Budgetary data from local council or governorate planning departments.

6 No clear explanation has been offered by Port Said Governorate officials as why these expenditures are higher than other Canal Cities. One partial explanation is suggested by the fact that Port Said enjoys greater local revenues conferred on it through its Free Port status, thus, allowing it greater control over its budget.

7 It has been suggested that the NUPS Team should have used the weighted average instead of the simple averages as shown. The Team calculated both and found that the differences are not great: some components are higher and some are lower. Therefore, since order of magnitude differences are not involved, we have not changed projection techniques.

SOURCE: NUPS Analysis Using Sources Cited in Above Notes.

settlements with lower standards; the differences also exist between settlements with similar populations and standards. For example, while the water supply standards of Tanta and Suez are roughly similar, the per capita investment in water supply running costs in Suez is more than four times that of Tanta. Per capita costs of operations of social infrastructure tends to follow a somewhat different pattern in that average expenditures are higher in the five non-urban governorate settlements than they are in the urban governorates.

Relatively little provision is made in most intra-urban infrastructure for non-wages and salaries portions of current expenditures. Furthermore, generally more is spent on intermediate inputs and routine maintenance in physical infrastructure than in social infrastructure as is shown in Table V-B.2. For example, in the urban governorates, roughly 84 percent of total water system current expenses are devoted to non-wages and salaries expenditures (BAB 2). However, current expenditures in health, education and social affairs are mainly salaries. In all other settlements, the trend towards devoting large portions of current expenditures in payment of salaries is even more pronounced. For example, 51 percent of current expenditure on water supplies is salaries while almost 94 percent of average expenditures on education is devoted to salaries.

The low level of expenditure on non-wage and salary current expenses results in relatively little provision being made for routine maintenance as much of the remaining available current expenditure must be devoted to purchase of intermediate inputs for actual operations. As a result, the useful life of much of the infrastructure stock is shortened and a much greater provision for replacement of existing infrastructure stock must be made in the capital expenditures portion of the bugdet (BAB 3).[4]

The rate at which expenditure in total operation and maintenance grows in comparison to total urban population growth is an important indicator of the adequacy of that expenditure. If total operation and maintenance expenditure is growing at rates which are much slower than population growth rates, service levels of infrastructure are likely to suffer as an increasing share of available resources must be spent first on salaries and secondly, on intermediate inputs. Maintenance requirements can only then be met by the remaining, declining residual. Thus, over time, as necessary maintenance is delayed due to lack of adequate financial resources, the condition of infrastructure declines and eventually service levels decline. In settlements with rapidly expanding populations, public authorities in charge of operation of infrastructure must make hard choices between expenditure on rehabilitation of existing stock or expansion of the infrastructure system to meet new demands as their resources are not adequate to finance both.

A comparison of the growth rates in total operation and maintenance (BAB 1 and 2) and settlement populations growth rates is presented in Table V-B.3. Generally, rates of growth in operation and maintenance have exceeded population growth rates in the urban governorates by much wider margins than they have in settlements in rural governorates. However, in most cases, the growth rates of social infrastructure marginal costs have exceeded population growth rates by much wider margins than have physical infrastructure. This has been true of settlements in both urban and rural governorates.

TABLE V-B.2

EXPENDITURE ON SALARIES AND WAGES AS A PROPORTION OF TOTAL EXPENDITURE ON INTRA-URBAN INFRASTRUCTURE OPERATION AND MAINTENANCE

INFRASTRUCTURE COMPONENT	AVERAGE PROPORTION OF OPERATION AND MAINTENANCE EXPENDED ON SALARIES & WAGES	
	URBAN GOVERNORATES	OTHER SETTLEMENTS
	%	%
Water	16.0	51.4
Sewerage	33.0	62.0
Transport	47.0	69.9
Health	73.0	75.4
Education	89.2	93.5
Social affairs	74.1	71.5
Other Local Government Administrative expenditures	54.1	NA

SOURCE: Central Government Budgets (1976, 1980/1981). Planning Department of various Local Councils & Governorates (1981) and NUPS analysis.

TABLE V-B.3

PER CAPITA ANNUAL GROWTH RATES IN TOTAL OPERATION AND MAINTENANCE (BAB 1 & 2) COMPARED TO SETTLEMENT POPULATION ANNUAL GROWTH RATES (1976-1980)

Settlement	POPULATION ANNUAL GROWTH RATES (1976-1980)	WATER[1]	SEWERAGE[1]	TRANSPORT[1]	HEALTH[1]	EDUCATION[1]	SOCIAL AFFAIRS[1]	OTHER LOCAL ADMINISTRATION[1]
Cairo	3.57[2]	2.16	4.48	1.71	N.A.	N.A.	N.A.	N.A.
	3.64[3]	N.A.	N.A.	N.A.	10.27	5.15	7.99	4.17
Alexandria	2.69	7.5	5.80	6.51	13.28	4.8	2.79	5.80
Port Said	7.06[4]	1.65	3.67	N.A.	2.25	2.24	5.47	6.52
		2.04	0.81	N.A.	2.85	2.39	4.80	3.74
Ismailia	7.75[5]	0.14	0.15	N.A.	2.34	2.99	2.63	N.A.
Suez	7.60[5]							
AVERAGE		2.71	2.98	4.11	6.20	3.51	4.74	5.06
El Mahalla	3.2[5]	N.A.	N.A.	0.78	3.93	4.19	1.39	N.A.
Tanta	2.75[6]	2.12	0.92	1.80	0.79	1.89	0.90	N.A.
Assiut	3.29[6]	0.66	0.50	0.99	0.97	1.24	0.43	N.A.
Beni Suef	2.56[6]	1.26	1.62	1.95	0.96	2.04	0.72	N.A.
Qena	3.15[6]	0.21	N.A.	N.A.	0.96	1.97	N.A.	N.A.
AVERAGE		1.06	1.01	1.38	1.52	2.27	0.86	N.A.
AVERAGE FOR 10 SETTLEMENTS COMBINED		1.98	2.24	2.29	3.86	2.89	3.91	N.A.

N.A. Not Available

1 Shows ratio of annual growth rates of operations and maintenance to annual growth rates of population expressed as a proportion of annual population growth rates

2 Greater Cairo Population growth rate

3 Cairo governorate population growth rate

4 Growth rates based on 1976 national census and 1980 Port Said census

5 Based on 1976 national census and data supplied from Planning Divisions of Ismailia and Suez Governorates

6 Source: Planning departments of various governorates

SOURCE: NUPS Analysis Using Sources Cited in Above Notes.

Several of the settlements with very high population growth rates have not been able to fund operation and maintenance at levels which have been adequate to keep pace with their growing populations. This has been especially true of Suez. Continued low levels of funding of operation and maintenance of infrastructure will seriously hamper future expansion of Suez making it less attractive to future private development and posing a serious constraint to Suez achieving its year 2000 Master Plan targets or its becoming a counter magnet to Cairo and Alexandria.

Tariff studies for water, sewerage and electricity master plans projected future requirements for operations and maintenance. However, since future resources for operations and maintenance generally depend on the degree to which individual infrastructure utilities are able to finance their own operations through revenues generated from user charges, these master plans have assumed that full cost recovery of operation and maintenance expenses (including provisions for depreciation and debt servicing) is necessary to provide adequate financial resources to maintain existing infrastructure and provide for future requirements. To accomplish this objective, the master plans have assumed that most of the increase in operation and maintenance requirements and, therefore, demand for revenues must come in the initial periods of their 20 year planning periods so that adequate resources can be built up to finance future expansion. As shown in Table V-B.4, while the average growth rates per capita for operation and maintenance expenditures are roughly 9.5 percent per annum, the average growth rates of per capita expenditures in the first five-year period averages 24 percent, a rate which is six times the average population growth rate. Thus, substantial increases in tariffs implemented over a short period of time are necessary to provide adequate revenue bases for these increased expenditures. So far, these very rapid increases in tariffs have not proven politically feasible and have not been implemented.

III. PROJECTIONS OF FUTURE OPERATIONS AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE

Two sets of projections of operation and maintenance costs illustrate the order of magnitude range of total future operation and maintenance costs. The first shows rates of increase in operation and maintenance costs if average rates of increase experienced between 1976 and 1980 continue over the 20-year planning period. The second shows rates of increase in operation and maintenance costs if the average growth rates projected by master plans are achieved. Both projections illustrate the increase in operation and maintenance costs which might be necessary to provide incentives to skilled workers to induce them to migrate to more remote regions. In both projections, operation and maintenance expenditures rise at a faster rate than is projected for Gross Domestic Product (GDP). As a result, the share of these intra-urban infrastructure expenditures in GDP rises from 7 percent in the 1970's to about 12 percent in the 1990's.

TABLE V.B-4

PROJECTED ANNUAL GROWTH IN OPERATIONS AND MAINTENANCE OF WATER AND SEWERAGE UTILITIES GREATER CAIRO, ALEXANDRIA AND THE CANAL CITIES (1980-2000)

SETTLEMENT	1980-1985 GROWTH RATES			1985-1990 GROWTH RATES			1990-2000 GROWTH RATES			1980-2000 GROWTH RATES		
	TOTAL OPERATING EXPENSE (L.E. MILLIONS)	POPULATION GROWTH	PER CAPITA OPERATING EXPENSE (L.E.)	TOTAL OPERATING EXPENSE (L.E. MILLIONS)	POPULATION GROWTH	PER CAPITA OPERATING EXPENSE (L.E.)	TOTAL OPERATING EXPENSE (L.E. MILLIONS)	POPULATION GROWTH	PER CAPITA OPERATING EXPENSE (L.E.)	TOTAL OPERATING EXPENSE (L.E. MILLIONS)	POPULATION GROWTH	PER CAPITA OPERATING EXPENSE (L.E.)
GREATER CAIRO												
WATER	16.6	2.95	13.2	10.8	3.2	7.3	11.3	3.53	5.3	11.3	3.30	7.7
SEWERAGE	26.8	2.95	23.1	9.6	3.2	6.2	8.1	3.53	4.4	17.9	3.30	9.2
ALEXANDRIA												
WATER	12.9	1.79	10.7	7.8	2.25	5.5	9.9	4.14	5.6	10.2	3.12	6.8
SEWERAGE	35.9	1.79	33.5	16.9	2.93	13.6	4.9	2.93	1.9	15.0	2.64	12.0
PORT SAID												
WATER	20.0	3.82	15.6	14.1	3.86	9.9	8.7	3.84	4.6	12.8	3.84	8.6
SEWERAGE	33.7	3.82	28.9	10.4	3.86	6.3	6.9	3.84	2.9	14.0	3.84	9.8
ISMAILIA												
WATER	20.0	4.35	19.9	14.1	3.98	8.1	8.7	4.51	5.94	12.8	4.34	9.8
SEWERAGE	39.6	4.35	33.8	11.9	4.32	7.2	9.2	4.32	4.67	16.8	4.33	12.0
SUEZ												
WATER	30.7	7.08	22.0	12.4	7.06	5.0	11.8	7.07	4.4	16.4	7.07	8.7
SEWERAGE	48.8	7.08	38.9	14.6	7.06	7.2	6.3	7.07	(0.76)	17.8	7.07	10.0
AVERAGE			24.0			7.6			3.9			9.5

SOURCE: Management Tariff Studies Relative to Water Sewerage Systems. Water and Sewerage Utilities Volumes. Population growth rates are derived from the Management Tariff Study.

The first set of projections based on existing trends in per capita operation and maintenance costs is shown in Table V-B.5. Growth rates in per capita operation and maintenance were projected using the ratios of per capita operation and maintenance to population growth rates expressed as proportions of population growth rates experienced between 1976 and 1980. Longer-term time series data were not used due to distortions during war years. The ratios used are shown in Table V-B.3. Since incentives may be necessary to attract skilled workers away from the metropolitan areas to other areas of the country receiving special emphasis, the salaries components of the per capita operation and maintenance expenditures were increased by 100 percent to reflect both wage and non-wage compensation which must be paid to workers.[5] Table V-B.6 shows the standards used to estimate operation and maintenance costs for the alternatives.

The second set of projections of operations and maintenance costs follows the methodology used for the first projection. However, the average ratios of growth in per capita operation and maintenance to population growth rates projected by water and sewerage master plans were used to project the rates in which operation and maintenance growth rates should exceed population growth rates. These modifications are shown in Table V-B.7.

IV. COST RECOVERY OF OPERATION AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE

The discussion of operation of intra-urban infrastructure has so far focused on only one side of infrastructure financing, current expenditures. The other side of the recurrent financing of intra-urban infrastructure is the revenues which might be available to finance both operation and maintenance of infrastructure and requirements for expansion of infrastructure systems to serve new populations. As pointed out in the NUPS First Round Alternatives Working Paper (page 64), "the net amount of capital the Government requires to finance infrastructure depends on the amount of capital investment which can be recovered from beneficiaries. Higher levels of cost recovery reduce future capital requirements as returns on investments from earlier periods can be used to finance development in later periods."

Generally, three major types of cost recovery are potentially available to development authorities to recover costs of capital investment:

- Direct cost recovery through sales or rents of physical assets to beneficiaries.
- Indirect cost recovery through charges to users of urban services.
- Taxes and transfers from other sectors not directly related to the provision of urban infrastructure.

TABLE V-A.5

TOTAL OPERATIONS AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE OF THE PREFERRED STRATEGY

(1986-2000)

ESTIMATE I: EXISTING GROWTH RATES

SETTLEMENT ZONE	(L.E. MILLIONS - 1979 PRICES) 1986-1990	1991-1995	1996-2000	TOTAL
I. MAJOR METROPOLITAN AREAS				
Greater Cairo	4,495.851	7,876.722	13,676.407	26,048.980
Alexandria	1,460.411	2,666.083	4,824.149	8,950.642
II. CANAL CITIES				
Suez	296.437	704.769	1,693.707	2,694.913
Others	323.383	537.730	892.019	1,753.132
SUB TOTAL	619.820	1,242.499	2,585.726	4,448.045
III. DELTA				
Tanta & Mansoura	282.657	456.007	713.116	1,451.780
Others	920.102	1,269.474	1,766.352	3,955.928
SUB TOTAL	1,202.759	1,725.481	2,479.468	5,407.708
IV. NORTH UPPER EGYPT	256.685	389.511	598.872	1,245.068
V. SOUTH UPPER EGYPT				
Special Emphasis	613.990	1,083.938	1,904.737	3,602.665
Others	278.858	402.412	579.628	1,260.898
SUB TOTAL	892.848	1,486.350	2,484.365	4,863.563
VI. REMOTE AREAS				
Matruh	24.370	34.388	49.480	108.238
Red Sea	30.303	42.946	57.641	130.890
New Valley	27.036	37.154	56.852	121.042
Sinai	16.970	54.928	158.660	230.558
SUB TOTAL	98.679	169.416	322.633	590.728
VII. GRAND TOTAL	9,027.053	15,556.061	26,971.620	51,554.734

SOURCE: NUPS.

TABLE V-B.6

OPERATIONS AND MAINTENANCE FACILITIES AND PACKAGES USED TO COST OPERATION AND MAINTENANCE FOR PREFERRED STRATEGY

OPERATIONS AND MAINTENANCE PACKAGES	PARAMETERS							ZONES IN WHICH OPERATION AND MAINTENANCE PACKAGES WERE USED	REMARKS
	WATER	SEWERAGE	TRANSPORT	HEALTH	EDUCATION	SOCIAL AFFAIRS	OTHERS		
I. Urban Government Settlements									
- Per capita (L.E.)	4.14	1.90	4.89	6.22	11.17	0.88	10.17	- Greater Cairo	Package used to project operations and maintenance for urban governorate settlements. Per capita amounts from 1980/1981 governorate budgets or national budgets. Existing ratios of operations and maintenance to population growth rates derived from historical data from governorate or national budgets. Master plan ratio: water, sewerage and transport from Greater Cairo, Alexandria and Canal Cities water and sewerage master plans; Health, education and social affairs at 50% of physical infrastructure due to large component of O & M costs resulting from salaries and wages.
- Existing ratio of per capita O & M to population growth rates	2.71	2.98	4.11	6.20	3.51	4.74	4.48	- Alexandria - Other Canal Cities	
- Master Plan Ratios of per capita O & M to population growth rates	3.63	3.99	5.51	7.25	4.11	5.54	5.24		
II. Urban Governments Settlements with Special Emphasis									
- Per capita (L.E.)	5.12	2.53	3.18	9.53	21.13	1.53	14.56		Package used for Canal Cities receiving special emphasis.
- Existing ratio of per capita O & M population growth rates	2.71	2.98	4.11	6.20	3.51	4.74	4.48	- Suez	Data sources similar to Urban Governorate Settlement Package except that the salaries component of per capita costs has been increased 100 percent.
- Master Plan Ratios of per capita O & M to population growth rates	3.63	3.99	5.51	7.25	4.11	5.54	5.24		

SOURCE: MUPS.

TABLE V-B.7

OPERATIONS AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE AT MASTER PLAN STANDARDS

ESTIMATE II

SETTLEMENT ZONE	(L.E. MILLIONS - 1979 PRICES) 1986-1990	1991-1995	1996-2000	TOTAL
I. MAJOR METROPOLITAN AREAS				
Greater Cairo	4,874.50	8,779.10	16,035.30	29,688.90
Alexandria	1,571.70	2,994.20	5,656.20	10,222.70
SUB TOTAL	6,446.20	11,773.30	21,692.10	39,911.60
II. CANAL CITIES				
Suez	318.70	790.10	1,981.00	3,089.80
Others	299.04	487.77	792.76	1,579.57
SUB TOTAL	617.74	1,277.87	2,773.76	4,669.37
III. DELTA				
Tanta & Mansoura	292.60	481.40	767.80	1,541.80
Others	952.30	1,340.03	1,901.55	4,193.88
SUB TOTAL	1,244.90	1,821.43	2,669.35	5,735.68
IV. NORTH UPPER EGYPT	265.70	411.21	644.78	1,321.69
V. SOUTH UPPER EGYPT				
Special Emphasis	632.87	1,136.62	2,031.83	3,801.32
Others	161.07	236.85	347.67	745.59
SUB TOTAL	793.94	1,373.47	2,379.50	4,546.91
VI. REMOTE AREAS				
Matruh	25.22	36.25	53.27	114.74
New Valley	27.98	39.22	61.21	128.41
Sinai	17.58	52.85	170.96	241.39
SUB TOTAL	102.14	173.65	347.49	623.28
VII. GRAND TOTAL	9,470.62	16,830.93	30,506.98	56,808.53

SOURCE: NUPS.

The amount of infrastructure costs which could be recovered under the current policies of agencies responsible for provision of infrastructure is discussed by reviewing first, direct recovery from beneficiaries through rent or sale; second, indirect recovery through user charges. Amounts not recovered either directly or indirectly are treated as residuals which must be financed through transfers from other sectors.

The affordability analysis shown in Chapter IV, Section II indicated that the household sector has the capacity to afford the housing portion of intra-urban infrastructure, either through savings as the bulk of housing is now being financed or through a combination of savings and mortgage loans. Initially, household income and savings may not be large enough to afford all intra-urban infrastructure capital costs. However, if as was shown in Chapter V, household incomes and savings continue to increase as they have in the past, this capacity to afford larger amounts of intra-urban infrastructure capital costs will increase over time.

This general test of household affordability did not differentiate between cost recovery mechanisms, instead it indicated that through increased mobilization of household savings and income, the sector does have adequate resources to finance an increasingly larger share of the capital costs of infrastructure investment. However, to mobilize this resource, a variety of cost recovery mechanisms could be used. Therefore, in the following sections indirect cost recovery through user charges and recovery of costs through lease payment or property taxes is discussed.

A. Indirect Cost Recovery

Indirect cost recovery whereby beneficiaries pay for the costs of installation of infrastructure through periodic charges based on consumption of urban services such as water supply, is frequently used to finance both capital investment and recurrent costs of intra-urban infrastructructure. These user charges normally are used to finance the costs of operation and maintenance of infrastructure systems prior to establishing any reserve which can be used to finance expansion of present systems. If such a reserve is established, expansion of existing systems is possible. If user charges are to finance completely new infrastructure, debt servicing must be deferred until the system is in use before any cost recovery can occur.

The present capacity of per capita revenues from water supply, sewerage, telecommunication, electrical and transport authorities of the urban governorates to finance expansion of infrastructure is shown in Table V-B.8. It compares per capita revenues from users with the costs of operation, maintenance, depreciation and debt servicing.

The information shown in Table V-B.8 comes from 1980 national budgets and tariff studies conducted on water supply and sewerage utilities in these settlements. As indicated, the capacity to finance new infrastructure through user charges is severely limited. All systems except the telecommunications authority show negative net incomes and require transfers from the Treasury to finance their current operations as well as expansion of their services.

TABLE V-B.8
INDIRECT COST RECOVERY UNDER CURRENT POLICIES

SETTLEMENT	1980 PER CAPITA RECOVERY UNDER CURRENT POLICIES (L.E.)							PERCENT REVENUE INCREASE REQUIRED FOR FULL COST RECOVERY SERVICE LEVELS
	REVENUES	TOTAL OPERATION AND MAINTENANCE	DEPRECIATION	NET OPERATING INCOME PER CAPITA	DEBT SERVICE	NET INCOME PER CAPITA	REVENUE REQUIREMENT FOR FULL COST RECOVERY	
Greater Cairo								
Water	1.92	2.15	1.12	(1.34)	1.50	(2.84)	4.77	148
Sewerage	1.60	1.20	1.10	(0.67)	0.41	(1.08)	2.71	69
Telecommunications	4.35	4.01	0.26	0.08	0.08	-	4.35	-
Electricity	9.76	10.52	0.34	(1.10)	0.16	(1.26)	11.02	13
Transport	6.84	4.05	3.54	(0.75)	2.12	(2.88)	9.72	42
TOTAL	24.47	21.93	6.38	(3.80)	4.27	(8.08)	32.55	33
Alexandria								
Water	2.82	2.31	0.98	(0.47)	1.41	(1.61)	4.43	57
Sewerage	0.76	0.92	0.92	(0.59)	0.37	(0.96)	2.67	143
Telecommunications	4.35	4.01	0.26	0.08	0.08	-	4.35	-
Electricity	8.69	9.45	0.46	(1.22)	0.09	(1.31)	10.00	15
Transport	7.13	7.13	1.34	(1.34)	0.32	(1.66)	8.79	23
TOTAL	24.09	23.66	3.96	(3.54)	2.00	(5.54)	29.63	23
Suez								
Water	3.71	3.29	1.61	(1.2)	4.02	(5.22)	8.92	140
Sewerage	3.24	1.09	1.58	(0.57)	1.44	(0.87)	4.11	27
Telecommunications	4.35	4.01	0.26	0.08	0.08	-	4.35	-
Electricity	2.91	3.67	0.08	(0.84)	0.08	(0.92)	3.83	32
TOTAL	14.21	12.06	3.53	(1.39)	5.62	(7.01)	21.22	49
Ismailia								
Water	3.51	3.83	0.69	(1.0)	1.56	(2.56)	6.08	73
Sewerage	2.0	0.87	1.88	(0.75)	1.22	(1.97)	3.97	99
Telecommunications	4.35	4.01	0.26	0.08	0.08	-	4.35	-
Electricity	2.91	3.67	0.08	(0.84)	0.08	(0.92)	3.83	32
TOTAL	12.77	12.38	2.91	(2.51)	2.94	(5.45)	18.22	43
Port Said								
Water	3.47	3.11	0.53	(0.17)	0.76	(0.93)	4.40	27
Sewerage	1.37	1.49	0.92	(0.84)	0.58	(1.42)	2.99	90
Telecommunications	4.35	4.01	0.26	0.08	0.08	-	4.35	-
Electricity	2.91	3.67	0.08	(0.84)	0.08	(0.92)	3.83	32
TOTAL	12.30	12.28	1.79	(1.77)	1.50	(3.27)	15.57	27

SOURCE: Total revenues and operating costs are from governorate budgets as found in the national budgets. Per capita revenues and operating costs were calculated using NUPS trend projections for 1980 settlement populations.

Although Table V-B.8 shows some regional variations in the amount of increase which would be necessary for user charges to provide sufficient revenue to fully recover the costs of operating and expanding urban infrastructure, overall tariffs would have to increase in the order of 30 percent or more before they could finance the current levels of service of these utilities. This increase would not provide for improved maintenance and service levels nor would it finance major expansion of these systems suggested by master plans for the different utilities. As indicated by the Tariff Study of the Greater Cairo Water Utility per capita revenues would have to increase 5.4 times by 1986 and almost 11 times by the year 2000 to finance major increases of service capacity for populations and improvements in existing service levels.[6] During the same period, total operating expense including depreciation would have to be increased almost 2 times by 1986 and about 4.4 times by year 2000 to improve existing service levels and provide larger depreciation reserves.[7]

Although the total revenue requirements shown in Table V-B.9 cannot be related directly to per capita household income as they include revenues from non-domestic consumers, the table indicates that major capital development programs could not be financed by existing user charges without either increasing tariff structures or increasing subsidies to these utilities.

Master plan and tariff studies for water, sewerage, electricity and telecommunications utilities have proposed tariff structures which develop cross subsidies from revenues from non-domestic consumers to reduce revenue requirements from domestic consumers. Nevertheless, total revenue requirements from domestic consumers, due to the total demand they represent, range from between 36 percent of total revenue requirements of Kafr El Sheikh Water Utilities to 77 percent of Ismailia sewerage utilities. (Table V-B.9)

Thus, even with substantial cross subsidies from non-domestic consumers, tariff increases would be necessary before the infrastructure program suggested in the Spatial Target Group Packages could be financed by user charges. As projected by the tariff studies, this increase of user charges could result in up to 3 to 4 percent of median household income being spent for water and sewerage and potentially another 6 percent of income being spent for transport, telecommunications and electricity.[8]

B. Cost Recovery Through Lease Payments or Property Taxes

The final section of the Spatial Target Group Intra-Urban Infrastructure Packages, Appendix V-A, has a section entitled "Land Price Which Recovers Non-Subsidized Portion of Capital Costs Net of Housing Costs" and shows a cost per square meter for New Areas and Existing settlement areas. This cost per square meter is an affordable land payment, either through leasehold payments or through land or property taxes which recovers the non-subsidized portion of intra-urban capital costs once housing costs have been subtracted out of the total costs. It is assumed that housing costs in this case would be financed through some other mechanism, whether it be through either private sector savings or through mortgage payments. It is also assumed that the subsidized portion of the costs would have to be borne by some other sector since the household sector does not have adequate resources to finance the

TABLE V-B.9

TOTAL REVENUE REQUIREMENTS PROJECTED BY MASTER PLANS AND FOR WATER AND SEWERAGE UTILITIES

UTILITY	REVENUES BY CONSUMER CLASS (L.E. MILLIONS) DOMESTIC	NON-DOMESTIC	TOTAL	DOMESTIC REVENUES AS A PROPORTION OF TOTAL REVENUES
Greater Cairo[1]				
Water	44.8	17.1	61.9	72 %
Sewerage	38.6	15.2	53.8	72 %
Alexandria[1]				
Water	14.8	13.2	28.0	53 %
Sewerage	11.9	8.4	20.3	59 %
Suez[1]				
Water	2.3	2.8	5.1	45 %
Sewerage	1.4	0.4	1.8	78 %
Ismailia[1]				
Water	2.2	1.3	3.5	63 %
Sewerage	2.3	0.7	3.0	77 %
Port Said[1]				
Water	1.2	1.9	3.1	39 %
Sewerage	2.4	1.0	3.4	71 %
General Organization For Potable Water[2]				
Behelra Water	4.0	4.6	8.6	47 %
Kafr El Sheikh Water	2.0	3.5	5.5	36 %

1 1984 test year in which revenues are to be sufficient to allow self-financing.

2 1990 test year in which revenues are to be sufficient to finance 50 % of capital development program.

SOURCE: NUPS Analysis of Information Provided by Respective Water and Sewerage Authorities.

entire costs of the development. Therefore, after subtracting the housing and subsidized portions of the capital costs of intra-urban infrastructure out of total capital costs, the combination of the present worth of increasing household incomes plus savings is still large enough to finance additional portions of intra-urban infrastructure. This land payment shows the annual payment per square meter of saleable land area which would recover this additional portion of intra-urban infrastructure costs at an opportunity cost of capital of 12 percent over an investment life of 30 years.[9] The payments for the major settlements indicative of the spatial target groups are shown in Table V-B.10.

TABLE V-B.10

LAND PRICE WHICH RECOVERS NON-SUBSIDIZED PORTION OF COSTS - NET OF HOUSING

(L.E. / M 2)

	ESTIMATE I: STANDARDS SIMILAR TO EXISTING PROPOSALS						ESTIMATE II: MODIFIED STANDARDS					
	1986-1990		1991-1995		1996-2000		1986-1990		1991-1995		1996-2000	
	NEW AREAS	EXISTING AREAS	NEW AREAS	EXISTING AREAS	NEW AREAS	EXISTING AREAS	NEW AREAS	EXISTING AREAS	NEW AREAS	EXISTING AREAS	NEW AREAS	EXISTING AREAS
I. METROPOLITAN AREAS												
Cairo	3.91	0.68	3.85	0.55	3.84	0.49	0.54	0.60	0.05	0.47	- 1.07	0.36
Alexandria	4.33	1.02	4.74	0.78	9.12	1.14	2.29	0.49	2.55	0.62	0.97	0.52
II. SPECIAL EMPHASIS												
Suez	11.52	2.04	16.39	2.02	22.32	2.32	2.70	1.23	1.60	0.70	- 0.03	0.16
Assiut	6.72	1.45	8.61	1.17	10.24	1.31	1.90	1.07	1.14	0.59	- 0.26	0.42
Qena	1.78	0.25	2.89	0.39	2.91	0.40	0.86	0.21	0.32	0.23	- 0.49	0.23
III. OTHER CANAL												
Port Said	3.47	0.58	3.74	0.41	4.94	0.47	2.34	0.61	2.19	0.44	1.75	0.41
Ismailia	11.85	0.03	15.05	1.84	20.89	2.15	7.04	1.92	9.76	1.32	3.85	0.83
IV. DELTA												
Regional Centers												
Tanta	5.04	1.07	6.25	0.95	9.16	1.23	3.19	1.00	3.29	0.85	2.[illegible]	0.75
Others												
Belbais	9.01	0.53	7.29	0.50	4.13	0.51	6.49	0.54	0.88	0.57	- 0.12	0.47
V. NORTH UPPER EGYPT												
Beni Suef	7.84	1.18	9.39	1.05	12.78	1.30	3.85	1.08	4.02	0.92	3.32	0.92
VI. SOUTH UPPER EGYPT												
Luxor	3.49	0.43	2.32	0.39	2.28	0.46	0.21	0.59	- 0.59	0.45	- 0.51	0.33
VII. REMOTE AREAS												
Matruh	5.47	0.07	3.91	0.02	4.41	0.32	3.38	[illegible]	3.04	0.35	2.65	0.32

SOURCE: NUPS.

NOTES

APPENDIX V-B

OPERATION AND MAINTENANCE COSTS OF INTRA-URBAN INFRASTRUCTURE

1 *Local governments also make ongoing expenditures for housing, but these are for only government owned housing. As publicly owned housing is a very small proportion of the total stock, and the intent of the public sector is to sell off the stock which it owns, public housing expenditures were excluded from this analysis as they represent only a fraction of the expenditures being made for operation and maintenance of housing.*

2 *The project is greatly indebted to the Governorate and Local Councils of Gharbia (Tanta & Mahalla), Suez, Beni Suef, Assiut, and Qena (the cities of Qena and Naga Hamadi) for providing NUPS with detailed time series data about local council budgets. NUPS also received data from the Governorate of Sharkia (Zagazig) regarding industrial and service functions of Zagazig.*

3 *Arab Republic of Egypt, Ministry of Health, Health Profile of Egypt, "Study on Financing & Expenditures in Egypt," Publication No. 10., April 1980. Since no data are available for private health expenditures for the Curative Organizations of Cairo and Alexandria, the General Organization for Health Insurance nor the university hospitals, it was assumed that the proportionate share of total health expenditure of these organizations met by the private sector in 1978 was more or less constant and, thus, could be used to project total 1980-1981 budgets for which only public sector data are available.*

4 *A more thorough discussion of the impact of low levels of expenditure on routine maintenance can be found in the following:*

- *Management Tariff Studies Relative to Water Sewerage Systems, (various Volumes) prepared for the Ministry of Development and New Communities by BVI-AOK Associates with Sabbout Associates, 1979.*
- *Provincial Water Supplies Project, Vol. 1, 2, 4 and 5, prepared for the Ministry of Housing by Binnie & Partners & John Taylor & Sons.*

5 *Relatively little experience exists about the types and sizes of incentives needed to attract labor to remote areas. However, in recent salary surveys of construction companies and petroleum companies operating in the Red Sea, it was found that these companies offer Egyptian personnel incentives and bonuses amounting to 100 percent of base salaries to compensate their workers for*

harder working conditions found in the Red Sea Governorate. These incentives are in addition to incentives normally given to workers in Greater Cairo. Discussions with personnel of the Aswan High Dam Authority indicate that the combination of hardship incentives, housing and travel allowances can increase their salaries by as much as 87 percent over the amounts that they would receive in Greater Cairo. Recent discussions with the consultants setting up a new land development agency in Suez have revealed that the governorate has not been able to attract qualified engineers to its staff even when they have offered incentives equal to 100 percent more than the remuneration which would be received by engineers in similar posts in Greater Cairo. This is because the base is so low that a 100 percent increase in salary is still less than what would be received in the private sector in Greater Cairo.

6 The overall aim of these revenue increases is to provide sufficient income for the utility to enable it to finance all of its current operating and maintenance expenses including depreciation expense and be able to finance interest expense through surpluses from its gross income after total operating expenses are deducted. This would provide the utility with a return on its investment in plant of 5.5 percent by 1986, the year in which it would not require major subsidies for interest expense and almost 8 percent by the year 2000.

7 More modest tariff structure increases were projected for the Beheira water system by the Provincial Water Supplies Project in which only 5 percent of the capital investment program would be financed by long-term loans. The remainder would be financed through equity participation of the central government.

8 Page 68 of the NUPS "Working Paper on Urban Development Standards and Costs" shows these calculations for water and sewerage systems, while it was assumed that all transport costs are domestic (the costs shown are those of the Cairo and Alexandria Transport Authorities who only provide intra-urban passenger transport) and that at the median income 6 percent of telecommunications revenue requirements result from households as the telecommunications authority has substantial revenues from other sources. Under the new electricity tariffs issued in January 1980, minimum consumption charges for household uses are estimated at L.E. 1.60 per month for 80 KWh, which is equivalent to 1 percent of median per capita household income of L.E. 200 per annum.

[9] *This annual payment was calculated as follows:*

$$PMT = \left[\frac{[(POP)\ (INV)]\ \ [1 - (\%\ SUB)] - [MSG]}{(POP)\ (DEN)\ (SP)\ (10{,}000)} \right] \left[\frac{i}{1 - (1 + i^{n}} \right]$$

Where:

PMT	=	Affordable annual payment/m^2
INV	=	Total per capita investment (either new or existing areas)
POP	=	Population served by investment
HSG	=	Total investment in housing (net of rehabilitation costs in new areas)
%SUB	=	Percent of investment not affordable by household sector
DEN	=	Gross density (expressed in persons/hectare)
SP	=	Saleable portion of settlement expressed as a decimal
i	=	Opportunity cost of capital (expressed as a decimal)
n	=	Life of the investment (expressed in years)

The sinking fund factor (the second portion of the formula) comes from "Compounding and Discounting Tables for Project Evaluation." World Bank, 1973, p. 143.