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No 7

FEASIBILITY STUDY
ON
EL-ARISH SEWERAGE AND
DRAINAGE SYSTEM
IN
THE NORTH SINAI PROVINCE
ARAB REPUBLIC OF EGYPT

FEASIBILITY REPORT

VOLUME THREE

APPENDICES

MARCH 1985

JAPAN INTERNATIONAL COOPERATION AGENCY

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APPENDICES

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JAPAN INTERNATIONAL COOPERATION AGENCY

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FEASIBILITY STUDY
ON
EL-ARISH SEWERAGE AND DRAINAGE SYSTEM

CONSTITUENT VOLUMES

VOLUME - ONE EXECUTIVE SUMMARY
VOLUME - TWO MAIN REPORT
VOLUME - THREE APPENDICES
VOLUME - FOUR DRAWINGS

Contents of Volume Three

Units and Acronyms

Agencies

GOSSD	General Organization for Sewerage and Sanitary Drainage
NOPWASD	National Organization for Potable Water and Sanitary Drainage
NSG	The North Sinai Governorate
CAPMAS	Central Agency for Public Mobilization and Statistics
JICA	Japan International Cooperation Agency

Technical Terms

BOD	Biochemical Oxygen Demands at 5-day, 20^0C
Cl	Chloride Ion
COD	Chemical Oxygen Demands
DO	Dissolved Oxygen
DWF	Dry Weather Flow
H_2S	Hydrogen Sulfide
MLSS	Mixed Liquor Suspended Solids
MPN	Most Probable Number
pH	The reciprocal of the logarithm of the hydrogen-ion concentration
SRT	Sludge Retention Time
SS	Suspended Solids
TS	Total Solids

Units

cm	Centimetre
gpcd	Grammes per capitaper diem
ha	Hectare
fd	Feddan (0.42 ha)
hr	Hour
km	Kilometre
lpcd	Litres per capita per diem
l/sec	Litres per second
m	Metre

Units and Acronyms

m/s	Metres per second
mm	Millimetre
m^2	Square metre
m^3	Cubic metre
mg/l	Milligrammes per litre
m^3/day	Cubic metres per diem
m^3/min	Cubic metres per minute
m^3/m^2/day	Cubic metres per square metre per diem
kl/day	Kilolitres per diem
kW	Kilowatt

Economic and Financial Terms

B/C	Benefit to Cost Ratio
EIRR	Economic Internal Rate of Return
FIRR	Financial Internal Rate of Return
NPV	Net Present Value
PW	Present Worth
OCC	Opportunity Cost of Capital
p.a.	Per annum

APPENDIX-ONE

TOPOGRAPHIC SURVEYS

APPENDIX - ONE
TOPOGRAPHIC SURVEYS

Topographic surveys include levellings, longitudinal profilings, and cross sections at the locations and with accuracies as described in the followings:

1.1. Levellings

Levellings at 1,500 points at an average 80 m intervals, with an accuracy within 20 mm $\sqrt{S}$, where S = one way distance of survey in km.
The levellings also include setting of eight temporary benchmarks as follows:

- El-Arish area — at 6 locations
- Salem area — at 1 location
- Masaid area — at 1 location

The accuracy of setting the benchmarks is within 10 mm $\sqrt{S}$, where S = one way distance of survey in km.

The base benchmark is located at the old railway station of El-Arish, established in 1961, on the basis of the mean seawater level at Alexandria. The elevation of the benchmark is + 10.644 m. The temporary benchmarks are as follows:

No. of Temporary benchmark	Elevation (m)	Location
No. 1	2 401	At the southeastern corner of the boradcasting station in El-Arish
No.2	9.412	At the northwest corner of the Governorate guest house at El-Sahry.
No.3	12.262	At the north west corner of El-Saha El-Shabia Stadium.
No.4	17.708	Southwest corner of Food Issue House of Governorate near El-Sheikh Gobara mosque.
No.5	18.514	North west corner of El-Arish Library at the south of El-Refai mosque.

No.6	13.808	At the north-west corner of El-Naser mosque.
No.7	5.902	At the south-eastern corner of El-Arish Hospital.
No.8	14.454	At the north corner of El-Salem Club House in Salem area.

1.2. Longitudinal Profilings

Longitudinal profilings for 18 km at 50 m intervals have been carried out along the routes for major sewer lines. The accuracy was within 1/5000 per round (50 x 1/5,000 = 0.01 m) for horizontal and for vertical within 20 mm$\sqrt{S}$.

1.3. Cross Sections Survey

Cross sections survey at 100 locations with sufficient width to indicate houses and other structures, with the accuracy same as for longitudinal profilings.

APPENDIX-TWO

BASIS OF COST ESTIMATES

APPENDIX - TWO

BASIS OF COST ESTIMATES

Construction costs for the sewerage and drainage systems in the First Stage programme have been estimated on the basis of the current labour and material costs prevailing in the region. These costs are consisted of direct and indirect costs.

In estimating the construction costs of the facilities, unit costs for labours, materials, power, equipment and transportation have been established, and then the construction costs for component works such as concrete works, excavations, masonry works, etc., are estimated.

Labours required for the sewerage construction range from common worker to skilled operator for heavy equipment, as shown in the following:

Table 1 Labour Costs in El-Arish (at mid-1984 price level)

Type of Labour	Unit	Cost (L.E.)
Common worker	day	10
Concrete mixer operator	"	10
Steel worker	"	15
Carpenter	"	15
Brick layer	"	15
Plumber	"	15
Operator (power shovel, bull dozer, etc.)	"	15
Electric worker	"	15
Welder	"	15
Plasterer	"	15
Site engineer	"	17
Site manager	"	20
Office boy	"	6
Driver	"	10
Typist	"	10
Foreman	"	10

In general, most of materials required for the construction of sewage treatment and pumping stations are available except for mechanical and electrical equipment. Sand and gravel for concrete works are available in good quality with sufficient quantity to meet the demands. Other materials such as wood, steel, cement, etc., are also available, but mostly produced or imported through Cairo or other locations in Egypt. Presently, most of pipes such as PVC and reinforced concrete pipes are produced in Cairo and other areas and transported to El-Arish for constructions. Unit prices of the materials are shown in Table 2.

Table 2. Costs of Basic Materials (at mid-1984 price level)

Item	Unit	Price (L.E.)
Sand	m^3	2
Sand for concrete	"	5
Gravel	"	9
Gravel for concrete	"	15
Crushed stone	"	9
Cement type I	t	38
Cement type V	"	75
Timber	m^3	300
Wood plank	"	300
Plywood (t = 12 mm)	m^2	13
Round steel bar	t	440
Deformed steel bar	"	480
Vitrified clay pipe 200 mm dia.	m	7
" 375 mm dia.	"	20
" 600 mm dia.	"	54
Reinforced concrete pipe 900 mm dia.	"	37
Ductile iron pipe 100 mm dia.	"	18
" 500 mm dia.	"	159

By using the basic labour and material costs as described in Tables 1 and 2 above, unit construction costs for major items are estimated as shown in Table 3.

Teble 3 Unit Construction Costs for Component Works (at mid-1984 price level)

Item	Unit	Price (L.E.)
Excavation soil	m^3	7
Backfilling	"	4
Banking	"	4
Soil disposal	"	3
Sheeting by timber up to 3 m deep	m^2	4
" deeper than 3 m	"	5
Lean concrete	m^3	60
Plain structural concrete	"	80
Reinforced concrete	"	120
Shuttering foundation	m^2	14
" super structure	"	20
Masonry	m^3	60
Cement mortar plastering	m^2	10
Asphalt pavement t = 5 cm	"	7
" t = 11 cm	"	15

Construction costs for sewer pipes are illustrated in Figure 1

APPENDIX-THREE

WATER QUALITY AND QUANTITY SURVEY AT HOTEL EGOTH OBEROI

APPENDIX - THREE
WATER QUALITY AND QUANTITY SURVEY
AT
HOTEL EGOTH OBEROI

A wastewater quality survey has been carried out at the wastewater treatment plant of Hotel Egoth Oberoi by the Japan International Cooperation Agency (JICA) El-Arish Sewerage Study Team from 9:00 a.m., 20th through 9:00 a.m. 21st August 1984. Totally seven wastewater samples have been collected and analysed on 15 items as shown in Table 1 and Figures 1 through 3. Functions of the treatment plant have also been investigated by the Study Team in close cooperation with the hotel staff in charge. On the basis of the available drawings for civil works, a flowsheet of the plant and water service installation diagram have been developed as illustrated in Figures 4 and 5, respectively.

As may be seen from Table 1, the qualities of the wastewater were in the rage of normal level, however, the problems observed were that the BOD removal efficiency was about 60 per cent, which is lower than that generally expected in this type of treatment process, and the colour of the plant effluent was even darker than that of influent. The colour of the wastewater mixture in the aeration tank is 'Activated sludge colour,' or 'Chocolate colour,' inherent to the activated sludge process, if the operation is well maintained. It was also observed that much of the sludge was caried-over from the final settling basin and the suspended solids concentration was often higher than that in the plant effluent.

These results of the survey apparently indicate that the operation and maintainance be improved so as to produce better plant effluent. In view of these, some suggestions for operation and maintenance of the plant facilities are made as summarized in the following: which we believe that if the following procedures are maintained, the qualities of the plant effluent will be improved to the level normally expected, say within a month time.

(1) Aerators shall be operated for 24 hours, not intermittently (Currently the aerators are being operated during day time only).

(2) Sludge from the final settling basin to the aeration tank. Returning of the sludge to the aeration tank is the must in the activated sludge process. In this process, the sludge of 100 per cent to the wastewater quantity should be returned to the aeration tank.

(3) The water surface elevation of the final settling basin shall always be kept at the level of the overflow weir, never submerged, so as to overflow the tank effluent freely.

(4) The sludge collector shall be driven for 24 hours. Presently, the collector is operated intermittently.

(5) The excess sludge should be withdrawn frequently from the settling basin, though the amount of the excess sludge may be reduced by the proper sludge return to the aeration tank.

The flowsheet of Figure 4 has been developed based on the results of the plant facilities inspection. Since design calculations and detailed drawings were not available, it was not possible to review the conditions actually designed, however, from the inspection the treatment process applied seems to be the extended aeration system with a total treatment capacity of 400 m3/day. Figure 5 was drawn on the basis of the drawings available at the hotel.

Table 1 The Results of Wastewater Qualities Survey

Item \ Time		20/8/1984 9:00	13:00	17:00	21:00	21/8/1984 1:00	9:00	20/8/1984 13:00 (Treated)
Temperature	(℃)	30.0	30.5	30.1	30.2	27.7	26.5	31.0
pH		7.56	6.03	8.01	7.09	7.13	8.00	7.07
Conductivity	(μS/cm)	3790	3690	3690	3280	2630	2580	3240
Alkalinity as $CaCO_3$	(mg/ℓ)	281	69.6	222	173	160	198	273
Suspended Solids	(mg/ℓ)	121	99.3	202	115	55.6	165	252
Biochemical Oxygen Demand (BOD)	(mg/ℓ)	375	142	360	325	200	225	116
Chemical Oxygen Demand ($COD_{Mn,100C}$)	(mg/ℓ)	237	81.8	209	229	127	378	99.7
Chemical Oxygen Demand (COD_{Cr})	(mg/ℓ)	517	175	564	633	228	524	179
Kjeldahl Nitrogen (Kj-N)	(mg/ℓ)	39.7	33.6	34.7	39.8	39.7	60.5	39.2
Ammonia Nitrogen (NH_4-N)	(mg/ℓ)	26	11	12	12	22	29	23
Nitrite Nitrogen (NO_2-N)	(mg/ℓ)	nd	2.8	nd	nd	nd	nd	0.04
Nitrate Nitrogen (NO_3-N)	(mg/ℓ)	12	18	20	18	20	22	25
Hexane Extracts	(mg/ℓ)	282	145	124	10.0	97.0	142	15.7
Chloride Ion (Cl^-)	(mg/ℓ)	499	440	446	438	345	400	450
Total Phosphate (T-P)	(mg/ℓ)	8.6	8.4	7.5	4.8	2.9	11.0	4.5

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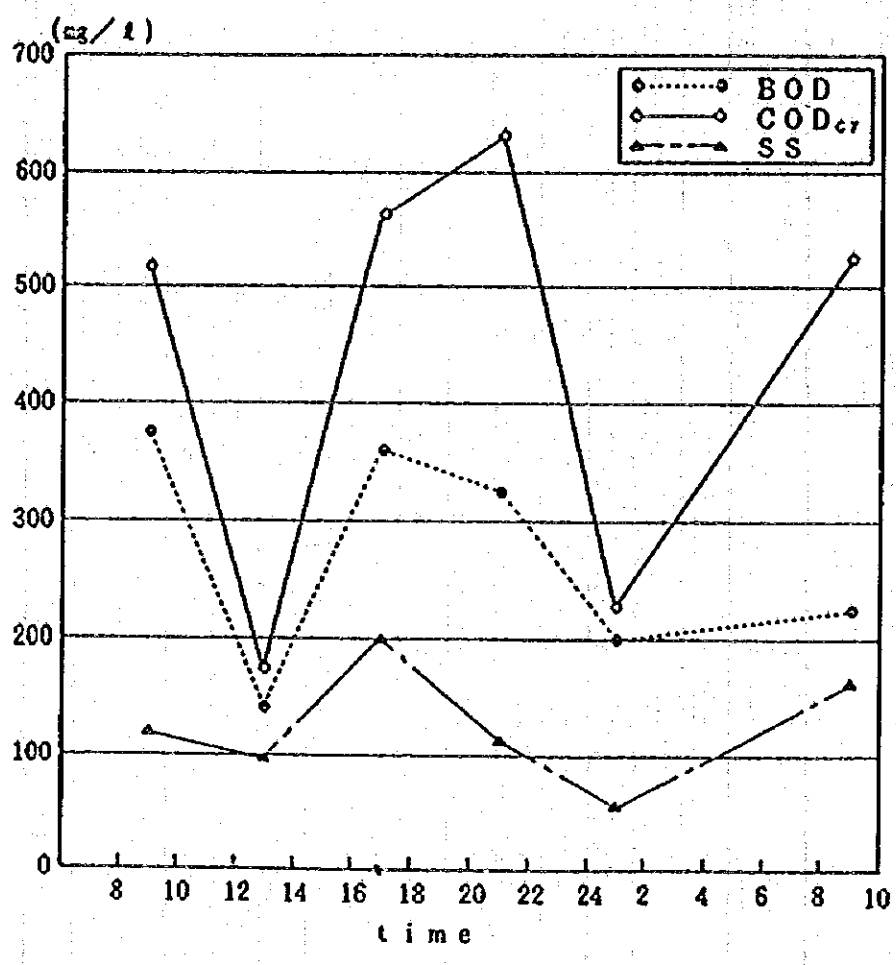


Figure 1 Variation of BOD, COD, SS

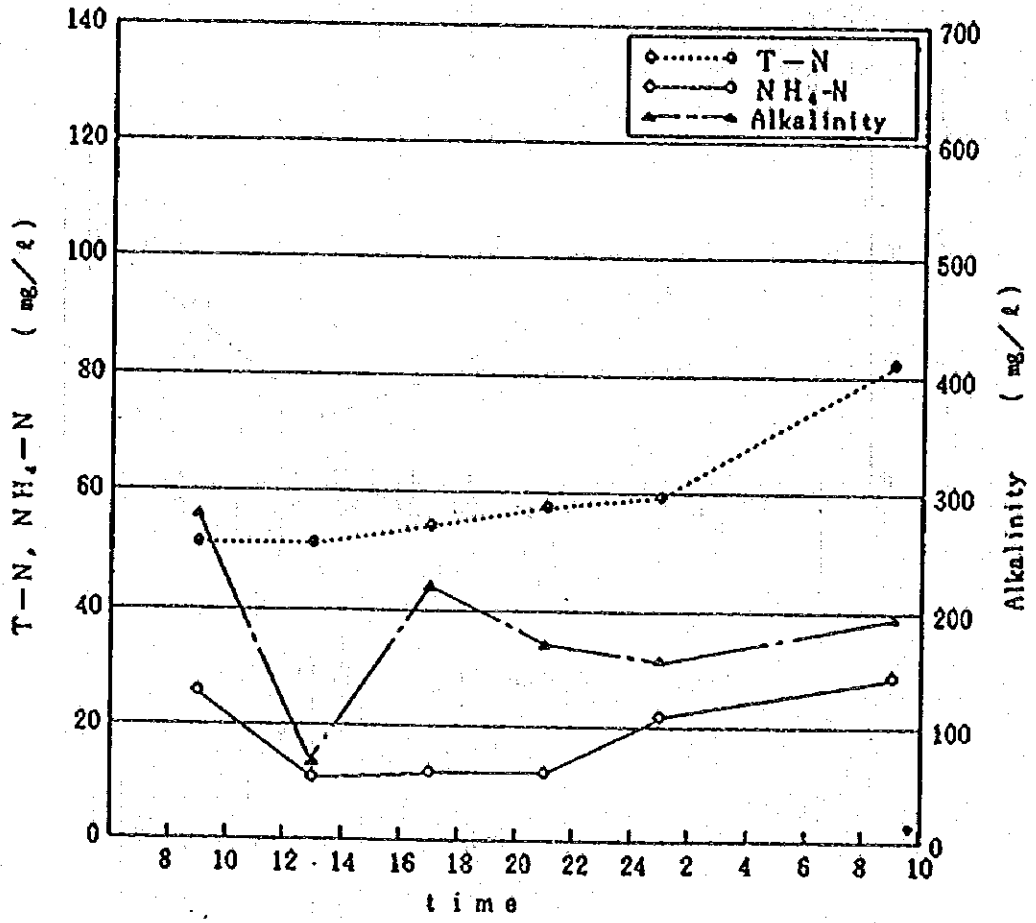


Figure 2 Variation of T-N, NH4-N, Alkalinity

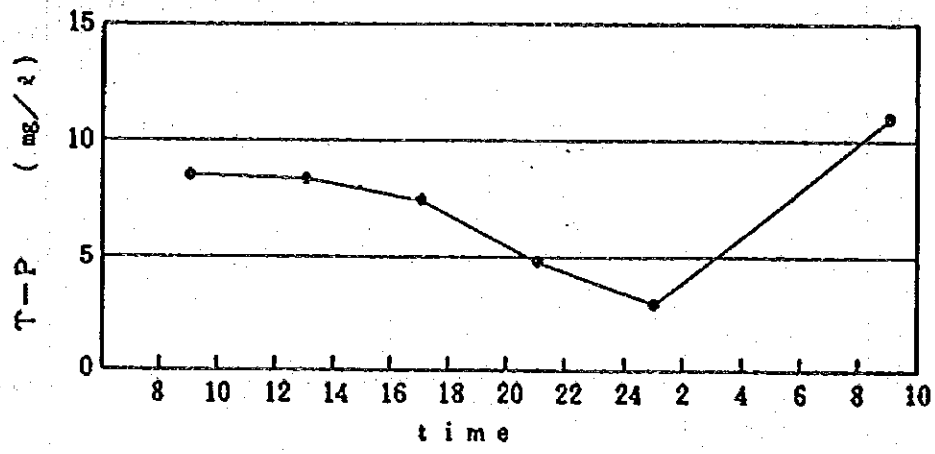


Figure 3 Variation of T-P

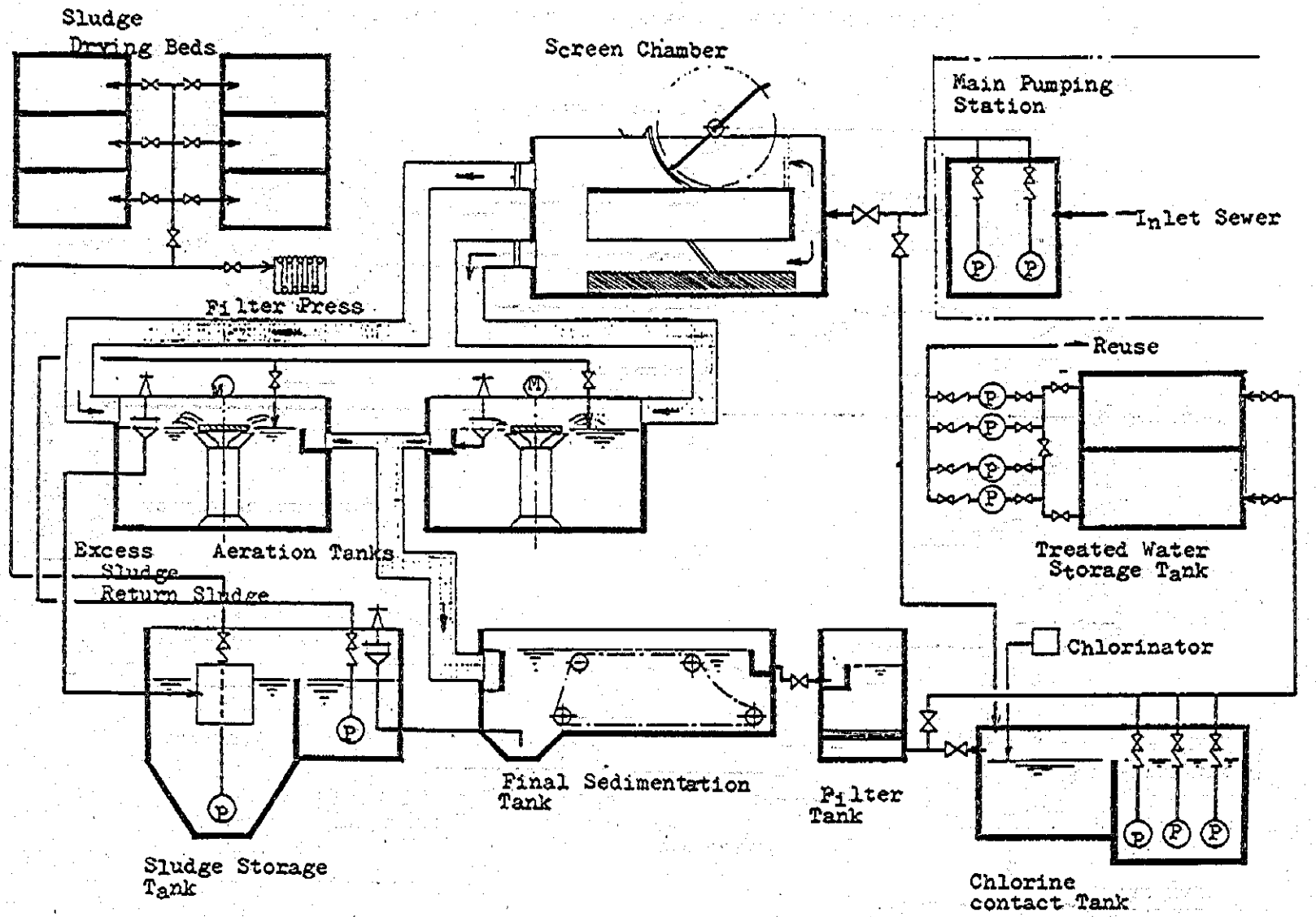


Figure 4 Flowsheet of Sewage Treatment Plant of Hotel Egoth Oberoi

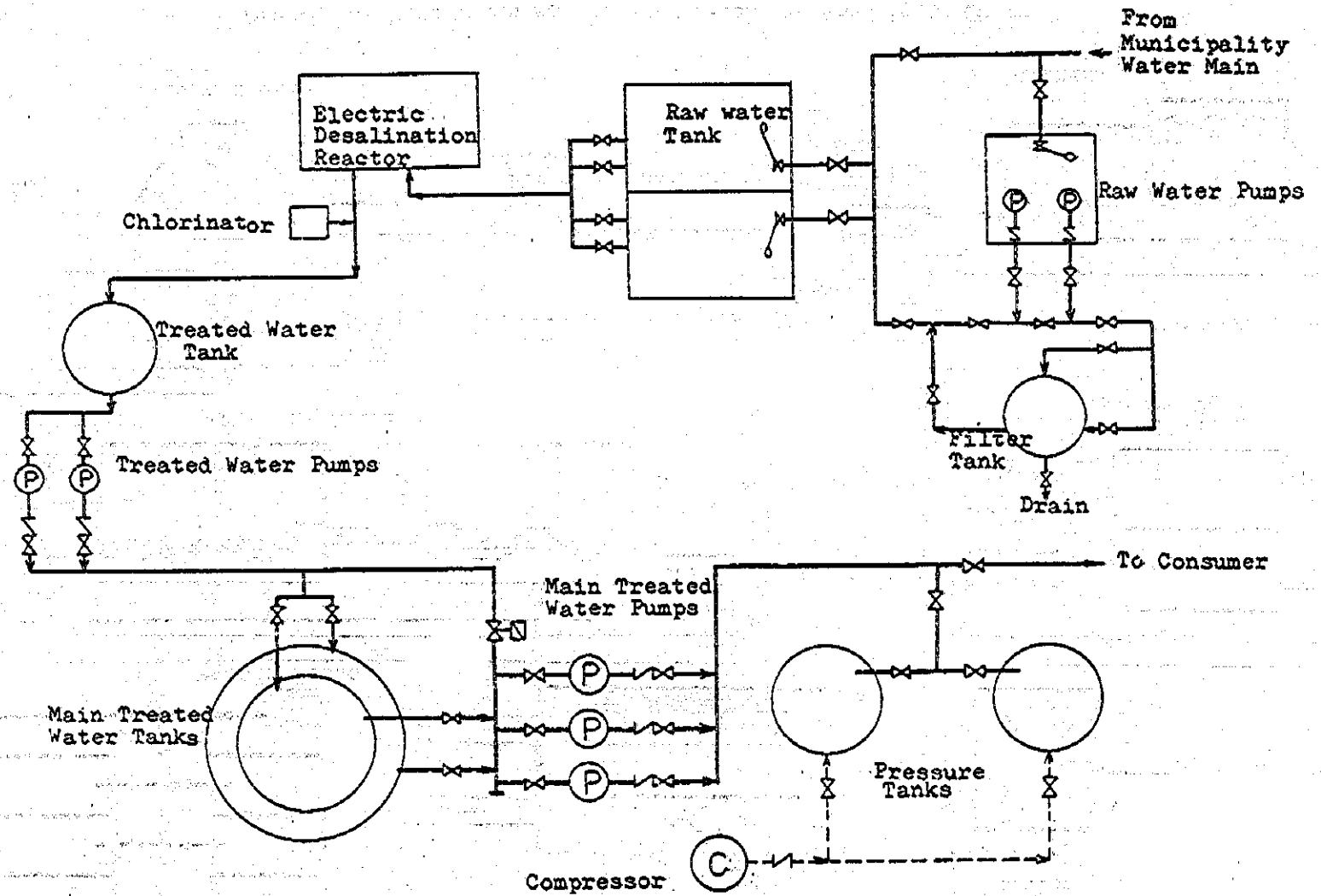


Figure 5 Water Service Installation of Hotel Egoth Oberoi

APPENDIX-FOUR

STORMWATER QUANTITIES

APPENDIX - FOUR
STORMWATER QUANTITIES

4.1. Runoff Formulae

In the engineering design of stormwater drainage facilities, many formulae and methods have been developed to determine the quantity of stormwater which will collect at a particular point within a drainage area. The purpose of this section is to develop the various factors which have been used as a basis of design for this project.

In computing quantities of stormwater runoff, the Rational Formula has been selected. The formula, generally accepted by engineers for use in the design of a project of this type is expressed as follows:

$$Q = 1/360\ C.I.A$$

where

Q = Peak discharge of the watershed above the point in question due to the maximum storm assumed.

C = Runoff coefficient, which is the ratio of the amoun amount of rainfall

I = Rainfall intensity based upon time ofconcentration.

A = Area of the watershed.

4.2. Rainfall Intensity Formulae

Various rainfall intensity formulae have been put forward for the calculation of rainfall intensities in terms of duration of the storm. Among the formulae, the "Talbot type" formula is considered to best fit to the conditions of relatively short duration rainfalls ranging between 10 and 60 minutes. This formula is know to give certain allowances in computed intensities than other formulae and easier in computations as its form indicates. The formula takes the form:

$$I = a / t + b$$

where

I = Rate of rainfall in mm/hr

t = Duration of the storm, in minutes.

a and b = Constants

In order to determine the constants 'a' and 'b' in the above formula for the different frequencies of storm, rainfall data measured by a self-registering measuring device have been collected from the Meteorological station in El-Arish and the Meteorological Authority in Cairo. The rainfall record papers for the three yearly heaviest rainstorms for the last ten years, from 1960 through 1966, 1980, 1981 and 1983, have been obtained and analysed to develop the intensity-duration-frequency relationships by the following steps:

(a) Tabulate the yearly heaviest rainfall intensities in the durations of of 10, 20, 30, 40, 60, 80 and 120 minutes.

(b) Compute probability of occurrance of the rainfall intensity for each of the above durations, thence, take out the figure from each of the durations for the same probability of occurrence and compute the values of the constants 'a' and 'b' for the different probabilities by means of the least square method.

The computed rainfall intensity-duration relationships for the different frequencies are as follows:

Frequency of recurrence (once in years)	Rainfall Intensity Formulae (mm/h)
3	$I_3 = 980 / t + 23$
5	$I_5 = 1060/ t + 22$
7	$I_7 = 1120/ t + 22$
10	$I_{10} = 1190/ t + 21$

The intensity-duration curves have been developed and shown in Figure 1.

4.3. Runoff Coefficients

The runoff coefficient respresents that portion of the total rainfall which will reach the proposed stormwater drains. The values assigned to the runoff coefficient depend upon the imperviousness of the surface and slope of surface.

The values are calculated as follows:

$$C = \sum_{i=1}^{m} C_i A_i / \sum_{i=1}^{m} A_i$$

where

C = runoff coefficient

C_i = runoff coefficient with respect to surface type

A_i = area of different surface type

m = the number of the different type of surface

For each drainage district, a composite runoff coefficient has been developed based on the percentage of different type of surface in the drainage area. For the calculations, all the drainage areas have been classified into four different types of surface, as shown in Table 1.

Table 1 Basic Runoff Coefficients by Type of Surface

Type of surface	Coefficient	Remarks
Roofs	0.85	Mainly flat roofs
Pavement	0.8	Sandy
Unpaved roads	0.1	Mostly sandy soil
Vacant lots	0.1	Mostly sandy soil

As may bee seen from the above table, vacant space is in general sandy soil and its permeabilities range from 25 to 50 mm/hr. Besides, even in the 10 years recurrence rainfall, the precipitation during 25 minutes time will be 26 mm/hr,and that the basic coefficient in the vacant space is likely to be such minimal as to leach into the ground, thus making the value almost zero. Taking such conditions and also certain allowances into account, the basic coefficient for the vacant space has been determined to be 0.1.

The component surface types of the area has been determined on the basis of the present conditions of the area and also the future development schemes elaborted after discussing with the Engineering Department. The total length of paved roads is extended about 4 km every year, thereby the present paved road length of about 15 km may be extended up to 100 km or seven times by

the year 2005. In accordance with the city development programme prepared by the City Council, the roads, streets and alleys occupy about 25 per cent of the city area with a total length of approximately 250 m long per ha of the area. As the total length of the roads and streets within the sewerage planning area is estimated to be 250 m/ha x 967 ha = 240 km, the ratio of the paved roads in the area may be;

At present	0.25 x (15/240) ≒ 0.02
At 2005	0.25 x (100/240) = 0.10

Table 2 Components of Surface Types

Type of surface	1983	2005
Roofs	0.25	0.40
Paved roads	0.02	0.10
Unpaved roads	0.23	0.15
Vacant space	0.50	0.35
Total	1.00	1.00

The composite runoff coefficients by year may be calculated as follows:

In 1983 - C = 0.85 x 0.25 + 0.8 x 0.02 + 0.1 x 0.23 + 0.1 x 0.5 = 0.3

In 2005 - C = 0.85 x 0.40 + 0.8 x 0.10 + 0.1 x 0.15 + 0.1 x 0.35 = 0.5

4.4. Time of Concentration

It is a general engineering practice to select a minimum time of concentration for design purposes. An estimate of the time of concentration to the point under consideration is made so that the average rainfall rate may be determined. For urban storm drains, the time of concentration consists of the inlet time plus the time of flow in the drain from the most remote inlet to the point under consideration.

Inlet time will vary with surface slope, nature of surface cover, and length of path of surface flow, as well as with the variables influenced by antecedent rainfall intensity and duration such as infiltration capacity and depression

storage. Calculation of an average time of concentration applicable for all the drainage design is unlikely to be obtained, but for paved or roofed area like El-Arish 10 minutes is generally accepted as the minimum time of concentration. This value is therefore used as a design criterion for this project.

Time of flow in the drain may be estimated closely from the hydraulic properties of the conduit. For the computation, the velocity of full flow may be used. Values of time of concentration generally used in stormwater drainage design are shown in Table 3.

Table 3. Standard Time of Concentrations

	Generally Used In Japan	ASCE Standard
High population density area	5 minutes	-
Low population density area	10 "	-
Trunk drains	5 "	-
Brach and laterals	7 - 10 "	-
Average	7 "	-
All paved, high pop. density completely sewered area	-	5 minutes
Relative;ly flat developing area	-	10 - 15 "
Average housing area	-	20 - 30 "

Source: Guideline for Sewerage Planning, Japan Sewage Works Association, 1972.

4.5. Rainfall Frequency

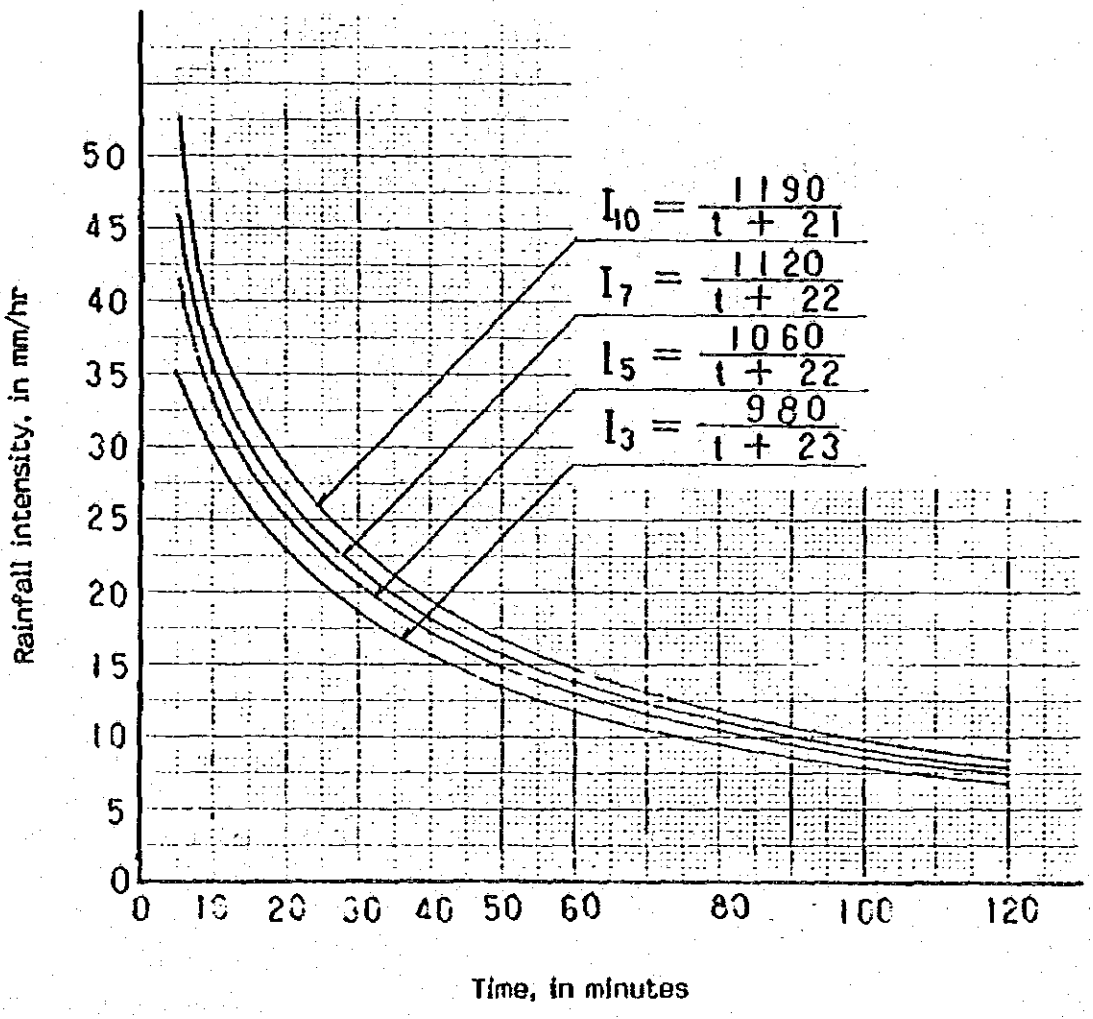
The average frequency of rainfall occurrence to be used for design determines the degree of protection afforded by a given storm sewer system. The rainfall characteristics in El-Arish area are:

- Low rainfall precipitation
- Low rainfall intensities.
- High permeability of the soil.

Because of these characteristics of the rainfalls, there have been not severe damage caused by the rainfalls, except those caused by the flooding of the

Wadi El-Arish. In the case of rainstorms, it has been observed that in some low-lying areas in the city stormwater runoffs overran on the streets and in certain districts flooding in the house floors facing the streets. According to the City Council, it has been observed that in general such floods occurred once every five years in the past. For these reasons, the frequency of 5 years is determined for the drainage facilities design.

Figure 1 Intensity-Duration Rainfall Curves



APPENDIX-FIVE

FINANCIAL, ECONOMIC AND INSTITUTIONAL PROJECTION

APPENDIX - FIVE
FINANCIAL, ECONOMIC AND INSTITUTIONAL PROJECTIONS

5.1. Alternative Plans at the First Stage as a Projection

A plan initially attempted for the project was set up mainly from the point of view of technical and engineering convenience, in which the study area was segmentally drawn in distributing sewerage networks by series. In accordance with the combination of this series, the construction period was targeted within 5 years as the one approach and 7 years as the other approach. Consequently, 8 alternative plans were made up.

The total cost by plan with diversification of domestic/foreign components was as indicated in Table V-1(A), and the analytical results of the projection such as B/C, NPV and FIRR were as shown in Table V-1(B). OCC or the discount rate was quoted 13 %. Project-life was 50 years and the targeted year was up to 2005.

5.2. Alternative Plans at the Second Stage as a Projection

The plans indicated in the Table V - 1 were reshaffled by the revised series of sewerage networks with review for socio-economic conditions such as population dynamics, housing distribution, land use, tourism etc.. In the review, financing aspect was particulary examined referring to the A.R.E. Five-Year Plan for 1982/1983 to 1986/1987 and the NSG Five-Year budget as well. the NSG budget for sewerage in the utilities sector was especially taken into account, since the MO cost should, in principle, be desirable to not far exceed the trenche of sewerage expenditure at the present stage.

Five alternative plans were thus composed and computed introducing their costs versus benefits confrontation. For the project cost, their specifics consisted in the temporal weighting to equip the assumed requirement for sewerage system. Majority of the construction was, therefore, shared with the precedence, the foregoing stage, except one case. The exception was a sort of tail as the continuous approach attempted at the

first stage projection as aforementioned, in which the Area should be considered to entirely and simulteneously equipped.

The conclusion in computation of them introduced at least 3 points necessary for careful examination. The first was, in the computed indices, that Case 1 of the projection was seemingly the best on the whole but the worsest at the precedent stage although the burden of the construction cost was the easiest, for which the heaviest burden should be undertaken at the sequent stage or the following stage construction in the projection. (Refer to Table V - 2 to V - 6)

The second was that Case 2 and Case 3 showed the computed indices in a close match each other on the whole. The computed indices of Case 2 at the precedence was, however, relatively inferior than that of Case 3. The burden allocated for the sequence of Case 2 was also relatively heavier than that of Case 3, too. The comparison of the computed indices of them are as shown in Tables V-3 and V-4. The comparison of construction cost is shown in Table 5-1 in Volume Two.

The third was that Case 5 as the continuous approach tailing after the first stage projection might be still not cancelled yet, since the Area was overlooked to grow so fast and actively. The computed indices of Case 4 also showed an appropriate level among the projection.

In this respect, 3 schemes were finally selected, i.e., Cases 3, 4 and 5 in this second stage projection and suggested to have further and precise examination in the Main Text as candidature as the optimum scheme for the project. In the Text, Scheme 1 is Case 3, Schem 2 is Case 4 and Scheme 3 is Case 5 in this second stage projection, respectively.

5.3. Project Cost

(1) Basic Condition

The project cost composed of the construction cost and the MO cost as well as land acuisition cost if any is discussed in the Chapter Four 4.3. in the Main Text. The yearly disbursement schedule of them is, also, indicated in the

tables of Chapter Four. The figures in the tables are computed in diversifying into two portions, i.e. domestic and foreign components, for preparation of implementation to the actual disbursement together with the financing programme. The preparation should indispensably be necessary for the works not only in the financial analysis but also in the economic analysis, too.

The construction and MO costs in breaking down a capitalized equipments and/or facilities and others such as labour cost, transportation charges etc., are chronologically indicated in the same tables. The breaking-down figures on them are also indispensable for the works in the economic analysis, in particular.

(2) Pricing

The monetary converted figures are reckonned at the base of 1984 price referring to the actual records of the past years, for which Tables V-7 and 8 show their details. As for the foreign exchange rate, the following conversions are simultaneously applied, in which the A.R.E. currency (L.E.) is accounted at the base of the fixed exchange rate since its execution in 1981 and the Japanese currency (Yen, ¥) is accounted at the mean average of the floating exchange records as indicated in the Table V - 9 .

LE 0.8316832 : U.S.$ 1.00 : ¥ 245.00

(3) Manpower

The labour cost is computed in rule of the A.R.E. Law No. 137/1981 and Law No. 133/1982 as well as Law No. 119/1982 on labour. Basic salaries sampled in the NSG for its official personnel are shown in Table V-10. Development of wages and sources of family income on the whole of A.R.E. are indicated in the Table V - 11 and Table V - 12 which are needed in the assumption of allowance for a possible sewerage charges in the project, too.

5.4. Project Benefit

(1) Basic Condition

The project benefit structually composed of factors is as drown in the Figure

5 - 2 in the Main Text. The factors are varied in three dimensions as discussed in the Text, Chapter Five 5.2.4., for which the following data are referred.

(2) Housing

Housing is fundamentally harmonized with population, besides other socio-economic factors like industry. The population dynamics and prospects referring to land use are as discussed in 2.3. and 3.3. in the Main Report. As for the housing itself, however, there are two patterns recognized in the study area.

The one is the private housing which is indicated in the Table V - 13. The basis of an assumption for private housing requirement should, besides the Figure V - 1 illustrates in relation with the population dynamics, be set in accordance with the official survey conducted by the Director's Office of Engineering Dept. of City Council at 1979/80. The survey indicates that the existing number of houses were counted roughly 20,000 at that time and observed the necessity at least 10,000 houses among them to be scrap-and built for next 10 years.

The figures indicated in the Table V - 13 suggests that the average housing would be around 720 since 1979. However, this average figure seems to be not always appropriate to take as it is, since the 1979's figure was registered just after the provisional restoration from Israel so that the actual figure might be better to recognize as the number combined as 1979/80's. The same might be able to apply the figures before/after the complete restoration in 1982. Again however, one thing is quite apparent that even the scrap-and-building requirement for housing would not be able to furnish with if the annual average figure of 720 should apply. In addition, the ratio of scrap-and building and complete-new-housing is not clarified in the record.

The other pattern is that the public apartment housing which is indicated in the Table V-14. The figures in the Table is the one except the new settlement located in Masaid, for which the Chapter Two 2.3. discusses its details.

Housing prospect should, also, not disregard other dynamic factors, e.g. housing condition, family composition, age structure, living standard, industrialization

etc., The factors are available to refer to the data indicated in Table V-15, V - 16 and V - 17 as well as the national and regional Five-Year Plan which are discussed in the Chapter Two in the Main Text.

From these factors, in relation with the private housing requirement, a possible given-condition for the number of houses, which might be not the same of household numbers, might be able to compute, although the housing condition together with household numbers seemingly show that the average number of per family would be around 6. As the age structure obviously shows, an emulation of the inhabitant aged less 12-years versus over 12-years is 1 (less 12) : 2 (over 12). In addition, taking into account of the specific character of the Study Area as the extensive pioneering land or rapid developing town, the relative younger generation should tend to outweigh the older one among the inhabitants, particularly in case of immigrant with whom small number of family might seem to come along.. In any manner, it should be noted that when the survey counted some 20,000 existing houses at the year of 1979/80, the population should be just less/over 50,000. That means some 3 persons per house.

As for the building for official and public uses, the data are regretfully not able to obtain mainly from the point of view of security. The authorized data obtained is only for schools which is indicated in the Table V - 18. . However, the requirement of scrap-and-building or the complete-new-building for public/official use is undoubtedly urged, but is again unobtainable.

The computation in this Chapter has, therefore, to circumspectly process in combinating and/or pairing factors at high, mid. and low assumption at least. The figures input into the final and integrated computation are excerpted the mid figures from the intermediate sub-output during the procession.

(3) Tourism

Number of tourists to gether with their tourist-nights as the actual records are as shown in the Chapter two of the Main Text. The numbers, however, do not include visitors to public recreation facilities such as youth-hostels, tents, etc. Hotel-charge is as indicated in the Table V - 19 and its weighted average figure is applied in computation.

From the point of view of the possible development as regional economy, an expected pecuniary damage for tourism induced by the environmental deterioration is generally assumed at the durable base putting together expected tourist expense with possible investment for tourism industry.

The former should be estimated in accordance with the certain p.a. growth rate of tourist-night. The latter should, also, be accorded with it, but it must be expected in advance by the nature of the industry. In the computation, however, the assumption should be adapted only for the former, since the expected investment might be much flexible because of rapid movement of regional phenomenon. The general formula adapted in incorporating with the computation is shown below, which is accorded with principle of the least " consumers' surplus ", so-called.

$$\frac{T(R^{n} - 1)}{2}$$

where,
T : basic/actual figure
$R : (1 + r)^{n}$
r = assumed/growth rate
n = term

In addition, there is another factor in assuming pecuniary damage of possible tourism development, namely the factor induced from daily extra expense of torist, for which approximate one-third of hotel-charge is internationally assumed as the least/minimum daily expense. However, taking into account of premature condition of cafe,restaurant, etc. in the project area, this factor is hesitated to input in the work.

(4) Cafe, Restaurant and Retail Shop

Data of cafe. restaurant and retail stores and/or shops are all discussed in Chapter Two 2.2. and 2.4. in the Main Report.

(5) Ground Water Development

In emulating to population increase, an additional requirement for pioneering ground water should be indispensably assumed, referring the development cost which is discussed in Table V - 20. (also. refer to Chapter Two 2.7. in Main Text)

(5) Vaccum-Pumping Lorry

The present condition of vaccum-pumping lorries which are operated in sucking sewage are as follows:

Price : LE 29,000 (sucking capacity 4.8. c.m. at the purchasing price in the mid. 1984)
Durabilty : 5 to 10 years (average 7 years)
MO cost : LE 800/y (fuel and spar-parts only)
Wage : LE 840/y (one driver each lorry, who also engages in sucking sewage

(7) Transh

There are 4 typical types and/or patters in transh The cost by type and by use are discussed in Table V - 21.

(8) Creation of land for arability

Table V - 22 indicates the summary of aasumed value for created land with arability from mere desert. Estimated value derived from possible plantation and cropping as well as dairy are precisely discussed in 3.6. and 4.2. in the Main Report.

5.5. Financial Analysis and its Sensitivity Ananlysis

The streams and their conclusive results of integrated computation are already discussed in Table V - 2 to V - 6 and the conclusive summaries in the sensitivity analysis each for Plan 3 and Plan 4 as well as Plan 5 are shown in Table V -23 to V - 25.

5.6. Statements as for the Optimum Plan

There are at least two prerequisite conditions should be taken into account in incorporating with computation of income and cash-flow.

(1) Possible Income

The methodological approach to seek the appropriate sewer-charge has three compatible directions at least. The first is the least " willingness to pay " at the end-user base. The second is the existing payment for water consumption. The third is a possibility of subsidy if the charge requirement might be so high that the end-user seems to be unable to bear it.

The most essential element must be referred to the directions consist in the existing condition of payment for water consumption. the relation of water supply and water consumption together with payment in other words. However, as precisly discussed in Chapter Two 2.7. and Chapter Three 3.4. in the Main Text, the accurate figures in/between supply and consumption of water are unable to clarify. The exact figures on payment as water-charge is accordingly due to. The referential data for them are limited in the figures as indicated in Table V - 16. V - 26 and V - 27. which are absolutely inconsistent each other.

The assumable figures would, therefore, be converged the relation in/between total population and actual record of collection charged to water consumption. The figure is LE 3.376 p.a. per capita at 1983/84 year base. The same assumption would be adapted relation in/between total population and NSG budget for potable water. The adaptation induces LE 15.000 p.a. per capita at 1983/84 year base. Consequently, the total amount to be borne by inhabitant in the project area is assumed to be LE 15.876 p.a. per capita. (if other factors as indicated in the marginals of Table V - 26 and NSG budget might be referred to, the amount would be ranged up to LE 18.376)

In general, there is no established rate applicable for the appropriate sewer-charge against water-charge, for which examples among the past projects in the world today, have varied some 80 % to less/over 20%.

In the computation, therefore, an applicable figure has to be induced through complicated reshafflement of combination/pairing/confrontation of water-charge and/or water-revenue, NSG sewerage budget, private income, household income and/or household income source, family expenditure composition and transh construction cost, otherwise the least " willingness to pay " or the possible proposition for sewer-charge would not be justified. An interviewing survey to take a sampling exampie is apparently inadequate in the project area, since inhabitants have no information on it at all.

LE 5.610 p.a. per capita sewer-charge with additional LE 3.910 p.a.per capita sewer-subisy are the figures finally induced from computation. The total amount to be borne by inhabitant in the project area should be thus L.E. 9,520 p.a. per capita, which indicates about 50% of the burden for water supply. The burden of LE 5.610 p.a. per capita of sewer-charge might be seemingly high than that of the charge for water-supply. But, it should be reminded that the present figure of water-charge at collection-revenue/total polulation base has been guesstimated by uncertain ratio of bad-debt or uncollection.

Also, the amount would be just less than that of the equivalence of transh depreciation at equal year base. For instance of private housing, in accordance with the figure in Table V - 20, around 5% would be expected to reduce and more than it should be able to assure if transh furnished with public and/or official houses or buildings are extensively used by inhabitants. The amount, in addition, would be equivalent less 1% of weighted average of basic salary per personnel/per year in case of NSG. Also, it would be within the frame of family expenditure ratio for public utilities, for which Table V - 28 shows reference. As for subsidy, the computation indicates just the same level of the present NSG budget for sewerage.

(2) Desirable outlay

The income including discussed sewer-charge should also be confronted to the outlay, which is composed of MO cost, management and administration (MO) cost, amortization, interest and depreciation. Setting aside amortization since the fund and the consequent asset of the project should be ultimately imputed to the state in the " Socialist Democratic Society " as the A.R.E., the computation anyway requires MO and MA costs and interest - for foreign component at least -- if possible. MA cost is discussed in section 5.4.2. of Chapter Five in the Main Text. Interest is reckonned at the low lwvel in case of bilateral lending agencies.

The computation shows that the project outlay to meet the income might be able to load MO and MA costs and interest for foreign component, but not anything more. However, it should be noted that the coverage for MO cost would mean a sort of burden for amortization. The possibility of coverage for MO cost, in case from this point of view, would be able to qualify as some 12% equivalence to the total project cost.

5.7. Economic Analysis

According to the internationally established approach to the economic analysis, the computation must adapt conversion factors as like as shown in Table V - 29. Taking into account of the figures arranged in 1982, the examination for them should be conducted referring to the latest key-data. In this Chapter, the records of import/export and custom/subsidy are referred, for which Table V - 30 and

V - 31 as well as V - 32 indicate the necessary figures. The general formula for referential calibration is as below.

$$SCF = \frac{M + X}{M(1 + Tm) + X(1 - Tx)}$$

where,

SCF : standard conversion factor
M : import (CIF)
X : export (FOB)
Tm : Custom
Tx : Subsidy

The records of them are different at their year-account, so that the custom/duty recorded at the financial year base have to apply to two figures of export/import recorded at the callender year base, respectively. The referential calibration indicates, however, the very close figures arranged in Table V - 30. SCF shows, in inter-changing way of the figures of 1982/83 vs. 1982 and 1983/84 vs. 1983 for example, 0.933 and 0.939.

As for tax, it should be referred the present tax laws, for which the marginal below indicates, and Table V - 33 too.

The results of computation are as seen in Table V - 34, V - 35 and V - 36. The Details of the sensitivity verification for them are also shown in Table V - 37, V - 38 and V - 39.

5.8. Institutational Arrangement

Assumption for possible budget requirement, among which the basic personnel salary is already discussed in Table V - 10, is arranged in accordance with the general approach for making budget taking into account of the structural composition of NSG's balance of payment as summarized as in Table V - 40.

° The Tax Law, Law No. 157/1981 : Promulgating Income Tax Law as amended ny Law No. 87/1983

° Ministrial Decree No. 164/1982 : Executive Regulation for Tax Law on Income Promulgating by Law No. 157/1981

° Land, House and Building Taxation 1981

Table V - 1 (A)

A Cost Estimation for an Alternative Plans at the First Stage

(LE 1,000)

	Construct.term	Total cost	Foreign(%)	Domestic(%)
Plan 1	5 years	18,891	5,482 (29.0)	13,409 (71.0)
" 2	7	"	" (")	" (")
" 3	5	30,915	7,460 (24.1)	34,455 (75.9)
" 4	7	"	" (")	" (")
" 5	5	19,979	5,938 (29.7)	14,041 (70.3)
" 6	7	"	" (")	" (")
" 7	5	32,976	8,328 (25.3)	24,648 (")
" 8	7	"	" (")	" (")

Table V - 1 (B)

A Concluded Indices in the Computation of the Financial Analysis for the First Stage

	B/C	NPV *	FIRR
Plan 1	0.412	(-) 8,199	5.63
" 2	0.385	(-) 7,702	5.45
" 3	0.49	(-)11,635	6.83
" 4	0.50	(-)11,540	6.25
" 5	0.60	(-) 6,579	9.34
" 6	0.67	(-) 4,408	10.12
" 7	0.79	(-) 5,397	11.17
" 8	0.81	(-) 4,202	11.43

* LE 1,000

Table V - 2

Plan I

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	683	0	-683
2	2464	0	-2464
3	2903	0	-2903
4	3791	0	-3791
5	4034	0	-4034
6	3733	0	-3733
7	2470	548	-1922
8	2323	699	-1624
9	2560	951	-1609
10	3107	1216	-1891
11	3122	1519	-1603
12	2928	1831	-1097
13	2317	2190	-127
14	1469	2630	1161
15	1327	3061	1734
16	1344	3594	2250
17	1362	4293	2931
18	1383	5065	3682
19	1402	5931	4529
20	1426	7044	5618
21	1452	8225	6773
22	341	8225	7884
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	341	8225	7884
Total	57489	287322	229833

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	683	0	-683
2	2180.53	0	-2180.53
3	2273.47	0	-2273.47
4	2627.35	0	-2627.35
5	2474.13	0	-2474.13
6	2026.12	0	-2026.12
7	1186.39	263.215	-923.172
8	987.416	297.117	-690.298
9	962.969	357.728	-605.241
10	1034.27	404.788	-629.485
11	919.705	447.48	-472.225
12	763.323	477.337	-285.985
13	534.546	505.246	-29.2997
14	299.918	536.953	237.035
15	239.758	553.051	313.293
16	214.893	574.647	359.754
17	192.718	607.443	414.725
18	173.176	634.229	461.052
19	155.359	657.228	501.869
20	139.839	690.763	550.924
21	126.008	713.784	587.776
22	26.1883	631.668	605.479
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	.854891	20.6202	19.7653
Total	20416	13053	-7362.92

COST-BENEFIT RATIO

B/C ..... .639355

NET PRESENT VALUE

NPV .....-7362.92

INTERNAL RATE OF RETURN

IRR= 9.59075 %

Table V - 3

Plan 2

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	872	0	-872
2	2400	0	-2400
3	2942	0	-2942
4	4394	0	-4394
5	4400	0	-4400
6	3859	0	-3859
7	1811	502	-1309
8	1826	661	-1165
9	2473	920	-1553
10	2153	1184	-969
11	2279	1461	-818
12	2606	1789	-817
13	2623	2165	-458
14	2503	2602	99
15	1510	3061	1551
16	1528	3595	2067
17	1627	4258	2631
18	1408	5000	3592
19	1430	5931	4501
20	1454	6998	5544
21	1479	8225	6746
22	341	8225	7884
:	:	:	:
:	:	:	:
50	341	8225	7884
Total	57466	286877	229411

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	872	0	-872
2	2123.89	0	-2123.89
3	2304.02	0	-2304.02
4	3045.26	0	-3045.26
5	2698.6	0	-2698.6
6	2094.51	0	-2094.51
7	869.857	241.12	-628.737
8	776.161	280.965	-495.196
9	930.243	346.067	-584.176
10	716.701	394.136	-322.565
11	671.367	430.394	-240.973
12	679.378	466.388	-212.99
13	605.142	499.478	-105.663
14	511.024	531.236	20.2123
15	272.822	553.051	280.229
16	244.313	574.807	330.494
17	230.214	602.491	372.277
18	176.307	626.09	449.783
19	158.462	657.228	498.766
20	142.585	686.252	543.667
21	128.351	713.784	585.433
22	26.1883	631.668	605.479
:	:	:	:
:	:	:	:
50	.854891	20.6202	19.7653
Total	20472.3	12935.5	-7536.76

COST-BENEFIT RATIO

B/C ..... .631855

NET PRESENT VALUE

NPV .....-7536.76

INTERNAL RATE OF RETURN

IRR= 9.54724 %

Table V - 4

Plan 3

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	923	0	-923
2	2539	0	-2539
3	3080	0	-3080
4	4532	0	-4532
5	4538	0	-4538
6	3996	0	-3996
7	2094	616	-1478
8	2105	773	-1332
9	2424	983	-1441
10	2118	1251	-867
11	2261	1556	-705
12	2553	1870	-683
13	2568	2250	-318
14	2013	2678	665
15	1439	3113	1674
16	1456	3650	2194
17	1538	4355	2817
18	1368	5065	3697
19	1357	6003	4646
20	1379	7044	5665
21	1404	8222	6818
22	341	8222	7881
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	341	8222	7881
Total	57574	287867	230293

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	923	0	-923
2	2246.9	0	-2246.9
3	2412.09	0	-2412.09
4	3140.9	0	-3140.9
5	2783.24	0	-2783.24
6	2168.87	0	-2168.87
7	1005.79	295.876	-709.911
8	894.753	328.572	-566.181
9	911.812	369.765	-542.046
10	705.05	416.439	-288.611
11	666.064	458.379	-207.685
12	665.561	487.505	-178.056
13	592.453	519.088	-73.3644
14	410.983	546.753	135.769
15	259.994	562.446	302.453
16	232.801	583.601	350.8
17	217.621	616.216	398.595
18	171.298	634.229	462.931
19	150.372	665.206	514.834
20	135.23	690.763	555.533
21	121.842	713.524	591.682
22	26.1883	631.437	605.249
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	.854891	20.6126	19.7578
Total	21037.7	13218.4	-7819.25

COST-BENEFIT RATIO

B/C ..... .628322

NET PRESENT VALUE

NPV .....-7819.25

INTERNAL RATE OF RETURN

IRR= 9.50152 %

Table V - 5

Plan 4

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	1006	0	-1006
2	2806	0	-2806
3	3347	0	-3347
4	4798	0	-4798
5	4804	0	-4804
6	4262	0	-4262
7	2438	771	-1667
8	2452	974	-1478
9	2245	1167	-1078
10	2002	1454	-548
11	2125	1743	-382
12	2391	2068	-323
13	2401	2380	-21
14	1847	2821	974
15	1304	3265	1961
16	1317	3760	2443
17	1373	4474	3101
18	1199	5195	3996
19	1217	6073	4856
20	1238	7121	5883
21	1260	8225	6965
22	341	8225	7884
⋮	⋮	⋮	⋮
50	341	8225	7884
Total	57721	290016	232295

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	1006	0	-1006
2	2483.19	0	-2483.19
3	2621.19	0	-2621.19
4	3325.25	0	-3325.25
5	2946.38	0	-2946.38
6	2313.24	0	-2313.24
7	1171.02	370.326	-800.691
8	1042.25	414.009	-628.24
9	844.479	438.979	-405.5
10	666.435	484.015	-182.421
11	626	513.467	-112.533
12	623.328	539.123	-84.2053
13	553.925	549.08	-4.84485
14	377.092	575.948	198.856
15	235.602	589.909	354.307
16	210.576	601.189	390.613
17	194.274	633.054	438.78
18	150.136	650.507	500.371
19	134.859	672.963	538.105
20	121.403	698.314	576.91
21	109.346	713.784	604.439
22	26.1883	631.668	605.479
⋮	⋮	⋮	⋮
50	.854891	20.6202	19.7653
Total	21977	13776.7	-8200.34

COST-BENEFIT RATIO

B/C ..... .626868

NET PRESENT VALUE

NPV .....-8200.34

INTERNAL RATE OF RETURN

IRR= 9.46531 %

Table V - 6

Plan 5

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	1693	0	-1693
2	3582	0	-3582
3	3848	0	-3848
4	4630	0	-4630
5	5086	0	-5086
6	5858	0	-5858
7	5497	0	-5497
8	4936	0	-4936
9	2805	1720	-1085
10	3124	2134	-990
11	3148	2595	-553
12	532	2904	2372
13	537	3245	2708
14	471	3728	3257
15	481	4132	3651
16	450	4646	4196
17	457	5262	4805
18	467	5845	5378
19	319	6567	6248
20	332	7426	7094
21	341	8225	7884
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	341	8225	7884
Total	58483	296954	238471

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	1693	0	-1693
2	3169.91	0	-3169.91
3	3013.55	0	-3013.55
4	3208.82	0	-3208.82
5	3119.34	0	-3119.34
6	3179.49	0	-3179.49
7	2640.31	0	-2640.31
8	2098.1	0	-2098.1
9	1055.13	646.995	-408.133
10	1039.93	710.376	-329.556
11	927.364	764.457	-162.907
12	138.691	757.066	618.375
13	123.889	748.641	624.752
14	96.1615	761.125	664.964
15	86.9054	746.556	659.65
16	71.9508	742.852	670.902
17	64.6638	744.553	679.889
18	58.4768	731.899	673.422
19	35.3491	727.704	692.355
20	32.5572	728.223	695.666
21	29.5928	713.784	684.192
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	.854891	20.6202	19.7653
Total	26104.2	14856.3	-11248

COST-BENEFIT RATIO

B/C ..... .569113

NET PRESENT VALUE

NPV .....-11248

INTERNAL RATE OF RETURN

IRR= 8.93269 %

Table V - 7

Indices of Wholesale Price

(1965/66 = 100)

Division	1978	1979	1980	1981	1982*
All Items	214.1	234.6	285.2	308.9	337.7
Agriculture, crops	258.9	266.6	342.4	372.3	402.9
Poultry & Fish	295.0	322.7	370.1	449.4	533.1
Inedible animal products	293.0	313.9	335.4	372.5	396.3
Foodstuff & Beverage	241.4	270.9	329.3	356.5	404.0
Tobacco & its mfg.	122.9	134.3	138.2	138.4	144.7
Yarn, Textile & Under garment	163.9	183.0	218.2	237.5	246.6
Tanned skins	187.4	187.7	180.4	201.7	265.4
Household appliance	139.6	146.5	156.6	159.7	167.8
Petroleum & Fuel	168.6	190.3	230.6	240.1	255.0
Wood	361.9	363.8	482.2	478.5	483.1
Paper	248.1	291.3	390.0	415.4	423.8
Construction materials	250.3	383.7	410.3	462.3	556.2
Medicines	158.3	158.3	178.2	183.2	193.3
Chemical materials	132.1	146.3	183.8	200.9	229.9
Metals & their mfg. products	228.7	246.8	290.2	319.5	351.2
Machineries & Implements	207.3	245.3	262.3	263.3	266.1
Transportation equip.	218.2	243.9	276.3	287.8	320.9

* Preliminary figures

Source : Statistical Yearbook ARE 1983, CAPMS. Aug. 1983

Table V - 8

Indices of Consumer Price

(1966/67 = 100)

Area & Item	1978	1979	1980	1981	1982*
Urban					
All Items	205.6	226.0	272.7	301.2	245.8
Furniture & Durables	176.7	187.7	187.7	200.5	287.6
Foods & Beverage	246.5	264.9	335.6	383.1	438.5
Services	200.2	238.3	270.8	272.0	331.2
Housing	110.1	112.7	116.1	114.6	114.5
Transportation & Communication	145.1	185.6	193.9	307.9	311.5
Clothing	225.2	246.2	284.3	308.3	351.1
Personal expenses	149.7	182.3	210.7	213.8	226.3
Rural					
All Items	234.2	248.7	311.0	353.4	402.8
Furniture & Durables	240.6	272.8	322.6	369.5	433.0
Foods & Beverage	270.6	284.7	362.3	413.5	466.2
Services	201.5	228.5	267.0	305.0	372.4
Housing	112.2	114.7	134.5	135.5	135.8
Transportation & Communication	125.0	125.0	125.0	125.0	200.0
Clothing	244.7	275.0	339.1	405.1	500.6
Personal Expenses	121.0	130.2	149.5	157.1	166.3

* Preliminary figures

Source : Statistical Yearbook ARE 1983, CAPMS. Aug. 1983

Table V - 9

The Actual Record of Foreign Exchange Rate,

Japanese Yen to U.S. $

	1983	1984
January	232.97	233.94
FebruAry	236.25	233.70
March	238.05	225.43
April	237.78	225.06
May	234.78	230.77
June	240.20	233.33
July	240.47	242.92
August	244.32	242.40
September	242.84	244.35
October	232.98	
November	235.28	
December	234.36	

Source : Bank of Tokyo

Table V - 10

Sampling for Basic Salary,

in a Case of North Sinai Governorate Personnel,

as of July 1st 1983 to June 30th 1984

(LE 1/Cap./Month)

Category	less 50	up to 70	up to 90	up to 110	up to 130	up to 150	over 150	Total
Specialist								
male	117	205	54	25	18	7	5	431
female	31	35	3	-	-	-	-	69
s.total	148	240	57	25	-	7	5	500
Administration-Officer								
male	162	38	21	21	13	4	-	259
female	115	14	2	-	-	-	-	131
s.total	277	52	23	21	-	4	-	390
Technician								
male	50	22	4	-	-	-	-	76
female	6	-	-	-	-	-	-	6
s.total	56	22	4	-	-	-	-	82
Assistant for Technician								
male	154	14	4	3	-	-	-	175
female	-	-	-	-	-	-	-	-
s.total	154	14	4	3	-	-	-	175
Workers								
male	101	8	-	-	-	-	-	109
female	5	-	-	-	-	-	-	5
s.total	106	8	-	-	-	-	-	114
Total								
male	584	287	83	49	31	11	5	1,050
female	157	49	5	-	-	-	-	211
s.total	741	336	88	49	31	11	5	1,211

Data relevant : Minimum wage adapted in El Arish, NSG at the same period

Basic wage (bw)	LE 28
Areal incentive (bw x 1.05)	LE 29.4
Bearing for fringe-benefits, insurance etc., (18%)	LE 10.332
Received earning	LE 47.068

Source : Information Center, NSG

Table V - 11

Development of Per Capita Labour Wages

(LE at current prices)

	1977	1978	1979	1980/81	1981/82
Commodity Sector	218.29	248.51	270.63	353.58	407.33
Agriculture	117.70	128.39	140.22	176.00	185.19
Industry	534.52	550.66	584.01	731.38	911.81
Construction	336.32	373.61	395.42	550.84	574.46
Services Sector	448.72	484.64	528.28	759.35	915.35
Finace & Trade	380.16	414.85	476.23	978.86	1,051.80
Housing	109.81	116.04	124.52	289.76	340.92
Public Utilities	291.21	315.00	321.88	355.69	406.34
Other servises	509.93	543.29	579.67	727.67	900.81
Total	315.90	347.08	379.94	533.33	635.32

Figures at the year-base

Source : Statistical Yearbook A.R.E. 1983, Central Agency for Public Mobilization & Statistics

Figure V - 1

A Basic Assumption for Housing Reuirement

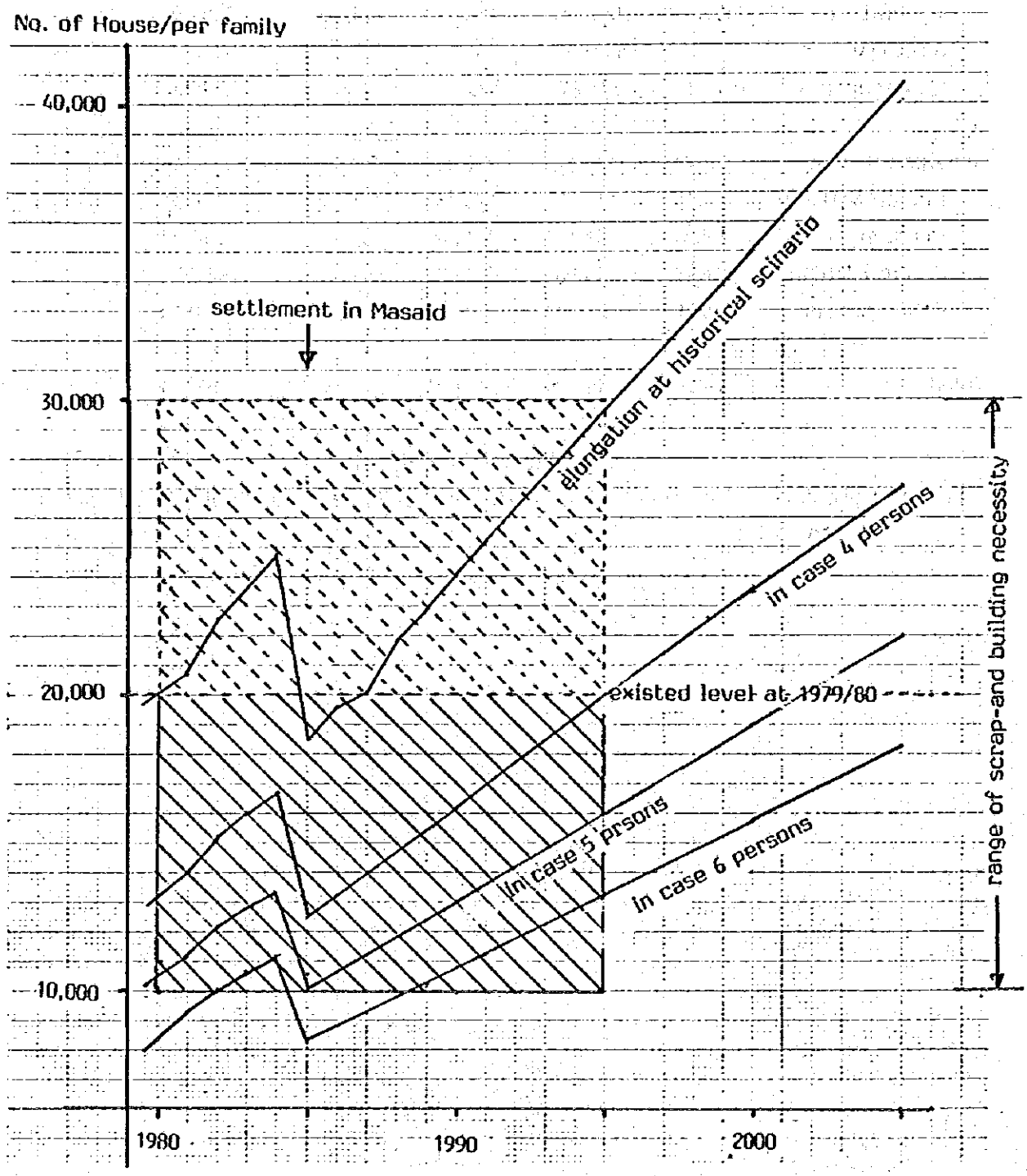


Table V - 12

Sources of income of rural households by income group

Sources of income of rural households by income group

Income group (annual income in £E)	No. of households	Average size of household	Source of income								Source of income								Total all sources	Total income per head
			Farm wage (excluding family farm)		Non-farm wage in village		Non farm wage outside village		Family farm (with labour input (only)		Rent of land		Rent of equipment and livestock		Earnings from non-agricultural productive assets		Remittances			
			X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y	X	Y		
>50	21	1.57	3	27	-	-	-	-	2	752	-	-	-	-	-	-	16	30	34	21.66
50-75	25	2.08	4	45	4	22	-	-	4	41	3	14	-	-	-	-	18	46	63	30.29
75-100	34	2.12	11	48	7	57	1	61	5	46	1	61	-	-	4	65	23	51	89	41.98
100-150	71	4.23	34	98	16	79	3	75	21	88	3	23	-	-	7	109	25	45	128	30.26
150-200	96	4.46	46	113	16	126	14	150	38	118	4	70	-	-	8	138	22	71	178	39.91
200-250	96	4.89	42	133	15	139	27	172	38	128	6	101	-	-	11	179	16	62	228	46.63
250-300	93	5.75	38	131	19	190	24	216	42	179	4	66	-	-	12	212	8	139	275	47.83
300-350	68	6.22	25	138	10	203	22	264	40	206	4	19	1	3	6	193	10	96	325	52.25
350-400	64	5.80	21	106	10	199	26	296	33	245	2	60	3	38	10	270	6	87	376	64.83
400-500	97	6.75	33	190	25	272	38	291	51	244	7	90	1	10	12	293	17	102	443	65.63
500-600	60	7.92	21	205	10	322	32	287	41	322	1	15	1	3	5	318	10	52	543	68.56
600-800	70	8.20	13	203	18	354	35	369	49	396	8	136	3	57	11	422	10	195	682	83.17
800-1,000	32	9.63	9	126	9	351	21	516	22	363	5	147	1	30	6	670	8	83	876	90.97
1,000-1,400	21	10.48	2	71	4	190	12	553	17	616	3	123	6	221	2	640	5	293	1,113	106.20
1,400-2,000	14	12.21	3	234	1	144	5	876	12	1,099	2	61	4	320	2	1,030	2	330	1,631	133.58
< 2,000	4	12.50	-	-	-	-	1	540	3	685	1	51	1	400	2	2,850	1	1,500	2,561	204.88
Average	-	5.93	-	134	-	188	-	311	-	273	-	84	-	159	-	340	-	87	-	-
Total	666		305	40,846	164	30,98	261	81,267	418	114,115	54	4,535	21	3,334	96	33,305	199	17,402	-	-

- = nil or negligible, . = not applicable
Key: X = number of households with each source of income, Y = value of income from each source in £E
Source: Employment opportunities and Equity in Egypt. ILO, 1982

Table V - 13

Private Housing in El Arish

Year	No. of House
1979	62
80	624
81	534
82	1,011
83	1,083
84	967 *
Total	4,281 (4,321)

* Additional 40 accepted housing application as of the end of August 1984. The number in ( ) includes the application.

Source : The DIRECTOR's Office of Engineering Dept, City Council, NSG.

Table V - 14

Public Apartment Construction in El Arish, from 1979 to the Mid. 1984

	Flat *	Storey **	Bloc or Bldg. ***
	192	4	12
	120	5	6
	132	3	11
	96	3	8
	96	3	8
	96	3	8
	88	4	6
	48	3	4
	48	3	4
	48	4	3
TOtal	964	35	70

* The same as unit-cell available to live in for per family per unit.

** The standard construction is 4 flats each storey.

*** No. of buildings.

Note : Additional 194 flats is scheduled to complete within 1984. Apartment type of house of 5 bldg. with 3 storeies in which 39 rooms are accommodated each storey is under plan for single person use. Another 3,000 houses for family use is also under plan and 684 flats bldg., too.

Source : Engineering Dept., City Council.

Table V - 15

Housing Condition, in Rural Egypt by Household Group

1977

	Household Group			
	Poor household	Marginal household	Non-poor household	Total
Owner-occupied houses by type of building				
Red brick				
No.	27	13	99	139
%	10.0	8.8	30.0	18.6
Average value (LE)	749	904	1,177	1,068
Mud brick				
No.	235	124	232	591
%	87.0	84.4	70.0	79.0
Average value (LE)	198	183	354	250
Hut				
No.	8	10	-	18
%	3.0	6.8	-	2.4
Average value (LE)	40	21	-	29
Total				
No.	270	147	331	748
%	100.0	100.0	100.0	100.0
Facilities				
Drinking-water				
No.	49	30	88	167
%	16	17	23	19
Electricity				
No.	37	21	139	197
%	12	12	36	23
Toilet				
No.	94	46	230	370
%	30	26	60	43
Density				
Average No. of rooms per house	3.1	2.9	3.8	3.4
No. of persons per room	2.5	1.9	1.5	2.0

- : nil or negligible

Source : Employment Opportunities and Equity in Egypt in the 1980s. Report of an Inter-agency Team Financed by UNDP and Organized by the International Labour Office. ILO, 1982

Table V - 16

Water Source Distribution by Household and by District

	1982				1983				1984			
	Tap for house	Tap for bldg. hall	Tap out-side Bldg.	Sub total	Tap for house	Tap for bldg. hall	Tap out-side Bldg.	Sub Total	Tap for house	Tap for bldg. hall	Tap out-side bldg.	Sub Total
El-Arish												
Urban	6,400	559	254	7,213	6,762	591	268	7,621	7,144	624	283	8,051
Beduin	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	6,400	559	254	7,213	6,762	591	268	7,621	7,144	624	283	8,051
Abu Sakhal & Salam Suburb												
Urban	689	83	31	803	728	88	32	848	769	93	34	896
Beduin	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total	689	83	31	803	728	88	32	848	769	93	34	896
El Masa'id												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	31	5	60	96	33	5	63	101	35	6	66	107
Sub Total	31	5	60	96	33	5	63	101	35	6	66	107
Attef El Sadat												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	52	9	53	114	55	10	55	120	58	10	59	127
Sub Total	52	9	53	114	55	10	55	120	58	10	59	127
El Slam Village & Airport Region												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	29	14	141	184	31	15	148	194	32	16	157	205
Sub Total	29	14	141	184	31	15	148	194	32	16	157	205
Arish Valley												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	225	225	-	-	238	238	-	-	251	251
Sub Total	-	-	225	225	-	-	238	238	-	-	251	251
El Sappel												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	38	38	-	-	40	40	-	-	42	42
Sub Total	-	-	38	38	-	-	40	40	-	-	42	42
El Medan												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	65	65	-	-	69	69	-	-	73	73
Sub Total	-	-	65	65	-	-	69	69	-	-	73	73
Zareb												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	31	31	-	-	33	33	-	-	35	35
Sub Total	-	-	31	31	-	-	33	33	-	-	35	35
Sarada												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	67	67	-	-	71	71	-	-	75	75
Sub Total	-	-	67	67	-	-	71	71	-	-	75	75
El Touiel												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	50	50	-	-	53	53	-	-	56	56
Sub Total	-	-	50	50	-	-	53	53	-	-	56	56
Beer Lehfeu												
Urban	-	-	-	-	-	-	-	-	-	-	-	-
Beduin	-	-	82	82	-	-	87	87	-	-	92	92
Sub Total	-	-	82	82	-	-	87	87	-	-	92	92
Total												
Urban	7,089	642	285	8,016	7,490	679	300	8,469	7,913	717	317	8,947
Beduin	112	28	812	952	119	30	857	1,006	125	32	906	1,063
Sub Total	7,201	670	1,097	8,968	7,609	709	1,157	9,475	8,038	749	1,223	10,010

Source : Information Center, NSG.

Table V - 17

Age Distribution of El Arish at the Year 1983/84

age	urban	rural	total
10 - 65 aged	34,660	3,582	38,242
0 - 12 aged	16,829	1,859	18,688
0 - 10 aged	14,168	1,607	15,775
10 - 12 aged	2,661	252	2,913
8 - 65 aged	48,828	5,189	54,017

Source : Information Center, NSG

Table V - 18

Education Facilities In El Arish at 1983/1984

Category	No.	Students
Teacher Trainning	1	632
Secondary	3	919
Commercial education	1	690
Agricultural		206
Technical	1	520
Preparatory	7	4,124
Primary	22	10,219

Source : Planning Section, NSG Office, Ministry of Education

Table V - 19

Hotel in El Arish,

Room-Charges by Hotel Classification

Class	Accomodation	Charges, LE
Class A	1 room, 3 beds, bath	7.2
	1 room, 2 beds, bath	14.0
	2 rooms, hall, bath	14.0
	2 rooms, hall, 4 beds, kitchen, bath	4.8
	1 room, 1 bed, bath (hot water), telephone	3.6
	1 room, 2 beds, bath	3.0
	2 rooms, 5 beds, bath (hot water), telephone	24.0
	2 rooms, 5 beds, hot water, telephone	20.0
	cottage, 1 bed, telephone	1.2
Class B	1 room, 3 beds, bath	6.0
	1 room, 2 beds, bath	6.0
	2 rooms, hall, bath	10.0
	2 rooms, hall, bath, kitchen	10.0
	1 room, 2 beds	1.5
	1 room, 1 bed	1.5
	1 room, 3 beds	3.6
	1 room, 4 beds	0.9
Class C	1 bed per single night	0.5

Remarks : Charges at the base in principle for per person, per night

Source : Tourism Dept. NSG

Table V - 20

Cost Estimation for Excavation of Ground Water Resources (Well)

1. 1st satge works (ususally up to arround 10 to 12 meters depth to excavate)

   4 workers : 7 to 10 LE/per worker
   period : 20 days in the ordinary case
   materials : cement and stons : 200 LE
   (Total cost should be around 1,000 LE)

2. 2nd stage works (condition depend of soil and circumstance)

   fixed cost : 1 worker + machine + different material used in. 30 to 40 LE/day
   workers cost : 5 workers 7 to 10 LE/day
   equipment : 12" pipe 50 LE/m. (worker usually avaliable to fix 1 to 3 m/day in depth

.....

An example of cost estimation : in case of 10 days and 30 meters well

1st stage	40 X 10	+ 400 LE
2nd stage	5 X 10	= 50 LE
euip.	30 X 50	= 1,500 LE
tital		1,950

Source : Engineering Office of City Council, NSG

Table V - 21

Cost and Mterial Specification of Transh,

by Type and by Case

(Data given by Engineering Dept., City Council, NSG.)

Type 1

Cost & Spec. Building and excavation cost
60 LE/m to 70 LE/m (meter to build and excavate is due to the place and soil condition

Ston, mortar and cement :
25 LE/m^3 (diameter)

Concrete cover :
100 LE/m^3

Case Box type for use in the ordinary private house and usual retail shops and stors. The estimated equipment rate of this type among the total transh is said to be varied from maximum 70% to minimum 50%.

Type 2

Cost & Spec. Excavation
3 LE/m^3 to 4 LE/m^3 (ordinary 12 LE/m to 15 LE/m are estimated as labour cost

Concrete cover :
100 LE/m^3

Case Circled well type for use in the ordinary private house and shops or stors. This type seems to be relatively bigger than Type 1.

Type 3

Cost & Spec. Septec tank with 3 rooms (2.5 m. depth with 3 covers is the typical structure) :
1,125 LE/tank

Circular trabsh (internal diameter 1.5 m. and 10 m. depth is the typical structure) :
2,000 LE/transh (in the typical type)

Case Analysis-transh type, which is eectangular container of septek tank with 3 rooms (4 rooms in some cases) together with circled well for final treatment. This type is mostly applied for apartment housing.

Type 4

Cost & Spec. Septec tank with 3 rooms (2.5 m. depth with 3 covers) :
1,125 LE/tank

Rectangular transh :
36 LE/m

Case Almosr same type to Type 3 but relatively larger scale than it, since use for public and official bldg.

Table V - 22

Estimated Land Value in the Jarada Area

1. Present land value LE100/feddan
(nearly equivalent to LE 120/ha

Estimated taking into account LE 150/feddan of the present value of arable lands extending in the western areas in the Ismailia city.

2. Prospective land value

(1) Prospective forage crop growing land .....LE 150/feddan
(neerly equivalnet to
LE 476/ha)

(2) Prospective tree growing land .....LE 200/feddan
(nearly equivalent to
L.E. 276/ha

(3) Prospective crop growing land (so-called farm land) .....
.....LE 250/feddan
(nearly equivalent to
LE 595/ha)

Table V - 23

Plan 3

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 0 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .698136                          -5713.44

**INTERNAL RATE OF RETURN**
    IRR= 10.2921 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .733047                          -5034.54

**INTERNAL RATE OF RETURN**
    IRR= 10.6077 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .76775                           -4373.42

**INTERNAL RATE OF RETURN**
    IRR= 10.9517 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 0 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .661392                          -6767.33

**INTERNAL RATE OF RETURN**
    IRR= 9.86407 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .698662                          -6104.43

**INTERNAL RATE OF RETURN**
    IRR= 10.214 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .727531                          -5445.31

**INTERNAL RATE OF RETURN**
    IRR= 10.5524 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit =-5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .342642                          -10503.9

**INTERNAL RATE OF RETURN**
    IRR= 8.4941 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit = 0 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .371202                          -9923

**INTERNAL RATE OF RETURN**
    IRR= 8.84187 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit = 5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .399762                          -9242.08

**INTERNAL RATE OF RETURN**
    IRR= 9.17733 %
```

. . . .

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit = 10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .471156                          -6497.4

**INTERNAL RATE OF RETURN**
    IRR= 10.1775 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit =-10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .338562                          -10193

**INTERNAL RATE OF RETURN**
    IRR= 8.44335 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit =-5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .368402                          -9532.04

**INTERNAL RATE OF RETURN**
    IRR= 8.8093 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit = 0 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .398002                          -8871.12

**INTERNAL RATE OF RETURN**
    IRR= 9.16162 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit = 10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .458242                          -7549.28

**INTERNAL RATE OF RETURN**
    IRR= 9.83011 %

*** In Case Of ***
Cost = 10 %    Benefit =-10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .314082                          -11264.8

**INTERNAL RATE OF RETURN**
    IRR= 8.13279 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit =-10 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .36349                           -9141.09

**INTERNAL RATE OF RETURN**
    IRR= 8.77324 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit =-5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .396904                          -8480.17

**INTERNAL RATE OF RETURN**
    IRR= 9.1443 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit = 5 %
**Cost-Benefit Ratio**          **Net Present Vallue**
     .439738                          -7150.32

**INTERNAL RATE OF RETURN**
    IRR= 9.84425 %
```

Plan 4

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 0 %

Cost-Benefit Ratio   ***Net Present Value**
.69652   -6002.63

INTERNAL RATE OF RETURN

IRR= 10.2173 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 5 %

Cost-Benefit Ratio   ***Net Present Value**
.731346   -5213.0

INTERNAL RATE OF RETURN

IRR= 10.574 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 10 %

Cost-Benefit Ratio   ***Net Present Value**
.766172   -4424.96

INTERNAL RATE OF RETURN

IRR= 10.9192 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 0 %

Cost-Benefit Ratio   ***Net Present Value**
.659961   -7101.49

INTERNAL RATE OF RETURN

IRR= 9.82030 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 5 %

Cost-Benefit Ratio   ***Net Present Value**
.692058   -6412.63

INTERNAL RATE OF RETURN

IRR= 10.1791 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 10 %

Cost-Benefit Ratio   ***Net Present Value**
.725047   -5723.82

INTERNAL RATE OF RETURN

IRR= 10.5105 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit =-10 %

Cost-Benefit Ratio   ***Net Present Value**
.564181   -9570.01

INTERNAL RATE OF RETURN

IRR= 8.73692 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit =-5 %

Cost-Benefit Ratio   ***Net Present Value**
.595326   -8869.10

INTERNAL RATE OF RETURN

IRR= 9.10785 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit = 5 %

Cost-Benefit Ratio   ***Net Present Value**
.630211   -7511.51

INTERNAL RATE OF RETURN

IRR= 9.8103 %

. . . .

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit = 10 %

Cost-Benefit Ratio   ***Net Present Value**
.687555   -6822.67

INTERNAL RATE OF RETURN

IRR= 10.1445 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit =-10 %

Cost-Benefit Ratio   ***Net Present Value**
.537315   -10676.9

INTERNAL RATE OF RETURN

IRR= 8.40718 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit =-5 %

Cost-Benefit Ratio   ***Net Present Value**
.567164   -9980.02

INTERNAL RATE OF RETURN

IRR= 8.77284 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit = 0 %

Cost-Benefit Ratio   ***Net Present Value**
.597017   -9277.17

INTERNAL RATE OF RETURN

IRR= 9.12517 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit = 10 %

Cost-Benefit Ratio   ***Net Present Value**
.656719   -7921.32

INTERNAL RATE OF RETURN

IRR= 9.79433 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit =-10 %

Cost-Benefit Ratio   ***Net Present Value**
.512872   -11775.7

INTERNAL RATE OF RETURN

IRR= 8.09705 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit =-5 %

Cost-Benefit Ratio   ***Net Present Value**
.541386   -11096.9

INTERNAL RATE OF RETURN

IRR= 8.45788 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit = 0 %

Cost-Benefit Ratio   ***Net Present Value**
.56988   -10378

INTERNAL RATE OF RETURN

IRR= 8.80542 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit = 5 %

Cost-Benefit Ratio   ***Net Present Value**
.598376   -9707.21

INTERNAL RATE OF RETURN

IRR= 9.14088 %

Table V - 25

Plan 5

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 0 %

Cost-Benefit Ratio   **Net Present Vallue**
.632349   -8437.54

INTERNAL RATE OF RETURN

IRR= 9.63944 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 5 %

Cost-Benefit Ratio   **Net Present Vallue**
.663963   -7894.73

INTERNAL RATE OF RETURN

IRR= 9.9765 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 %   Benefit = 10 %

Cost-Benefit Ratio   **Net Present Vallue**
.693383   -7151.72

INTERNAL RATE OF RETURN

IRR= 10.2987 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 0 %

Cost-Benefit Ratio   **Net Present Vallue**
.599066   -9962.76

INTERNAL RATE OF RETURN

IRR= 9.27395 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 5 %

Cost-Benefit Ratio   **Net Present Vallue**
.62902   -9197.75

INTERNAL RATE OF RETURN

IRR= 9.6035 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 %   Benefit = 10 %

Cost-Benefit Ratio   **Net Present Vallue**
.630773   -8437.16

INTERNAL RATE OF RETURN

IRR= 9.92234 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit =-10 %

Cost-Benefit Ratio   **Net Present Vallue**
.512202   -12733.6

INTERNAL RATE OF RETURN

IRR= 8.24784 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit =-5 %

Cost-Benefit Ratio   **Net Present Vallue**
.540657   -11990.8

INTERNAL RATE OF RETURN

IRR= 8.59663 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit = 5 %

Cost-Benefit Ratio   **Net Present Vallue**
.577369   -10505.2

INTERNAL RATE OF RETURN

IRR= 9.25717 %

. . . .

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 %   Benefit = 10 %

Cost-Benefit Ratio   **Net Present Vallue**
.626028   -9762.35

INTERNAL RATE OF RETURN

IRR= 9.37106 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit =-10 %

Cost-Benefit Ratio   **Net Present Vallue**
.497011   -14038.9

INTERNAL RATE OF RETURN

IRR= 7.93779 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit =-5 %

Cost-Benefit Ratio   **Net Present Vallue**
.518912   -13296

INTERNAL RATE OF RETURN

IRR= 8.70165 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit = 0 %

Cost-Benefit Ratio   **Net Present Vallue**
.542053   -12553.2

INTERNAL RATE OF RETURN

IRR= 8.61292 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 %   Benefit = 10 %

Cost-Benefit Ratio   **Net Present Vallue**
.596216   -11067.6

INTERNAL RATE OF RETURN

IRR= 9.24197 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit =-10 %

Cost-Benefit Ratio   **Net Present Vallue**
.465630   -15344

INTERNAL RATE OF RETURN

IRR= 7.66612 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit =-5 %

Cost-Benefit Ratio   **Net Present Vallue**
.491507   -14401.2

INTERNAL RATE OF RETURN

IRR= 7.98566 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit = 0 %

Cost-Benefit Ratio   **Net Present Vallue**
.517376   -13858.4

INTERNAL RATE OF RETURN

IRR= 8.31226 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 %   Benefit = 5 %

Cost-Benefit Ratio   **Net Present Vallue**
.543786   -13115.6

INTERNAL RATE OF RETURN

IRR= 8.62769 %

Table V - 26

Water Consumption Record and Water-Charge Rate

(1) Water Consumption

No. of Joint (gauge)	Approx.8,000
Volume of consumption 3 months average in/by water source in 1983	
Private house	337,852 m³
Shop	13,108 m³
Factory	14,674 m³
Total	413,099 m³

(2) Water-charge rate

* private house	
up to 75 m³ (as fixed)	LE 1.50
76 - 150 m³ (additional)	0.05/m³
151 - 240 m³	0.10/m³
over 241	0.15/m³
* Factory	
up to 15 m³ (as fixed)	LE 1.50/m³
16 - 150 m³ (as fixed)	15.00/m³ plus addtional 0.10/m³
151 - 240 m³ (every 3 months additional)	0.15/m³
over 241 m³	0.25/m³

(3) Consumption/expense

Approximate average consumption versus expense in case of private house seems, accroding to the past experience, to be 30 LE/year per joint(gauge).

Sorces : Engineering Dept., City Council
Section of Water-charge collection, City Council

Table V - 27

The Record of Water-Revenue,
as of the Year 1983/1984

	(Month)	(LE)
1983	July	4,637.750
	August	7,712.460
	September	4,357.570
	October	13,752.196
	November	8,347.830
	December	9,760.012
1984	January	10,258.890
	February	10,948.020
	March	26,361.230
	April	3,852.825
	May	12,681.453
	June	15,952.420
Total		129,622.656

Remarks : Collection rate 60 - 70%.
Collected from all users of private, official and general consumption in the urban area of El Arish City.

Source : Chief Accountant Office, City Council, NSG

Table V - 28

Interim Report for Family Expenditure.
as for July - September of 1981

Food	54.7%
Cloth	14.1%
House	6.4
spirit and tobacco	4.9
Capital goods and furniture	2.5
Electricity and fuel	2.4
Public transportation	2.1
Medical care	1.9
Meal. outside of home	1.6
Cosmetics and pocket-money	1.6
Education	13
Sports and culture	1.1
Laundry	1.1
Private car purchasement	0.9
Gasolin and oil	0.4
Others	0.8

Souce :Central Agency for Public Mobilization and Statistics, March 1982

Table V - 29

Conversion Factors

Standard conversion factor	0.965
Intermediate goods	0.980
Capital : building	1.120
" machinery	0.965
" vehcle	0.910
Skilled labour , urban in formal sector	1.120
Unskilled labour	0.395
" , rural in formal sector	0.224
Consumption conversion factor	
urban	1.118
rural	1.070

* Traded goods

aluminum	1.061	cement	2.185
electri machinery	0.965	electrical distribution machine	0.830
electrical motor	0.849	iro & steel products	0.937
iron & steel building material	2.358	machinery, for metal working	0.965
machinery, for office	0.768	machinery, spare parts	0.965
metal products	0.899	paint & pigment	0.911
paper & printing	0.951	plastic	0.810
rubber product	0.783	tire & tube	0.818
telecomm. equip.	0.870	truch & lorry	0.910
wood.crude	0.994	wood, product	0.975
vehcle spare	0.868		

* Agricultural input & output

agricultural machinery	1.159	bags	1.280
" , spare	1.021	fertilizer	1.663
pesticide	1.976	seed	1.149
onion	4.259	sugar	0.9690

* Petroleum products

diesel	6.751	fuel oil	15.299
gas oil	6.265	kerosene	5.883

* Non-traded goods

building & construction	1.669	building material	3.773
electricity	3.371	housing, rural	1.626

Source : Shadow Price for Trade Strategy and Investment Planning in Egypt. World Bank No. 521/1982

Table V - 30

Import, 1979 - 1983, by Commodity

C.I.F., LE 1,000

	1979	1980	1981	1982	1983
Petroleum	14,585	23,408	138,415	221,512	367,159
Raw Mterials for Foods	328,715	473,560	890,152	749,279	696,615
Inte rmediate Commodity	894,036	1,276669	1,959.094	2,033,159	1,338,612
fats & oil, animals	74,971	79,718	84,633	108,704	124,557
oil, non animals	6,149	11,721	35,597	33,745	39,130
chemicals, organic & non-organic	52,629	86,090	130,138	122,307	138,212
dyeing	10,382	22,435	16,304	15,996	17,694
fertilizer	13,737	25,361	72,392	15,977	17,483
wood	98,883	191,640	265,297	242,981	287,121
asphalt	99,001	103,096	164,915	250,129	321,489
paper, for news paper	4,009	10,198	22,097	29,774	22,251
steel, reinforced	99,933	180,395	152,232	172,192	180,020
tin metal	22,907	26,452	40,154	40,564	64,806
chemical, concentrated	40,779	58,139	80,633	96,267	109,909
Capital Goods	823,284	832,945	1,588,246	1,682,435	2,105,378
internal combastion engines	12,260	9,123	44,005	25,230	109,404
spinning machines & parts	41,122	44,966	70,413	74,081	95,733
tractors, with lifts	12,533	19,476	58,160	31,268	22,661
auto-bus	16,031	15,566	27,053	20,983	13,919
cars, for transport & transport goods	102,611	117,767	221,959	168,696	190,729
sparparts, for cars & tractors	84,488	44,581	161,145	165,271	199,387
airplanes, parts	375	870	3,990	2,171	314
air pumps	24,902	32,955	66,280	70,047	66,516
moters & parts materials	22,446	22,991	34,816	36,439	37,125
drilling,parts	67,544	78,101	95,109	132,673	109,482
generators	30,256	35,520	58,840	66,656	85,725
electric parts	20,070	26,918	58,641	54,740	79,686
Concummer Goods	625,592	795,417	1,611,579	1,568,132	1,684,893
Durable	169,371	166,746	311,599	417,456	476,883
cars	83,688	83,546	133,118	177,976	215,335
refrigerators	1,805	868	5,441	11,612	6,740
telephone	29,420	22,677	54,021	86,340	98,791
Not-Durable	456,221	628,671	1,299,980	1,150,676	1,208,010
Grand Total	2,787,212	3,401,999	6,187,486	6,354,517	7,192,607

Table V - 31

Export, 1979 - 1983, by Commodity

F.O.B LE 1,000

	1979	1980	1981	1982	1983
Petroleum	535,438	1,370,572	1,457,321	1,446,680	1,400,664
Raw Cotton	267,277	296,372	319,964	286,021	308,775
Raw Mterials	82,561	104,563	104,443	134,849	155,396
fresh onions	3,304	8,150	4,738	3,700	8,198
potatos	18,812	22,744	17,928	28,762	21,436
oranges	14,410	27,238	32,980	36,835	50,660
peaqnutt	4,057	7,306	3,379	2,700	3,439
kettan, raw	6,256	4,716	3,717	2,438	4,102
Half-Manufacturing Commodity	209,245	208,826	225,939	168,452	176,739
cotton, yarn	130,098	135,869	108,603	86,625	137,142
oil, perfume	6,924	1,058	3,230	7,934	8,532
aluminum,raw	32,116	35,391	77,803	46,237	5,823
Manufacturings Commodity	193,284	151,845	155,315	148,125	209,721
rice	22,072	22,996	28,738	7,596	4,955
dried onion	5,099	5,922	6,887	6,496	7,325
sugar	8,894	3,014	10,422	6,172	7,325
food, cereal	5,657	6,978	7,391	4,605	2,800
shoes	3,200	630	1,692	1,626	2,022
cotton, textile	41,012	36,723	23,524	15,802	28,311
garmets	14,996	19,500	15,716	14,348	12,596
alcholic beverage	6,868	3,201	4,119	4,000	1,432
cosmetic	7,100	9,304	2,700	3,637	12,735
furniture	2,590	1,692	1,750	1,681	1,422
medicine	1,430	3,119999	2,408	4,436	4,558
leather	4,651	1,169	2,865	2,255	3,776
aluminum, reinforced	31,035	15,268	14,413	34,708	61,064
tin plate, iron & steel	814	-	-	4,700	6,205
Grand Total	1,287,805	2,132,178	2,262,982	2,184,122	2,250,295

Table V - 32

Actual Recors of Custom and Subsidity

(LE million)

	SUBSIDY	CUSTOM
1980/81	1,563.0	1,161.2
1981/82	2,000.0	1,458.5
1982/83	2,040.0	1,951.0
1983/84	1,686.4	2,300.0

Remarks : Subsidy is used to be composed of ;

1. foods such as wheat, flour, vegitable oil, sugar, tea etc,
2. interest subsidy for agriculture, food products promotion and housing .
3. cloth
4. butane gas
5. fertilizer and pesticide
6. pubiic transportation
7. others including medicine and papers for printing.

Source : General State Budget, Ministry of Finance

Table V - 33

Rates of Taxes, Subsidies and Net Taxation, by Income Group (percentage)

	Income group		
	Lowest 60%	Middle 30%	Top 10%
Taxes, direct and indirect	12	15	17
subsidies	9	7	4
Net taxation	3	8	13

Source : Employment Opportunity and Equity in Egypt. ILO. 1982

ECONOMIC ANALYSIS

Table V - 34

Plan 3

(INPUT DATA)

Year	cost	benefit	net cash flow
1	914	0	-914
2	2877	0	-2877
3	3507	0	-3507
4	4971	0	-4971
5	4975	0	-4975
6	4246	0	-4246
7	2259	684	-1575
8	2263	854	-1409
9	2556	1075	-1481
10	1693	1358	-335
11	2447	1687	-760
12	2737	2008	-729
13	2743	2405	-338
14	2145	2853	708
15	1540	3297	1757
16	1555	3346	1791
17	1659	4584	2925
18	1457	5306	3849
19	1477	6267	4790
20	1495	7350	5855
21	1516	8541	7025
:	:	:	:
:	:	:	:
50	1516	8541	7025
Total	94996	299304	204308

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	914	0	-914
2	2546.02	0	-2546.02
3	2746.5	0	-2746.5
4	3445.15	0	-3445.15
5	3051.26	0	-3051.26
6	2304.56	0	-2304.56
7	1085.04	328.538	-756.502
8	961.912	363.002	-598.91
9	961.465	404.372	-557.093
10	563.574	452.058	-111.516
11	720.858	496.971	-223.887
12	713.529	523.481	-190.049
13	632.826	554.848	-77.9786
14	437.933	582.481	144.548
15	278.242	595.691	317.449
16	248.63	534.994	286.364
17	234.742	648.619	413.877
18	182.443	664.406	481.964
19	163.67	694.461	530.791
20	146.606	720.77	574.165
21	131.562	741.208	609.646
:	:	:	:
:	:	:	:
50	3.80063	21.4124	17.6118
Total	23453.3	13842.8	-9610.51

COST-BENEFIT RATIO

B/C ..... .590228

NET PRESENT VALUE

NPV .....-9610.51

INTERNAL RATE OF RETURN

IRR= 8.77226 %

ECONOMIC ANALYSIS Table V - 35 Plan 4

(INPUT DATA)

Year	cost	benefit	net cash flow
1	995	0	-995
2	3183	0	-3183
3	3816	0	-3816
4	5276	0	-5276
5	5276	0	-5276
6	4591	0	-4591
7	2672	857	-1815
8	2687	1078	-1609
9	2548	1278	-1270
10	2177	1581	-596
11	2318	1889	-429
12	2581	2224	-357
13	2590	2542	-48
14	1985	2943	958
15	1409	3401	1992
16	1422	3968	2546
17	1476	4715	3239
18	1301	5446	4145
19	1318	6272	4954
20	1335	7425	6090
21	1354	8548	7194
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	1354	8548	7194
Total	91576	302059	210483

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	995	0	-995
2	2816.81	0	-2816.81
3	2988.49	0	-2988.49
4	3656.53	0	-3656.53
5	3235.87	0	-3235.87
6	2491.81	0	-2491.81
7	1283.41	411.633	-871.778
8	1142.14	458.215	-683.923
9	958.455	480.732	-477.723
10	724.69	526.291	-198.399
11	682.856	556.477	-126.378
12	672.861	579.792	-93.0691
13	597.528	586.454	-11.0739
14	405.267	600.856	195.59
15	254.573	614.481	359.908
16	227.365	634.447	407.082
17	208.848	667.155	458.306
18	162.909	681.937	519.028
19	146.051	695.015	548.964
20	130.915	728.125	597.21
21	117.503	741.815	624.312
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
50	3.39449	21.4299	18.0354
Total	24777.6	14504.9	-10272.8

COST-BENEFIT RATIO

B/C ..... .585401

NET PRESENT VALUE

NPV .....-10272.8

INTERNAL RATE OF RETURN

IRR= 8.7226 %

Table V - 36

Plan 5

ECONOMIC ANALYSIS

(INPUT DATA)

Year	cost	benefit	net cash flow
1	1675	0	-1675
2	4047	0	-4047
3	4357	0	-4357
4	4910	0	-4910
5	5685	0	-5685
6	6298	0	-6298
7	5841	0	-5841
8	5319	0	-5319
9	3134	1880	-1254
10	3448	2315	-1133
11	3470	2809	-661
12	498	3118	2620
13	502	3466	2964
14	436	3969	3533
15	445	4375	3930
16	414	4900	4486
17	417	5543	5126
18	426	6122	5696
19	280	6857	6577
20	293	7748	7455
21	300	8544	8244
:	:	:	:
:	:	:	:
50	300	8544	8244
Total	60895	309422	248527

Cost = 0 % Benefit = 0 %

**Discounted at the rate of 13 %

Year	cost	benefit	net cash flow
1	1675	0	-1675
2	3581.42	0	-3581.42
3	3412.17	0	-3412.17
4	3402.88	0	-3402.88
5	3486.72	0	-3486.72
6	3418.3	0	-3418.3
7	2805.54	0	-2805.54
8	2260.9	0	-2260.9
9	1178.89	707.181	-471.704
10	1147.79	770.628	-377.158
11	1022.22	827.499	-194.723
12	129.827	812.855	683.028
13	115.814	799.627	683.812
14	89.0157	810.329	721.313
15	80.4011	790.46	710.059
16	66.1948	783.465	717.27
17	59.0039	784.314	725.31
18	53.3428	766.584	713.241
19	31.0274	759.84	728.813
20	28.7327	759.8	731.067
21	26.0347	741.468	715.433
:	:	:	:
:	:	:	:
50	.752103	21.4199	20.6678
Total	28265.7	15652.9	-12612.8

COST-BENEFIT RATIO

B/C ..... .553777

NET PRESENT VALUE

NPV .....-12612.8

INTERNAL RATE OF RETURN

IRR= 8.75425 %

Table V - 37

Plan 3

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 0 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .655609                         -7265.17

**INTERNAL RATE OF RETURN**

    IRR= 9.57985 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .688399                         -6579.03

**INTERNAL RATE OF RETURN**

    IRR= 9.95922 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-10 %    Benefit = 10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .72139                          -5880.89

**INTERNAL RATE OF RETURN**

    IRR= 10.3344 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 0 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .621272                         -8437.44

**INTERNAL RATE OF RETURN**

    IRR= 9.14355 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .652357                         -7745.71

**INTERNAL RATE OF RETURN**

    IRR= 9.53903 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost =-5 %    Benefit = 10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .683422                         -7053.57

**INTERNAL RATE OF RETURN**

    IRR= 9.9003 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit =-10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .531205                         -10994.8

**INTERNAL RATE OF RETURN**

    IRR= 7.97842 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit =-5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .560716                         -10302.7

**INTERNAL RATE OF RETURN**

    IRR= 8.38422 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit = 5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .619739                         -8918.37

**INTERNAL RATE OF RETURN**

    IRR= 9.14430 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 0 %    Benefit = 10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .64925                          -8224.23

**INTERNAL RATE OF RETURN**

    IRR= 9.50215 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit =-10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .50571                          -12167.5

**INTERNAL RATE OF RETURN**

    IRR= 7.61471 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit =-5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .534016                         -11475.3

**INTERNAL RATE OF RETURN**

    IRR= 8.01789 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit = 0 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .562122                         -10783.2

**INTERNAL RATE OF RETURN**

    IRR= 8.40308 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 5 %    Benefit = 10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .618334                         -9398.9

**INTERNAL RATE OF RETURN**

    IRR= 9.12699 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit =-10 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .482714                         -13340.1

**INTERNAL RATE OF RETURN**

    IRR= 7.26987 %
```

```
**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit =-5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .509742                         -12648

**INTERNAL RATE OF RETURN**

    IRR= 7.47083 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit = 0 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .536571                         -11955.8

**INTERNAL RATE OF RETURN**

    IRR= 8.05362 %

**Discounted at the rate of  13 %

*** In Case Of ***
Cost = 10 %    Benefit = 5 %

**Cost-Benefit Ratio**          **Net Present Vallue*
     .563399                         -11263.7

**INTERNAL RATE OF RETURN**

    IRR= 8.42021 %
```

Plan 4

Discounted at the rate of	Cost	Benefit	Cost-Benefit Ration	Net Present Vallue	INTERNAL RATE OF RETURN (IRR)
13 %	-10 %	0 %	.430931	-7784.19	9.52491 %
13 %	-10 %	5 %	.483478	-7038.4	9.90081 %
13 %	-10 %	10 %	.714025	-4332.42	10.2433 %
13 %	-5 %	0 %	.414672	-9023.07	9.11317 %
13 %	-5 %	5 %	.447303	-8277.29	9.4845 %
13 %	-5 %	10 %	.478379	-7571.3	9.84236 %
13 %	0 %	-10 %	.327234	-11713.5	7.94548 %
13 %	0 %	-5 %	.354546	-10987.7	8.34444 %
13 %	0 %	5 %	.41313	-9326.17	9.09422 %
13 %	0 %	10 %	.444422	-8810.38	9.448 %
13 %	5 %	-10 %	.302147	-12752.4	7.38885 %
13 %	5 %	-5 %	.330044	-12224.6	7.98465 %
13 %	5 %	0 %	.357941	-11500.8	8.3632 %
13 %	5 %	10 %	.413732	-10049.2	9.07705 %
13 %	10 %	-10 %	.279322	-14171.3	7.2512 %
13 %	10 %	-5 %	.305751	-13445.3	7.44385 %
13 %	10 %	0 %	.33758	-12739.7	8.01955 %
13 %	10 %	5 %	.357209	-12013.9	8.30005 %

Table V - 39

Plan 5

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 % Benefit = 0 %

Cost-Benefit Ratio .615307 **Net Present Vallue** =-9786.24

INTERNAL RATE OF RETURN

IRR= 9.45342 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 % Benefit = 5 %

Cost-Benefit Ratio .646073 **Net Present Vallue** =-9003.6

INTERNAL RATE OF RETURN

IRR= 9.78508 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-10 % Benefit = 10 %

Cost-Benefit Ratio .676836 **Net Present Vallue** =-8270.95

INTERNAL RATE OF RETURN

IRR= 10.1043 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 % Benefit = 0 %

Cost-Benefit Ratio .582923 **Net Present Vallue** =-11199.5

INTERNAL RATE OF RETURN

IRR= 9.09170 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 % Benefit = 5 %

Cost-Benefit Ratio .612049 **Net Present Vallue** =-10416.9

INTERNAL RATE OF RETURN

IRR= 9.41786 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost =-5 % Benefit = 10 %

Cost-Benefit Ratio .641215 **Net Present Vallue** =-9634.23

INTERNAL RATE OF RETURN

IRR= 9.73344 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 % Benefit =-10 %

Cost-Benefit Ratio .478377 **Net Present Vallue** =-14178.1

INTERNAL RATE OF RETURN

IRR= 8.07729 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 % Benefit =-5 %

Cost-Benefit Ratio .526088 **Net Present Vallue** =-12993.4

INTERNAL RATE OF RETURN

IRR= 8.42177 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 % Benefit = 5 %

Cost-Benefit Ratio .581444 **Net Present Vallue** =-11820.2

INTERNAL RATE OF RETURN

IRR= 9.07518 %

* *

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 0 % Benefit =-10 %

Cost-Benefit Ratio .609133 **Net Present Vallue** =-11067.5

INTERNAL RATE OF RETURN

IRR= 9.38576 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 % Benefit =-10 %

Cost-Benefit Ratio .474444 **Net Present Vallue** =-13591.4

INTERNAL RATE OF RETURN

IRR= 7.77098 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 % Benefit =-5 %

Cost-Benefit Ratio .501936 **Net Present Vallue** =-14808.7

INTERNAL RATE OF RETURN

IRR= 8.11069 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 % Benefit = 0 %

Cost-Benefit Ratio .527404 **Net Present Vallue** =-14026.1

INTERNAL RATE OF RETURN

IRR= 8.43808 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 5 % Benefit = 10 %

Cost-Benefit Ratio .580147 **Net Present Vallue** =-12460.8

INTERNAL RATE OF RETURN

IRR= 9.06016 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 % Benefit =-10 %

Cost-Benefit Ratio .45309 **Net Present Vallue** =-17004.7

INTERNAL RATE OF RETURN

IRR= 7.48277 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 % Benefit =-5 %

Cost-Benefit Ratio .478262 **Net Present Vallue** =-16222

INTERNAL RATE OF RETURN

IRR= 7.81808 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 % Benefit = 0 %

Cost-Benefit Ratio .503433 **Net Present Vallue** =-15439.4

INTERNAL RATE OF RETURN

IRR= 8.14074 %

**Discounted at the rate of 13 %

*** In Case Of ***
Cost = 10 % Benefit = 5 %

Cost-Benefit Ratio .528605 **Net Present Vallue** =-14656.7

INTERNAL RATE OF RETURN

IRR= 8.45269 %

Table V - 40

A Summary of Balance of Payment of NSG

for the Year 1982/83

Inflow		Outflow	
Tax, direct concerned	1,058,205	Salary & Wage	8,018,980
Charge, Fee & Custom	11,598,320	Continuos Expense	4,637,545
Capital Revenue	9,745,290	Initial Investment	9,745,290
Others including indirect tax	7,213,447	Capital Expenditure	7,213,447
Total	29,615,262		29,615,262

Source : Gnenral Manager's Office of

Financial Dept., NSG.

Table V-41

GPD 1981/82: 1982/83 - 1986/87

(Constant Price of 1981/82 in Mill. L.E.)

Sections	Expected	Targets		Annual Rate of Growth (%)		Relative Shares		
	81/82	82/83	86/87	82/83 / 81/82	86/87 / 81/82	81/82	82/83	86/87
Agriculture3,891.5	3891.5	4,000.0	4,660.0	2.8.0	3.7.0	19.8	18.8	16.1.0
Industry and Mining	2,665.2	29.5.8	4,359.4	9.0	10.3	13.6	13.6	15.1
Oil and Oil products	2,945.2	3,547.6	5,238.9	20.5	12.2	15.0	16.6	18.1
Electricity	117.3	126.8	194.6	8.1	10.7	0.6	0.6	0.7
Construction	930.2	1,004.7	1,384.0	8.0	8.3	4.7	4.7	4.8
Total, Commodity Sectors	10,549.4	11,584.9	15,836.9	9.8	8.5	53.7	54.3	54.8
Transportation, Storage and Communication	858.8	916.0	1,363.3	6.7	9.7	4.4	4.3	4.7
Suez Canal	692.6	719.6	899.0	3.9	5.4	3.5	3.4	3.1
Commerce	2,510.0	2,680.4	3,488.0	6.8	6.8	12.8	12.6	12.1
Finance	1,040.0	1,097.0	1,455.0	5.5	6.9	5.3	5.2	5.0
Insurance	47.0	51.3	69.0	9.1	8.0	0.2	0.2	0.2
Restaurants and Hotels	230.5	239.5	323.3	4.0	7.0	1.2	1.1	1.1
Total, productive services sectors	5,378.9	5,703.8	7,597.6	6.0	7.2	27.4	26.8	26.2
House Property	356.6	401.0	548.7	12.5	9.0	1.8	1.9	1.9
Public Utilities	37.7	42.0	72.3	11.4	13.9	0.2	0.2	0.2
Social Personal Serices	809.6	866.0	1,126.8	7.0	6.8	4.1	4.1	3.9
Social Insurance	20.6	22.3	30.3	8.3	8.0	0.1	0.1	0.1
Government Services	2,486.0	2,696.0	3,707.4	8.4	8.3	12.7	12.6	12.8
Total Social Services Sectors	3,710.5	4,027.3	5,485.5	8.5	8.1	18.9	18.9	19.0
Grand Total	19,638.8	21,316.0	28,920.0	8.5	8.1	100.0	100.0	100.0

Source : the Five-Year Plan

Table V-42

Development of Total Employment Over
1981/87 - 1986/87

Sector	1981/82	1986/87
Agroculture	4,427.5	4,738.0
Mining	39.5	46.1
Manufacturing	1,423.2	1,863.2
Oil and Oil Products	24.5	28.1
Electricity	64.2	80.9
Construction	664.1	912.0
Total Commodity Sectors:	6,463.0	7,668.3
Transportation and Comminucation	433.3	538.1
Suez Canal	18.8	20.7
Commerce	1,103.8	1,332.3
Finance	71.9	87.8
Insurance	13.6	18.0
Tourism, Hotels & Restaurants	140.5	170.3
Total Productive Services Sectors	1,781.9	2,167.1
House Property	171.3	244.8
Public Utilities	66.2	85.9
Social and Personal Services	895.6	993.5
Social Insurance	29.5	39.4
Government Services	2,137.4	2,637.8
Total Social Services Sectors:	3,480.0	4,001.4
Grand Total	11,724.9	13,835.8

Source: the Five-Year Plan

Table V-43

Grand Total of Main Investment in the Five-Year Plan Distributed by Sectors and Financial components

(in Million L.E.)

Sectors	Grand Total	Local	Foreign		
			Total	Currency	Credit Facilities
Agriculture & Land Reclamation	889.7	688/5	201.2	133.7	67.5
Irrigation & Drainage	1,831.0	1,424.8	406.2	156.0	250.2
Industry & Mining	6,841.9	3,424.8	2,317.1	1,508.4	1,908.7
Petroleum	624.4	176.1	448.3	258.3	190.0
Electricity	2,844.8	1,224.8	1,620.0	352,5	1,267.5
Construction	526.7	182.9	343.8	143.1	200.7
Total Commodity Sectors	13,558.5	7,121.9	6,436.6	25,552.0	3,884.6
Transp., Communic. & Storage	5,117.5	3,185.4	1,932.1	644.0	1,288.1
Suez Canal	335.0	169.5	165.5	105.0	60.5
Commerce	385.1	229.3	155.8	60.4	95.4
Fiance & Insurance	9.2	6.5	2.7	0.5	2.2
Tourism	312.5	202.9	109.6	71.7	37.9
Total Productive Service Sectors	6,159.3	3,793.6	2,365.7	881.6	1,484.1
Housing	263.0	228.6	34.4	3.0	31.4
Public Utilities	2,858.1	2,176.0	682.1	316.7	365.4
Education	898.3	691.8	206.3	106.0	101.5
Health	624.7	323.4	301.3	65.3	236.0
Other Services	852.5	659.0	193.5	123.1	70.4
Total Social Services	5,496.6	4,078.8	1,417.8	613.1	804.7
Total Fixed Investment	25,214.4	14,994.3	10,220.1	4,046.7	6,173.4
Investment Expenditure	578.4	378.8	199.6	139,0	60.6
Grand Total Investments	25,792.8	15,373.1	10,419.7	4,185.7	6,234.0

Source: the Five-Year Plan