

Prepared By
The United Nations
Relief and Works Agency For
Palestine Refugees in the Near East
and
The Permanent Council for the Development
of National Production
of
The Republic of Egypt

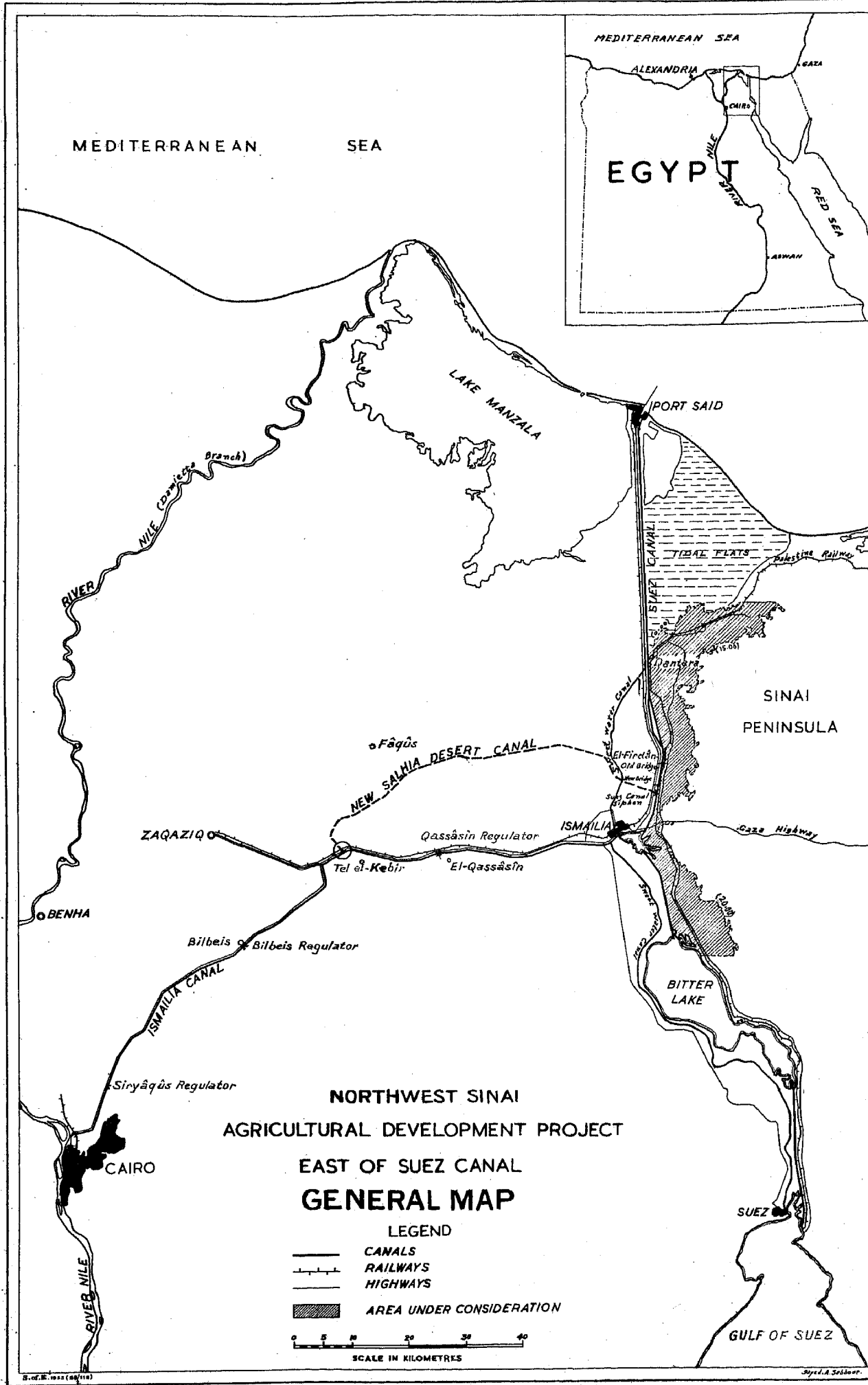
S U R V E Y R E P O R T

N O R T H W E S T S I N A I P R O J E C T

R E P U B L I C O F E G Y P T

Northwest Sinai Project Investigation Staff
Cairo, Egypt

July, 1955



MEDITERRANEAN SEA

MEDITERRANEAN SEA

EGYPT

LAKE MANZALA

PORT SAID

NILE (Damietta Branch)

TIDAL FLATS

SINAI PENINSULA

NEW SALHIA DESERT CANAL

ZAQAZIQO

Qassâsîn Regulator

ISMAILIA

Gaza Highway

BENHA

Bilbeis & Bilbeis Regulator

ISMAILIA CANAL

Siryâqûs Regulator

CAIRO

BITTER LAKE

NORTHWEST SINAI

AGRICULTURAL DEVELOPMENT PROJECT

EAST OF SUEZ CANAL

GENERAL MAP

LEGEND

- CANALS
- RAILWAYS
- HIGHWAYS
- ▨ AREA UNDER CONSIDERATION

SCALE IN KILOMETRES

SUEZ

GULF OF SUEZ

Cairo,
28th of July, 1955

The Minister of Production,
The Government of the Republic of Egypt,
Cairo; and

The Director of the United Nations Relief and
Works Agency for Palestine Refugees in the
Near East, UNRWA Headquarters, Beirut,
Lebanon.

The offices of the undersigned were delegated in October, 1953, by the Government of the Republic of Egypt and the United Nations Relief and Works Agency for Palestine Refugees in the Near East, with the joint responsibility of directing a survey project of which the object was to determine the feasibility and estimated cost of a scheme which is outlined in a project agreement dated the 14th of October, 1953, and signed, on behalf of the Republic of Egypt, by the Chairman of the Permanent Council for the Development of National Production, and, on behalf of the United Nations Relief and Works Agency for Palestine Refugees, by the UNRWA Representative to Egypt. In the performance of this task the Co-Directors have been assisted by the Director of the Palestine Affairs Office of the Ministry of War and by a Joint Policy Committee of which he is a member.

The principal features of this scheme are the conveyance of irrigation water from the Nile River to a part of the Sinai, east of and adjacent to the Suez Canal, and its deployment thereon for the purpose of reclaiming and permanently irrigating an area of not less than 50,000 feddans which the Egyptian Government has offered as a

possible means of livelihood for Palestine refugees now residing in the Gaza Strip.

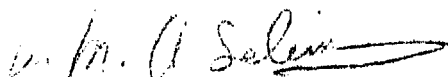
The investigations which have been made cover principally the three broad fields of irrigation engineering, agriculture and refugee rehabilitation. With regard to the work carried out directly by Egyptian Government Departments, the services rendered by their permanent staff have been contributed by the Egyptian Government. Otherwise, all the costs of the investigations have been met from the UNRWA rehabilitation fund. The results of these surveys and studies have been put together jointly by Egyptian Government and UNRWA personnel and are embodied in the attached report entitled "Survey Report, Northwest Sinai Project, Republic of Egypt."

The technical annexes, from which the respective parts of the Survey Report have been compiled, and which furnish more details of the work which has been done, are not yet available for publication. It is the intention that they shall be published successively in the immediately following months and in a form that will assist the compilation of such detailed planning reports that may later be required. The Survey Report has been so written as to make the technical annexes unnecessary for an understanding of the conclusions and recommendations presented in the report itself.

In presenting this Survey Report for your consideration, the Co-Directors wish to place on record their appreciation of the services rendered by the staff of the Permanent Council for the Development of National Production, and, by the technical departments of the Ministries of Public Works and Agriculture, as well as the Council of Public

Services and the Department of Statistics. They also wish to record their appreciation for the services of the engineering consultants and specialists of the UNRWA, for those of the United States International Co-operation Administration, and for the advice and facilities which they have received throughout from the Palestine Affairs Office of the Ministry of War.

Yours truly,



(Dr. Mohamed Solim)

Permanent Council for the Development
of National Production, Republic of
Egypt



(John B. Pruett)

Acting UNRWA Representative
to Egypt

I. INTRODUCTION AND GENERAL DESCRIPTION OF PROJECT AREA

Introduction

The 1948 hostilities in Palestine caused over three-quarters of a million Palestinian Arabs to flee from their homes in Palestine to neighbouring Arab States. Some 200,000 of these persons sought refuge in what is now known as the Gaza Strip, a narrow coastal area some forty kilometres long and six to twelve kilometres wide. This economically depressed area, with a total population of some 302,000 persons, has remained under the administration of the Egyptian Government.

The welfare of these refugees, who for the most part were entirely destitute, was the cause of great concern to the governments of the countries to which they fled as well as to the United Nations Organization, which appointed a mediator and subsequently a conciliation commission to treat with the conflicting parties. A number of immediate relief operations were organized for the refugees which were necessarily of a short-term duration.

On 23 August 1949 the United Nations Conciliation Commission for Palestine established an Economic Survey Mission for the purpose, inter alia, of investigating ways and means of bringing more permanent relief to the refugees through the economic development of the areas in which they were residing. That Commission recommended the establishment of a special United Nations agency to deal with the problem, and as a result, the General Assembly established the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA). The purpose of this Agency was "to carry out in collaboration with

local governments programmes of relief and works for the benefit of the Palestine Refugees in the Near East; and, secondly, to consult with those Near East governments concerning measures to be taken by them preparatory to the time when international assistance for relief and works projects would no longer be available".

The Director of the UNRWA subsequently recommended and the General Assembly authorised the establishment of a \$ 200 million rehabilitation fund to be used for refugee self-support projects requested by governments of Middle Eastern countries and recommended by the UNRWA.

The Egyptian Offer

The Egyptian Government has long expressed deep and sympathetic concern on behalf of the refugees, and despite the fact that it is itself feeling the pressure of a growing Egyptian population, its co-operation with the United Nations Relief and Works Agency in alleviating the situation in Gaza resulted in an offer to furnish facilities for a refugee self-support project in the neighbouring Egyptian territory of the Sinai.

It was clear that the utilization of large tracts of land in the Sinai, and the introduction of refugees thereon, would be dependent upon an adequate supply of water for irrigation purposes. Investigations for underground water were accordingly carried out by the UNRWA in collaboration with the Egyptian Government in the northeastern tip of the Sinai Peninsula, but these were unfruitful.

Despite this the Government continued to seek means whereby Sinai lands might be utilized for refugee benefit. Late in 1952 it

was suggested that the Nile River might be considered as a source of water supply for the irrigation of lands lying immediately east of the Suez Canal. As a result of this suggestion, the UNRWA, on 30 June 1953, concluded a programme agreement with the Egyptian Government which provided for the reservation of \$ 30 million from its rehabilitation fund. Of this sum, up to \$ 500,000, was to be used for project research purposes in the Sinai Peninsula and in Gaza. The remainder was to be used for construction and establishment, should preliminary surveys prove that feasible projects could be developed.

Project Survey Agreement

In conformity with the programme agreement, a project survey agreement between the UNRWA and the National Production Council was signed on 14 October 1953. This agreement was based on an offer of the Egyptian authorities to make available an area of not less than 50,000 faddans of undeveloped State Domain in the Northwest Sinai, to be reclaimed and irrigated permanently to provide some 10,000 refugee families presently residing in the Gaza Strip with a means of livelihood by cultivating the soil.

The purpose of the agreement was to conduct a preliminary survey for determining the feasibility and estimated cost of a plan, which would include the widening of the existing supply and navigation canal which extends from the Nile to the Suez Canal, and the construction of canals, drains, pumping stations and other necessary structures to irrigate the area; it would also include the construction of roads, housing units and a minimum of essential public utilities and common services in the project area. It was provided

that there would be an allocation of funds necessary to cover the investigations and surveys, and that the work would be carried out jointly by the UNRWA and the Egyptian Government. Egypt was to furnish technicians already in its employ and UNRWA was to provide certain necessary facilities, transport, and where needed, technical co-ordination and assistance.

The agreement also provided for a Joint Policy Committee to provide policy guidance, direction and periodic review of progress. The Chairman of the Permanent Council for National Production of the Government of Egypt and the UNRWA Representative to Egypt were designated as Co-Directors of the Project Survey.

Purpose of Survey Report

It is the purpose of this report to establish the physical and engineering feasibility of developing about 50,000 feddans in the Northwest Sinai area as irrigated farm land, and the practicability of establishing a part of the Gaza refugee population there as gainfully employed members of society. Estimates of the costs of this development and the probable income generated by the project will also be determined.

The economics of the project involve an assessment of whether or not a farm family can be supported by a small acreage with a return to them from the production of the land adequate for a reasonable standard of living, and whether or not the area will, in addition, be able to support the necessary non-farm population and natural increase in population, and to what extent. This picture will be analyzed over a period of twenty-five years representing approximately one generation.

Special attention will be paid to assessing the amount of assistance which will be required during the early years of development before the project becomes fully self-supporting. The basic assumption of the plan evolved is to provide minimum essential services with sufficient potential for increasing standards as the development of the area becomes stabilized.

General Description of Project Area

Location

The project will be located in the northwestern portion of the Sinai Peninsula. It lies within the Isthmus of Suez, approximately 140 kilometres from the city of Cairo, and roughly midway between Port Said and the town of Suez.

The general project area throughout the greater portion of its length lies east of and approximately adjacent to the Suez Canal. The northern portion of the area turns to the northeast away from the town of Qantara (East).

Size of Project Area

In accordance with the **Project Survey Agreement**, preliminary surveys were to be conducted in the Northwest Sinai covering an area "bordered on the western side by the Suez Canal, on the south and east sides by the contour plus fifteen metres and on the north side by the water of the Mediterranean". This embraces an area of more than 230,000 feddans, more than half of which are the tidal flats lying southeast of Port Said.

The project Survey Agreement provided for topographic surveys of the area and for selection by the Joint Policy Committee, while the mapping proceeded, of these portions of the area which should be given detailed consideration.

As the reconnaissance surveys proceeded, doubt was raised regarding the feasibility of reclaiming the tidal flats in a short period of time. Although these marshy tidal flats could be served with irrigation water delivered by gravity, they contained excessive

salt and it was seen that their reclamation would require a relatively long period of development and large expenditure.

On these grounds, the Co-Directors agreed, at the second meeting of the Joint Policy Committee, to exclude these marshes from consideration at the time and to extend the boundary of the total area to be surveyed and investigated into the lands south of the Gaza highway.

As a result, the project area falls into two natural divisions: the Northern Area, bounded on the north generally by the zero contour line, on the west by the Suez Canal, on the south by the Gaza highway, and on the east generally by the plus fifteen metre contour; and the Southern Area lying to the south of the Gaza highway, which extends to an arbitrary line running east from kilometre fifty-six of the Qantara - El-Shatt railway and is bounded generally by the contour plus twenty metres on the east and by the Suez Canal on the west.

In order to conserve time and expenditure, it was agreed by the Joint Policy Committee to reduce the extent of the survey and soil examination in the area remaining to be investigated. In this way, a selective survey policy evolved concerned primarily with obtaining sufficiently reliable data to demonstrate the feasibility of the project on the most suitable area of about 50,000 feddans.

The lands selected for reclamation by 10,000 farm families and the results of the soil classification studies thereon are described in the Soils and Soil Improvement Chapter. The final total area under consideration is shown as the shaded portion of Plate 1.

The precise delineation of the final project area is a matter which belongs more properly to a detailed planning report.

Physiography and Geology

The project area lies against the Isthmus of Suez, a low-lying piece of land joining Africa to the Sinai Peninsula and the adjoining land mass of Asia. Significant geological deposits in the project area are of recent age. The Isthmus has gradually assumed its present appearance through the accumulation of deposits left there by the sea, the Nile and the winds. Between Qantara and the Bitter Lakes, the sand dunes of the project area are of recent age and overlie lake beds which may be of Pleistocene Age. These late deposits show a well marked sequence of deposition layers consisting of gravels, sands, and clays, and harder beds of gypsum and some halite. Outcrops of these gypsum beds may be seen in the eastern bank of the canal in the vicinity of Ismailia. In general, these deposits are relatively deep over the project area and have no effect on the soils.

Topography

Project lands rise to the east and southeast to about fifteen metres above sea level within five to six kilometres (see Plate 2). They are bordered on the east and southeast by steeper lands which rise to the highlands of the Sinai Peninsula. Due to the extremely absorptive nature of the soil, and the low rainfall, there are no well defined wadis or other channels. The topographical details have been formed by wind action characterized by shallow depressions and low, isolated knolls. Within the first ten kilometres north of Ismailia, project lands are relatively rough. For the next ten kilometres to the north,

the lands are much flatter except for relatively steep slopes along the eastern margin. The remainder of the area lying north and east of Qantara contains smooth flat slopes with minor exceptions.

South of Ismailia, the first ten kilometres of the project area are narrow and rough and have been excluded from consideration for development. Beyond this narrow strip the topography is flat to gently-rolling, with a maximum width of about ten kilometres.

Climate

The climate of the area is semi-tropical desert, characterized by very low annual rainfall, long summers, clear skies and pronounced diurnal temperature changes. Climatological data are available for Port Said, Ismailia and Suez, all adjacent to the project area. Table I - 1 summarizes the official records for the three towns and Plate 3 shows graphically the data for Ismailia with the exception of wind velocities, which are plotted for Port Said and Suez, since no record exists for Ismailia. Of the three towns, the Ismailia records should be more nearly representative of the climate of the project area as a whole.

During the long summer season, from April to November, daytime temperatures are generally high but the diurnal difference is great and averages 13.4°C . During the winter months, from December through March, the days are pleasantly warm but again diurnal temperature differences remain great, averaging 11.8°C . Since frosts rarely occur, injury to crops due to low temperature occurs infrequently, and damage even to sensitive sub-tropical crops is slight.

Rainfall occurs almost entirely during the winter months.

TABLE I -- 1

SUMMARY OF CLIMATOLOGICAL DATA

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year
	TEMPERATURE -- °C												
<u>Maximum of Record</u>													
Port Said	29.0	33.1	38.0	40.4	45.0	43.9	38.1	37.2	40.1	37.6	36.5	29.8	45.0
Ismailia (1)	30.1	31.8	36.7	37.9	40.7	44.7	43.0	41.7	39.5	40.2	36.0	30.2	44.7
Suez	26.0	30.5	34.2	42.5	43.8	43.6	42.2	42.9	39.9	42.6	41.1	30.0	43.8
<u>Minimum of Record</u>													
Port Said	3.0	2.3	2.7	9.2	10.2	14.2	19.0	20.6	17.5	13.0	9.3	0.0	0.0
Suez, Beaufort Scale	1.7	1.9	2.3	2.3	2.3	2.5	2.3	2.4	2.5	2.2	1.9	1.6	2.2
km/hr (3)	9	10	13	13	13	15	13	14	15	12	10	8	12

N.B.

Source of all data other than noted below: Climatological Normals for Egypt; Meteorological Department, Ministry of War and Marine, Cairo, 1950.

- (1) Average from unpublished records of Meteorological Department, Egypt, for the years 1947 through 1951, and 1953.
- (2) Average from unpublished data of Meteorological Department, Egypt, for the years 1947 through 1950, and 1953.
- (3) Converted to km/hr from recorded Beaufort values, approximate only.

It is characterized by heavy showers of short duration and occasional brief storms of severe intensity. Small amounts are recorded in the months of April, May and October and there is no rainfall in the area during the months of June, July, August and September. No appreciable storm run-off is anticipated in the project area.

Mean monthly wind velocities reported at Port Said vary from 11.3 to 15.5 kilometres per hour. The eastward moving storms are the primary influence on weather conditions. During the winter, the storm patterns are centred over the Mediterranean and their passing causes wind, cloudy weather, and occasional rain. During the spring, the passage of storms is over the Libyan desert, frequently resulting in strong winds known as the Khamâsin.

History and Archaeology

The Sinai Peninsula, although now largely an uninhabited desert, has witnessed the development of man, cultures, and civilization over an extended period of history. Its strategic position between the Holy Lands and Egypt, connecting Asia and Africa by a narrow strip of land, has made it the eastern rampart for the defence of the Delta and Nile Valley, as well as a route of invasion in times past for the armies of Persians, Greeks, Romans, Arabs and Turks. During the two world wars, large allied armies saw service in this area.

Egyptian expansion in the direction of the Sinai began as early as the Sixth Dynasty (2400 B.C.) when efforts were made by the rulers to settle the area's autonomous population on these lands by regulating irrigation, thus creating beyond the kingdom a protective zone against attacks from without and sporadic raids of hostile nomads

from within.

Its economic importance was at its highest when the Pelusiac branch of the Nile flowed from the vicinity of Cairo through the north-western fringes of the project area to the Mediterranean, enabling the irrigation and cultivation of the peripheral area. During this period, when the southern branch flowed through Qantara into the Bay of Pelusium, some thirty kilometres east of the present city of Port Said, the area surrounding Pelusium and the banks of the River was under extensive cultivation. Vineyards existed and barley, wheat and other grains were grown. Indeed, Pelusium was looked upon by the invading armies as a source of replenishment of supplies for the troops.

By 800 A.D. with the Pelusiac branch of the Nile beginning to silt up, the flow diminished, thus ushering in the eclipse of the area as a seat of settled population. At the present time, Pelusium exists only as an indistinct mound of ancient ruins surrounded by the blank desolation of the desert. It has been explored from time to time by amateur and professional archaeologists who have barely scratched the surface of the area which comprises the ancient city. These ruins lie outside the area proposed for development.

Closer to the Suez Canal evidence exists of the remains of ancient cities along the route followed by invading armies. A cluster of ancient structures on the borders of a depression just southeast of Qantara in the centre of the project area indicates that Lake Ballâh once covered this depression, and that several villages were located along its banks. Some of these village ruins might be within the development area but are not of particular archaeological interest.

Except for Pelusium, Qantara, and a few scattered ancient villages, there are no other known historical remains of archaeological value in the general area.

Present Population

Within the project area there are few signs of organized society. Small clusters of black bedouin tents with a few camels and domestic animals may be seen at certain seasons of the year, but no permanent bedouin establishments exist due to the scarcity of vegetation for grazing.

The only towns in the Sinai which lie in the immediate proximity of the project area are Qantara (East), a terminus for the Palestine Railroad of approximately 7,110 persons, and Gilbana, the railroad watering point some eighteen kilometres to the east, comprised of few houses built for employees of the railroad and the local security forces. Qantara lies on the Suez Canal twenty kilometres north of the proposed siphon crossing and just outside the north-western boundaries of the project area. Apart from a few family garden plots it depends almost entirely on external sources for its requirements. Its water supply comes by pipeline from the Sweet Water Canal lying on the western side of the Suez Canal.

Although it lies on the west bank of the Suez Canal, the town of Ismailia is of foremost importance to the project. It will undoubtedly become the principal supply and distribution centre for the project area and possesses hospitals and other public service institutions which will probably see use by the future project population. Ismailia had a recorded population of 68,229 in the

census of 1947.

The area is administered under the authority of the Frontier Administration of the Egyptian Ministry of War.

Transportation Facilities

The project area is linked by ferry at Ismailia and Qantara with good surfaced roads which run along the west bank of the Suez Canal from Port Said to Suez and from Ismailia to Cairo. From Cairo to Ismailia, immediately across the Suez Canal from the project area, the distance is 140 kilometres. Within the project area along the eastern bank of the Canal, an asphalt surfaced road runs from Port Tawfiq in the south, some 120 kilometres north to Qantara and then northeast to El-'Arish. A second highway runs directly east from the Ismailia ferry crossing and then northward some 327 kilometres to Gaza.

About eight kilometres north of Ismailia the new Firdân bridge crosses the Suez Canal, carrying a standard gauge railway which connects with the Qantara-Gaza line to the north and with Port Tawfiq to the south. From Ismailia rail connections can be made with Port Said, Suez, Cairo, Alexandria and Upper Egypt.

Smaller roads built for army use provide a rudimentary system of access roads and thus, due to the elongated shape of the project area, no point is further than five kilometres from both the railway and a good highway. The proximity of the Suez Canal enables ready access to the area by water borne transportation.

Agriculture

At present only scattered oases located in shallow depressions throughout the project area can be seen. These are very small and

consist of clusters of palm trees which draw their water from shallow brackish beds where the limited rainfall has collected. Agriculture in the project area is non-existent and the agricultural census of 1950 reported a total of only 3,762 feddans under cultivation in the entire Sinai Peninsula. The bulk of these lands are in the Rafah - El-'Arish, northeastern fringe of the Peninsula, some 100 to 200 kilometres from the project area.

Economic Aspects

The Suez Canal constitutes the most significant economic asset in the general area. The Canal, which was started in 1854 and officially opened in 1869, has been constantly improved until the volume of traffic it now handles has placed Port Said in the category of one of the principal ports of the world. Most ships transitting the Canal stop at Port Said to take water and provisions, giving rise to a considerable ship chandling trade.

In conjunction with its canal operations, the Suez Canal Company operates general workshops, water treatment and filtration plants, power plants, clinics, and hospitals. The Company provides employment for over 4,000 workmen as well as for 775 pilots and other marine personnel. The existence of the Canal has brought about a growth of population in the Isthmus of Suez from several thousand to over 350,000 and this is rapidly increasing. Agriculture has developed due to the construction of the Sweet Water Canal, and industrial development including ship repair yards, salt works, fertilizer plants, oil depots, and working of Red Sea ore deposits have also multiplied. In 1951, there were almost 6,000 commercial and over 2,800 small

industrial trades establishments in the area of the Isthmus of Suez.

Apart from the activities of the Suez Canal Company, there exists little in the framework of a general economy in the area. Except for sand and gypsum which are found in abundance and can be used for certain construction purposes, there are no known mineral resources in the project area to support further economic activity.

III. HYDROLOGY

In general, hydrology is that branch of the earth sciences that deals with the occurrence, utilization and disposal of water. It covers all phenomena from the meteorology affecting precipitation of moisture from the sky through all the phases of run-off, and its utilization and disposition on or below the surface of the earth, to its eventual return to the atmosphere by evaporation.

This report is concerned with only a portion of that cycle, namely, the availability of water to meet the requirements of project uses and the ultimate disposal of the available supply. The subject as it pertains to the project is covered in the two general topics of water supply and water requirements.

Water Supply

As provided in the Project Agreement of 14 October 1953, the water supply for the Northwest Sinai project will come from the Nile River. In order to understand the water supply conditions, it is necessary to consider some of the characteristics of the flow of the River.

The Nile River is reported by most authorities to be the longest river in the world, having a length of 6,690 km (kilometres) and a drainage area of over 2,850,000 km². At Khartoum, approximately 1,600 km south of Cairo, the Blue Nile, which has its origin in Ethiopia, joins the White Nile, which originates in the Lakes region of Uganda, to form the main Nile. About 296 km north of Khartoum, the main Nile is joined by the Atbara, which also originates in Ethiopia and which is its third principal tributary. These three rivers

contribute to the flow of the Nile in roughly the following proportions:

Taken over the whole year:

Blue Nile	58%	or	48,000 million m ³
White Nile	28.9%		23,700 " "
Atbara	12.5%		10,300 " "
			<hr/>
			82,000 " "

Over the flood months of August, September and October:

Blue Nile	70.3%
White Nile	12.2%
Atbara	17.5%

Whereas for the summer period (February through July):

Blue Nile	30.7%
White Nile	64.6%
Atbara	4.7%

In the headwater region, rain begins to fall on the highlands of Ethiopia in March or April, and by June the Blue Nile is well on the rise. This rise greatly increases the flow in the Blue Nile, its flood discharge being approximately forty times its April flow. The White Nile, however, has a more constant flow and its contribution prevents the main Nile from falling in the same proportion as the Blue. The regularity of flow of the White Nile is caused mainly by the storage provided in the great Victoria and Albert Lakes.

The control of flood water is limited, but major projects now being considered would do much to increase control during the flood season. During the low period, from February to July, the River is

at one time. The maximum requirement according to the consumptive use pattern, after the overall project water use efficiency reaches 49%, is 1.5 million m^3/d , which corresponds to a project duty of 60 $\text{m}^3/\text{F/d}$ on the same rotation.

Conclusions

In the dry period, February through July, water requirements for the project can be met by the delivery of 250 million m^3 . Actual requirements to supply the ultimate needs of the project are in the magnitude of 440 million m^3 per year. During the development period it will be necessary to pump an additional 135 million m^3/yr . Limited underground storage in the project area requires that provision for drainage of the irrigated land be made shortly after the land is put into production. Finally, a project system capacity of 2 million m^3/d should be provided.

IV. HUMAN RESOURCES

The soil and water resources of the Northwest Sinai project have been examined in the preceding chapters. A third factor of equal importance governs the viability of the undertaking as a whole - the Palestinian refugees of the Gaza strip, who form the human resources for whose benefit the other two resources are to be developed.

In order to appraise their suitability for the project and the possibility of planning to conform with their habits and requirements, it is necessary to know something of the refugee background - to examine their demographic, economic, and social structure and their present and former living conditions.

It is intended first to appraise the existence among the refugee population of the background and those skills necessary for the successful development of the project. The past and present environments which have shaped this population will be studied, in order to adapt planning to the specific needs of the population to be served, and finally it is intended to examine those factors which will facilitate the transformation of the present dependent refugee population into a group of self-reliant farmers. It is only through such knowledge that a genuine solution to the question of project viability may be found, meeting both the aspirations and abilities of the refugees and the potentialities of the project.

The data presented in this chapter have been taken chiefly from Agency records and statistics, the Official Gazette of the Gaza Administration, and the considerable documentation of the Department of Statistics of the former Palestine Government.

Origins and Occupations

The group of refugees from whom the future population of the Sinai project will be drawn are those at present living in the Gaza strip. In May 1955 they approximated 214,000 of the 302,000 persons resident in Gaza, the remaining 88,000 representing the original inhabitants of the area. Officially the distinction between the two groups is found in the United Nations definition of a refugee - a person resident in Palestine for at least two years prior to 1948 who has lost both his home and means of livelihood as a result of the Palestine conflict and is in need.

A full sociological survey of the Gaza refugee population has never been carried out. Thus, in order to determine the skills and occupational background of the refugees it was necessary to examine their geographic origin in Palestine and to apply the statistical data of the mandate period which gives some insight into the nature of the population of each area.

The Gaza refugees come almost exclusively (99%) from the southern part of Palestine comprised of the sub-districts of Beersheba, Gaza, Jaffa, and Ramleh. Since 45% of the Palestinians originally living in these four sub-districts are now found in Gaza, it may be assumed that the refugee population of Gaza represents a generalized cross-section of the normal Arab population of southern Palestine.

To determine the rural-urban ratio of the Gaza refugees, the sociological classification used by the Palestine Government was applied to a breakdown of refugee distribution by place of origin, which the UNRWA established in September 1953. Table IV - 1 summarizes the results.

TABLE IV - 1

GAZA REFUGEE GROUPING
BY TOWNS, VILLAGES, AND TRIBES

September 1953

Sub-district	Urban	Rural	Bedouins	Total	%
Gaza	12,859	66,161	1,969	80,989	35
Beersheba	4,478	70	37,510	42,058	21
Jaffa	32,219	6,018	2,042	40,279	20
Ramleh	7,056	23,758	8,048	38,862	19
Others	1,445	647	91	2,183	1
Total	58,057	96,654	49,660	204,371	
%	29	47	24	100	100

It may be noted from this Table that the rural population, (which comes from three large villages averaging 6,000 inhabitants and ninety-four small villages averaging 800 inhabitants), amounts to 47% of the total. The bedouin and semi-nomadic population represents 24% of the total. Amongst these, the most important bedouin groups are those coming from Beersheba. The purely urban population makes up 29% of the Gaza refugees, more than half coming from the port town of Jaffa.

Rural Skills

It is assumed from the foregoing that more than 150,000 of the Gaza refugees are the products of a rural environment, possessing the customary agricultural skills associated with farming methods practised in southern Palestine. As noted above, approximately 50,000 of this number constitute a bedouin or semi-nomadic population.

In order to examine more closely the specific agricultural experience of this population, the proportion of refugees experienced in the several types of farming has been derived from the records of the mandatory administration. These records describe the land cultivated by the Arab population of southern Palestine both in area and type of cultivation.

The sub-districts from which the Gaza refugee population originates lie almost entirely in two natural climatic regions, the maritime plain fronting on the coast, a region of considerable rainfall, and the Negeb sub-desert with its small extension into the foothills of the central Palestine range, a region of extremely low annual rainfall. These sub-districts cover almost the whole field

of agricultural conditions which may be found in the Near East, ranging from a nomadic, extensive type of culture to one of intensive, irrigated farming.

In the Gaza, Jaffa and Ramleh sub-districts roughly 300,000 dunums of land were cultivated under conditions of intensive farming, about half of which was devoted to citrus plantation. In this same area, 1,200,000 dunums were dry farmed, mostly to support cereal production. At the same time considerable vegetables and deciduous fruit were raised in these districts of the coastal plain. In the Beersheba sub-district, where the annual rainfall is below 300 millimetres and there is no water for irrigation, some 1,600,000 dunums of fertile loess were devoted to extensive cultivation.

The raising of livestock in southern Palestine was an important part of the total agricultural production. Cattle and poultry were raised in large numbers in the coastal plain, and in the Gaza sub-district, where the type of cultivation changes from intensive to extensive and even semi-nomadic agriculture, numerous sheep and donkeys were also found. This transition to nomadic agriculture was accentuated in the Beersheba sub-district where in addition to cattle, large numbers of horses, camels, donkeys, sheep and goats, were grazed.

From a comparison of the cultivated area with the rural population of these sub-districts before 1948, it may be estimated that about one-fifth or 20% of the rural population was engaged in intensive agriculture while the remainder including the bedouin population practised dry farming.

This bedouin group of some 50,000, has been divided for refugee registration purposes into "northern" bedouins, coming from the coastal plain covered by the Gaza, Jaffa, and Ramleh sub-districts, and the "southern" bedouins who lived previously in the Beersheba sub-district. The most important group is the southern, who are distributed among five paramount tribes comprising sixty sub-tribes. The Negeb, where these tribes had their grazing lands, represented about half the area of Palestine, but the climatic conditions and especially the rainfall, which in the southern part averaged less than 100 millimetres a year, rendered nomadic life compulsory. Most of these bedouins moved about within the boundaries of their tribal lands according to the time of the year, sowing and harvesting crops on their arable land and moving out to pasture their herds and flocks between seasons.

The vast plain of fertile loess lying in the northern part of their tribal lands, however, was regularly cultivated with extensive cereal growing - barley and wheat in the winter and other crops such as millet and water melons in the summer. Thus, even in the south the bedouins did not depend entirely upon their sheep and camels for their living, and under the favourable economic conditions of the last world war proved their readiness to adopt better farming techniques to raise their income.

The northern bedouins, who were distributed among a number of small sub-tribes, undertook grazing and the farming of arable lands in the northern sub-districts of the maritime plain. Their life and method of farming resembled closely that of their neighbouring villagers. In general, it appears the bedouins were at least partially engaged in extensive agriculture and under conditions of good crop

prices undertook to increase their agricultural production. The main distinction between them and the fully settled rural population was their seasonal change of pastures and their preference for tent dwellings. The prevailing trend, however, was toward settlement on cultivable land.

The exact proportion of individual farm owners in southern Palestine is not known. By far the largest part of the rural population in this area were either share-croppers or tenant farmers. Grazing rights and the farming territory of the bedouins belonged to the tribe as a whole. The Agency's statistics on occupational distribution among the Gaza refugees are based on information given by the refugee head of family himself and inscribed on his registration card. A close examination was made of the information provided by these cards for twelve specific villages but unfortunately, neither of these sources possesses a high degree of reliability. Although they indicate that some 13,000 refugee heads of families have listed themselves as farmers, there is a strong likelihood that this number includes persons other than these owning their own farms.

From the earlier analysis of geographical origin it has been concluded that the refugees of Gaza represent a general cross-section of the Arabs of southern Palestine. On this basis it may reasonably be assumed that roughly some 30,000 refugees in Gaza with a rural background have had some experience in irrigated farming while another 120,000 have had varying degrees of experience in extensive and dry farming. These numbers provide an adequate reservoir on which to draw for the 10,000 refugee farm families planned for establishment under

conditions of irrigated farming in the Sinai. However, in view of the passage of seven years under conditions of idleness for a large majority of the Gaza refugees, and the especial conditions of farming in the Sinai involving the reclamation of sandy soils, it is recommended that a programme of agricultural training under similar conditions be considered for the refugees selected for the project, prior to their introduction to the Sinai.

Urban Skills

The Gaza refugees experienced in trades, crafts, private services and the numerous functions carried out by the public administration are for the most part those who possessed an urban background in Palestine.

It may be seen from Table IV - 1 that a total of 29% of the Gaza refugees have been designated as urban. Of these only 43,000 or 21%, however, originated from a strictly urban environment, having come from Jaffa, Haifa, Jerusalem, Lydda, Ramleh or Gaza itself. The remaining 15,000 came from such large villages as Majdal and Beersheba, which although basically rural in character served as marketing centres for the surrounding villages, providing them with necessary supplies and equipment. Even in the more important urban centres, there was a marked interpenetration of suburban farmers (citrus, vegetable, and dairy farmers) and the purely urban population, resulting in a corresponding overlap in occupation.

The urban population earned its living principally from trades, services, and land ownership. The bulk of the Arab population gainfully employed in the towns were either independent proprietors

or employees in small enterprises, most of which had a commercial character. Industrial establishments were more limited, both in size and number. They consisted chiefly of grain milling and other food processing industries, the textile industry (including a few mechanized plants and the important hand weaving centre of Majdal), olive and sesame oil pressing mills, soap factories, tanneries, and a number of factories for leather apparel, metal trades, wood working and tobacco manufacturing. To these were added other diversified enterprises designed to meet the needs of a basically rural population which depended for its more elaborate requirements on goods imported from abroad.

Thus the predominant feature of urban employment was the small private enterprise varying from one man counters to middle sized workshops. No accurate information is presently available on the occupational breakdown of this population, but a survey of twelve wholly or predominantly Arab areas covering the greatest part of the urban community outside of Jerusalem and Haifa, carried out by the administration, indicates that in 1939 an average of eighteen business establishments existed per 1,000 population. This percentage might be expected to have increased as a result of the remarkable expansion of activity in commercial and industrial enterprises which developed with the second world war.

In addition to this private services group, there was a sizable and skilful group of refugees who worked as civil servants in the mandatory administration and in the police force and armed services.

Again their numbers and those now resident in Gaza are not known with any degree of precision.

In general, it may be concluded that the main skills of the Arab urban population are in those trades, handicrafts, and services related to agricultural production. In addition, the government services offered employment and experience which supplemented the more limited opportunities provided by industrial establishments. Therefore, it may normally be expected that the 58,000 Gaza refugees of urban origin will furnish a supply of ancillary workers and public service employees required for the Sinai project and will even provide a number of skilled agriculturists. The loss of efficiency in the performance of these skills associated with the sedentary existence of the last seven years will probably require some refresher training. The exact nature and amount of this training can be determined only by a detailed study of the Gaza population. A general discussion of their training needs is presented later.

Demographic Characteristics of the Refugee Population

All aspects of project planning which involve the human element, from agriculture to community services and facilities, require accurate information on the demographic characteristics of the refugee population from whom the future project population will be drawn. On the basis of existing data, the factors affecting the natural increase, age and sex distribution, and family size of the Gaza refugees were examined.

The main source of information on refugee vital statistics

is the refugee registration lists which were established at the beginning of relief operations. Since then these lists have been brought up to date by a continuous process of additions and deletions. The lists indicate a net increase from 198,000 in May 1950, when UNRWA assumed working responsibility for refugee care, to 214,000 in May 1955. Additions are due mainly to births and transfers from other host countries. Deletions from the lists are made on the basis of deaths, false registrations, duplications and the attainment of a stipulated level of income. These lists are generally recognized to be on the high side due to the non-reporting of deaths and migration from the area, factors which cannot easily be checked by the registration authorities.

Other sources of statistical data used include the Statistical Abstracts of the Palestine Department of Statistics, the Gaza Official Gazette, and a sample survey of twelve villages and two tribes considered to be a representative cross-section of the Gaza refugee population. This survey was carried out by the UNRWA Registration Division in Gaza in December 1954 from the registration cards and fact sheets belonging to the groups under study. In general, the method used was to analyse the results of the sample survey, correct them for inconsistencies, and compare the final results with the statistical data of the former Palestine Government.

Natural Increase

On the basis of the Moslem population statistics for the period 1931 through 1944 as published in the Palestine Government

Statistical Abstracts and assuming that the population increased according to a geometric progression, the average rate of natural increase over that period may be computed at 2.6%.

On the other hand, examination of birth and death rates published by the UNRWA Registration Office and the Gaza civil administration reveals that the birth rate among the refugees may be estimated at 5%, while the death rate may be considered to be 2%, resulting in a net rate of natural increase of roughly 3%. In view of the inaccuracies inherent in refugee statistics, it is believed that 2.6% may be the more accurate estimate. However, it has been decided to adopt the average rate of 2.8% as a conservatively high estimate for use in this report.

Distribution by Age and Sex

The basic source of information on the age and sex distribution of the refugees are the registration cards on which detailed characteristics of the family are recorded on the strength of the refugee's declaration at the time of registration. For the purpose of this study a sample survey referred to earlier was carried out in twelve villages and two tribes to provide a more detailed breakdown.

Results of this sample survey were taken as a base for the population pyramid attached in Plate 13. The age returns reveal the usual irregularities due to the preference for round numbers given in age statements by respondents who do not know the exact date of their birth or that of their relatives. This type of inaccuracy is quite common in under-developed areas and is accentuated in the

female returns when the women of the household are not available for interrogation. In order to reduce these irregularities as far as possible a breakdown in age groups of five years has been established.

On the whole, the distribution by sex revealed by the sample result seems reasonable except for certain inaccuracies in the female population in the 10 to 64 age group. To correct these distortions the females between these years have been redistributed according to the distribution of males in the corresponding age groups. The corrected distribution was then plotted in the cumulative curve presenting sample survey results in Plate 13.

In order to obtain the probable pattern of age distribution, a comparison was made between the corrected sample results and estimates for the Palestine Moslem population of 1944. This is shown in Plate 13 where the cumulative frequencies of five year age groups of the Gaza sample survey and the Palestine population of 1944 have been plotted on the same diagram.

The main difference between the present refugee age distribution reflected in the sample survey and that of the Moslems in Palestine in 1944 lies in the fact that the refugee population has a much higher percentage in the 0 to 15 age group. For Gaza refugees the percentage less than 15 years old is approximately 51% while the corresponding percentage revealed by the 1944 estimates for Palestine Moslems is only 43%. This significant change in the population structure may be explained by the prevailing social and economic conditions among the refugees, under which the refugees marry young and beget more children.

These statistics point to the need for employment of as many factors as possible to decrease the rate of natural increase among the project population in order to bring about a more balanced age structure.

Distribution by Family Size

Again the major source of information concerning the family size of Gaza refugees is to be found in the ration card. These cards were in principle issued on the basis of family composition as defined by the refugee applicants themselves. Subsequently, however, for the purposes of obtaining more living space under the Agency's shelter programme and for purposes of employment, young couples and for a while boys over eighteen tended to become separated from their original family card and to be assigned cards in their own right. Although there has since been some regrouping, the system employed tends to give a downward bias to family size and in any case is not particularly well suited for purposes of project planning.

Accordingly, the results of the December 1954 sample survey of Gaza refugees presented in Table IV - 2 were compared with a rural social and economic survey of five villages in the Ramleh sub-district carried out by the Palestine Department of Statistics in 1944. The differences are clearly shown by the cumulative curves of family and population distribution according to size of family appearing in Plate 14. It may be noted that the Gaza survey points to an unusually large number of isolated persons and families comprising two members. Families of ten and more persons are on the other hand less common in the Gaza sample than in the Palestine survey. The disparity between these

TABLE IV - 2

FAMILY DISTRIBUTION GAZA REFUGEES

Size of Family	SAMPLE SURVEY December 1954			
	Families		Persons	
	Number	Percentage	Number	Percentage
1	474	8.5	474	1.7
2	732	13.1	1,464	5.3
3	712	12.8	2,136	7.7
4	721	12.9	2,884	10.5
5	699	12.6	3,495	12.7
6	677	12.2	4,062	14.7
7	567	10.2	3,969	14.4
8	402	7.2	3,216	11.7
9	264	4.7	2,376	8.6
10	152	2.7	1,520	5.5
11	95	1.7	1,045	3.8
12	42	0.8	504	1.8
13	17	0.3	221	0.8
14	11	0.2	154	0.6
15 and over	4	0.1	65	0.2
Total	5,569	100	27,585	100

N.B.

For the purpose of determining the family distribution, the sample survey was extended to fourteen towns, villages and tribes, instead of the twelve used for age distribution. The average family size for the sample survey is:

$$27,585 : 5,569 = 4.95 \text{ persons.}$$

curves may be further illustrated by the fact that while 34% of the families are of three persons and less in the Gaza study, the corresponding percentage for the 1944 survey is 19%.

It is evident that the percentage of families of small size is high for any rural area in the world. It should be pointed out, however, that the average family size would normally be expected to be larger in a group of isolated rural villages than in a larger population such as that of the Gaza refugees, which include a sizable urban group. In the absence of more precise information the results of the 1954 Gaza survey will be taken for the purposes of this report.

According to UNRWA statistics, the average family size for the whole refugee population retains a remarkable constancy. In April 1955 registration records set it at 5.29, and in the sample survey of December 1954 it was 4.95. Dividing the population by groups of origin, the sample survey results indicate that the urban population had an average of 4.6 persons per family, the rural population 4.8 and the bedouins 5.6. Since the general average is 5.0, it will be assumed for planning purposes that an average family consists of five members.

Rural Background in Palestine

The occupational and demographic features of the Gaza refugees have been examined. However, to appreciate fully the conditions in Palestine which have defined refugee attributes, customs and traditions, it is of interest to review briefly the broad outlines of their rural background.

Over the limited area of Palestine extending from Beersheba to Jaffa, an agricultural existence has been maintained on the basis of techniques which have evolved only slightly since the early history of this area - a pastoral and nomadic life in the dry south, extensive cereal cultivation in areas with higher rainfall, and intensive fruit and vegetable crops where irrigation was possible.

The human element in these rural areas has not been deeply modified despite the ebb and flow of several civilizations. The political and economic structure of the country was decided in the towns, while the remoteness and limited intervention of the government and external world in the rural hinterland has favoured a traditional way of life and fostered village particularisms and loyalties.

Two factors have influenced the characteristics of the rural population of southern Palestine. The first has been the deep influence of Islam and the Moslem state for thirteen centuries. This is reflected in the religious composition of the Gaza Strip, which is 99.7% Sunnî Moslem. The second factor was the long established pattern of nomadic life to which a high degree of prestige was associated. This has resulted in the survival of a tribal spirit which is manifested in the clan and in the dominance of blood over land and geographic ties. This trend was accentuated by the lack of security which prevailed over many centuries and by the system of land tenure which tended to deprive the peasant from much of the benefit of his labour.

These conditions survived practically up until the second world war and resulted in habits which limit the peasant's work to that required to satisfy his family's minimum requirements. Thus,

by conditions beyond his control, the peasant's productive activity was tied to a subsistence economy and most of his time devoted to village social life centred around the family and clan.

Land Tenure

The system of land tenure common in Palestine did little to reverse this trend. The system had its roots in the Ottoman land code which maintained a basic distinction between mulk and mîrî lands.

Mulk was that property in which full ownership was vested in private persons and initially applied mostly to built up residential areas in towns. The rest of the country, including most of the cultivable land, was mîrî and was vested in the sovereign or the state on behalf of the Moslem community. Since it was manifestly impossible for the sovereign to cultivate this land directly, its use was left to the inhabitants of each area against the payment of certain tithes or tributes. Hence in regard to mîrî land, a double right exists - the ultimate ownership vested in the state and usufruct left to the possessor.

Since by far the greater part of the cultivable land of Palestine was mîrî, the relative precariousness of rural property as compared with urban was pronounced. Combined with the social and political primacy of the towns, this situation led to a generalized seizure of the land by the urban and some rural notables with a far-reaching extension of the share-cropping system as a consequence. Because of the financial and political assistance needed by the peasant, those notables, through money-lending and clientage, progressively acquired the title to rural land holdings in most

parts of the country.

The share of the peasant varied with the amount of assistance received from the landlord and with the type of crop grown; in general it barely ensured the vital minimum to the share-cropper. This system, characterised by landlord absenteeism and the general indebtedness of the peasants, served to maintain the same families on the same lands for many generations.

Apart from the share-croppers, a few small farm proprietors maintained their independence either on individual farms or through the mashâ'a system of collective tenure. This latter system is based on land holdings of the village being shared in common, individual plots being redistributed every year or two by lot. The exact extent of independent proprietors in southern Palestine is not known, but is generally admitted to be limited.

Another factor affecting adversely the long range development of agriculture was the extravagant fragmentation of land holdings resulting from the traditional inheritance law. The system of collective tenure, involving continual rotation of individual land parcels, also served to impoverish the land. It is therefore recommended that in the planning for refugee establishment steps be taken to avoid the recurrence of these problems in the Sinai.

Rural Income and Indebtedness

In 1939 roughly half of the total agricultural production in Palestine was marketable, the highest rate being enjoyed by fruit raising farms and the lowest by those growing cereals, where market dependency did not exceed 20%. During the second world war, however,

these rates tended to increase appreciably.

The basic pattern of self-sufficiency resulted in a very low standard of living for the rural community. In 1945, although the lot viable for a rural family was estimated at one hundred dunums under dry farming conditions, yielding a gross income of LP 100. per year, the actual size of the average Arab holding was not more than fifty dunums, of which 80% was given over to cereals, 18% to vegetable crops, and 2% to citrus. Conditions in southern Palestine corresponded to these averages with a slightly higher proportion of citrus. During the war, however, farm income was supplemented by additional earnings from employment in towns and in the government service.

Prior to this war time prosperity, a considerable proportion of the peasant's income was absorbed by exorbitant interest on indebtedness. In 1930 the average family indebtedness was virtually equal to annual income, and an average interest rate of 30% was being paid. By 1945 although usury had declined materially and bank-loans increased, the average farm indebtedness stood at more than LP 100. per family even among members of co-operative credit and thrift societies. This represented roughly half the farmers' yearly income. The carry-over of present debt by the Gaza refugees into the project area could present difficulties to the balance of the project economy and should be the subject of subsequent study. It is sufficient to note here the importance of establishing adequate farm credit facilities in the Sinai.

Rural Co-operatives

As a means of freeing the rural population from the high

interest rates and adverse social effects of the money-lenders, the Palestine Government initiated a well planned co-operative movement. In 1945, one hundred and thirty-five credit and thrift societies and forty-five other agricultural co-operatives existed in Arab villages comprising several thousand members. Apart from the credit co-operatives, the most important groups were those dealing with the marketing of the citrus crop. The co-operative system in Palestine enjoyed a considerable success, demonstrated by the fact that during the whole mandatory period very few co-operatives were disbanded. Much of this success was due to the guidance and control provided by the government authorities. The experience of the refugees with co-operatives in Palestine, however limited, will facilitate their establishment in the project area. It should be noted, however, that for full success their establishment and operation should, initially at least, enjoy close guidance from the appropriate project authorities.

Local Government

The extension of local self-government made considerable progress in Palestine during the mandatory regime and the foundations for some institutions of local government were laid as early as the latter period of Ottoman rule. Under the former administration, elected municipal councils were established with their own budgets and financing. Subject to the approval of the mandatory authorities, they were authorized to levy rates for the maintenance of normal services including water supply, education, and town planning, etc. In 1945, seven Arab village councils were formed in southern Palestine and by 1948 municipal councils existed in the towns of Beersheba, Gaza, Khân-Yûnis, Majdal, Jaffa, Lydda and Ramleh.

Under Ottoman law, village administration was entrusted to mukhtârs, or village headmen, as agents of the government for the collection of taxes, general administration, and the maintenance of public security. The villages were encouraged to take as much initiative as possible for the improvement of village services, and during the second world war, owing to the improvement in general economic conditions, the amount contributed by the villagers increased substantially. The mandatory government's work to establish village councils in exclusively rural areas met with a certain degree of success. In southern Palestine most of the actual power remained with the mukhtâr, however, who acted in a liaison capacity with the district administration. It may be noted nonetheless, that a sufficiently broad background of experience in local government exists among the Gaza refugees to provide a base for the development of such institutions in the Sinai.

Social Organization

The environment of rural economy described above was made operative by a traditional social organization which rests on natural social units formed by the family, the clan, and the village. Together they constitute the machinery which holds the community together, even under the abnormal conditions of camp life.

The Family

The nucleus of rural social organization is the patriarchal family, in which the sons and their conjugal families are grouped together under the authority of the oldest male member. Due to the absence in the village of any strong external pole of attraction, the

family occupies a high degree of the peasant's interest and allegiance. The patriarchal family shares the same land and house and carries out agricultural operations under the direction of its head, who has absolute authority over all its members. Agricultural labour is primarily the function of the men of the household, but the women, in addition to their domestic duties of supplying the household with food, fuel and water, share in the sowing and harvesting and look after the livestock within the farm compound.

The Clan

The direct blood relationship which governs the patriarchal family is usually extended, through relationship with a common ancestor, to a tribal family with which very active ties are maintained. The clan system prevailed in most of the Palestinian villages and was probably an inheritance of nomadic custom where the search for security obliged the families to unite for common protection. The clan is usually divided into sub-clans which play a lesser role in village organization.

The clan has survived in the villages as the unit in which individual families group themselves in order to settle feuds, land disputes, and to exercise their voice in community decisions. When a system of collective land tenure prevails, the clan also has an economic function, each clan being allotted a fixed area of land and the distribution and rotation of tenures being effected among members of the clan families only.

The main function of the clan system is, however, of a social and customary nature. Clan rights and duties are the subject

of an elaborate set of traditional rules varying from village to village but having the force of law with respect to its members. These rules are characterized by joint liability or rights of compensation for wrongs committed by or against any member of the clan. In addition, the whole public life of the village is looked upon from the point of view of the clan's interest and pride, from the reception of guests in the clan's madâfa, or guest house, to the choice of the mukhtâr for higher office.

The Village

Apart from the family and clan, the only basis for social loyalties accepted by the peasant is his attachment to his village, the largest rural social grouping in Palestine since the early period of agricultural settlement. As elsewhere in the Middle East, there has been a direct passage from nomadic life to the concentration of population in villages owing to the requirements of security and the scarcity of water supply. Thus a geographical community exists in addition to the blood relationship of the family and the clan.

Within the village, life goes on in almost complete isolation and regardless of conflicts within the village, it faces the outside world, other villages and the state, with an unshakable solidarity. As a result, the Palestinian villages were largely self-dependent, maintaining their own limited services and subsisting on their own produce. Apart from the seasonal migration to towns and casual calls on the nearest urban market, the mobility of the population remained low, and births, marriages, and deaths took place within the confines of the village. Although some disruption to this pattern

occurred during the second world war, basically it remained the same, and even in the Gaza camps the refugees are organized according to their original clans, tribes, and villages. It is recommended that this framework be utilized to the full in all establishment and community development operations involving the refugees in the Sinai.

Present Conditions

Since December 1948, the Gaza refugees have been almost completely dependent upon the aid of the United Nations, the Egyptian administration and certain voluntary agencies for their food, shelter, clothing, and public services. The Gaza area stripped of its supporting hinterland is economically unviable and complete economic collapse has been averted only through the injection of large amounts of goods and services into the economy without any compensating payment. The persistent negative balance of trade is illustrated by the imports into the strip, which in 1951-1952 amounted to LE 2.8 million as opposed to only LE 0.3 million worth of exports.

Because of the limited natural resources of the Gaza Strip and their full utilization by the original inhabitants of the area, numerous studies and attempts to develop projects capable of rehabilitating a substantial number of refugees have met with small success. It may be concluded that opportunities for project development in Gaza would not afford a livelihood for more than a few hundred refugee families, and other solutions must be found if the refugee population is to attain a condition of economic independence and bring an end to the unfortunate psychological conditions associated with a life of dependency.

Assistance to the Refugees

Food

The main recurrent item of assistance is the regular issue of rations to families which provide an average daily diet of between 1,500 and 1,600 calories. In addition, a supplementary feeding programme is offered for certain categories of refugees in special need, and a milk distribution programme is carried on for the benefit of infants, children up to fourteen, and expectant and nursing mothers. Periodic surveys carried out by health and nutrition experts of the Food and Agricultural Organization and the World Health Organization of the United Nations indicate there is no evidence of widespread malnutrition among the refugees.

Shelter

More than half of the refugees in Gaza are living in camps where concrete shelters offer adequate housing conditions. Rooms were initially distributed on the basis of 3.5 to 4 persons per room but are now assigned at the rate of an average area of two square metres per person.

A sizable number of the refugees - about 90,000 - are living in private accommodation, either rented or in makeshift shelters of their own construction. The bedouins have maintained their traditional preference for living in tents. Others, however, driven by the depletion of their personal resources, and attracted by the superior accommodation, are applying in increasing numbers for admission to the nine official camps.

Health Services

Despite the prolonged period of crowded and unnatural living conditions and subsistence on an unbalanced diet, the health of the refugees remains good and probably better than it was in Palestine. There have been no epidemics. Only dysenteries and eye diseases, endemic to the area, are found in any number.

The facilities of several private and public hospitals are made available to the refugees through Agency subsidies, at the rate of one bed per 500 refugees. In addition, the UNRWA runs nine clinics comprising a dispensary, and medical, dressing, ophthalmic and maternal sections, which are open six days a week, with staff always available in case of emergency. There are also eight maternity centres where babies are delivered and are cared for with their mothers for several days. A health education programme and school health service have been instituted recently and are expected to raise even more the very satisfactory health standards of the Gaza Strip.

Education

Schooling facilities for boys and girls provided in Gaza offer standards which are recognizably high and compare favourably with those enjoyed by the children of other states in the region. Approximately 20% of the present Gaza refugee population are undergoing some type of regular training.

In addition to elementary and secondary education, an activity programme has been started to occupy children finishing primary school for whom no further education is anticipated.

Vocational and agricultural schools have been established and some eighty-five students are being subsidized in Egyptian universities. Apart from this, a fundamental education programme provides training in literacy and adult education for some 2,000 refugees who have not had the benefit of a formal education.

Social Welfare

Although these health and education services are in many instances superior to those enjoyed by the refugees in Palestine, at least for the poorer sections of the rural community, they are not an adequate substitute for the normal conditions of life. Refugee morale, although better in Gaza than in some other areas, still reflects the psychological characteristics of a displaced and socially dislocated population. As a means of improving this situation and the special lot of certain hardship cases, a social welfare programme is carried out.

Social welfare activities in the camps are organized around social centres run by refugee committees and assisted by an UNRWA social case-worker. Various educational and recreational facilities are provided in the centres including libraries and sporting equipment. Lectures and cinema shows are given periodically, and each week a local paper is produced by the centres themselves. Social centre sections have been started recently for women and scout troops, while activity programmes for training and production in sewing, embroidery and weaving previously established for some 600 girls have met with a considerable degree of success.

Conclusions

In concluding this appraisal of the human resources from which the Sinai population will be drawn, it appears that the Gaza refugees possess a background adequately suited to provide the farmers, ancillary workers, and some of the public service personnel for the future Sinai community. In some instances refresher training will be necessary to recapture lost skills or to adapt them to the special needs and conditions of life in the project area.

The present condition of refugee morale, which reflects a strong disinclination on the part of the refugee to change of environment and the complete dependency upon external support for a high level of services, indicates the need for concrete and tangible incentives to be built into the project if full refugee participation is to be assured. It also indicates the need for a programme of psychological conditioning and preparation for a life of self-dependence, without which the future development of the Sinai project cannot be assured.

The basis for these necessary programmes will be laid in the subsequent chapters.

VII. IRRIGATION WORKS AND LAND DEVELOPMENT

Irrigation Works

The general plan of the development for project irrigation facilities and for the preparation of land for irrigation is treated in this chapter. A description is included of those facilities which will be required to deliver water to the project lands, of the leveling of lands, the possible application of clay, and the construction of necessary roads and construction camps. The estimated cost of these phases of project construction is summarized.

The basic plan for the irrigation of 50,000 feddans of land in the Sinai is to convey water in canals from the Nile River near Cairo, easterly for about 140 kilometres to the Suez Canal near Ismailia, to cross the Suez Canal with an inverted siphon, and to distribute the water to the lands through a system of pumping stations, main canals, and laterals. Delivery to the project area cannot physically be made at an elevation that will permit irrigation service by gravity; hence, all water will have to be pumped to the main distribution canals. The lifts will be relatively small, however.

The general plan of the works for irrigation development is shown on Plates 2 and 21. Plate 21 shows the location of the Ismailia Canal from the Nile River to the Suez Canal and the location of the proposed Sâhla Desert Canal. Plate 2 is a topographic map of the Sinai agricultural development project on which have been shown the locations of the principal irrigation features such as main canals, drainage channels and pumping stations. The variously coloured areas on this map represent the land classifications as defined in the legend

and described in the Soils and Soil Improvement Chapter.

Surveys and Field Investigations

As soon as the Joint Policy Committee in the latter part of 1953 established the general limits of potential project lands, field work was initiated by the engineers of the Irrigation and Survey Department of the Egyptian Ministry of Public Works. Field inspections were made by UNRWA and Egyptian engineers and included aerial inspection of the project and adjacent areas. A survey camp was established near Qantara in the early part of December 1953, and an office was opened in Ismailia for administrative support of the field parties.

Topographic Surveys

The first surveys were made for the preparation of topographic maps of the area on a scale of 1:25,000 with a contour interval of one metre. Horizontal control was established by a third order triangulation network of Egypt. Primary vertical control was supplied by a system of levels which were run along the highway which traverses the entire project area, and another system was run along the upper boundary of the area. All were of first order precision. The datum plane is mean sea level at Alexandria.

Cross-sections were then taken of the area being surveyed at 500 metre intervals, with observations being made at a maximum of 50 metre intervals along the cross-sections. Vertical control was maintained by levels, horizontal control by transit-chain traverses. Cross-section surveys were followed by plane-table surveys, which located topographic details and mapped outstanding physical features. Elevations were plotted and the contours delineated in the office on

the basis of the field observations made as outlined above.

Detailed topography was taken of the Suez Canal siphon site on a scale of 1:1,000 with a contour interval of fifty centimetres. The same procedure was followed as for the other topographic surveys, except that cross-sections were taken at twenty metre intervals and elevations were observed at a minimum distance of twenty metres along each cross-section.

Canal Surveys

Surveys of the existing Ismailia Canal consisted of taking cross-sections at every major change in dimension and at minimum intervals of 500 metres. The cross-section extended to fifty metres on each side of the canal centre line. Water was in the canal throughout the period of the survey, and boats were used to take rod readings across the wetted section. Longitudinal levels were run between established bench-marks, generally in accord with third order procedure. Observations were taken at a minimum interval of two metres along each cross-section. All distances were chained.

New canal lines were located by transit-chain traverses. Elevations and grades were furnished by a level party which ran circuits between established bench-marks. Cross-sections were taken at all major changes in topography with the minimum interval being 400 metres. Elevations, read to the nearest centimetre, were observed at twenty metre intervals along the cross-section and at any marked breaks in surface slopes. All distances were measured by chain.

Field Investigations

Field investigations were begun early in 1954 with an

inspection of other reclamation projects under development in Egypt. Discussions were held with the Chief Engineer of the Suez Canal Company and engineers of the Desert Irrigation Department of the Egyptian Government for the purpose of determining clearances and other specifications or regulations of the Suez Canal Company that would control the location and design of the siphon. Information was obtained regarding the present use of water for irrigation from the Ismailia Canal and the requirements for navigation and domestic water service. Information was also obtained regarding the existing structures and their foundations, and reports on borings were prepared.

Foundation Explorations

During 1954, foundation explorations were made by means of borings at existing structures on the Ismailia Canal which must be enlarged or extended. At least one boring was made at each structure. Other borings were put down at the sites of structures along the alignment of the proposed Sâlhîa Desert Canal. Borings were made on the two sides of the Suez Canal to determine foundation conditions at the siphon site, and records of borings made in connection with the building of the new El-Firdân railway bridge, 850 metres north of the proposed siphon site, were obtained from the contractors. Borings were also made at the proposed power and pumping plant sites.

Irrigation Service Capacities

While it would not be advisable to design the irrigation works at capacities substantially in excess of the theoretical maximum irrigation demand, reasonable provision should be made for the normal decrease in capacity that will result from the deposition of silt. In

the early years before siltation reduces canal capacities, higher system losses and greater irrigation requirements will necessitate larger capacities. Furthermore, provision must be made for adequate capacity to serve the deep sandy soils and to apply as much silty Nile water as practicable in the early stages of development. The possibility of future expansion of the irrigated area must also be considered as this can be expected if subsequent events are conducive to such development.

Requirements of the Sinai project for irrigation water and the design criteria which influence capacities of canals and appurtenant structures of the distribution system have been discussed under the topic of "Water Requirements". It was shown there that the main distribution canals on the project will have maximum delivery capacities in proportion to the areas of irrigated land they serve. An adequate system capacity is found to be 2 million m^3/d (cubic metres per day) for flood season deliveries, after allowance for normal transmission losses in the fully developed stage of the project. Similarly, pumping stations will have the capacities required by the area to be served, and will be equipped with the requisite number of pumping units to permit changes in the rates of delivery of water in accordance with reasonable variations in irrigation demands.

The capacity of the siphon under the Suez Canal should be greater than the original maximum capacity of the irrigation system. It is recommended that this siphon should have a capacity of 3 million m^3/d .

If the siphon is made up of three tubes of 1 million m^3/d capacity each, as described below, one tube would remain as standby, or insurance capacity, in case of damage or disruption of service in one of the operating tubes. The third tube could also be utilized in rotation for cleaning and maintenance of the siphon. The excess capacity could well be used in the future for expansion of the project or for delivery of water for the irrigation of other lands at a smaller incremental cost than would be incurred by the construction of another siphon. Facilities of this nature, being less subject to additional expansion, should have adequate capacity for such contingencies.

It is planned to construct the Sâhîa Desert Canal from the Ismailia Canal at km 75.200 to the siphon. Excavation for this canal would be entirely in the sand and large amounts of water would be lost by percolation in the early years. As the wetted surfaces of the channels become coated with Nile silt, losses will diminish. Reduction of the capacity and cross-section downstream, in accord with some assumed margin of losses has not been considered at this stage. It is proposed to construct the Sâhîa Desert Canal with an initial capacity of 3,500,000 m^3/d throughout its length from the Ismailia Canal to the siphon, to provide for adequate additional capacity to carry Sinai project water, and to provide for ordinary distribution losses. The capacity of the Ismailia Canal at the head regulator must be enlarged by 3,850,000 m^3/d . The present normal maximum flood flow capacity of the Ismailia Canal at its intake at the Nile is 7,500,000 m^3/d . Thus, the head regulator of the Ismailia Canal must be enlarged to divert a

total of 11,350,000 m³/d. The required cross-section of the canal will be reduced downstream from points of large diversions for irrigation, and thus, the enlarged canal capacity at km 75.200 will need to be only about 6,000,100 m³/d.

The above discussion has been on the basis of estimating the cost of the construction required for the Sinai project and does not consider the plans for additional expansion being made by the Egyptian Government. These plans are discussed in the following section.

Plans of the Egyptian Government

The Egyptian Government is presently preparing plans and specifications for enlarging the Ismailia Canal beyond that which is necessary for serving the Northwest Sinai project. The new policy established by the Government would provide for enlargement, which would bring the Ismailia Canal into the category of a first-class navigation channel, to provide capacity to serve new irrigated areas from the Ismailia Canal, and to relieve the present rotational difficulties in the Ismailia system.

It is planned that if the Sinai project is constructed and built, the additional expansion of the Ismailia system will be undertaken at the same time by the Government. If the Sinai project is not constructed, these plans will be reserved for future development.

Cost estimates for the necessary expansion of the Ismailia facilities for the Sinai project have been made on the basis of these requirements alone. The additional expansion would be undertaken completely at the expense of the Egyptian Government.

Irrigation Works

The following sections describe briefly the necessary modifications of the existing irrigation works and the new works to be constructed. Designs and drawings have been prepared by several engineering departments of the Egyptian Government, normally engaged in the planning, design and construction of such various types of facilities as highways, railways, irrigation works, power plants and pumping stations. The designs and plans have been carried forward only to the extent necessary for a description of each physical feature in its general dimensions and to provide adequate information for a reliable estimate of costs.

Ismailia Head Regulator for Diversion from Nile River

This regulator, headgate structure, is located on the right hand bank of the Nile River, about five kilometres north of Cairo, and controls the rate of diversion of water to the Ismailia Canal, in accordance with the requirements for irrigation, navigation and domestic use.

The existing regulator is a massive concrete and stone masonry structure consisting of three discharge gates and a navigation lock. This structure is more than fifty years old and cannot safely or practically be remodelled and extended to permit so large an additional diversion as required by the Sinai project; accordingly, a new diversion headgate apart from the old structure must be built with a capacity to discharge 3,850,000 m³/d.

Ismailia Canal to km 75.200

The Ismailia Canal was constructed in its location along

the southeast edge of the Nile Delta in conjunction with the Suez Canal development and was completed in 1887. It has since been enlarged and its services have been expanded in the following decades. This Canal not only supplies water for irrigation of about 200,000 feddans in the Delta but provides a navigable channel for small boats and barges moving from the Nile to the Suez Canal. It also supplies water for domestic uses to villages along its course, to the town of Ismailia, and through the Sweet Water Branch Canal which runs northerly and southerly, respectively, from the vicinity of Ismailia to the cities of Port Said and Suez. Hence, the construction work of enlarging the channel and the control structure must be done without interference with these continuous operations.

Since the enlargement of the Ismailia Canal to provide for the supply to the Sinai project will be substantial, amounting to about one-half of the present capacity, all of the existing structures will have to be correspondingly extended. It will be necessary to enlarge the canal by excavation along its left hand bank, downstream to km 7.000, and along its right hand bank to at least km 75.200 near Tel el-Kebir. The quantities of earth and sand to be removed between the intake and km 75.200 are substantial, amounting to about seven million cubic metres.

Estimates of the cost of excavation have been based primarily on doing the work with dredges, which are customarily used throughout the Delta for canal maintenance and widening. It has been proposed that part of the excavation be done by hand labour and also that dragline excavators be used in place of dredges. In certain ..

locations, elevating graders with belt conveyers might be used successfully along the canal berm and these would dump the excavated material along the alignment of the new embankment.

The quantity that can be moved by dredges depends, firstly, upon the work load of the dredging companies in Lower Egypt at the time of construction and upon the economics of building or importing new equipment, and secondly, upon the economics of purchasing or hiring other new equipment such as draglines and graders. The use of hand labour in considerable force will be possible at selected locations, and it is the opinion in Egypt that the cost of such excavation under certain conditions would be no more than if the same work were done with heavy earth-moving machinery.

Three existing railway and six road bridges must be lengthened across the additional width of canal, and new gates, or vents, will have to be constructed at the two existing regulators, (sometimes called check and diversion structures). The turnout structure with gates for diverting water to irrigation laterals along the right hand bank of the Ismailia Canal will have to be removed when the Canal is widened and will then have to be replaced in the new embankment. The new construction will be in accordance with standard practices of the Irrigation Department. Two principal drainage channels, the Bilbeis and the El-Shûlya, cross under the Ismailia Canal in concrete or masonry siphons and these will have to be made longer when the canal is widened.

Alternate Routes from Ismailia Canal at km 75.200 to Siphon at Suez Canal

Beginning at the Ismailia Canal at km 75.200, two alternate

routes have been considered for conveying Sinai project water to the Suez siphon, both of which are shown on Plate 21.

Selection of one, the Sâlhîa Desert route, has been made on the basis of the information available. The following presents a description of the conditions to be encountered along each of the routes and the reasons for making the selection.

Firstly, the Ismailia Canal (Alternate "A") can be enlarged downstream to km 120.300, which is upstream from the turnouts to the Sweet Water Canal; the water can then be diverted through a by-pass channel to the Port Said Canal, thence along an enlarged Port Said Canal to its km 7.100, and finally by a southeasterly route to the siphon. Secondly, the proposed Sâlhîa Desert Canal (Alternate "B") can be constructed; this would run north from 75.200 for a few kilometres towards the village of El-Qurayn and thence generally east and southeast to the siphon. The construction quantities for both alternates have been computed from the field surveys and preliminary designs previously referred to, and the costs of construction have been estimated in considerable detail.

Alternate "A" - Ismailia Canal Enlargement

The Ismailia Canal from km 75.200 to km 120.300 would have to be widened on the right bank; otherwise, the paved highway all along the left bank would have to be removed and replaced at great expense. The carrying capacity even in flood season averages only about 2,000,000 m³/d, whereas the added requirement for project water is 3,500,000 m³/d and thus, the enlargement would be much more than an ordinary task of widening. In addition, the channel would have

to be made at least one metre deeper than it is now. The new embankment would be mostly artificial fill, as its base would be nearly at the elevation of the bottom of the water channel. In some places it would even be below it, so that an impervious core wall of clay would be needed to stabilize the fill, at least in part of its length.

Quantities to be excavated along this sector of the Ismailia Canal are estimated to be 5,100,000 cubic metres. Although the Port Said Canal by-pass is only 7.150 kilometres long, the quantity of excavation would be 3,200,000 cubic metres since this channel must be cut through high ground for most of its length. An additional 1,800,000 cubic metres would be moved in widening the Port Said Canal from its km 4.900 to 7.100, and in building the new canal to the site of the Suez Canal siphon.

New structures required would include regulators at El-Qassâsin, at the by-pass diversion from the Ismailia Canal, and at km 7.100 in the Port Said Canal where diversion of project water would be made into the canal leading to the siphon. There would be new railway bridges, one on the Ismailia - El Zağāzīq line and the other on the Ismailia - Port Said line, and four new road bridges, all on the channels downstream of the diversion from the Ismailia Canal. The most difficult construction would be encountered at El-Qassâsin where the existing lock must be kept open for navigation; hence the new regulator probably would be built on a by-pass channel of the Ismailia Canal. Miscellaneous construction would include replacement of existing irrigation turnouts, rebuilding ramps and terraces along the navigable channel, lengthening the Abu-Suwayr

drain crossing, and the paving of roads along the new canals.

A major problem would be encountered downstream from km 75.200, because of the location of this canal along the northerly edge of the Wādī Tūmaylāt depression. Throughout this region, most of the lands on the left side are higher than the canal and on the right side, where widening would be done, they are lower. In some places the cultivated lands actually are at a lower elevation than the bottom of the existing canal. The longitudinal cross-section of the Ismailia Canal throughout its length is shown on Plate 22. It will be noted that much of the canal, on its right side from about km 66 to the Ismailia Canal front-lock at km 127.740, would be built on a fill and that even the low water line would be substantially above the ground surface. This is particularly true between km 66 and km 95 and again between km 113 and the front-lock.

The original channel of the Ismailia Canal was all in sand, but over many years the wetted area has accumulated a coating of Nile silt which has reduced the amount of seepage to the low ground. Nevertheless, it has been necessary to install an extensive system of drains throughout the depression to protect some 22,000 feddans of cultivated land.

During the work of deepening and widening the Ismailia Canal all of the bottom and the right bank would be excavated into the sand. The proportion of silt in the bottom and the right bank of the newly excavated canal would be quite small, and the rate of seepage would thus be increased. The existing drainage system might then be inadequate to protect the lands from rising ground water.

Without making detailed surveys and quantity estimates, the cost of protecting the Wādī Tūmaylāt lands and other low-lying irrigable areas are somewhat speculative. Nevertheless, a cursory review indicates these would be at least in the order of LE 500,000. and that they might be fifty percent greater.

Alternate "B" - Sālhiā Desert Canal

Many of the problems inherent in the enlargement of the Ismailia Canal can be avoided by building a new canal through the Sālhiā Desert from the Ismailia Canal at km 75.200 to the Suez Canal siphon, a distance of about 68 kilometres. The location that has been surveyed is feasible, as shown by the longitudinal section on Plate 23. Except for a short distance near El-Qurayn village, there will be no interference with cultivated land and other improved property.

The flood capacity of this canal will be $3,500,000 \text{ m}^3/\text{d}$, equivalent to 40.5 cubic metres per second. In consideration of the hydraulic characteristics of non-erosional velocities at high stages, non-silting velocities at low stages, and the topography along the alignment, the hydraulic gradient has been fixed at six centimetres per kilometre (0.00006 longitudinal slope).

Field inspection and the results of a number of borings along the Sālhiā Canal location indicate that the excavation will be all in sand. From the surveys and the plotting of cross-sections, it is estimated that a total quantity of 10,000,000 cubic metres of material will have to be moved.

The principal hydraulic structures will be at the Sālhiā

Canal diversion heading. There the water levels upstream in the Ismailia Canal must be controlled to maintain the diversion rates required for existing irrigation canals. Also at that point, the remaining flow must be divided between downstream requirements for irrigation, domestic water supply and navigation, and the irrigation demands of the Sâhîa Canal for the Sinai project.

Road bridges will be required at two main crossings - the Port Said highway at km 62.030 and the Suez Canal road at km 67.775. In the desert reach between El-Qurayn village and the Port Said Canal, eight bridges for rural roads have been included in the preliminary designs and their locations are shown in the general plan on Plate 21. All of these will be of a standard design, and preliminary plans have been drawn for a bridge having a central span nineteen metres long with spans eleven metres long at each end.

Bridges must also be constructed for the Ismailia - El-Zaqâziq railway line at Sâhîa Canal at km 0.042 and at the crossing of the railway line to Port Said at km 67.350. The Egyptian Republic Railways Administration will design these structures and carry out the construction work.

Where the new channel crosses the Port Said Canal at km 62.000 this small canal will be carried underneath the Sâhîa Canal in a siphon. The design for this structure will include control gates through which in an emergency small quantities of water could be diverted from either of these canals to the other.

In considering the selection of the Sâhîa Desert Canal as an alternate to enlargement of the Ismailia Canal downstream from

Tel el-Kebir, allowance must be made for the additional costs of power at the Sinai main pumping stations. This arises from the fact that water could be delivered there through the Ismailia route at a higher elevation than through the Sâhîa route because of differences in the hydraulic gradients.

Comparison of Alternate Routes

Cost estimates of the two routes have been made and reveal that the cost would be substantially the same for either of the two routes.

Alternate "A", the Ismailia route, offers only one material benefit - that is the delivery of water at the siphon at a higher elevation than can be delivered by Alternate "B". The average of the additional elevation weighed for differences in both dry and flood season flows would be about 1.5 metres.

In comparison with the one advantage, the disadvantages of Alternate "A" are as follows:

1. The elevation of the Ismailia Canal below km 75.200 in relation to adjacent lands along its right bank is a source of potential damage to those lands.

2. Difficulties would be encountered in construction of (a) the core wall in the right bank of the Ismailia Canal, (b) the new regulator at El-Qassâsin or the widening of the existing one, and (c) the Port Said Sweet Water Canal diversion, with its deep excavation and attendant earth-moving problems.

3. Because of the major enlargement involved in this portion of the canal, it would be very difficult to maintain canal levels for navigation and the delivery of irrigation and domestic water during construction.

4. The Ismailia Canal in this reach runs close to low cultivated lands. This would be a source of difficulty in controlling and distributing water due to water losses, seepage, and the task of controlling outlets. These conditions need continuous supervision and inspection to guarantee deliveries of water to the project.

Alternate "B", the Sâhîa Desert Canal, has only one disadvantage - that of delivering water to the siphon at a lower level and thus requiring a higher pumping lift to the project.

Its advantages are as follows:

1. It runs in its entire length through high desert lands and will cause little or no change to adjacent lands which may be cultivated in the future.

2. No difficult problems of supervision are envisaged to guarantee the delivery of water to the project area.

3. There will be no difficult construction problems or interference with irrigation, navigation and domestic water supply.

Selection of Sâlhîa Desert Canal

It is the engineers' opinion that, beyond the above cited advantages, there would be less chance of incurring contingency and unforeseen costs in the case of the Sâlhîa Canal construction than in the enlargement of the Ismailia Canal and a portion of the Port Said Sweetwater Canal.

The capitalized cost of additional power for pumping the Sinai water supply must be added to the Sâlhîa Desert Canal, Alternate "B". However, this would be more than offset by the cost of protecting agricultural lands in the Wâdî Tûmaylât depression from damages by excess ground water due to the enlargement of the Ismailia Canal.

Considering all factors, tangible and intangible, it is concluded that both capital costs and annual expenses would be less under Alternate "B", the Sâlhîa Desert Canal. Accordingly, that feature has been made a part of the irrigation works proposed for the Sinai project for the purposes of this report.

Siphon Under Suez Canal

Selection of a site for the inverted siphon crossing of the Suez Canal was limited by the location of the Sâlhîa Desert Canal and controlled by the topography and other physical features along both sides of the Suez Canal. For example, disposal of sand and clay dredged from the Canal has built up large embankments on both sides, which rise to about five metres above the natural ground surface and in some places to a height of ten metres. The most suitable site for the siphon was found at km 60.850 on the Suez Canal which is 850 metres south of the new El-Firdân railway bridge.

The cross-section of the Suez Canal at this location, shown in Plate 24, indicates the dimensions of the existing channel.

The capacity of the siphon will be 3 million m^3/d , equivalent to $34.7 \text{ m}^3/\text{s}$ (cubic metres per second) of continuous flow. Actual design of the siphon will be made during the period of construction planning. However, it is envisaged that the siphon should have three tubes of 1 million m^3/d capacity each. It has been shown under the topic of design criteria that a project capacity of 2 million m^3/d at the main pumping plant is sufficient for the needs of the project. Thus, only two-thirds of the siphon capacity would be needed at any time, and the remaining third would be provided for insurance against emergencies and for cleaning and maintenance of the siphon tubes.

Dredging a trench across the Suez Canal to a depth of twenty-five metres in fifteen metres of water presents no especial difficulty. It could be done by dragline, clam-shell, or suction dredge. The choice of equipment will depend on how each method might interfere with traffic and on the amount of material to be removed.

The principal construction difficulty will be that of proceeding without interruption of the traffic in the Suez Canal. No especial underground difficulties are anticipated. Borings at the site of the El-Firdân bridge, which went to minus 23 metres, and two borings made during project investigations at the site of the siphon, one to minus 29 and one to minus 33 metres elevation, indicate no unusual underground conditions. The cost estimate has been based upon experience in other countries, with a large margin

allowed as a safety factor.

Suez Canal Company

Before the siphon can be constructed under the Suez Canal, full agreement must be reached with the Suez Canal Company on the conditions and methods of construction. Of primary importance to the Canal Company is the transit of vessels through the Suez Canal without interference. Next in importance is the position of the siphon with relation to the existing canal and the proposed enlargement of the Suez Canal. Plate 24 shows the position of the siphon which has been suggested by the Suez Canal Company in preliminary discussions. It provides for adequate space for widening the Canal on the east side and for increasing its depth to an elevation of minus 15 metres, which would provide for clearance between the bottom of the proposed channel and top of the siphon amounting to five metres. Final design criteria may or may not conform to the suggestions shown on the Plate and will be based upon the agreement reached between the Egyptian Government and the Suez Canal Company.

Distribution System

Power Plant

Because of the necessity of pumping all of the water delivered to the project, except that required for about 200 feddans which can be served by gravity, the power plant becomes one of the key facilities of the development. It will consist of a plant for the generation of electric power and will use oil as its fuel. The oil can come from the existing refinery at the town of Suez.

The power plant is also a key in the construction timing

of the project. It will take approximately two to two and one-half years to obtain and install the equipment after bids have been let. Thus, it becomes of extreme importance to design for the power plant as early as possible. Preliminary estimates for this report were made by the Mechanical and Electrical Department of the Ministry of Public Works. Estimates were based upon the latest information available to the Department from tenders on recent construction of similar power developments throughout the Delta.

The preliminary estimate was based upon an assumed design which would meet the most severe conditions of plant operation. This resulted in a designed capacity of 12,000 kilowatts, composed of several units and including 100% stand-by capacity. The basic power demand is made up of 3,500 kilowatts for pumping, 1,500 kilowatts for village lighting, and 1,000 kilowatts for shops and auxiliary service. The 100% stand-by capacity provision for this type of plant is in accordance with present custom in the Middle East, which in turn is dictated by the difficulty of obtaining equipment in the event of major breakdown.

Costs summarized at the end of this chapter include all of the appurtenant facilities and transmission lines.

Principal Irrigation Canals

Of the total of 50,000 feddans to be irrigated, about 32,000 feddans are in the Northern Area and 18,000 are in the Southern Area. Water will be distributed through three main canals from the central pumping stations and through four auxiliary canals to be supplied by secondary pumping stations.

By reference to the topographical map, Plate 2, it will be seen that irrigation development of the Northern Area will begin just downstream of the main pumping station and will extend in a strip about three kilometres wide almost to Qantara. The canals then extend to the northeast to cover the wider and flatter area towards Gilbana. The alignment for the canals to serve these lands will be relatively easy to develop, but the strip along the Suez Canal north of the main pumping station is much more uneven and will require greater quantities of excavation per kilometre.

To the south along the main canal for about fifteen kilometres there are no suitable areas of sufficient size to warrant irrigation development. Downstream from kilometre 16, however, most of the Southern Area between the Suez Canal and contour 18 metres is irrigable land with flatter slopes through which canals can be constructed with no difficulties. Borings which have been put down along the main canal alignment show that limited amounts of rock will be encountered in the excavation. Despite the fact this rock is rather soft and friable limestone, there will be some increase in the cost of excavation of this material over the costs of digging through the areas of sandy soils.

It is planned that the agricultural lands will be irrigated in the two rotation system, each period of rotation being about five days. These periods of rotation will be applied continuously to each of the three main canals and to each of the auxiliary canals which are served by a separate pumping station. The capacities that these canals must have at their regulators has been determined from this plan of

irrigation and by the maximum rate of discharge in the flood season, namely 2,000,000 m³/d.

Preliminary locations of the three principal canals have been made in the field, and preliminary design studies have been made of the alignments, gradients, and cross-sections. Typical cross-sections in the northern and southern canals are shown on Plates 25 and 26, respectively.

Only sufficient studies have been made of the secondary distribution canals to give a basis for estimated costs. A tentative pattern of this system has been laid out and the alignments, gradients and cross-sections will be finally developed during the design period.

Pumping Stations

East of the siphon, water for the Sinai project will be conveyed in an open canal for a distance of two to three kilometres to the site of the main pumping stations. These pumping stations must have a combined capacity sufficient to lift all the water that will be distributed for the irrigation of 50,000 feddans during the flood season and hence will be unusually large installations. Preliminary designs for these pumping stations have been made by the Mechanical and Electrical Department of the Egyptian Government.

It is the general custom in Egypt to provide living quarters in the immediate vicinity of the plant for the supervisors, operators, and labourers permanently engaged in operation and maintenance. In the Sinai project, it is proposed that these principal pumping stations will be located near the capital town and that living quarters for operational and maintenance personnel will be provided in that town. Provision and

costs for this housing are included under "Community Construction".

There will be four auxiliary pumps on the main canals for lifting part of the irrigation supply to higher elevations. The locations of these are shown on Plate 2. No detailed design drawings have been made for these pumping stations, but their design will be similar to a large number of installations which have been built by the Egyptian Government in recent years.

Drainage Works

Three main drainage canals will be constructed along with the other main features of the project. These are shown on Plate 2.

One canal in the Southern Area should be built to drain a series of depressions and to discharge into the Great Bitter Lake by gravity. Another should be located close to the western boundary of the project in the Northern Area. This drain would serve two purposes; it would collect the waste waters from the dredging operations of the Suez Canal Company, thus preventing salt water from damaging the project lands, and would also serve as a toe drain for the northern project area. It would discharge by gravity into the Suez Canal.

A third main drain should be located along the low lands at the western boundary of the project, east of Qantara. Because of its elevation, a pumping station will be needed to lift the water into the Suez Canal. In order that the discharges from this pump will not create current in the Canal, some type of diffusion device will be required.

This station can be equipped and its units put into operation when needed as the rate of flow in the drain increases. It is

anticipated that after the project reaches full development, as much as 6 m³/s might need to be pumped at this point.

Water requirement studies have indicated that excess water delivered to the project lands will cause early drainage needs. The main drains discussed above should be built at the same time as the distribution system. Planning for the primary lateral drainage system should be undertaken following the period of pre-construction planning and design. Construction of the primary lateral drains should be undertaken soon after the development of the lands and the application of the first irrigation water.

Costs of the drainage system are included in the estimated costs for the distribution system.

Table VII - 1 gives a summary of the distribution system facilities which have been described.

Project Roads and Construction Camps

Since in addition to the function of providing a means of communication for the transport of goods and people, roads in the project area will be directly related to the operation and maintenance of the irrigation system. They will be discussed here along with the other phases of irrigation development. Brief reference is made to construction camps merely to provide an estimate of cost.

Roads

The preliminary layout of roads in the project area is shown on Plate 28. Each village will be connected directly with the existing main highway traversing the project area, either by access roads or by roadways along the main canal banks. Whenever possible, villages will

TABLE VII - 1

SUMMARY OF DISTRIBUTION SYSTEM FACILITIES

	Approximate Length of Canal Served (km)	Service Area in Feddans		Average Pump Lift ⁽¹⁾ (m)	Annual Power Consumption ⁽²⁾ Million (kwh)
		1st Rotation	2nd Rotation		
<u>Main Pumping Station</u>					
North Low Lift	41	4,690	5,560	3.3	1.3
High Lift:					
North Service	47	11,180	10,870	8.5	12.5
South Service	35	9,080	8,470		
<u>Auxiliary Pumping Stations</u>					
North	20	4,080	3,050	5.5	1.5
South No. 1	18	2,000	1,800	8.0	1.1
South No. 2	6	3,090	0	6.5	1.2
South No. 3	6	0	3,220	7.0	1.3
<u>Drainage Pumping Station</u>	-	-	-	4.0	3.2
Total Power Consumption					22.1

(1) Including allowance for friction loss.

(2) Assuming 65% efficiency.

be connected to each other by the canal bank roads.

Because of the sandy conditions, all the roads will be surfaced by a mixed-in-place oil paving. All paving would be six metres wide except canal bank roads which would have a paved width of four metres.

Village connections and main highways are estimated to have a total length of about thirty kilometres. Surfaced roadways would be provided on one side of the main canals only and the total length would be approximately 120 kilometres. Within the towns and villages, it is estimated that the twenty villages will each require about 1,200 metres of roadway, the two district centres approximately 1,750 metres, and the capital town about 2,500 metres, involving in all a total length of approximately 30 kilometres.

In addition, about twelve canal crossings would be required.

Construction Camps

No detailed estimate has been made for the cost of construction camps. A conservative figure of LE 70,000 has been used, which would include the cost of construction water supply and health services, which it is planned to provide. Proper precautions must be taken to protect the labour force against malaria, small pox, typhoid and para-typhoid fevers and contaminated water supply.

Land Development

Methods of land improvement have been discussed in the Soils and Soil Improvement Chapter. Land development, as discussed herein, pertains to those features of project construction which deal with preparation of the land for irrigation and the growing of crops. Only two topics - land levelling and the application of clay - are covered. The purpose of the discussion is purely to present an estimate of cost.

Land Levelling

In addition to the construction of irrigation facilities, land levelling may be considered as part of the irrigation development.

In general practice, field slopes of between 0.2% and 0.5% are common in irrigated areas. The maximum field slopes in the project area in the early stages of development should not be greater than 1%. However, it is proposed that initial levelling will not be carried to a higher degree than 1%. As more silt and clay are incorporated in the soils, conditions will warrant and even dictate further levelling of the soils. This process can be carried out in the ordinary course of farming operations.

In order that an approximation could be made of the amount of initial levelling required, an estimate was made from the topographical maps of the area of different slopes. That data is summarized in Table VII - 2.

This Table reveals that about 33,000 feddans in the project area have slopes of less than 1% and will require virtually no levelling. In the remaining area it is estimated that there may be as

TABLE VII - 2

VARIATIONS IN SLOPE

Area	Feddans			
	0% - 1% Slope	1% - 1.5%	Over 2% Slope	Total
Qantara - Gilbana	15,600	5,500	1,400	22,500
El-Firdan - El-Ballah	8,300	4,300	2,400	15,000
Southern Area	9,100	3,500	1,900	16,500
Total	33,000	15,300	5,700	54,000

much as 4 million m^3 of earth to be removed in order to attain slopes of 1%. The area with slopes over 3% is practically nil.

In order to keep the cost of levelling within a reasonable range, heavy earth-moving equipment should probably be used. Data on the use of bulldozers for land levelling shows that for work no heavier than that which will be encountered in the Sinai project, a reasonable estimate of cost is about LE 0.070 per m^3 . Applying the cost to 4 million m^3 of earth to be moved would indicate a total cost for levelling of about LE 300,000.

Application of Silt and Clay

As indicated in the Soils and Soil Improvement Chapter, the necessity for the application of silt and clay and the actual amount to be employed is a matter for later determination. For the purpose of this report, however, an item of cost is included for this phase of land development.

Providing enough clay to increase the content to 12% (an addition of 10%) in the top twenty-five centimetres of the soil would require an application of about twenty-five millimetres (or one inch), equivalent to an application of 100 m^3/F .

It is estimated that this degree of clay application will be required on no more than 30,000 feddans net area. The amount of clay required, therefore, would be approximately 3 million m^3 . As described in the Soils and Soil Improvement Chapter, more than 19 million m^3 are available in the project area.

The clay could be spread on the land or introduced onto the soil through the canals at convenient locations throughout the project

area. The exact method is a matter for later determination.

Estimates of Construction Costs

As explained previously, estimates of the cost of construction of the irrigation works have been prepared by the various departments of the Egyptian Government customarily concerned with the planning, design, and supervision of construction of the various types of facilities. These estimates have been reviewed by the Engineering Consultants of the UNRWA.

Although all estimates of cost have been based upon general surveys and preliminary designs, the computation of quantities and the application of unit prices to the various classifications of construction work have, nevertheless, been carried out in considerable detail. The quantities of excavation have been computed from surveyed profiles and designed cross-sections. Estimates for the structures, which represent the other substantial item of canal cost, have also been carried out in detail.

The estimates of the cost of construction are given in Table VII - 3.

Operation and Maintenance Costs

Annual operation and maintenance costs were estimated for the power plant and pumping stations by the Mechanical and Electrical Department of the Ministry of Public Works. Because of the interrelation of the pumping and power costs in this computation, no separation has been made of power and pumping costs. Total operation and maintenance costs, including power plant operation and pumping station operation and maintenance, amount to LE 230,000. This is equivalent to LE 4.6 per

TABLE VII - 3

SUMMARY OF CAPITAL COSTSIRRIGATION WORKS AND LAND DEVELOPMENT
(Values in LE)

<u>I t e m</u>	<u>C o s t</u>	<u>Sub-total</u>	<u>T o t a l</u>
<u>Ismailia Canal Enlargement to Km 75.200</u>			
Rights of Way, etc.	300,000.		
Earthwork (8,300,000 m ³)	735,000.		
Structures	575,000.		
Miscellaneous Removal and Construction	140,000.		
Contingencies, Engineering and Administration	250,000.		
		2,000,000.	
<u>Roads and Construction Camps</u>			
Village Connections (30 km at LE 1,800)	54,000.		
Canal Bank Roads (120 km at LE 1,200.)	144,000.		
Village Streets (30 km at LE 2,000.)	60,000.		
Canal Crossings (12 at LE 2,000.)	24,000.		
Contingencies and Other Costs	48,000.		
		330,000.	
<u>Construction Camps - Including Construction</u>			
Water and Health and Sanitation	70,000.		
			70,000.
			10,850,000.

GRAND TOTAL - PROJECT FACILITIES

(1) Including Contingencies and Other Costs.

feddan. No depreciation or interest on capital investment is included in this figure. Annual depreciation costs are estimated at LE 70,000. Operation and maintenance costs with depreciation would amount to LE 6.0 per feddan. Independent estimates of power cost indicate that electrical energy may be produced for about LE 0.005 per kilowatt-hour. Total annual costs for irrigation and utilities are indicated in Table VII - 4.

TABLE VII - 4

SUMMARY OF ANNUAL COSTS IRRIGATION AND UTILITIES

<u>Feature</u>	<u>Cost</u> <u>LE</u>
Electric System and Pumping Plants (1)	230,000.
Maintenance of Canals	40,000.
Roads and Streets	<u>27,000.</u>
Total annual costs	297,000.
Cost per feddan	= LE 5.94
Cost per five-feddan farm	= LE 29.70

N.B. No depreciation has been included for facilities having a life of more than ten years.

- (1) Includes cost of power delivered to communities on the project; a capacity of 1,500 kilowatts has been allocated for this purpose.

VIII. THE REHABILITATION PROGRAMME

The rehabilitation programme is a chronological sequence of activities, all of which involve the authorities in direct relationships with the refugees, and which will on that account be susceptible to special considerations of organization and planning. These activities comprise the preparation, selection, and where necessary the training of the refugees in the Gaza Strip, their movement to, and establishment in the project area. It is intended in this chapter to describe the probable extent and scope of these activities and to develop their probable costs.

While it is not possible to anticipate in this report the detailed organizational structure of the authority which will be administering the rehabilitation programme, it is nevertheless necessary to discuss the matter in broad terms of function with tentative reference to certain offices. It is considered that the total administration of the reclamation area, throughout the bulk of the period of construction, land development and establishment, can be administered most effectively by a single Project Authority. This Authority, whatever its constitution may be, will dispose of a number of subordinate offices dealing with separate functions such as construction, land development, and the administration of public services, etc., until such time as the establishment of the community is assured, within the normal framework of modern Egyptian provincial administration.

With regard to the particular activities described in this chapter, it has been found convenient to amalgamate the functions of preparation, selection and movement in one group (training will

probably be administered separately), and to consider them as being exercised by some co-ordinative office in Gaza. For the purpose of describing these functions and computing their costs, this office is referred to in the following pages as the Selection and Movement Office, it being understood that ultimate division of responsibility is a matter which must follow more detailed planning.

With regard to the process of establishing the refugees in the project area, it is believed that this can best be administered by a Development Office, subordinate to the Project Authority, and responsible for all those functions directly connected with the scheduled development of the project area. The broad functions of the Development Office and its principal branches are dealt with in the "Establishment" section of this chapter.

Preparation

Objectives

As has been seen, the Palestine refugees left their homes in 1948 and many of those that may eventually be selected for rehabilitation in the Sinai will have been living an unnatural life of enforced idleness for periods varying from nine to fourteen years. Their attitudes towards leaving the security of organized relief camps will vary from one individual to another, depending upon such diverse factors as former background and the extent to which refugee existence has exerted its influence upon individual character and aspiration. Few will be morally equipped to embark immediately upon what is essentially a pioneering enterprise in a desert environment, without some special preparation.

An essential task, which must precede all others in the Gaza Strip, will be that of inculcating a desire in the refugees to live a fuller and better life and creating a genuine demand for the means to do so. This must be combined with the dissemination of positive and authoritative information regarding the new opportunities for self-support which are being created for their benefit.

Methods

The principal means for this purpose lie within the machinery of the existing fundamental education and social welfare programmes of the UNRWA, combined with complementary social welfare activities administered by the Egyptian authorities in the Gaza Strip and, where possible, those of voluntary societies. Encouraging experience has already been gained by the UNRWA of the benefits of fundamental education

directed towards both young and old, and it will be advisable to draw up larger and more embracing programmes of this kind with special emphasis on the objectives outlined above.

Combined with this, it will be necessary to institute a public relations programme which will disseminate through the medium of films, illustrated literature and lectures, authoritative information on the Sinai project and on the many and varied opportunities for a higher standard of living which the enterprise offers.

One of the most efficacious means of ensuring a constant flow into Gaza of reliable information regarding the project and the standards and opportunities which it offers will undoubtedly be the employment of refugee labour during the construction period. It is believed that this early association of Gaza refugees with the construction of large scale irrigation works and well planned villages complete with modern but traditional facilities, combined with the convincing demonstration that can be offered by a few pilot farms, will go far towards offsetting the effects of misinformation and rumour which will inevitably be circulated in the Gaza camps.

Construction labourers should be given opportunities to participate in the project when the first farmsteads are ready, and at this point special arrangements should be made for their families to join them. It is also likely that, in the early period of construction, opportunities will arise for a limited number of ancillary enterprises such as will be required to supply the needs of a paid labour force. If arrangements are made for selected refugees to fill these needs, there is little doubt that they will stay so long as

business opportunities are promising, and, with the development of the area, they will want to establish themselves with their families in newly constructed homes and business premises.

In this connection, it will be necessary to assure the refugees, through the most authoritative channels that can properly be employed for the purpose, that the acceptance of these opportunities for self-support is not prejudicial to their rights to return to their original homes or to receive compensation therefor.

In administering this preparation activity, it is recommended that special attention be paid to traditional sources of leadership and influence, with a view to preserving them rather than attempting to disassociate the people from their familiar and customary sources of guidance and support. The association of the Egyptian authorities in the Gaza Strip with all preparation activities is regarded as being of special importance.

Selection

It is not possible to treat this subject conclusively at this stage of planning. It is necessary, however, to consider the more important principles which should govern selection policy and to examine the application of those principles in the light of the information which has already been furnished in the Human Resources Chapter.

Principles of Selection

Selection should be made wherever possible on the basis of securing natural social units, as opposed to the selection of individual families, in order to derive the maximum advantage from the natural cohesion and social discipline existing within the group. Secondly, it is important that selection shall be made against the criteria of occupational background and experience, in order to obtain refugees best adapted for the purpose. Only by selecting the best qualified refugees will the optimum development of the project be assured.

Complementary to the above is the desirability that a high proportion of families within a given group should have adequate working capacity in so far as numbers, sex, age, and health are concerned. The application of these principles to the selection of the three main categories of project population is examined below.

Farm Workers

The principle of selecting natural social units is one which has special applicability to the establishment of a new Palestinian Arab agricultural community. The clan organization which has

characterized the rural Arab community of Palestine for centuries has its roots in an earlier and hostile desert environment, and its attributes include an innate concept of mutual assistance and group security. Its preservation provides an accepted means of treating a relatively wide field of social and agrarian disharmonies which arise in any community and which, in this case, are less susceptible to adjustment by more conventional methods. It is therefore considered that a traditional system which binds not only individual members of a family together, but whole groups of families, for the economic, social and moral benefit of the community, is one whose continuation should be encouraged for the purposes described in this chapter. It may be concluded that its immediate and long term advantages are likely to outweigh those which might at first sight appear to be obtainable from an approach based on the selection of individual but unrelated families.

The main occupational background requirement is that of agricultural experience and association with the land. Since it is desirable to try to minimize by selection the difficulties that will be associated with introducing dry farmers to irrigation techniques, and in order to minimize the degree of specialized training that will have to be undertaken in any case, it will be preferable to select as many families as possible with former experience in irrigation farming and fruit tree cultivation. The rural element of the refugee population presently occupying the Gaza Strip has already been estimated to be about 130,000 persons of whom only about 30,000 were formerly associated with the intensive cultivation of the soil by irrigation,

the balance being largely engaged in dry farming operations. In addition to this, it has been seen that some 50,000 bedouins are equipped with varying degrees of experience in dry farming.

While the advantages of applying the principle of occupational background are clear, it may be well to bear in mind that the first response to opportunities of rehabilitation in the Sinai may come from the bedouins. This section of the rural populace has often demonstrated its ability to seize upon new agricultural opportunities and to employ modern machinery and techniques, under favourable economic conditions. Moreover, it is probable that their gradual transition from a nomadic to a sedentary life would receive an unusual impetus from the prospects of becoming property owners on an unprecedented scale.

Criteria related to working capacity should not be too difficult to meet. The work requirements of the standard five feddan farm described in this report demand at least two working members in the family under ordinary farming conditions. Data furnished by the Egyptian Ministry of Agriculture, for purposes of assessing national income, designate an adult male farmer as one labour unit, an adult female as two-thirds of a unit, and children of working age as one-half of a unit. Plate 14 indicates that more than half of the refugee population in the Gaza Strip are grouped in families of five persons and above and Plate 13 reveals that 40% of the population falls within a reasonable working age group of from sixteen to fifty years.

Accordingly an average family of five should comprise two members of suitable working age. It is the custom in rural areas in

the Middle East, as elsewhere in the world, for children below the age of sixteen to assist their elders in farm operations and it is expected that this custom will prevail in the Northwest Sinai project. It may be concluded that an average family of five representing a normal cross-section of the Gaza refugee population will have an adequate labour supply for all normal farm operations.

During the initial work of farm development when final levelling, the adding of clay to the soil, and the planting of wind-breaks are required in addition to the normal farm operations, the labour needs of an average farm of five feddans increase to three full working members. This requirement may be met by giving preference to families of six and over for the first group of refugees established and by giving preference in selection to clans and other groups whose common bonds will promote mutual assistance. When a clan, tribe or village is established en masse, help and co-operation will be assured and farming operations may even be undertaken in common. These considerations, combined with flexibility in adjusting land allocation problems, suggests that no outstanding problems of this nature will be encountered.

Ancillary Workers

Opportunities for rehabilitation in the ancillary sector will vary in type and number throughout the successive stages of development, and selection of families for this purpose must be preceded at each stage by an examination of the needs of the community for special services.

The principal requirement in selecting ancillary workers

will be to establish by investigation that applicants possess an adequate degree of business background and experience, and that their plans for rehabilitating themselves, which will necessarily be more individualistic in character than those of the farming population, are essentially the product of maturity and proved capacity. In some slight contrast to the farm sector, the ancillary should be less a place for aspiring but inexperienced youth, and more of one in which an already acquired shrewdness and ability can find full play for its energies, and thus lay the foundations of a progressive ancillary community.

In the preparation of this report some thought has been given to an assessment of priorities in respect to the introduction of ancillary workers to the project area. In view of the major objectives of the undertaking, first priority will be given to Palestinian refugees financed by the UNRWA followed by self-financed Palestinian refugees. However, if the proper development of the ancillary sector cannot be assured from these sources, possibly through lack of requisite skill or capital, opportunities may then arise for Egyptian private enterprise.

Public Services

It is of overriding importance that the selection of candidates for office in the public services should be made primarily against the criteria of qualifications, age and experience. This is especially true of key posts. All other considerations such as refugee status and size of family should, in general, be subordinated to the need to establish an efficient cadre of civil servants upon which the progress

of the community will permanently depend. It is equally important that this principle be applied to recruitment for the special services which are being proposed for the duration of the establishment period. Experience indicates that the administration of technical assistance services can be more authoritatively and effectively carried out when the key personnel are not tied by intimate family relationships with the people they are instructing.

Conclusions

As will be seen later, the total population to move to the project area has been estimated at 59,500, comprising some 12,200 families. It will be possible to select most but not all of these families from the Gaza refugee population. There is an adequate supply of farming skill and experience among the Gaza refugees but certain of the functions in the public services are such that either by the required level of skill involved or the special nature of the post, it will be necessary to appoint Egyptian or other non-refugee personnel. This may also be true in a few instances in the ancillary services should the cost involved favour the establishment of self-financed Egyptian enterprise, or should requisite experience not be found amongst Palestinians.

Applying the principle that the project is primarily in the interest of Palestinian refugees currently supported by United Nations relief, and that training in specialized skills will be provided wherever feasible to permit them to qualify for these opportunities, it is estimated that 56,500 persons of the total enumerated above could be selected from bona fide Palestinian refugees. It is considered likely that the bulk of the remaining 750 families would be Egyptian.

Training

The whole problem of training Gaza refugees for rehabilitation in the Sinai arises from the need to ensure that the planned and scheduled development of a new economy is not prejudiced by inordinate deficiencies in human skills. Any quantitative assessment of the training that will be required will depend ultimately upon the minimum criteria established by the Project Authority and the extent to which they can be satisfied by the selection of refugees with the requisite qualifications. These factors cannot accurately be assessed at the present time, but, in the light of the various considerations that are set out in the following paragraphs, it is likely that training needs, in one degree or another, will be extensive rather than limited, and that considerable thought will have to be given to making the best possible use of the time and facilities that are available.

Agricultural Training

The factors that are most likely to determine the kind of agricultural training that will be required have already been introduced in the Human Resources Chapter and in the immediately preceding sections of this chapter. In the main they are represented by the possibility that a little more than fifty percent of the project's requirements in farm families can be met from Gaza refugees with some previous experience in irrigated farming. In addition to this, it is necessary to take into account that some of the families who derive their origin from the citrus belt of southern Palestine will have lost something of their former quality as experienced irrigators over the intervening years, as a result of death, old age

and unemployment. This will apply in the same measure to the agricultural section of the Gaza refugees as a whole, among whom a new generation is already emerging without practical farming experience.

It follows that the minimum requirements of agricultural skill established by the Project Authority will have to be made good in part by the fullest possible training in irrigation farming and fruit growing, depending upon the general standard of skill and experience existing among the working members of the families selected. It is also essential that the training courses and facilities should be designed to provide instruction appropriate to the conditions and problems that will be associated with the reclamation of sandy soils.

When undertaking necessary training, it is desirable that the fullest possible use should be made of the training opportunities that already exist in Gaza, and that, where necessary, they should be supplemented or expanded. The nucleus for this training programme will be provided by the UNRWA Agricultural Training Centre, now under construction. It is presently intended to train fifty farm leaders through a two year course and one hundred adult farmers per year in a refresher course. Since the size and shape of the Sinai agricultural training programme are matters which will be largely influenced by the detailed requirements of the Project Authority, yet to be refined, and the possibilities of meeting them by selection, yet to be determined, it follows that existing agricultural training facilities in the Gaza Strip will have to be re-appraised, at least quantitatively, in the not too distant future. The striking of an appropriate balance between the intensive training of farm leaders and the institution of short

term refresher courses for larger numbers of farmers will also have to be determined in the light of knowledge not yet available.

Reference has already been made to the necessity of demonstrating, in some tangible way, the advantages and opportunities which are offered by the project. In this connection, it should be possible to serve both training and preparation purposes by constructing a standard Sinai farm and home in the Gaza Strip, in which the full potentialities of reclaiming sandy soil under technical guidance can be brought dramatically to the attention of a large number of prospective Sinai farmers.

Training for Ancillary Employment

Although the number of families to be engaged in ancillary occupations in the earlier years is relatively small, reference to the Non-Agricultural Employment Chapter will show that there is a wide variety of enterprises to be considered and that some of them are of importance in relationship to the scheduled development of the area and its total resources. Some of these occupations, such as retail businesses, will not be susceptible to specialized training because the essential qualifications can best be furnished out of capacity and experience. On the other hand, it is evident there is a range of occupations, such as co-operative executives, and persons engaged in food processing and packing, and to some extent the artisan group of enterprises, which will advance or retard the scheduled development of the economy in proportion to the standard of skill and general performance which they maintain.

Emphasis has already been placed upon the need to develop

the ancillary sector with the most able and experienced applicants available. With a few exceptions, training needs should be confined to refresher courses for adult persons and should be supplemented by technical assistance services of the type that are proposed in the "Establishment" section.

Training of Public Service Personnel

The exact pattern of public service personnel, not discussed heretofore, will be described subsequently under "Community Development". In view of the creation of what is virtually a new society, whose component members will not have experienced any meaningful corporate life for a considerable period, it is of paramount importance that the employees of the public administration, who will provide leadership to the Sinai community, should be of the highest possible calibre.

In addition, it is foreseen that for accepted reasons of general polity, certain administrative offices will be filled by Egyptian civil servants. For these reasons it is assumed that primarily the middle and lower ranges of the public service cadres will be staffed with Palestinians. Where qualified applicants cannot be found for these posts, they must be obtained by training, and the indications are that the bulk of the training will be concerned with the production of properly qualified school teachers of which there is generally a marked and serious deficiency. The possibility also exists of the need for training a considerable number of sanitary workers.

The progressive removal of approximately a quarter of the refugee population in Gaza to a new environment will undoubtedly have

some effect in reducing the number of administrative and specialized service posts presently maintained by the UNRWA mission in Gaza; this possible source of supply for officials of the project should not be overestimated, however.

The above has been concerned solely with conventional training requirements, of which the true extent will be made more evident as detailed planning of the public services proceeds and as the Project Authority's requirements are matched against available and qualified candidates.

In addition to this, and in view of the basic considerations already advanced, it is considered essential that recruited public service workers on the village level be given an immediate course of some three or four months' duration in the objectives and techniques of village development. At the same time it is also recommended that all public service workers be given, after recruitment, a shorter orientation course of about one month, in order to acquaint them with the objectives of the project and the part that they are required to play in order to ensure its successful implementation. This course should include, where necessary, special instruction designed to show how their technical knowledge must be adapted to meet the specific technical needs of the project.

Movement

The movement operation involves the transportation of approximately 56,500 refugees, including a specified quantity of personal effects and other property, from the Gaza camps to various destinations in the project area. This figure is made up of 10,000 farm families, 750 public service families and 700 ancillary families, (public service families being assumed to be composed of an average of four members instead of five). For purposes of estimating probable costs it is suggested that the refugees be allowed free transportation of 100 kilogrammes of belongings per person. This would represent a total of 5,650 tons. The movement operation is envisaged as occupying a period of five years, and is conditioned by the scheduled plan of construction of the irrigation system, community dwellings, and other factors discussed in the Community Development Chapter.

Rate of Movement

For the purposes of broad illustration, Table VIII - 1 represents the planned rate of population movement from Gaza based on the anticipated schedule of project construction and community development.

It may be seen from the Table that the number of families to be moved in any one year would vary roughly from 1,700 to about 2,600. However, this does not represent accurately the size of the problem since the initial movement of families will be small, being generally restricted to public service and ancillary families who will be required to proceed to the area in advance of any

TABLE VIII - 1

REFUGEE MOVEMENT FROM GAZA

Year	Rate of Refugee Movement	Total Movement From Gaza (Families)
1	15%	1,718
2	16%	1,833
3	23%	2,633
4	23%	2,633
5	23%	2,633
Total	100	11,450

significant agricultural group, so that they can participate in the establishment of the basic public services and ancillary enterprises. The smooth introduction of the farm families will be dependent upon these services being already in operation.

It has already been indicated that the type of farm operation envisaged for the first year will permit the introduction of the farmers to the area at almost any season of the year. However, in practice, there may be several reasons for concentrating movement into a small period, such as the desirability of having the bulk of the farmers available early in summer, so that they can take advantage of the flood season and follow up with cropping operations in the autumn. Unexpected variations in the development schedule may also lead to modifications in an evenly spaced movement programme and precipitate peak loads on the transport system and the administrative organization. A stabilizing factor, however, will be the necessity to avoid introducing refugees to the project area in advance of land reclamation or other work being available for them to perform. In general, it must be taken into consideration that movement will be conducted in what is presently a restricted area, and that the planning of movement will have to be sufficiently flexible to allow for the intervention of other priorities.

Method

In considering means, both road and rail transport facilities have been examined, but road transport has been rejected on the ground that it is likely to prove by far the more costly of the two. From an administrative point of view, rail transport communications

are favourable because both the Gaza camps and the project area are connected by the main lines of the Egyptian Republic Railways, which pass in close proximity to both the camps and the new communities in the project area. Short road transport at either end will be necessary.

It is anticipated that families will travel in selected groups and that they will be accompanied by temporary staff who will have been instructed in the general management of the operation, including whatever special arrangements are required by the Egyptian Frontier Administration for passport and customs formalities. The administration of these formalities should be planned in advance and so organized that official requirements are properly met and that halts and delays are reduced to a minimum. With the careful preparation of documentation in advance, and the administration of passport and customs formalities on the train while it is in motion, it is considered feasible for large groups of persons to be entrained, transported and introduced to their homes in a single and continuous operation, covering the hours of daylight or a little more.

Capital and Annual Costs

It has been assumed that all costs connected with the preparation and training of Gaza refugees for rehabilitation in the Sinai will be administered by the UNRWA and financed from its normal annual budget. However, it is clear that the administration of these activities will have to be closely co-ordinated with the Egyptian Government and the Project Authority in Egypt, and with the Egyptian and UNRWA authorities in Gaza. It may also be desirable

that the ultimate responsibility for selection of refugees should be delegated to a single office, which is aware of the requirements of the various authorities concerned, and in which their observance can be assured by administrative collaboration.

These functions, which are largely of a co-ordinative nature, have been tentatively assigned to the proposed Selection and Movement Office, based in Gaza and responsible to the Project Authority for the direct administration of the movement operation. The Selection and Movement Office will have to be in operation for a period of about seven years, of which the first two will be devoted exclusively to co-ordinating in Gaza the functions of preparation, training and selection. While these functions will continue throughout that whole period, the last five years will be characterized by the direct administration of the movement operation.

The total estimated costs of the selection and movement operation are indicated in terms of capital and annual expenditure in Table VIII - 2. It will be seen that the total cost for the seven year period is LE 230,000. Of this, LE 80, 000. is the estimated cost of moving 11,450 refugee families. The total cost of selection and movement therefore represents an average cost of about LE 20. per family.

TABLE VIII - 2

SUMMARY OF COSTSSELECTION AND MOVEMENT

	<u>Capital</u> (LE)	<u>Annual</u> (LE)
<u>Administration</u>		
(taken over a seven year period)		
Salaries		136,000.
Office accommodation (rent)		2,400.
Furniture and capital equipment	4,000.	
Operating supplies		7,600.
Sub-total	4,000.	150,000.
<u>Movement Operation</u>		
(taken over a five year period)		
Railway fares		
Persons		21,000.
Belongings		44,000.
Road Transport		12,700.
Temporary Staff		2,300.
Sub-total		80,000.
Grand total	4,300.	230,000.

Establishment

Establishment is defined as the process of introducing refugees to the project, whether it be on farms, in ancillary employment or in the public services, and supplying them with the capital assets and financial and organizational support required to bridge the gap between a life characterized by dependency on relief and a new life of self-reliance.

The construction programme is a distinct, scheduled operation whose extent and duration is largely governed by the physical quantities with which it deals. This is largely true also of the land development programme. The task of the Project Authority in the establishment period will be to co-ordinate those two separate activities with that of the introduction and rehabilitation of the refugees, so that all three are fused into a single and harmonious operation, the common goal of which is the rapid and scheduled attainment of self-support status for the entire community.

In describing the establishment operation, only those costs have been included which are strictly related thereto and which have not been treated elsewhere. However, a more comprehensive picture of the estimated cost of the establishment operation may be found in the Financial Analysis Chapter at the end of the report.

Principles of Establishment

It is believed that establishment policy should be governed by certain broad principles, based on general experience in the field of land and community development and, taking into consideration the special problems connected with the rehabilitation of Palestinian refugees.

A first principle arises from the necessity to create an incentive

to the refugees which will be present as a dominating influence from the moment of their induction to the project, and which will naturally sustain the momentum of their progress throughout the critical period of adjustment and early development. This incentive is already provided by a planned standard of living which represents a marked improvement upon that to which the average refugee has been accustomed in the Gaza camps and which, in some cases, will be higher than the standard enjoyed by Palestinians in their original environment. However, to begin with, this improved standard of living is largely a potential, which will require intelligent demonstration to the newcomer together with an appropriate degree of technical guidance and encouragement to assure its achievement.

A further principle of establishment policy is related to the psychological importance of creating, from the start, an intimate and enduring relationship between the refugee and the land and property which he uses. It is felt that such a relationship can best be provided by vesting ownership of land, houses and business premises in the refugee. Such a policy will serve to enhance the quality of work which the refugee performs, and should lead him to exercise more care in the proper use of his livestock, materials and equipment than might otherwise occur.

It must be stated in this connection, however, that the question of ownership of property together with the repayment of its cost is regarded as a matter that will have to be determined later, in the light of a more detailed examination of its merits and against

the background of Egyptian Government legislation.

Of equal importance to the principles described above are the moral values associated with obtaining property by effort or payment as opposed to becoming its possessor through outright grant. It is the common experience of authorities working in this field that people do not develop self-reliance when they are the recipients of excessive and easily obtained assistance, and, in so far as the circumstances of the case permit, there should be a well regulated balance between giving and receiving.

With this in view, and if it is ultimately decided that transfers of property be made, it is recommended that they be effected under conditions of repayment, even though in some cases repayment may be only nominal.

General Considerations of Establishment

It is not intended to anticipate the detailed planning of the establishment operation. However, it is considered pertinent to the object of this report to deal briefly with some of the more important considerations that arise from experience in dealing with Palestinian refugee rehabilitation, and which it is considered should be incorporated as conditions of establishment.

Probationary Period

All refugees selected for the project should be accepted on probation with the understanding that they are entering a work status, that the work they are performing is for their own benefit, and that their right to enjoy those benefits is conditional upon their willingness to conform to the regulations and requirements of the Egyptian Government

and the authorities in the reclamation area.

Land Distribution

The determination of actual farm size in relation to the actual size of the family will have to be made on the basis of economic and operational criteria already presented in the report, taking into account any modifications or refinements that may be made as a result of more detailed planning. Minor difficulties of family adjustment on the land should be resolved as much as possible in collaboration with the village elders. Distribution of land units which may have an apparent difference of value, or which may vary in distance from the village, could be decided by lot.

Subsidies and Grants to Include Cash

Where local procurement and economic considerations permit, initial grants and subsidies should include an element of cash. This will serve several purposes. It will not only constitute an additional incentive to the refugee, but it will also serve to distinguish more sharply the establishment operation from the ration line atmosphere of the relief camp, where individual taste and need cannot, for understandable reasons, find much freedom of expression. Immediate opportunities to turn labour into money will not only help to inject an atmosphere of returning normality but will provide sound support to the establishment and growth of ancillary enterprises.

Community Development

It is a natural consequence of the artificial life of the relief camps that the energies of the people have not easily found an outlet in those constructive group activities which are normally

associated with the social and economic development of a community and its government. Where those aspirations are lacking, the mere provision of physical assets will not be enough to ensure the scheduled and co-ordinated development of the area within a framework of healthy, corporate life. It is therefore considered necessary that the fundamental education and social service activities, presently designed for limited purposes in the camps, shall be resumed in the project, and that, under the arrangements described in the Community Development Chapter, they should be directed exclusively into channels designed to associate the population of the area intimately with the organized growth of the community and to encourage them to share in its government.

Allocation of Properties and Grants

As the refugees arrive from Gaza, the first task will be to allocate to them both movable and immovable properties. These are listed below, but the costs have been shown here only for those items which are strictly related to establishment and which have not been treated elsewhere.

10,000 Farm Families

The farm family will have allocated to it:

1. A house and barn of which details are furnished in the Community Development Chapter.
2. A unit of farm land which is not valued in this report. The principle of recovering its value is discussed below.
3. Agricultural equipment and livestock per family

as follows:

Fruit trees and wind-breaks.	LE	45.
Farm equipment.		25.
Livestock.		156.
Fodder.		<u>50.</u>
Total	LE	276.

LE 276. x 10,000 LE 2,760,000.

4. Agricultural supplies such as seeds and fertilizers which are described in the Agriculture and Agricultural Economics Chapter under the heading of "Production Costs".

5. An installation grant which has been designed to cover an average family's needs in house furniture, utensils, clothing, etc. estimated at LE 50. per family.

LE 50. x 10,000 LE 500,000.

700 Ancillary Families

The ancillary family will have allocated to it:

1. A house described in the Community Development Chapter.
2. A grant to cover the estimated average cost of business premises and appurtenance of the trade or profession.

LE 350. x 700 LE 245,000.

3. An installation grant for the same purpose as that described above for farm families.

LE 50. x 700 LE 35,000.

1,500 Public Service Families

The public service family will have allocated to it:

1. One of four types of houses described in the Community Development Chapter.
- .. It is not proposed to give an installation grant to families employed in the public services.

In the light of the principles set out above it is desirable that the transfer of title of these properties from the donor to the refugees shall be effected under some condition of repayment. However, it is clear that the only recompense which the farmer refugee can afford initially will be his labour and co-operation, directed under technical guidance into agricultural and community development, and that the first demand upon his disposable income will be made by the fiscal authorities in order to offset, and eventually to meet the cost of public services. It follows from this that immediate repayment of the cost of movable properties, such as furniture and farm equipment, will have to be nominal and, like the direct subsidy (see below), will have to be related specifically to fixed labour tasks and good performance.

As has already been stated, the more substantial repayment of the cost of immovable property, such as the land, business premises and the home, has been introduced here in principle only. It is

considered that repayment of immovable property transferred to farm families would have to be deferred until probably the eleventh year from installation, and that ancillary families could commence repayment in perhaps the third year. Public service employees, who will be in receipt of regular income, could commence repayment immediately. However, since this seems essentially to be a matter which will require more detailed consideration by the authorities at a later time, no firm recommendation has been made, nor have the possible effects of obtaining repayment of the cost of immovable property been included in the Financial Analysis Chapter.

Subsidies

As indicated earlier, the financial aspect of subsidies is treated further in the Financial Analysis Chapter at the end of the report.

References to the Agriculture and Agricultural Economics Chapter makes it apparent that the process of establishment, which bridges the gap between relief and rehabilitation, is characterized in its early phase by a complete absence of farm income, and that this situation is progressively improved until a point is reached when the farm family income covers all related expenditure. For convenience, a distinction has been drawn between direct subsidies paid in cash or in kind and indirect subsidies furnished by services.

Direct Subsidy

The direct subsidy is the amount by which the farm family's estimated income will fall short of living and production costs. It has been suggested that this subsidy shall be issued to the family in cash, and that its payment shall be related to the performance by the

refugee farmer of specific work tasks scheduled in the land development programme. The relationship of the amount of the subsidy to the work performed will in a sense be arbitrary, but its relationship to the cost of subsistence of an average farm family will be near to exact. The amount of subsidy paid will progressively decrease until the farm income is sufficient to cover all subsistence and production costs. In actual practice it may be more desirable to establish a uniform rate of declining subsidy and supply it universally so as to offset the effect of penalizing the more progressive farmer.

Families deriving their livelihood from ancillary employment will also require to be subsidized, but for a much shorter period than farm families. The purpose of the subsidy will be to cover subsistence costs only, and it will be progressively diminished over the short period of time that is considered necessary for the ancillary worker to establish himself in his trade and secure a clientele.

Families deriving their livelihood from employment in the public services will be in receipt of a regular salary and will not require subsidization.

Indirect Subsidy

Indirect subsidy is the amount by which the farm family's estimated income will fall short of its share of the costs of the public services and the operation and maintenance of the irrigation system. It is clear that this subsidy will have to be paid over a longer period of time than the direct subsidy for subsistence and production costs. It will, however, be paid in diminishing amounts as the farm family's income increases throughout the period of establishment. As a subsidy, it will be paid to the fiscal department of the Project Authority and

will be received by the refugee in the form of public services. It is recommended that taxation for all governmental services be instituted as early as possible, in order to disassociate them from the free services supplied in the relief camps. The amount of taxation may be nominal until economic conditions justify its progressive increase and will not effect the figures presented in the Financial Analysis Chapter.

Indirect subsidy will likewise be furnished on behalf of those families deriving their livelihood from ancillary employment. Since their enterprises will develop at a much faster rate than those of the farm population, the period in which the indirect subsidy must be paid will be correspondingly less. No indirect subsidy will be paid for those families employed in public services and taxation may be collected from them with effect from the date of first appointment.

Duration of Establishment Period

The duration of the establishment period for an individual family is measured by its progress from the date of arrival in the project area to the estimated date when that family is bearing from its earned income the full costs of subsistence and taxation. This will vary in accordance with the occupation of the family concerned and the stage in project development when the family is first installed. For the project as a whole, however, the establishment period ends when the project has generated enough income to pay for all the services and subsidies necessary to support the total project population. Reference to the "Financial Analysis" shows the project will approach this situation in the tenth year and finally achieve a fully self-supporting status in the eleventh year from the entry of the first refugee group on the land.

Machinery

In the light of the discussion of organization made in the introduction to this chapter, the establishment operation will probably be best administered by a Development Office, subordinate to the Project Authority and responsible for a number of functions, such as land development and the operation and maintenance of the irrigation system, which are described in detail elsewhere. Those functions which are peculiar to refugee establishment, the costs of which have not been developed elsewhere, are indicated below. They would be administered by a branch of the Development Office which for the purpose of present discussion will be termed the Establishment Office.

Installation of Refugees

Refugees will have to be met on arrival and conducted to their homes. Concurrently, arrangements will have to be made for issuing their installation grant either in cash or in kind. This should be followed up as smoothly as possible by the allocation of land and such farm equipment and materials as are required to commence, under technical guidance, the preliminary phase of land development. These operations will involve a series of administrative actions including stores accounting, cash accounting, registration of land holdings (a function of the Central Government) and associated documentation.

Administration of Direct Subsidy

As has been explained earlier, the payment of the direct subsidy to the farm family will be related to the performance of specific work tasks connected with the land development programme.

The amount of subsidy which a farm family will receive in any given area will depend upon an assessment of the degree to which its earned income falls short of subsistence and production costs. It is suggested that both these functions, namely certification of work performance and assessment of subsidy to be paid, be carried out by the office responsible for the administration of the agricultural extension service. The actual payment of the subsidy will be effected by the finance staff in the Establishment Office. The discharge of all these functions has been taken into account in assessing the administrative costs which appear below.

Agricultural Technical Assistance

An agricultural extension service has been proposed as a permanent feature of the project, and is dealt with as a whole in the Agriculture and Agricultural Economics Chapter. However, it is considered that the special problems associated with the early reclamation of the land by a farming community with limited training and experience will require additional agricultural technical assistance and leadership throughout the establishment period. The costs of this additional service have been deducted from the overall costs of the agricultural extension service and placed here because they are related strictly to the establishment operation. They are derived from the envisaged employment of additional agricultural leaders only, all other administrative and capital expenditure being shown in the budget estimates of the permanent extension service.

Technical Assistance for the Ancillary Sector

While no large measure of technical assistance is envisaged,

it is thought that the establishment of refugee families in the ancillary sector can best be accomplished on lines roughly analogous to those of a small development bank. As has already been indicated, selection of ancillary families will have to be preceded, at each successive stage of intake, by a survey of the needs and economic opportunities that exist. This will provide a fairly reliable index to the number and type of enterprises that will justify investment. Candidates for establishment will then have to have their applications examined with a view to ensuring that they possess the requisite qualifications, and their establishment will follow on the lines already set out for the farm population. The assessment, provision, allocation, and installation of the varied equipment in the ancillary sector is likely to involve special knowledge and, when the circumstances of the case warrant it, some degree of technical assistance. Financial provision has accordingly been made for a small staff for this purpose.

Technical Assistance in Community Development

Reference has already been made in this chapter to the importance of laying the foundations, during the establishment period, of a healthy and progressive community, the subject itself being treated in the Community Development Chapter. Since the costs of special assistance for this purpose are related strictly to the establishment operation, they have been shown here together with the costs of all other establishment activities described above.

Co-operatives

An essential part of the machinery for the establishment operation, which has not been included as an item of cost in the

project budget, is the agricultural co-operative organization. It is intended that these co-operatives should be operated on a self-financed basis. The composition of the estimated 700 families who would derive their employment from the ancillary sector includes, in fact, a proportion who are expected to find employment in marketing and supply co-operatives. Although some time will elapse before co-operatives have full scope for their activities, consideration should be given to establishing them immediately in order to foster a co-operative approach towards the problems of early land development and production. They will, moreover, constitute a valuable link between the land development authorities and the farmers, and can perhaps be delegated with responsibility for distributing agricultural implements, seeds, fertilizers and livestock in accordance with the schedule of land development.

Banking and Credit Facilities

No financial provision is being made in this report for banking services or credit facilities. While these will ultimately be necessary, it is considered that the growing community will easily be able to satisfy its needs from those banking houses already existing in Egypt, and which are likely to open branch offices in or near to the project area as soon as the demand is created.

Establishment Costs

The following estimates presented in Table VIII - 3 are the product of assessing the total capital and annual costs of each function (except those of subsidies which are treated in the Financial Analysis Chapter) and phasing them over the estimated number of years

that the function will be required. Capital expenditures have been minimized on the assumption that establishment activities will be administered in the offices and buildings erected for the permanent administration of the area.

TABLE VIII - 3

SUMMARY OF ESTABLISHMENT COSTS
(Excluding Subsidies)

<u>Establishment Office</u>	<u>LE</u>
General administration for ten years.	225,000.
Agricultural technical assistance for ten years.	162,000.
Ancillary technical assistance for seven years.	66,000.
Community development technical assistance for seven years.	<u>57,000.</u>
Sub-total	510,000.
<u>Grants</u>	
Farm families	3,260,000.
Ancillary families.	<u>280,000.</u>
Sub-total	<u>3,540,000.</u>
Grand total	4,050,000.

IX. COMMUNITY DEVELOPMENT

Introduction

When the initial work of soil reclamation has been completed and the Nile waters have been led to the land, the physical basis for development will exist and the intricate task of adjusting a dislocated population to a new environment will begin.

The planning of services to meet refugee needs after their long period of idleness in the camps and designed to rehabilitate the project families as a healthy self-reliant community has been based on several criteria. Consideration has been taken of the traditions and normal life in Palestine before 1948, the emergency conditions of camp life in Gaza under UNRWA care, and the present and planned pattern of community services in Egypt under whose administration the Sinai communities will be established.

Since the initial costs of construction and provision of equipment will be borne by the United Nations and the annual charges must be met by the project families, the level of services and facilities has been established at the minimum essential to provide a sound base from which the optimum may develop.

In preparing recommendations for the specific features of the services and facilities to be provided, the various technicians and contributors who collaborated in the preparation of this chapter were requested to bear in mind the primary objective of establishing a reasonable estimate of the costs of a workable plan for community development. Thus the recommendations do not attempt to develop a model demonstration project but simply provide the minimum essential

from which the optimum can grow. It is the function of the several sections of this chapter to determine the precise significance of "minimum essential" for each of the community services in terms of personnel, buildings, supplies, and other variables.

In making this analysis it is planned to discuss first the population to be served, its number and composition, and to make proposals for its distribution in communities throughout the project area. An assessment will then be made of each of the several community services to be provided - health, education, social services, and civil administration - and finally their requirements for capital construction will be evaluated in terms of cost and design.

In preparing the data which appears in the succeeding sections, technical officers and specialists of the Egyptian Government and the UNRWA have collaborated as teams in undertaking specific studies, surveys, and field investigations. Recourse was made to numerous technical documents, reports, and standard texts, as well as analysis of the special experience in pertinent fields of the UNRWA, the Egyptian National Production and Public Service Councils, and the Egyptian-American Rural Improvement Service. The recommendations in this chapter reflect the work of the Government and Agency officers who together established the basis for the specific sections which follow.

It should be noted that the recommendations for specific features of community development presented in this chapter are in no case considered definitive. They represent the need to examine the general lines detailed planning is likely to follow and the need to establish reliable estimates of cost.

Project Population

The successful development of a balanced system of community services and facilities, designed to meet the needs of the project community will be possible only with the identification of the demographic characteristics of the population to be served. The total number of families who will move from Gaza, their rate of movement, rate of natural increase, the size and composition of the average family and its age distribution are all necessary factors to be considered in the preparation of plans for community development. They will be examined here and in the subsequent sections of this chapter as they specifically affect construction requirements for housing and public building and as they influence the extent and pattern of health, education, welfare and other community services. The influence of the traditional patterns of Palestinian social organization on community planning will also be taken into consideration.

The demographic data presented has been taken from the Human Resources Chapter where a fuller description of its preparation and reliability may be found. This data is sufficiently accurate for the determination of project feasibility and to provide reliable indications of the direction which planning must take. Prior to implementation of the programmes proposed, however, it is recommended that a comprehensive sociological study be made of the population which will eventually be established in the Sinai. Only such a study will establish a sound basis for determining the most suitable physical and social facilities and their relationship to the complex of refugee customs, loyalties, fears, and aspirations.