

BASIC DESIGN STUDY

PERFORMANCE STUDY

BASIC DESIGN STUDY
ON
THE PROJECT
OF
FARM MACHINERY HIRE SERVICE STATION
IN
ARAB REPUBLIC OF EGYPT

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PREFACE

In response to the request of the Government of the Arab Republic of Egypt, the Government of Japan decided to conduct a basic design study on the project of Farm Machinery Hire Service Station and entrusted the study to the Japan International Cooperation Agency (JICA). The JICA sent to Egypt a survey team headed by Mr. Kenichi Ando (Second Economic Cooperation Division, Economic Cooperation Bureau, Ministry of Foreign Affairs) from 5 August to 29 August, 1983.

The team exchanged views with the officials concerned of the Government of the Arab Republic of Egypt and conducted a field survey in Cairo and Dahkalia. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the Project and contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Arab Republic of Egypt for their close cooperation extended to the team.

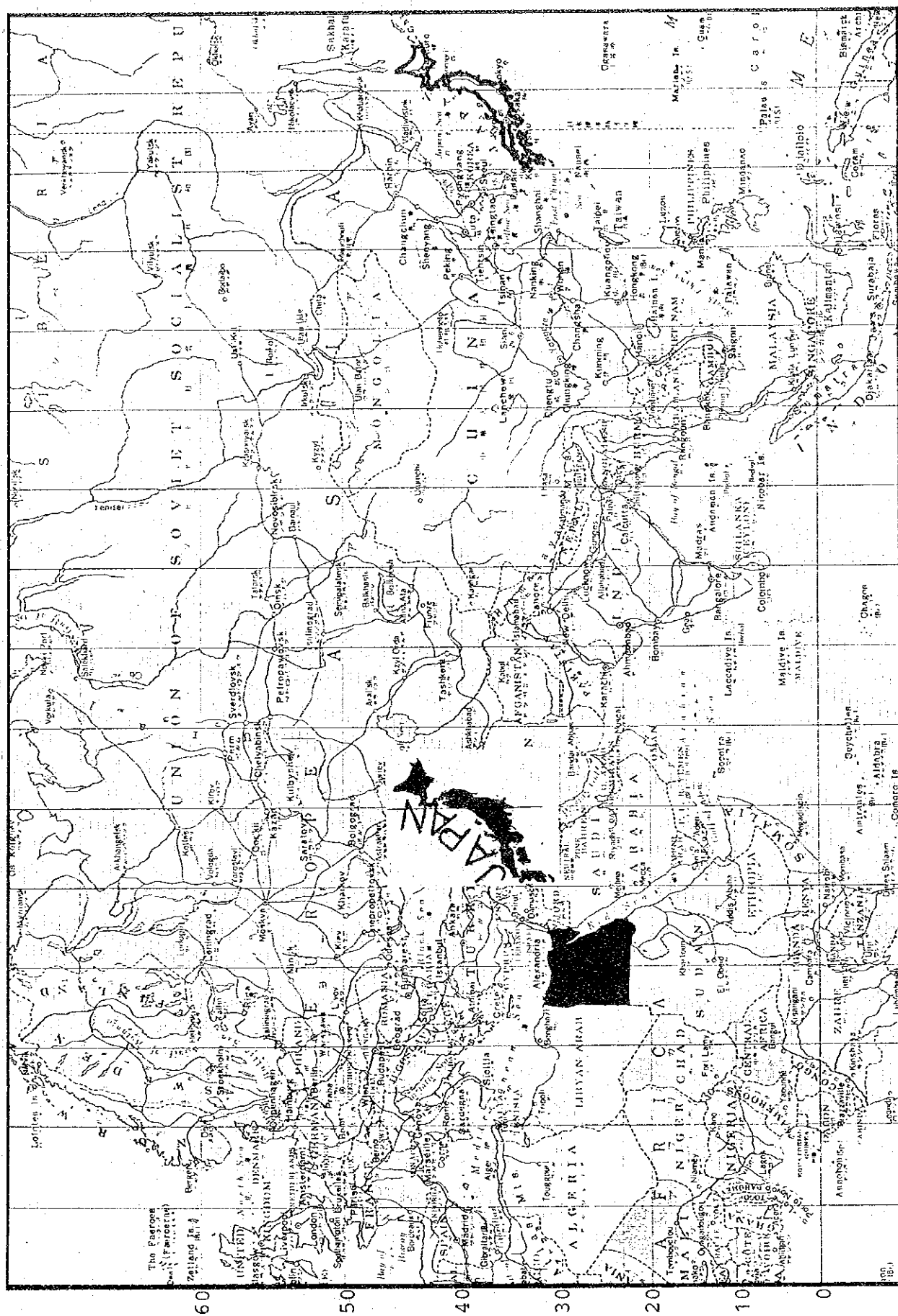
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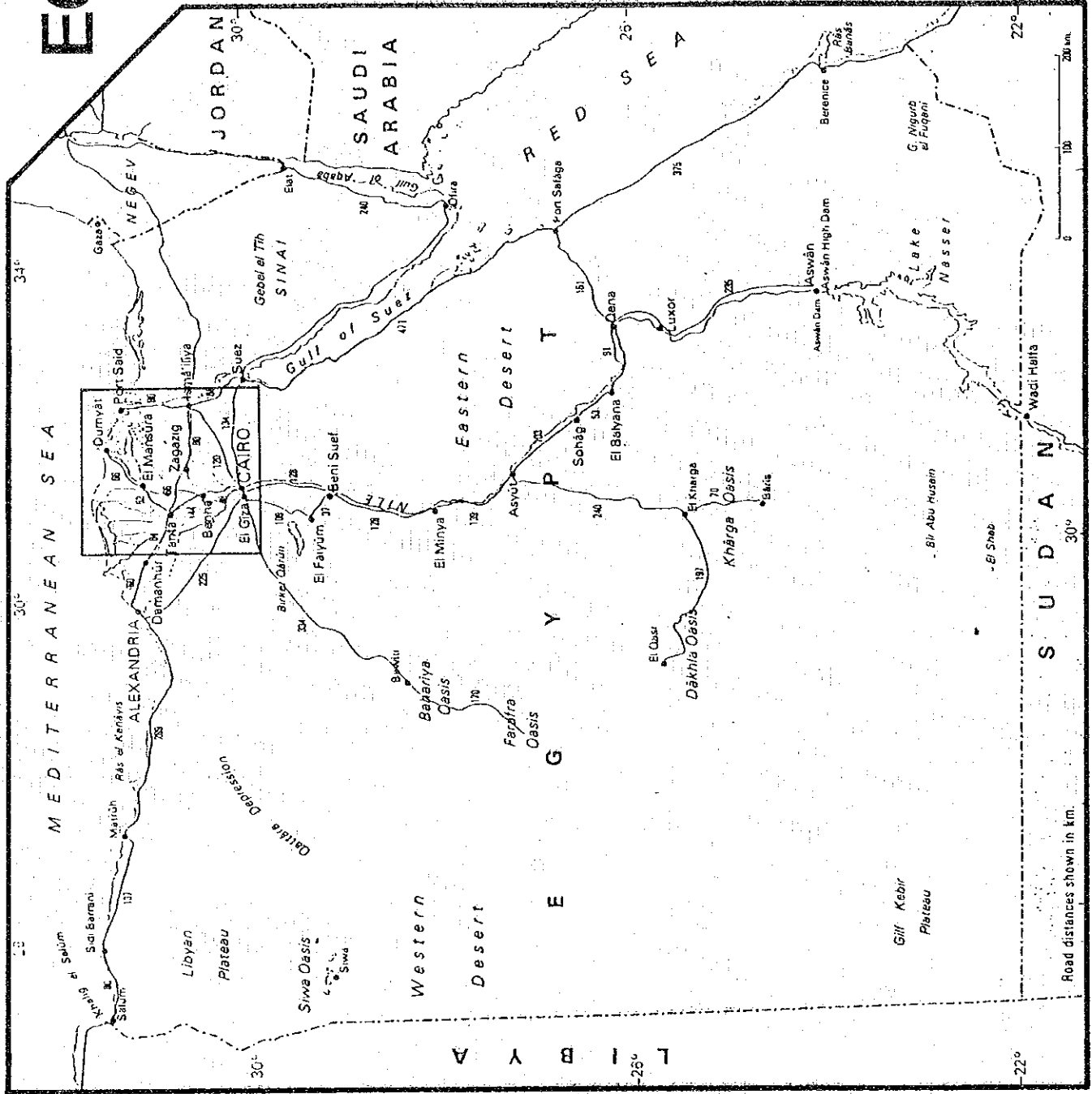
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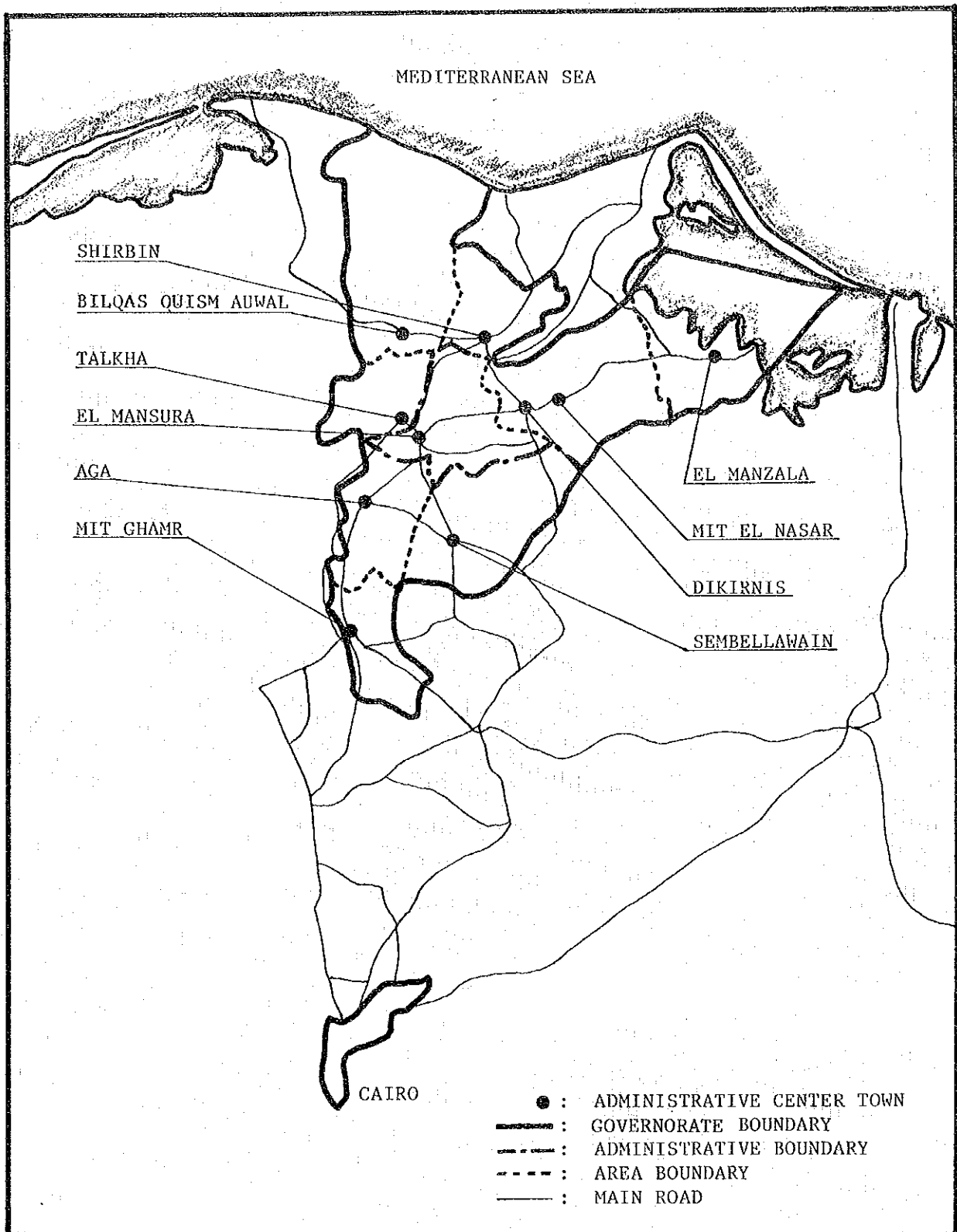
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Japan International Cooperation Agency



EGYPT





PROJECT SITE, SEMBELLAWAIN

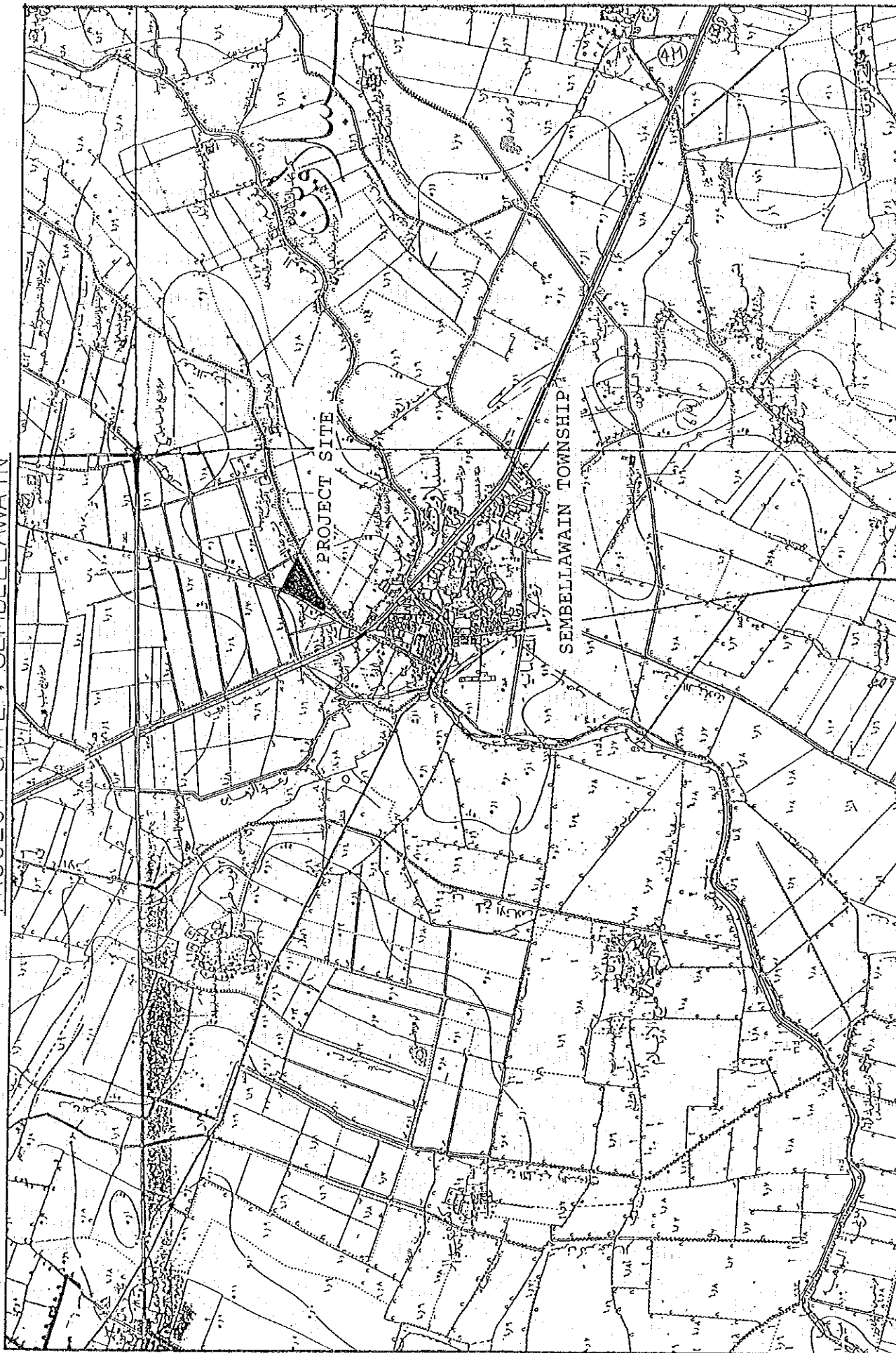
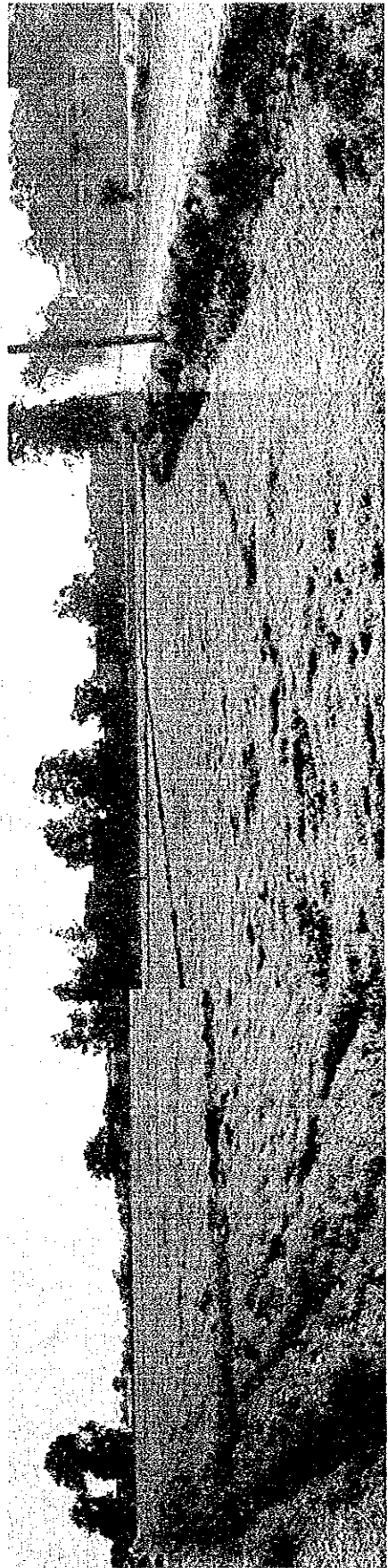


Plate 5 CONSTRUCTION SITE, PHOTO POSITION A



Plate 6 CONSTRUCTION SITE, PHOTO POSITION B



SUMMARY

In Egypt, the agricultural sector accounts for approximately 23.6% of the GNP. Since the latter half of the 1970s, however, agricultural production has fallen far behind the rapid population increase, the self-sufficiency rate of the national food supply dropping to as low as 50%. This trend is closely related to the great loss of farm laborers leaving to seek employment in neighbouring oil producing countries. In response to this problem, the Government of Egypt has promoted the Food Security Plan, the most important part of which is the farm mechanization policy.

The nationwide Hire Service Station (HSS) Network plan forms the key to the realization of this farm mechanization policy. Due to limited experience with this type of hire service station, however, various potential difficulties in management and implementation are foreseeable. These difficulties should be resolved prior to the establishment of the nationwide HSS network. To this end, the Government of Egypt has proposed that the Government of Japan contribute to the establishment of one center station of one HSS unit as a pilot project, the "HSS Pilot Center Station (Pilot Center) Project" under the grant aid program. The Japanese government accordingly dispatched a "Preliminary Study Team for the Farm Machinery Hire Service Station" to Egypt on June 12, 1982 for a period of 16 days through the Japan International Cooperation Agency (JICA). This was subsequently followed by a Basic Design Study Team to Egypt on August 5, 1983 for a period of 25 days. The team headed by team leader, Mr. Kenichi Ando, (Second Economic Cooperation Division, Economic Cooperation Bureau, Ministry of Foreign Affairs) was assigned for overall planning and preparation of the basic design required for the Pilot Center.

The Study Team appraised the Egyptian Government's plan and designed the Pilot Center to be established in the district of El Sembellawain in Dakhalia Governorate. The area of the Project site is about 42,000m².

The object of the Pilot Center is the promotion of mechanized farming and the smooth adoption of the HSS system. This will in turn have a positive impact on the domestic economy by increasing agricultural production and thus self-sufficiency.

The Pilot Center will perform the functions listed below.

- (1) Farm Machinery Hire Service
- (2) Farm Machinery Maintenance and Repair
- (3) Education, Training, Instruction and Demonstration
- (4) Management and Maintenance of Facilities

The service area surrounding the Pilot Center is approximately 4,200ha. The Pilot Center has 4 substations which are to assist the same. The service area of each substation is also 4,200ha. The Pilot Center thus needs farm machinery sufficient to serve 4,200ha of farm area. In consideration of the scale of maintenance and management this will entail, phased introduction of machinery is scheduled.

A management system will be implemented to ensure effective operation and proper maintenance of the various facilities.

The envisioned Pilot Center consists of the following facilities:

a) Administration Office	1,750m ²
b) Building for Operators	750m ²
c) Workshop	1,600m ²
d) Utility Building	200m ²
e) Tractor Shelters	3,000m ²
f) Drivers' Training Yard	3,500m ²
g) Practice Field	4,700m ²
h) Other	400m ²

Prompt and efficient construction of the substations for the Pilot Center by the Government of Egypt is essential for proper functioning of the HSS unit.

The smooth establishment of a nationwide HSS network will be based upon and initiated by the results of the various trials of operation and administration employed in the Pilot Center's management system. The Pilot Center will thus have a significant and beneficial influence on the domestic economy and, at the same time, increase the farmer's understanding of mechanized farming techniques. The potential benefits to be gained through the establishment of this Pilot Center, therefore, make the same a very appropriate project for general grant aid from the Government of Japan.

C O N T E N T S

Preface		Page
Plates		i
Summary		vi
1. INTRODUCTION		1
2. BACKGROUND OF THE PROJECT		
2-1 General Agriculture		3
2-2 Present Situation of Agricultural Mechanization		4
2-3 Nationwide HSS System		6
3. PILOT CENTER ESTABLISHMENT PLAN		
3-1 Objectives		38
3-2 Organization		38
3-3 Program of the Pilot Center		38
3-4 Proposed Construction Site		45
3-5 Farm Machinery to be Introduced		47
3-6 Facilities, Machinery and Equipment Required		50
4. BASIC DESIGN		
4-1 Selection of Farm Machinery		54
4-2 Basic Design of Facilities		68
5. OPERATION AND MAINTENANCE		
5-1 Operation Schedule		93
5-2 Maintenance		96

6.	PROJECT IMPLEMENTATION PLAN	
6-1	Implementation and Operation System	100
6-2	Construction Schedule	101
6-3	Supervision Schedule	102
6-4	Allocation of Major Undertakings.	102
6-5	Construction Schedule	105
7.	PROJECT EVALUATION	106
8.	CONCLUSION AND RECOMMENDATIONS	
8-1	Conclusion	108
8-2	Recommendations	108

APPENDICES

1.	Minutes of Discussions	A-1
2.	Architectural Drawings	D-1

LIST OF PLATES

Plate	1	Map of Arab Republic of Egypt & Japan	i
	2	Map of Arab Republic of Egypt	ii
	3	Map of Nile Delta & Dakhalia Governorate	iii
	4	Project Area: Sembellawain	iv
	5	The Construction Site, Photo Position A	v
	6	The Construction Site, Photo Position B	v

LIST OF TABLES

Table	II-1	Climatological Data of Main Cities	19
	2	Financial Statistics	19
	3	Change of Consumer Price Index	20
	4	GDP by Sector	20
	5	General Data	21
	6	Production of Main Crops in Egypt	21
	7	Trade Performance and Self-Sufficiency for Principal Agricultural Commodities	22
	8	Number of Persons Engaged in Each Economic Sector	23
	9	Increases in Farm Wage Rates Farm Gate Prices and Rural Cost of Living, 1968 -78	24
	10	Farm Machinery Inventory by Type, 1978	25
	11	Tractor Sales (Public & Private)	26
	12	Period of Tractor Use	27
	13	Tractor Projections	27
	14	Degree of Mechanization by Size of Land Holding	28
	15	Type of Machine and Labor used by Egyptian Farmers for Various Farm Practices	29
	16	Hours of Tractor Use by Type and Ownership: Farm Machinery Survey, 1978 . . .	30
	17	Tractor Ownership Comparison between Agri. Cooperative and Private	31

Table I-1	Training Schedule	44
Table IV-1	Yield of Cotton, Wheat and Maize as Affected by Plowing Depth and Type of Plow . . .	63
2	Yield of Maize Grain as Affected by Tillage . .	63
3	Types of Farm Machinery Introduced	64
4	Calculation of Tractor Standard	65
5	Farm Machinery to be Introduced	66
6	Scope of Work for Center Station Workshop and Number of Tractor Breakdowns . . .	67
Table V-1	Staff Recruitment Plan	98
2	Personnel Expenses	98
3	Electricity, Water and Gas Expenses	99
4	Estimate fo Running Cost for Facilities	99

LIST OF FIGURES

Figure II-1	Farm Wage Rate, Consumers' Price Indexes and Farm Gate Prices 1973 - September 1978 . . .	32
2	HSS Unit	33
3	Process of Determination of HSS's Scale & Contents	34
4	Ogranization of Proposed Center Station	35
5	Organization of Proposed Substation	36
6	Daily Routine	37
Figure III-1	Organization of HSS	39
2	Location Map	46
3	Cropping Pattern of District El Sembellawain . .	53
IV-1	Water Supply System	88
2	Hot Water Supply System	89
3	Sewage System	89
4	Single Line Diagram	90
5	Telephone Wiring and Piping System	91
6	Public Address System	91
7	Master Antenna TV System	92
8	Alarm System	92

LIST OF DRAWINGS

Drawing	1	Site Plan (General)	01
	2	Ground Floor Plan (Administration & Operators' Wings)	02
	3	Second Floor Plan (Ditto)	03
	4	Elevation (Ditto)	04
	5	Section (Ditto)	05
	6	Workshop	06
	7	Other Facilities	07

1. INTRODUCTION

The Government of the Arab Republic of Egypt has been promoting increased farm production through agricultural mechanization as a part of the "Food Security Plan". This plan has first priority within the overall agricultural program. Within the plan, a program to establish a nationwide network of "Farm Machinery Hire Service Stations" (HSS) is envisioned by the Egyptian government. Prior to the establishment of this nationwide network, the Egyptian government requested assistance from the Japanese government to establish a "Pilot Center".

In this connection, the Japanese government dispatched a "Preliminary Study Team for the Farm Machinery Hire Service Station" to Egypt on June 12, 1982 for a period of 16 days through the Japan International Cooperation Agency (JICA).

Subsequently, the Japanese government dispatched a Basic Design Study Team to Egypt on August 5, 1983 for a period of 25 days. The team headed by Team Leader, Mr. Kenichi Ando, (Second Economic Cooperation Division, Economic Cooperation Bureau, Ministry of Foreign Affairs) was assigned for overall planning and preparation of basic design of buildings and facilities, in addition to drawing up specifications for machinery required under the Pilot Center.

The Study Team held a series of meetings with concerned officials of the Egyptian government to exchange views on the program and initially proposed sites, and also carried out a field survey in the areas of Cairo, El Mansura and its outskirts, and El Sembellawain. The main objectives of the survey were to identify the existing social, economic, agricultural and construction conditions of the said areas, and to propose a candidate site for the Pilot Center.

After examining five potential sites for the establishment of the Pilot Center, the Study Team selected and subsequently recommended El Sembellawain as the most promising site, and, in a joint meeting with the concerned agency of the government, El Sembellawain was designated as the Pilot Center site.

The concerned agencies of the government and the Study Team held a final meeting on measures to be undertaken for the realization of the Pilot Center. Minutes of this meeting have been duly prepared and a signed copy, together with the work schedule and Team member and contact list are attached herewith.

In accordance with the Minutes of Discussion between the two concerned parties, among other things the Study Team will prepare Basic Design Criteria for the establishment of the Pilot Center and submit the same to the Government of Egypt in due course.

This report has been prepared after examination of the survey results and analysis of information and data collected to date.

2. BACKGROUND

2-1 GENERAL AGRICULTURE

Agriculture in Egypt is concentrated along the Nile River and the Nile Delta, the cultivated area of which is approximately 3.45 million hectares in total. As shown in the meteorological data (Table II-1), due to low precipitation agriculture is dependant upon the Nile River as its main water source.

The soil along the Nile is alluvial and of clayish consistency, becoming quite hard under dry conditions and collodial under wet conditions. The pH level of the soil is high and, in order to lower it, paddy cultivation and upland farming are practised on a rotation basis.

Winter crops consist of wheat, Egyptian clover, legumes, onions, etc., and summer crops of rice, cotton, maize, sugar cane, potatoes, tomatoes, etc. The production of wheat, legumes, rice and tomatoes is increasing (Table II-6).

The production growth ratio of staple foods however, can not keep abreast of population growth in Egypt (Table II-7). In the meantime, the population engaged in agriculture, 4.1 million at present, continues to decrease due to the massive exodus of rural labor to obtain jobs in oil producing countries in the Middle East. This has been causing further decreases in agricultural production (Table II-8). The Egyptian government has therefore planned a Food Security Program to increase the country's self-sufficiency in food production.

Egypt's New Five Year Development Plan (1982-87) identifies the major obstacles to agricultural development and proposes the following programs to solve the same:

- improvement in integrated agricultural development schemes
- improvement in control of investment and production
- introduction of new technology and increased production through technological renovation
- reduction in loss of harvested crops
- increase in production of locally recommended crops

- increase in the ratio of arable land per capita
- increase in productivity of reclaimed land
- development of rural areas and reduction of the outflow of rural population

Through the above objectives, the Government of Egypt aims to improve the agricultural sector in the country.

2-2 PRESENT SITUATION OF AGRICULTURAL MECHANIZATION

2-2-1 General

More than 2.8 million workers, one quarter of the total work force in Egypt, have left the country in about last ten years due to rapid development and the consequent demand for labour in oil producing countries and to the promotion of emigration (labour export) by the Government. In turn this has created a drastic domestic labor shortage, particularly in the agricultural sector, resulting in the gradual decline of the land utilization ratio, delays in crop rotation, and a decrease in the yield per unit area. Also a raise in labor wages has decreased the agricultural industry's profit further. These factors have all resulted in severe losses for the small-scale farmer (Table II-9 & Figure II-1).

2-2-2 Farm Machinery

Agricultural mechanization commenced in the 1950s and has been developing rapidly since middle of 1960s (Table II-10, 11 & 12). However, the main function of mechanization was limited to land preparation after plowing by tractors, while mechanization for fertilizing, sowing and harvesting has not been adopted to date (Table II-14 & 15).

In the 1960s a large number of tractors were introduced suddenly the country upon the establishment of an Agricultural Credit Cooperative and the encouragement of private ownership of tractors by the Government. This Cooperative set-up a hire service system for tractors and in recent years tractor hire as a primary occupation has increased considerably.

According to Table II-13, the average horse power of tractors, increased from 45 PS in the 1960s to 60 PS in the 1980s and is expected to reach 65 PS in the near future.

At present it is predominantly the moderate to large-scale farmers who own farm machinery such as tractors, plows, harrows, planters, pumps etc., while the ratio of privately owned farm machinery to the total number of farm machines is over 80% (Table II-16).

2-2-3 Present Situation of Farm Mechanization

Except for plowing, 77% of which is mechanized (Table II-15), the utilization of farm machinery in other areas of farming is considered still very low. Mechanization is still insufficient in the areas of manure spreading, fertilizer application, digging of irrigation ditches, transplanting seedlings, weeding, thinning and harvesting.

Among the above, harvesting requires the largest work force, while weeding, seeding and transplanting also require periodic intensive labor. Mechanization of these practices will greatly decrease the need for human labor and thus alleviate the labor shortage. Mechanization would also shorten the time needed for crop rotation, thereby raising cropping intensity, and would eventually result in increased production and income for the farmers.

2-2-4 Maintenance

Agricultural mechanization has been progressing along with the introduction of tractors, but adequate services for maintaining farm machinery have not developed accordingly. At present approximately 10% of all tractors are reportedly difficult to use due to a shortage of both maintenance facilities and spare parts, resultant in a long waiting period for repairs (Table II-17).

The level of technical skill in machine maintenance is fairly high in Egypt. In the urban area manufacturers of farm machinery are able to provide dealers with adequately equipped repair shops and necessary spare parts. They can not, however, extend these services to the rural

areas. Although the villages have blacksmith shops where farm machinery is repaired, the mechanics of these repair shops generally have not been trained by farm machinery manufacturers, nor do they have access to repair manuals. Furthermore, these repair shops are usually equipped only with a welder grinder, drill and small tools which are not sufficient to properly repair farm machinery. For the above reasons, farm machinery is generally poorly maintained.

Accordingly, in addition to the promotion of maintenance and management training, the accessibility of workshops and the adequate supply of spare parts are also important factors to consider for proper realization of farm mechanization.

To deal with these problems the government of Egypt envisages the establishment of a nationwide HSS system.

2-3 NATIONWIDE HSS SYSTEM

2-3-1 Objectives of the Program

The adoption of mechanized agriculture will compensate for the chronic shortage of farm labor as discussed in the preceding section. It will also facilitate efficient crop rotation, increased cropping intensity and improved land utilization. As a result land productivity will be substantially increased to meet the principal objectives of the Food Security Plan.

(1) Efficient Machine Use and Reduced Production Cost

The cost of agricultural production can be substantially reduced by efficient use of machinery. Under the envisioned HSS system, machinery would be selected for each HSS area in accordance with the area's agricultural requirements and conditions. Each HSS would be provided with an appropriate quantity and variety of machines and be responsible for operation and maintenance of the same. An increase in the number of operative hours and the possible working area of the machines through a well organized schedule would also make up part of the scheme.

(2) Use by Small-Scale Farmers

Due to the inefficiency of manual labor and shortage of man power, small-scale farm production has faced difficulties to attain government objectives. Moreover, small-scale farmers who wish to increase production through mechanization do not have the income necessary to invest in machinery. This problem would be effectively overcome through the hire service system which would provide easy access to machinery at a low cost and preclude the necessity for individual ownership.

(3) Increased Standard of Living
and Stabilization of Livelihood

The mechanization of farming, by increasing agricultural production, will in-turn enhance farmers' income. It will also decrease the number of hours necessary for farming, thus freeing the farmer to engage in other activities and increasing both his general standard of living and the quality of his life.

(4) Regional Economic Impact and
Creation of Employment Opportunities

The basic economic impact of the envisaged HSS system would be to increase the economic self-sufficiency of each area by the profits gained through use of the rental service itself and through encouragement of farms to participate in regional agricultural development. Moreover, the necessity to train and hire personnel to operate the HSS will enhance employment opportunities throughout the country.

(5) Promotion of New Technology

Through the establishment of the HSS, modern agricultural machinery will be further introduced into the rural area. At the same time, both technical skills in machine operation and maintenance, and knowledge of modern mechanized farm technology and system operation management will be promoted among small-scale farmers.

2-3-2 HSS Network

The Ministry of Agriculture is planning to establish the HSS network system throughout the country. It is presently projected that initially the system will consist of over one hundred units which compose one center station and 4-5 substations each and be coordinated centrally for efficient operation. The number of units will expand gradually under the direction of the Ministry of Agriculture, with an organization similar to that of the National Agricultural Cooperative. This will promote more effective agricultural mechanization and increased agricultural productivity.

2-3-3 Scale of Nationwide HSS

Although the HSS system is designed to serve the entire country, due to practical limitations resulting from such factors as the area traversable by each machine in one day's use and the availability of spare parts, as well as in consideration of system management and administration, the most suitable service area for one HSS unit was determined to be 50,000 feddan (21,000ha). The projected number of units necessary to provide service to all areas of the country would thus be 160. At present however, because of the location of administrative divisions within the country and other factors, the Ministry of Agriculture plans to establish 120 HSS units. The total cultivated area of Daklalia Govenorate for example, is approximately 570,000 feddan. This would theoretically require the establishment of 11 HSS units. Within the Governorate however, there are only 9 administrative districts. The establishment of one HSS unit for each of those 9 districts, rather than 11, will thus be appropriate.

As machinery hired from the HSS will travel to and from the fields on a daily basis, the most efficient design for each HSS unit would be one center station encircled and supported by 4 or 5 substations. Communication and interaction between the center station and the substations would take place as illustrated in Figure II-2. The respective areas covered by the services of the center station and substations would be similar in size, approximately 10,000 feddan (4,200ha).

The scale of buildings, the amount of spare parts in stock, and the type and quantity of machines to be provided will be determined as shown in Figure II-3.

2-3-4 Function

Although the size of the area covered by the center station and the substations is basically the same, the functions performed by each are different. The center station will have a workshop equipped to overhaul machinery for the entire HSS area. The center station will also have facilities for training local farmers in operation and maintenance. One further function will be to oversee the management of each substation. On the other hand, the substation's activities will include a limited supply of machinery and implements, and minor repairs.

The functions of the center station and substations are summarized as follows:

Center Station

1. Operation and management of the center station
2. Supervising management of the substations
3. Integrated accounting management
4. Maintenance and repair of machines owned by the center station
5. Overhaul work for required machines owned by HSS
6. Training of operators
7. Training of mechanics
8. Issuing recognition certificates
9. Instruction for farm mechanization and communication of information received from the Agricultural Research Center

Substation

1. Operation and management of substation
2. Maintenance and repair of machines owned by substation

2-3-5 Organization

The organization system of the center station and substations, the personnel to be employed by the same and their work content are shown in Figure II-4 and Figure II-5.

2-3-6 Management of HSS

Agricultural development in Egypt is under the jurisdiction of the Egyptian National Plan. The details of crop type, cultivated land, marketing prices, production area, etc. are all determined by the Ministry of Agriculture. Likewise, the management of HSS will also follow the guidelines of the national plan and the goals determined by the Ministry of Agriculture. Specific goals of agricultural production under the national plan are allocated to each governorate by the Ministry of Agriculture. On the basis of this plan, the Governorate agriculture office and agricultural cooperative office discuss and allocate amounts and types of crops to each administrative district. The district agriculture office and district agricultural cooperative offices in turn allocate production targets for each crop to different purpose agricultural cooperatives.

Board members of the governorate and district cooperative offices are made up of representatives of the farmers. On the basis of production targets designated by different purpose cooperatives, these farmers then determine the type of crop and acreage to be cultivated.

(1) Agricultural Machinery Utilization Plan

HSS management will organize the utilization of farm machinery in close cooperation with the district agricultural cooperative office in such a way as to effectively facilitate the implementation of the government agricultural production plan. All farmers within the area will register with the HSS, recording their farm acreage and the type of machine required for cultivation. With this information, the HSS will prepare a detailed annual machine allocation plan. A schedule for overhaul and periodic checks of machinery during the off-season will also be prepared. In addition, life of machinery in use will be evaluated and on this basis a plan for the replacement and depreciation will be made.

(2) Foundation of HSS Management

As agricultural production is under the direction of the National Plan, HSS management may not necessarily be economically independent from the government finance. The existing plan of the Egyptian government to manage the HSS in close cooperation with the agricultural cooperatives and the District Government Offices, aims to greatly accelerate agricultural mechanization.

As a means to this end, the government will assist the HSS program with a subsidy, making the fee for the services provided affordable to the average small-scale farmer.

2-3-7 Service Plan

The service plan is divided into two types; hire of machinery and implements with operator, and rental of machinery and implements without operator.

(1) Hire Service

Each HSS will offer the types of machines and implements required for cultivation in its respective area as well as services of trained operators. The system will operate on a cycle including (a) preparation of a distribution plan, (b) determination of service fees, (c) contracting for services, (d) completion of contract and (e) collection of fees. This cycle is described in detail below.

1) Allocation

Based on such factors as present condition of farm mechanization, number of farm households, cultivated land area and type of crops planted, the number of machines and projected hours of operation will be calculated according to the cropping pattern and a allocation plan based thereon will be drawn-up.

2) Service Fee

Based on the above plan the lowest possible fee per hour of use will be determined for each type of machine. The service fee will

take into consideration such factors as fixed management expenditures, operation time, and value of machine, to determine fee charged for machine use.

3) Contracting for Services

All farm machinery services rendered by HSS will be carried out in accordance with a contract concluded previous to hire and within the concerned center station's or substation's service area. The contract fee will be fixed according to the guidelines described in 2) above. To increase efficiency users will be expected whenever possible to notify the contract management a week or more in advance of the time when use of the machine is desired. A user's registration system will be set-up for this purpose.

4) Completion of Contract

Upon completion of the contracted works, the HSS representative in charge of final machinery and implements inspection will check the work performed in the case of hire service and calculate the number of hours worked by the hour meter attached to the machinery to determine the total fee. This fee will be presented to the hirer and, upon mutual agreement, the bill will be issued.

(2) Rental Service

Rental Service is similar to Hire Service. In the former case however, the HSS does not provide machine operators. Instead, the renter is expected to either operate the machine or locate an operator.

1) Operators

The operator of a rented machine will be arranged by the renter. However, the operator must be a registered operator recognized by the local HSS having passed the examination conducted by the same after completion of a training program. The name of this registered operator with his registered number will be recorded in the contract between the user and center station or substation whichever the case may be.

Machines owned by the HSS and rented out under the Rental Contract will be returned to the station as scheduled at the end of every work day and as indicated in the work instruction note.

2) Training and Issuing Certificate

HSS will provide periodic training for farmers within each respective service area in the operation of machines, machine inspection prior to use, and machine maintenance. The training will be carried out by a registered engineer from the Agricultural Training Center, these instructors being officially recognized by the HSS. After successful completion of the training course, the attendants will be given a certificate for operation and a registration number.

3) Rental Fee

Service fee under the rental service system will be determined by the number of hours of use and the type of machine. When determining the fixed service fee effected in HSS unit, due consideration will be given to the farmer's income and to encouragement of machine use within HSS unit. As the farmer will be trained to operate the machine himself, no operator's fee is required and thus the rental fee will be reduced accordingly.

2-3-8 Daily Service Routine

Personnel engaged in the HSS are divided into four categories; operators, supervisors and administrative and maintenance staff.

These are further divided into work shifts (Figure II-6):

Control staffs for operation - 2 shifts a day

Operators - 4 shifts a day

Maintenance staff and administrative staff - 1 shift a day

In addition to their regular shift, during peak periods operators and control staffs are expected to work two additional hours per day, one hour in the morning and one at night.

(1) Daily Routine of Contract & Control Section

1) Contract

(a) Farmers who wish to use the services of the center station or substation are to submit a request form to the contract control section office.

(b) Said office shall be at all times informed of the availability of all tractors and implements under its authority.

(c) Total service fee is to be calculated and acceptable to the farmer after the work contracted is completed.

(d) On the basis of the total service fee accepted by the farmer, a bill will be submitted to the same.

2) Control

(a) Control Staffs who monitor operators are divided into a morning and afternoon shift. The morning shift begins one hour before the operators' shift commences during which time control staffs arrange and allocate the operators' work schedules. The operators including farmer operators are divided into four groups of 40 tractors each with one control staffs per group.

(b) In the morning, after control staffs have completed the schedules and checked the implements etc., operators begin work.

(c) If a machine is found faulty by an operator, it should be sent for repairs immediately, replaced and recorded.

(d) The morning shift arranges the work schedule for the following day and prepares necessary information for the subsequent shift.

(e) The afternoon shift organizes the implements to be used on the following day, and performs necessary administrative tasks, etc.

(f) After return of the tractors, the afternoon shift checks the operators' reports while the tractors are being cleaned, and then allocates machines for the following day. The same informs the operators of any necessary replacement or exchange of implements to be made after the tractors have been cleaned and refueled. The tractors are then returned to the tractor shelter

(g) Work orders and reports shall be properly kept and filed. When arriving and leaving from work, a time clock records each staff time by punching a time card.

(2) Operation Daily Routine

(a) Operators are divided into 4 groups, following the daily schedule shown in Figure II-6.

(b) Each operator is responsible for operation and maintenance of one specific machine, and may not operate other machines without permission of a control staffs.

(c) One work shift is eight hours, which includes checking the machine, moving it to site, operation time plus lunch-break, returning to the station, washing and housing the machine, and reporting to the control staff. The operator is expected to bring his own lunch to the field.

(d) The operator clocks in and receives his work orders from the control staff. The names of the farmers, the operation site(s) and content of work are indicated in the work order. He shall mount the necessary implement according to the work order when the replacement is needed.

(e) The operator checks his machine before starting work according to a check list. He records the result on this sheet and, if repairs are unnecessary, he goes to the designated working site. He must record the number of hours of use

indicated on the meter before leaving the station and starting work.

(f) After he has finished working in the field and returned to the center station or substation the operator cleans his machine and it is then checked by the control staff prior to housing.

(g) The operator reports the amount of work completed and is given a work order for the following day. When replacement of implements is required before the following day's use, the operator must reserve the necessary implements from the relevant personnel at the control office.

(h) Operators clock out when they finish work.

(3) Operation and Maintenance

1) Daily Check

The check list which operators fill in before and after work must be filed. The contract & control section must review submitted check lists and give the operators permission to begin work. When repairs are needed, necessary action should be taken immediately.

2) Regular Checking

The contract & control section requests the checking & repairing section to carry out regular checks after a designated number of operating hours, the content of this check being dependant on the total hours of operation.

3) Spare Parts

When parts must be changed after inspection, a request form for the parts will be completed and submitted to the purchasing section. Spare parts will be supplied on receipt of this form.

4) Storage of Spare Parts

The purchasing section is responsible for the inventory of spare parts, two years supply of which will be in storage.

Purchase orders are prepared once a month. At this time the purchasing section will present its estimated budget for purchase of parts to the finance section. Upon receiving approval of the budget from the finance section, the purchasing section will issue a purchase order.

2-3-9 Payment of Service Fees

(1) Payment of Charges/Collection of Fees

The user may pay fees for services rendered in cash at the HSS Finance section, by deposit in the HSS account at a designated bank, or through the Principal Bank for Development Agricultural Credit (PBDAC).

(Note) PBDAC is a nationwide bank specifically dealing with agricultural development. There are 130 branches throughout the country with liaison offices in 740 villages and about 4,200 authorized agents to facilitate procurement of farm machinery and other supplies and to extend credit for varying lengths of time.

End users intending to pay their fees through PBDAC must record their intention in the hiring service contract, designating the PBDAC branch to be used within the respective HSS service area. HSS then requests PBDAC to prepare the appropriate funds. The user presents the HSS application form to PBDAC and requests payment. Upon this request PBDAC transfers the required funds to the HSS. In lieu of cash payment the user then submits a predetermined portion of his harvest to PBDAC thereby settling his debt.

(2) Farm Mechanization Subsidy System

A farmer who carries out employs mechanized farming method is eligible for a 10 pound subsidy per feddan of land. It is important to consider this subsidization system in relation to payment for HSS

services. Due to the shortage of fund to purchase farm machinery, the small-scale farmer is difficult ot mechanize farming in spite of their willingness.

Table II—1 CLIMATOLOGICAL DATA OF MAIN CITIES

CITY	Season	Temperature °C		Humidity (%)	Precipitation (mm)
		Max.	Min.		
CAIRO	Winter	18.2	8.8	54	1.0
	Summer	33.3	20.5	55	0
ALEXANDRIA	Winter	18.2	9.1	62	124.4
	Summer	29.1	21.4	66	0
ASWAN	Winter	22.9	9.0	47	0
	Summer	40.8	24.9	31	0

Source : STATSTICAL YEAR BOOK, EGYPT, 1982

Table II—2 FINANCIAL STATISTICS

	1976	1977	1978	1979	1980	1981	1982
Merchandise : Exports fob	1,609	1,974	1,939	2,424	3,854	3,999	--
Merchandise : Import fob	-3,842	-4,038	-4,743	-6,002	-6,814	-7,918	--
Other Goods, Serv. & Income : Cred	1,220	1,639	1,719	1,960	2,662	2,938	--
Other Goods, Serv. & Income : Deb.	-1,260	-1,763	-1,960	-2,193	-2,931	-3,385	--
Private Unrequited Transfers	842	988	1,824	2,269	2,791	2,230	--
Official Unrequited Transfers	--	--	--	--	--	--	--
Direct Investment	61	98	298	1,211	541	747	--
Portfolio Investment, nie	--	6	4	3	5	7	--
Other Long-Term Capital, nie	367	199	417	431	405	1,275	--
Other Short-Term Capital, nie	-272	-1,040	-536	-130	61	36	--
Net Errors and Omissions	-31	30	-28	11	35	124	--
C'part to Mon./Demon. of Gold	--	--	--	--	--	--	--
Counterpart to SDR Allocation	--	--	--	31	31	29	--
Counterpart to Valuation Change	64	49	61	-47	-67	-450	--
Intergovernmental Grants Rec'd	624	386	296	36	2	1	--
Bop Loans to Government	75	305	154	75	63	1	--
Bop Loans to Central Bank	59	1,225	500	--	--	--	--
Official Deposits in Central Bank	403	30	40	21	24	114	--
Liab. Const. Fgn Author. Reserves	--	--	--	--	--	--	--
Total Change in Reserves	81	-88	14	-99	-662	252	--
NATIONAL ACCOUNTS							
Millions of Pounds : Year Beginning July							
Exports	1,034	1,773	1,945	3,252	5,285	5,411	--
Government Consumption	1,571	1,697	1,841	2,059	2,826	3,630	--
Gross Fixed Capital Formation	1,385	1,838	2,618	3,346	3,943	4,950	--
Increase in Stocks	195	561	416	450	230	200	--
Private Consumption	3,863	4,917	6,279	8,623	11,620	14,551	--
Less : Import	-1,772	-2,575	-3,316	-5,254	-7,281	-8,015	--
Gross Domestic Product	6,276	8,210	9,782	12,475	16,623	20,727	--
Less : Net Factor Pmts Abroad	-158	-433	-983	-785	836	865	--
Gross Nat'l Expenditure = GNP	6,118	7,777	8,799	11,690	17,459	21,592	--
Gross Dom. Prod. 1975 Prices	5,239	5,653	6,226	6,766	--	--	--
Millions : Mid-Year Estimates							
Population	37.87	38.79	39.82	40.98	42.29	43.47	--

Source: IMF International Financial Statistics, 1983 June

Table II—3

CHANGE OF CONSUMER PRICE INDEX

	1976	1977	1978	1979	1980
Consumer Price Index (1966/67=100)	164.2	185.1	205.6	226.0	272.2
Comparing to the Preceding Year	10.3	12.7	11.1	9.9	20.7

Source: "Statistical Indicators" 1982, Central Agency
for Public Mobilisation & Statistics, EGYPT

Table II—4

GDP BY SECTOR

(Unit. : %)

	1973	1974	1975	1976	1977	1978	1979
Goods Industry			57.6	56.0	55.6	54.5	54.5
agriculture			30.7	28.3	26.1	25.0	25.0
manufacturing			17.8	17.4	17.5	17.4	17.4
industry							
mines & quarries			3.1	4.2	5.7	6.1	8.4
electricity			1.5	1.5	1.5	1.4	1.5
construction			4.5	4.6	4.8	4.6	4.7
Distribution	n.	n.	18.5	20.4	20.7	22.7	21.8
Industry	a.	a.					
transport,			5.2	7.8	8.3	8.8	8.4
communication &							
storage							
(Suez)			(--)	(--)	(--)	(2.8)	(3.3)
commerce			13.3	12.6	12.4	13.9	13.4
Finance & Insurance Services			23.9	23.6	23.7	22.8	22.8
houses			2.7	2.6	2.5	2.4	2.4
services			0.4	0.4	0.4	0.4	0.4
others			20.8	20.6	20.8	20.0	20.0
TOTAL	—	—	100.0	100.0	100.0	100.0	100.0

Source: NATIONAL BANK OF EGYPT, ECONOMIC BULLETIN 1980. No.1

Table II-5

GENERAL DATA

Item	Population		※ GDP	Agriculture & Fisheries	Mining & Manufactur- ing Industry
Unit	Thousand	(1971 =100)	Million L.E.		
Year					
1960	25,992	----	1,459	402.7	285.6
1965	29,390	81	2,388	608.5	461.1
1970	33,330	96	3,146	774.0	611.0
1972	34,840	----	3,417	933.0	590.0
1973	35,620	----	3,663	1,062.0	635.0
1974	36,420	----	4,197	1,280.0	844.0
1975	37,010	----	4,861	1,469.0	999.0
1976	37,870	----	6,276	1,744.0	1,303.0
1977	38,790	----	8,210	2,038.0	1,588.0
1978	39,820	----	9,782	2,286.0	1,945.0
1979	40,980	----	12,475	2,688.0	3,386.0
1980	42,290		16,623	----	----
1981	43,470		20,727	----	----

※ : Fiscal Year

Source: Overseas Cooperation Handbook, 1983

Table II-6 PRODUCTION OF MAIN CROPS IN EGYPT

	1969~71	1979	1980	1981
Cereals	7.385	8.068	8.120	7.795
wheat	1.509	1.856	1.796	1.850
rice	2.566	2.517	2.350	2.500
maize	2.370	2.938	3.231	2.700
millet	847	635	636	643
Legumen	368	304	286	329
Cotton	520	484	529	520
Potatoes	496	1,019	1,214	1,120
Vegetables	5.330	7.126	7.315	7.356
tomatoes	1.580	2.421	2.571	2.632
onions	547	621	567	527
Sugar cane	7.096	8.791	8.791	9.076

Source: FAO Production Year Book, Vol.35, 1982

Table II - 7

Trade Performance and Self-Sufficiency for Principal Agricultural Commodities
(Exports and imports in thousands of tons; self-sufficiency in domestic supply or percent of total domestic consumption)

	1960			1974			1981		
	Exports (+) or Imports (-)	Self- Sufficiency Ratio	Exports (+) or Imports (-)	Self- Sufficiency Ratio	Exports (+) or Imports (-)	Self- Sufficiency Ratio	Exports (+) or Imports (-)	Self- Sufficiency Ratio	
<u>Basic Food Commodities</u>									
Wheat	-624	69.8	-3,200	36.8	-5,878	24.8			
Rice	+272	143.9	+136	111.2	+25	101.7			
Maiz	-95	94.0	-388	86.6	-1,300	71.1			
Sugar	+42	114.2	-23	96.0	-580	53.2			
Beans	+11	100.4	-10	92.5	-90	69.8			
Lentils	-2	92.3	-13	81.2	-85	5.6			
Edible Oils	-6	95.4 (101.4)	-151	49.7	-355	31.6 (51.1)			
<u>Other Exportable Field Crops</u>									
Cotton	+375	400.0	+232	211.0	+165	149.6			
Onions (fresh only)	+164	170.0	+104	150.0	+40	117.0			
Groundnuts	+3.8	17.2	+7.4	12.6	+7.5	18.0			
<u>Livestock Products</u>									
Red Meat	-16	94.5	-1	99.7	-125	73.3			
Poultry	-7	100.0	-1	99.2	-60	62.8			
Fish	-85	94.5	-19	92.4	-130	53.6			
Milk	-85	94.2	-138	92.5	-1,150	62.2			
<u>Fruits and Vegetables</u>									
Citrus	+20	106.8	+162	120.3	+140	114.0			
Potatoes	+91	135.1	+100	118.2	+145	113.6			
Tomatoes	+4	100.4	+2	100.1	-3	100.1			

Table II-8 NUMBER OF PERSONS ENGAGED IN EACH ECONOMIC SECTOR

Unit: upper %
lower number (1,000 persons)

	1959/60	1969/70	1975	1977
Agriculture	54.0 3,243	49.4 4,087	45.2 4,245	42.2 4,101
Mines & Quarries	10.0 601	11.2 927	12.8 1,207	12.8 1,244
Electricity, Gas & Water	0.2 12	0.2 17	0.4 38	0.6 58
Construction	3.1 186	3.3 273	4.6 434	4.7 458
Trans. Comm. & Storage	3.6 216	4.2 348	4.5 424	4.6 447
Commerce, Finance & Insurance	10.6 637	10.1 836	10.0 943	10.8 1,050
Houses	0.3 18	1.7 141	1.5 142	1.5 146
Service Industries	0.4 24	0.4 33	0.5 47	0.6 58
Others	17.8 1,069	19.5 1,613	20.6 1,943	22.3 2,167
TOTAL	100 6,006	100 8,274	100 9,433	100 9,719

Source: Federation of Egyptian Industries, Yearbook 1976 and
Statistical Yearbook, 1979

Table II—9

INCREASES IN FARM WAGE RATES, FARM-GATE PRICES
AND RURAL COST OF LIVING, 1968 - 78

Period	Man-Day Wage Rate ①		Rural Consumers' Price Index	Index of Farm-Gate Prices Received ②	
	Actual	Index		Cotton	Maize
1968-71	25.3	100	100	100	100
1973	28.5	113	111	106	137
1974	35.1	139	128	128	154
1975	46.5	184	142	139	136
1976	61.6	244	160	179	152
1977	76.0	300	175	190	174
Jan.-June 1978	88.0	348	202 (March)	—	—
July-Sep. 1978	90.0	356	—	—	—

① Source: Central Agency for Public Mobilization & Statistics

② Source: Agricultural Economics Research Institute,
Ministry of Agriculture

Table II—10

FARM MACHINERY INVENTORY, BY TYPE, 1978

Item	Estimated Total No.	Percent Owned Privately
	No.	Present
Tractors	24,680	83
Tractor Plows	19,900	86
Subsoiler / Ditcher Excavators	125	88
Harrows	8,820	86
Planters	6,430	95
Irrigation Pumps		
Electric powered	2,160	98
Diesel or gasoline powered	24,830	98
All Motor-driven Pump Sets	26,990	98
Threshers and Winnowers	3,580	89
Dusters		
Manual	2,580	98
Motor operated	960	8
Sprayers		
Motor operated	160	38
Others	2,640	20
Spraying Equipment		
Motor operated & car carried	4,730	10
Motor operated & back carried	1,940	55
Manual and back carried	50,600	23

Source: ERA 2000, INC.

Table II—11

TRACTOR SALES (PUBLIC & PRIVATE)

Description HP/Make	Y e a r										TOTAL
	1967	1968	1969	1970	1971	1972	1973	1974	1975	1975	
50 IMR Assm.	—	500	500	500	500	500	500	500	500	—	4,000
60 IMR "	—	300	500	500	500	500	500	500	500	500	4,300
65 Univ (Rom)	—	—	—	—	500	500	1,500	1,000	1,000	1,500	6,000
54 Fiat "	—	—	—	—	—	—	—	—	504	—	504
60 IMR Imp.	—	—	—	—	—	—	200	500	300	—	1,000
45 Otus (Rom)	—	500	500	—	—	—	—	—	—	—	1,000
50 Zetor	—	1,000	1,500	—	—	—	—	—	—	—	2,500
60 IMT	—	—	—	—	—	100	—	—	450	350	900
60 Ebro	—	—	—	—	—	—	—	79	71	—	150
65 Univ	—	—	150	150	150	—	—	—	—	—	450
55 U550	—	250	100	100	—	—	—	—	—	—	500
45 Belaros	2,000	1,500	—	—	—	—	—	—	—	—	3,500
50 Fordson Major	200	—	—	—	—	—	—	—	—	—	200
50 David Brown	300	200	—	—	—	—	—	—	—	—	500
50 John Deer	100	—	—	—	—	—	—	—	—	—	100
TOTAL	2,600	4,250	3,250	1,300	1,650	1,600	2,700	2,579	3,325	2,350	25,604

出所 : Ministry of Agriculture, EGYPT

Note : Assm. = Assembled, Imp. = Imported, (Rom) = Romania

Table II—12

PERIOD OF TRACTOR USE

Period of Use	Plow- ing	Level- ing	Har- rowing	Thre- shing	Trans- portation
Never Used	3.9	31.0	35.4	11.5	81.9
2 years	2.8	3.2	4.9	1.8	1.8
5 years	7.9	6.7	9.5	8.3	2.2
10 years	21.4	19.9	16.3	27.6	6.7
20 years	45.8	29.8	25.1	39.6	5.3
30 years	12.7	7.9	6.0	7.1	1.7
Over 30 years	5.4	1.4	2.7	4.0	0.3

Source : State of Agricultural Mechanization, EGYPT

Table II—13

TRACTOR PROJECTIONS

Year	Tractor Units	Average HP	1,000 HP
1961-65 average	13,607	45	612
1969	16,962	45	763
1970	17,500	48	840
1974	18,597	55	1,023
1977	21,000	58	1,218
1980	28,700	60	1,722
1985	37,000	65	2,405

Source : Adapted from Feasibility Report for
Massey-Ferguson/NASCO Tractor Manufacturing Facility

Table II-14

DEGREE OF MECHANIZATION BY SIZE OF LAND HOLDING

Size of Lnad Holding Feddans	Degree of Mechanization						TOTAL No.
	Low		Medium		High		
	No.	%	No.	%	No.	%	
Less than 1	27	52	17	33	8	15	52
1 ~ 2.99	25	41	24	39	12	20	61
3 ~ 4.99	5	28	3	17	10	55	18
5 ~ 9.99	5	29	3	18	9	53	17
10 & Over	3	30	1	10	6	60	10
TOTAL	65	--	48	--	45	--	158

Source : ERA 2000, INC.

Table II—15

TYPE OF MACHINE AND LABOR USED BY
EGYPTIAN FARMERS FOR VARIOUS FARM PRACTICES

Farm Practices	LABOR			MACHINES			PERCENT		
	Family Labor	Hired Labor	Animal Labor	Own-ed	Rented Private	Coop	Human Labor	Animal Labor	Machine Labor
Plowing	4	7	30	7	95	34	6%	17%	77%
Discing	21	32	47	5	43	13	33	29	38
Manuring	73	66	53	1	2	0	71	27	2
Leveling	7	20	60	6	47	12	18	39	43
Furrowing	5	11	86	6	47	6	10	53	37
Ditching	91	73	22	1	2	1	86	12	2
Planting	110	95	0	0	0	0	100	0	0
Weeding	108	99	0	0	0	4	98	0	2
Thinning	107	80	0	0	0	0	100	0	0
Insect Control	16	22	0	4	24	71	27	0	73
Fertilizing	113	78	0	0	2	0	99	0	1
Irrigation	37	11	56	25	32	1	29	35	36
Harvesting	95	120	4	0	1	0	97	2	1
Transporting Crop	9	10	133	3	14	3	11	77	12
TOTAL	796	724	491	58	309	145	60.2	19.5	20.3

Source : ERA 2000, INC.

Table II-16

**HOURS OF TRACTOR USE BY TYPE AND OWNERSHIP :
FARM MACHINERY SURVEY, 1978**

Ownership	TYPE OF USE					
	Plowing	Irrigation	Threshing	Transportation	Other	All uses
		<u>Hours per tractor *</u>				
Co-operative	291	8	162	96	--	557
Private						
Own farm	85	37	58	46	9	235
Custom work	271	28	260	100	14	673
Total Private	<u>356</u>	<u>65</u>	<u>318</u>	<u>146</u>	<u>23</u>	<u>908</u>
All Tractors	345	56	291	137	19	848
		<u>Percent of all uses</u>				
Co-operative	52	2	29	17	--	100
Private						
Own farm	36	16	25	19	4	100
Custom work	40	4	39	15	2	100
Total Private	<u>39</u>	<u>7</u>	<u>36</u>	<u>16</u>	<u>2</u>	<u>100</u>
All Tractors	41	7	34	16	2	100
		<u>Percent of total hours</u>				
Co-operative	16	3	10	13	--	12
Private						
Own farm	20	55	16	27	38	23
Custom work	64	42	74	60	62	65
Total Private	<u>84</u>	<u>97</u>	<u>90</u>	<u>87</u>	<u>100</u>	<u>88</u>
All Tractors	100	100	100	100	100	100

* Inoperable tractors are excluded from base numbers.

Source : ERA 2000, INC.

Table II—17

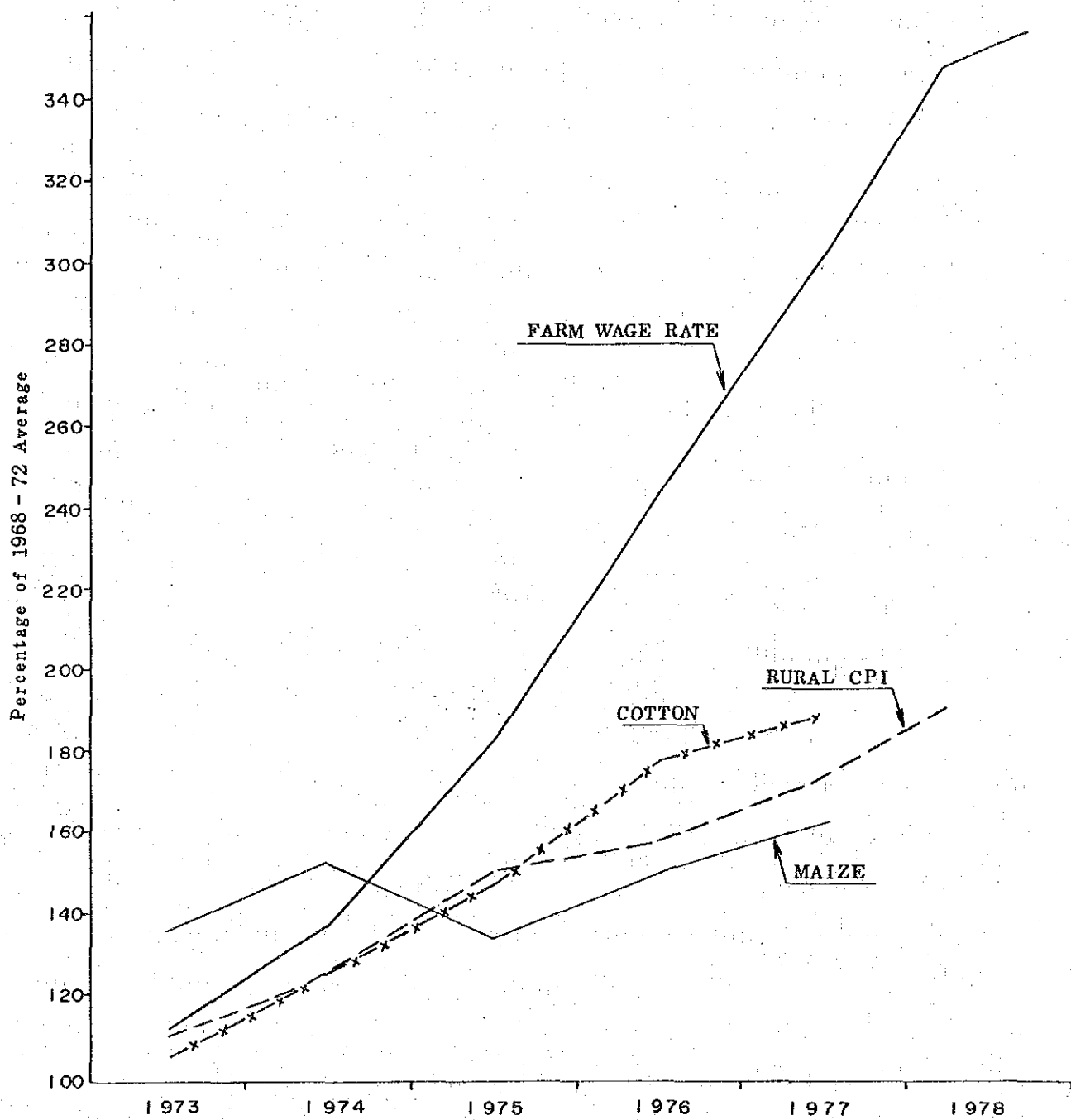
TRACTOR OWNERSHIP COMPARISON
BETWEEN AGRI. COOPERATIVE AND PRIVATE

<u>Which tractors work better ?</u>			%
Agri. Cooperative has no tractor	209		20.9
Agri. Cooperative's tractor works better	207		20.7
Privately owned tractors work better	402		40.2
Same	177		17.7
Do not know	5		0.5
TOTAL	1,000		100.0

<u>Waiting Period for Hire</u>			Agri. Cooperative	Private
Never used a tractor			38	38
Usually leases a tractor			5	174
Waiting period	1	day	11	139
"	2	days	39	160
"	3 ~ 7	days	80	171
"	7	days	114	167
Hires privately owned tractors			713	
Hires Agricultural Cooperative's tractor				151
TOTAL			1,000	1,000

Source: ERA 2000, INC.

Figure II-1 FARM WAGE RATES, RURAL CONSUMER PRICE INDEXES AND FARM GATE PRICES 1973-September 1978



Source: ERA 2000, INC.

Figure II-2 H.S.S. UNIT

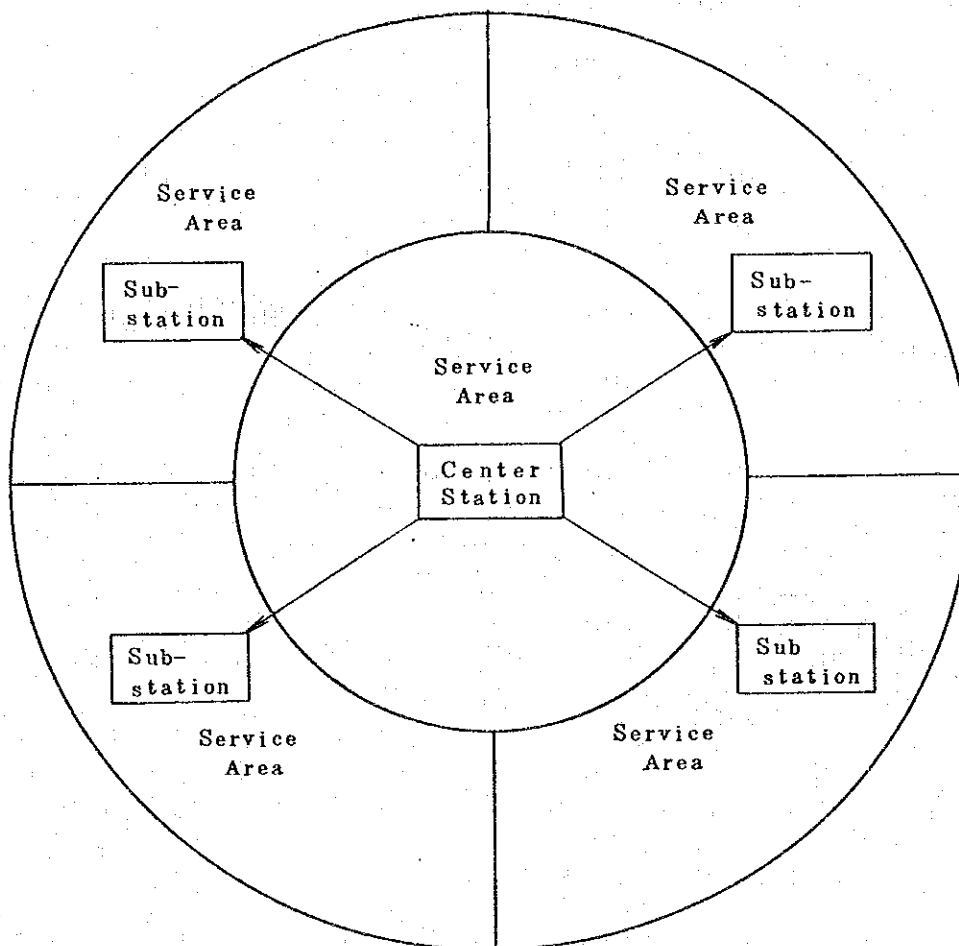


Figure II-3

SCALE & CONTENTS OF HSS FORMATION PROCESS

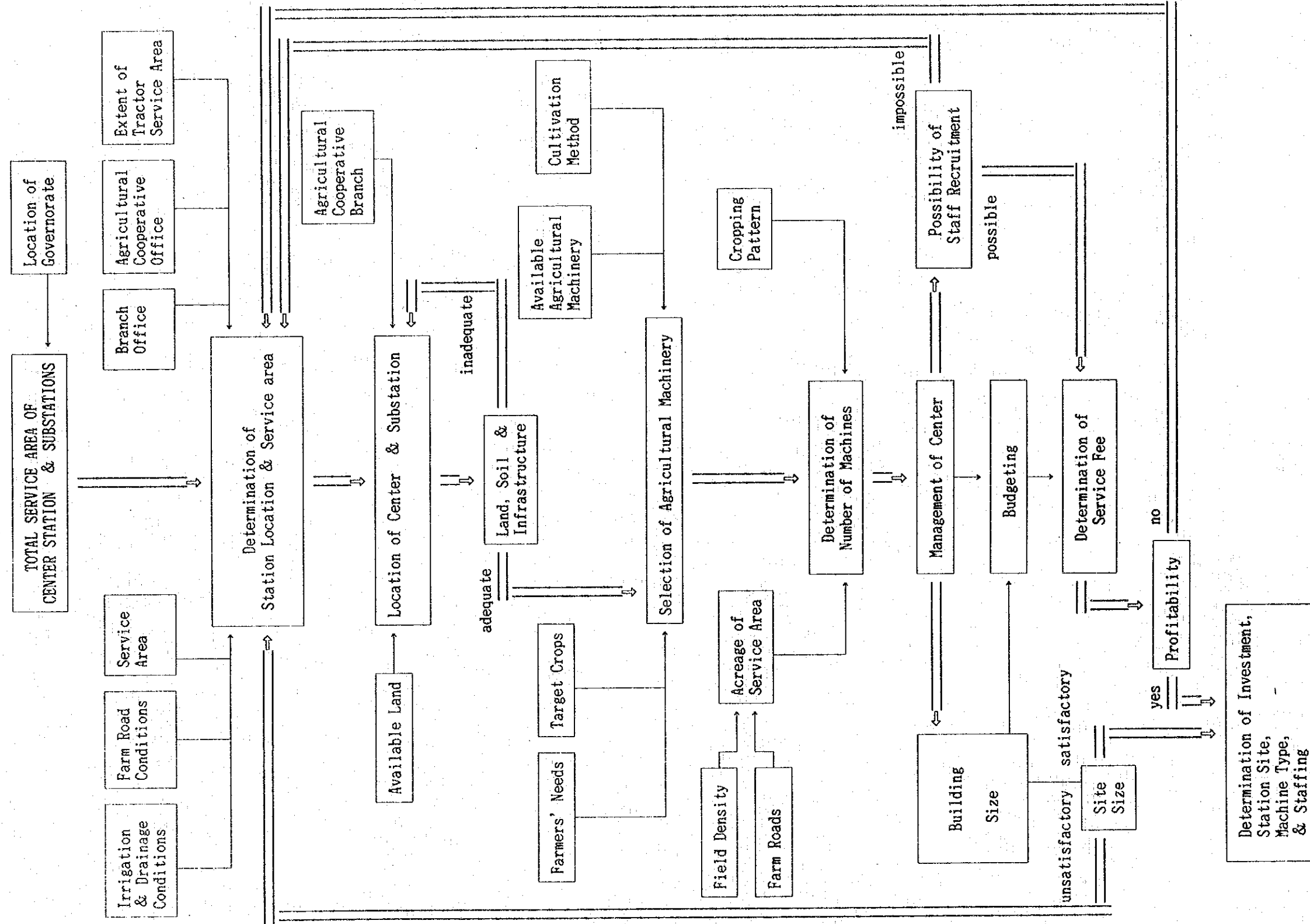


Figure II-4

ORGANIZATION OF PROPOSED CENTER STATION

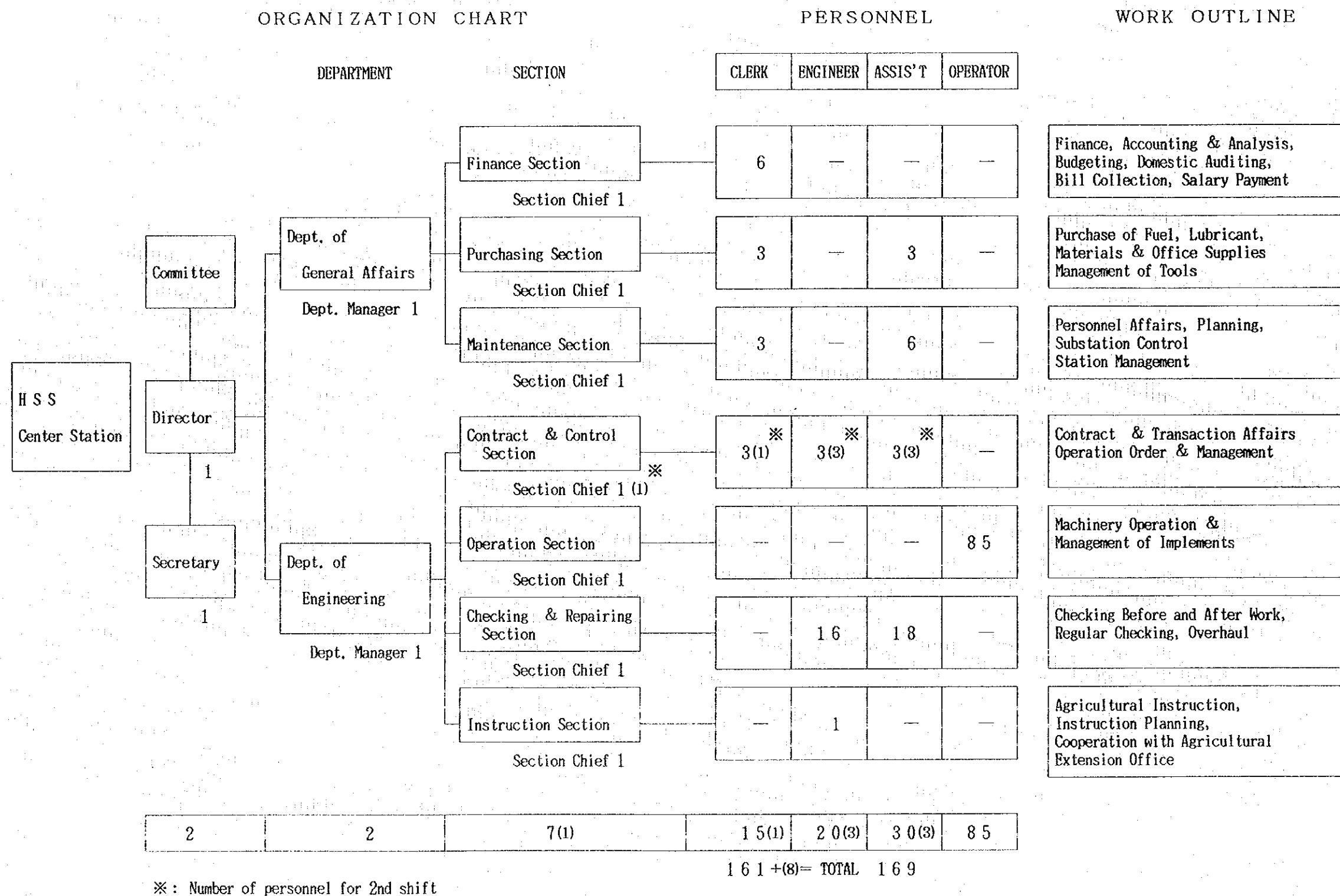
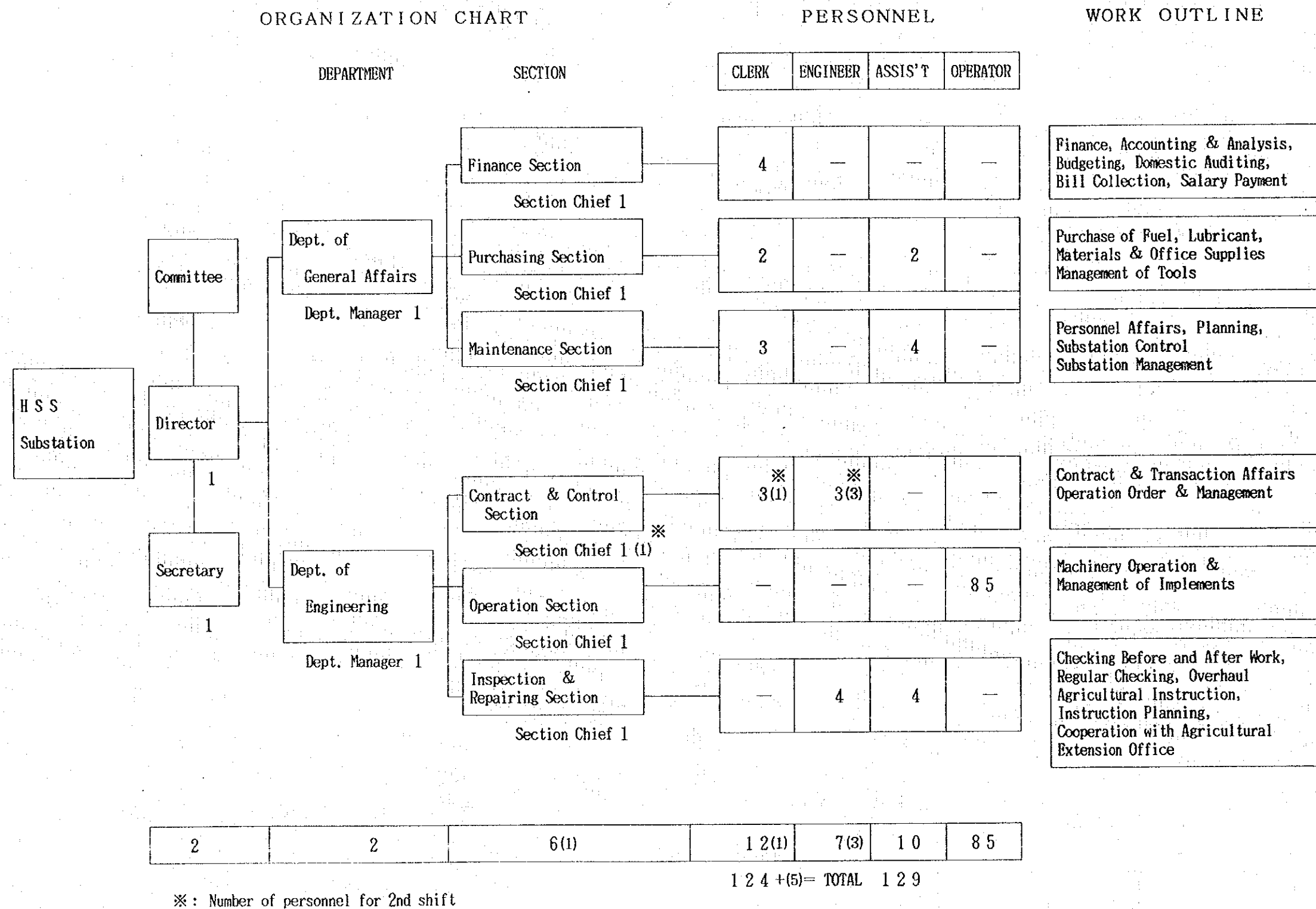


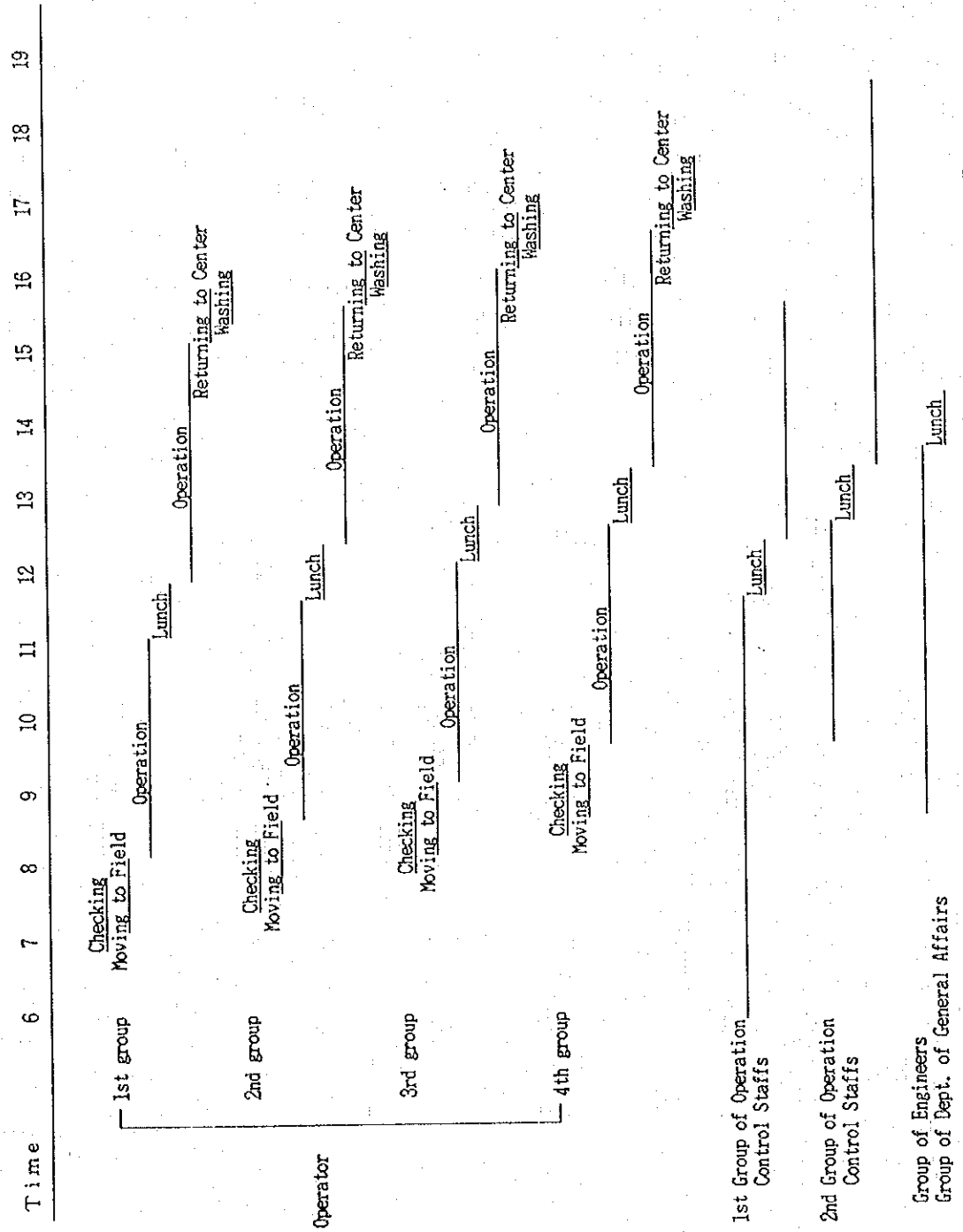
Figure II-5

ORGANIZATION OF PROPOSED SUBSTATION



DAILY ROUTINE

Figure II-6



3. PILOT CENTER ESTABLISHMENT PLAN

3-1 OBJECTIVES

The HSS pilot center station (Pilot Center) will be established and managed in accordance with the HSS Program mentioned in the previous chapter. However, as no HSS of this scale has yet been attempted in Egypt, the successful implementation of this Pilot Center, an experiment in the management of a HSS system, will form the foundation for the establishment of a future nationwide HSS network. As such the Pilot Center will provide the following:

- (1) an established management guide for an overall HSS system if subsequently implemented, and
- (2) a basis on which the economic effect of the HSS can be determined.

3-2 ORGANIZATION

The Hire Service Station (HSS) will at first be established and directly managed by the Department of Mechanized Farming within the Ministry of Agriculture. As management of the HSS network by the private sector is also under consideration as a future possibility however, management of the Pilot Center may be shifted to the regional Agricultural Cooperative upon successful completion as a pilot station. The position of the HSS within the central government in the initial phase is presented in Figure III-1.

3-3 PROGRAM OF THE PILOT CENTER

3-3-1 Activities

The basic function of the Pilot Center will be the same as that of the HSS Program; to promote the adoption of agricultural mechanization and technology. In addition, it will also serve as an experiment to determine the actual final guidelines of the envisioned HSS system.

ORGANIZATION



The Pilot Center will serve as a center for the following activities;

- (1) farm machinery hire/rental service,
- (2) maintenance and repair of farm machinery and implements,
- (3) education, training, guidance and demonstration, and,
- (4) management and maintenance of facilities.

To facilitate the above, the following programs will be prepared:

- (a) management, (b) maintenance and repair, (c) education and training, and
- (d) guidance and practice.

3-3-2 Management Program

The Pilot Center will develop a management guide system after various trial experiments. However, as there has been no precedent for the management of the HSS system of this scale in Egypt, in the first phase smooth management of the Pilot Center will likely present problems. To minimize the same, management will be divided into three phases and implemented gradually. The size and extent of management in each phase will be determined by the size of the area to be served, while manpower and equipment will also increase gradually. The areas to be served in each phase are as follows:

- 1st Phase: 2,100ha
- 2nd Phase: 3,200ha (2,100 + 1,100ha)
- 3rd Phase: 4,200ha (3,200 + 1,000ha)

The manpower and equipment to be supplied in each phase are discussed in Chapter 4 and 5, respectively.

3-3-3 Maintenance and Repair Program

The maintenance and repair program will include the following;

- (1) inspection before and after each day's operation,
- (2) periodical inspection of specific parts,

- (3) periodical overhaul,
- (4) minor repairs,
- (5) minor repairs in the field, and,
- (6) major repairs.

The type of farm machinery to be repaired at the Pilot Center is listed in the table below.

Maintenance Activity	Item to be handled
Beginning and final inspection	Only tractors of Pilot Center
Periodical inspection	Only tractors, trans-planters, combines of Pilot Center
Periodical overhaul	Only tractors and combines including those of the sub-stations
Minor repairs	All machinery of Pilot Center
Minor repairs in the field	All machinery of Pilot Center
Major repairs	All machinery of Pilot Center plus tractors and combines belonging to sub-stations

Note: The maintenance program is described in Chapter 4.

3-3-4 Education and Training Program

In order to familiarize people involved with the HSS system, the following will be assigned to a training program:

- (1) Operators
- (2) Supervisors
- (3) Mechanics (engineers)
- (4) Assistant Mechanics
- (5) Renters

The curriculum of each training program is summarized below:

(1) Operators

The operators to be employed at the Pilot Center, require a thorough knowledge of the operation, structure, function and inspection of all farm machinery furnished by the Pilot Center in order to operate the same efficiently and safely. The operator will therefore receive training in machine operation for one month and training in maintenance techniques, such as inspection and emergency repairs, also for one month.

(2) Control Staffs

Control Staffs are expected to control the operation of all machinery provided by the Pilot Center, as well as to cooperate with the District Agricultural Office's extension worker in the promotion of mechanized farming through instruction and demonstrations given to farmers during the off-season.

Control Staffs will therefore be given training in mechanized farming methods and in the operation and maintenance of farm machinery. Their training will include a one month lecture course on mechanized farming as well as a one month practical application period.

(3) Mechanics (engineers)

Although the mechanics to be employed at the Pilot Center are expected to have technical skills previous to employment, additional training will be provided. To give the mechanics a thorough knowledge of the operation of the farm machinery furnished by the Pilot Center, they will undergo 3 months training in maintenance techniques, and half a month's training in the operation of the machinery.

(4) Assistant Mechanics

The assistant mechanics to be employed at the Pilot Center will receive half a month's training in machine operation, and one month's training in maintenance, followed by on the job training under the instruction of the engineers.

(5) Renters

Renters who wish to rent farm machinery from the Pilot Center must pass an examination and then register with the Pilot Center prior to hiring the equipment. Each renter will be trained in maintenance, inspection and operation of the equipment. The length of training will vary according to the individual farmer's skill. Registration received after each respective program will be classified into class A, B, and C according to length of training, and machinery available to members of each class will likewise vary.

Class A: Operation & Maintenance	0.5 month
Class B: " " "	1 week
Class C: " " "	4 days

Renter may undergo training on an intermittent basis if necessary, and may also receive training for a higher level after passing a lower level examination. A detailed education and training plan will be prepared in accordance with the above concepts. The initial trainers dispatched by the machine manufacturer will subsequently be replaced by trainees who will be selected and re-trained under the first training program.

The schedule for the training program is presented in Table III-1.

3-3-5 Guidance and Demonstration Program

The Pilot Center's role is to promote the spread of farm mechanization in the region. To this end it will provide education programs in mechanized farming and practical demonstrations of farm machine operation. The Pilot Center will function as a training center to educate operators, mechanics and assistant mechanics. At intervals in the training, it will also provide instruction in mechanized farming through the use of audio-visual aids to interested farmers.

The operation of farm machinery will be demonstrated in a driver's training yard near the administrative building while farming methods will be demonstrated at a designated practice field. Interested farmers will be

Table III-1

TRAINING SCHEDULE

	1st Phase		2nd Phase		3rd Phase		Training Term	
	Operation	Maintenance	Operation	Maintenance	Operation	Maintenance	Operation	Maintenance
Operator & Control Staff	Manufac- turer's Instructor	Manufac- turer's Instructor	Selected Operation Trainee of Phase I	Selected Maintenance Trainee of Phase I	Selected Operation Trainee of Phase I	Selected Maintenance Trainee of Phase I	month 1.0	month 1.0
Engineer	— do —	— do —	— do —	— do —	— do —	— do —	0.5	3.0
Assistant	—	— do —	— do —	— do —	— do —	— do —	0.5	1.0
Famer Operator	Class A	Manufac- turer's Instructor	— do —	— do —	— do —	— do —	0.5	0.5
	Class B	—	— do —	— do —	— do —	— do —	week 1.0	week 1.0
	Class C	—	— do —	— do —	— do —	— do —	day 4	day 4

invited by the District Agricultural Office's extension worker to participate in the classes and demonstrations. A maximum number of 30 participants will be trained during each demonstration which will be held at least 50 times a year, but never more than once per day.

Supervisors will be available to visit the area at any time with the District Agricultural Office's extension worker to give the farmers instruction in mechanized farming methods.

3-4 PROPOSED CONSTRUCTION SITE

The Government of Egypt recommends Dakhalia Governorate as the construction site of the Pilot Center for the following reasons:

(1) Dakhalia has the highest percentage of farmers who have accepted and subsequently adopted mechanized farming methods.

(2) The economic condition of agriculture in Dakhalia is fairly stable and the upper middle class income level of the residents makes it feasible for the same to pay for the HSS services.

(3) Local officers of the Ministry of Agriculture and the Governor of Dakhalia Governorate strongly support the idea of mechanized farming.

(4) The site is located close to the capital, Cairo, and the type of farming is suitable for mechanization.

The previous construction site, Kafr El Aram, was proposed by the Dakhalia local chapter of the Ministry of Agriculture, but was found, when the Study Team visited El Mansura to discuss site selection with officers of the Ministry of Agriculture, to be unsuitable because the area was only 2 feddan.

Subsequently, the local chapter requested the Study Team to select another construction site from among five alternative sites proposed, all of which are under the jurisdiction of the same. The Study Team evaluated all alternative sites, checking 22 items including functional effect, demonstration effect and suitability as a Pilot Center.

After an intensive study, the Study Team selected a site in El-Sembellawain district as the most suitable construction site for the Pilot Center. The area of the project site is about 42,000m².

The local chapter of the Ministry of Agriculture was in agreement with the conclusion made by the Study Team, and have officially designated El Sembellawain site as the Pilot Center construction site.

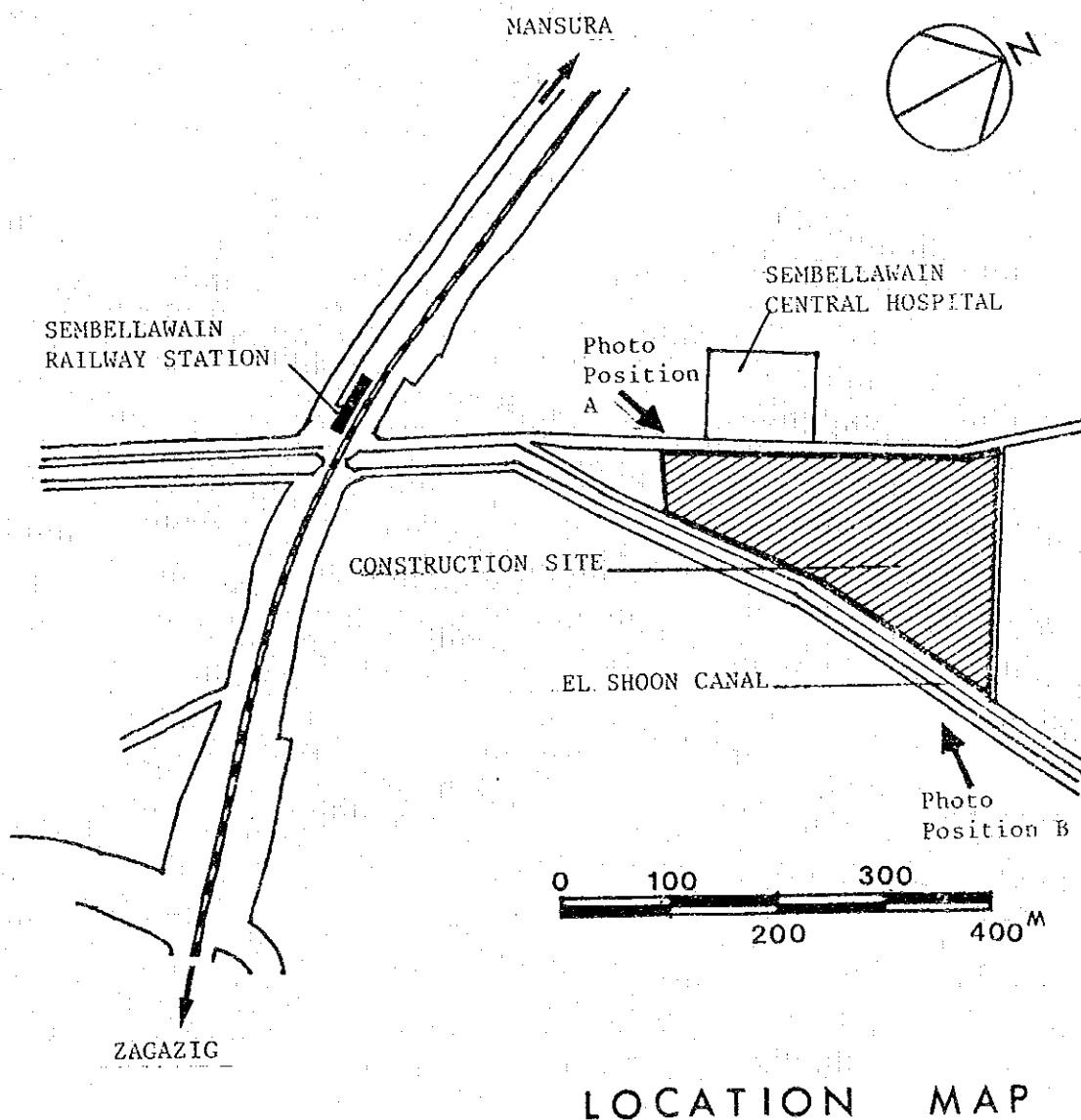


Figure III-2

LOCATION MAP

3-5 FARM MACHINERY TO BE INTRODUCED

The farm machinery to be adopted by the Pilot Center will be decided considering the following agricultural conditions in the region of the same.

3-5-1 Agricultural Conditions in the Region

Within the proposed construction area, the major agricultural products in summer are rice, cotton and maize, and in winter wheat, clover and beans. Figure III-3 shows the cropping pattern of the region. Based on a review of this pattern the general cultivation and farming conditions are identified as follows;

(1) Rice

Rice cultivation in the area of the Pilot Center is conventionally unmechanized and rice transplanting is dense and random. According to the survey, inter-row spacing is as little as 15cm, while the number of stems per hill is as many as 30 to 40.

This spacing approach has been adopted to increase production under non-mechanized conditions. At the same time however, it makes it impossible to mechanize farming.

(2) Cotton

Cotton is one of the major export products of Egypt, and in the project area about 38% of arable land is used for cotton cultivation. For cotton cultivation the same furrow irrigation system as practiced for other upland crops in the area is applied; inter-row spacing is 60 to 90cm. Once mechanized sowing has been developed, the 45cm inter-row spacing recommended by the government will be gradually introduced. Under the existing circumstances, cotton is cultivated almost entirely by human labor.

(3) Maize

Maize is cultivated for two different purposes, as grain crop and as green fodder for livestock. Regarding mechanization of maize

cultivation, only animal power for intertillage weeding is used at present. About 60cm of inter-row spacing and about 30cm of hill spacing have been applied with furrow irrigation.

(4) Wheat

Wheat, a major winter crop, is cultivated by manual broadcast seeding from October to December, with harvesting in May and June. Interim practices of additional fertilizer and an occasional herbicide distribution are also implemented. The ratio of wheat cultivated land to total arable area in this region is about 26%.

(5) Clover

Clover grown in the region is of the red clover variety, and grows to about 50 or 60cm. Sowing is manual broadcast while harvesting consists of either two reapings or four reapings a year. After harvesting, the clover is processed for commercial fodder.

(6) Beans

Beans are mainly broad beans known as Egyptian Beans, but soybean cultivation is increasing. Almost all bean cultivation is carried out by human labor. The ratio of bean cultivated land to total arable area is about 12% in this region.

(7) Other Crops

In this region other than the above mentioned crops, sugar cane and summer vegetables are cultivated while other vegetables such as onions, and flax crops are cultivated in winter. The ratio of land for these crops is 6%.

(8) Scale of Farm and Relationship to
Consecutive Planting and Crop Rotation

Major farmers cultivate approximately 2ha per farmer while the size of one field block, the unit of cultivated area, is almost 25m by 50m (12.5ares).

Since seeding of wheat and clover in winter is made to correspond to those crops which have been cultivated in summer, area devoted to wheat and clover varies annually. Summer vegetables, on the other hand, are usually cultivated in a farm area of 15m x 15m.

To prevent salinity caused by consecutive single crop planting, rice cultivation occurs every two years, thus representing 50% of the cultivated field area.

(9) Fertilizers and Agricultural Chemicals

In Egypt, a large quantity of fertilizers and agricultural chemicals are used. The main fertilizers are nitrogenous and phosphorous while agricultural chemicals used are insecticide, fungicide, rodenticide and herbicide.

3-5-2 Farm Machinery

Farm machinery to be adopted by the Pilot Center will be determined according to the concepts listed below. These concepts take into consideration the existing conditions in the area and the on-going "Rice Mechanization Pilot Project" financed by the Japanese Government, on a grant basis.

Basic concepts for the selection of machinery are:

(1) Farm machinery to be adopted under this scheme will be mainly for field cultivation.

(2) Farm machinery is classified into:

(a) Farm machinery for immediate introduction

(b) Farm machinery to be introduced experimentally at first adoption of which will depend on the results of the test period

(c) Farm machinery for rice cultivation under special conditions

(3) The program for adoption of farm machinery will correspond with the progress of the Pilot Center.

(4) The type of farm machinery adopted will be selected to reduce the implementation period of the existing cropping pattern and thereby raise cropping intensity.

3-6 FACILITIES, MACHINERY AND EQUIPMENT REQUIRED

The following facilities, machinery and equipment are required to manage, maintain and operate the Pilot Center properly;

3-6-1 Required Facilities

Facilities required with a description of their functions are listed below:

- (1) Administration Wing (Plot area: 1,100m²)
(Total Floor area: 1,750m²)

Work space for administrative staff required for the operation of the Pilot Center including dining room, lecture rooms, instructor's room, etc.

- (2) Building for Operators (750m²)

Small conference room for operators and mechanics, dining room and wash rooms

- (3) Workshop (1,600m²)

Maintenance and tractor repair shop with 14 bays, precision instrument workshop, implement repair area, and storage area for 2 years supply of spare parts

- (4) Utility Building (200m²)

Power substation, generator room, etc.

- (5) Tractor Shelter (3,000m²)

Shelter for protecting tractors from direct sunlight

(6) Diver's Training Yard (3,500m²)

(7) Practice Field (4,700m²)

Field for practical training in uses of machinery

3-6-2 Required Equipment

The machinery and equipment required and their use are listed below:

(1) Excavator: 3 units

Digging ditches and canals in the area

(2) Micro Bus: 3 units

Transportation of staff and trainees between the Pilot Center and pick-up stations

(3) Sedan: 5 units

Transportation for administrative work

(4) Mobile workshop: 3 units

A vehicle equipped to repair farm machinery at the site of break down

(5) Crane truck: 2 units

Transportation of equipment, materials and etc.

(6) Forklift: 2 units

Transportation, loading and unloading of equipment and materials at the Pilot Center

(7) Workshop equipment and tools: 1 set

A full set of workshop equipment and tools for maintenance and repairs

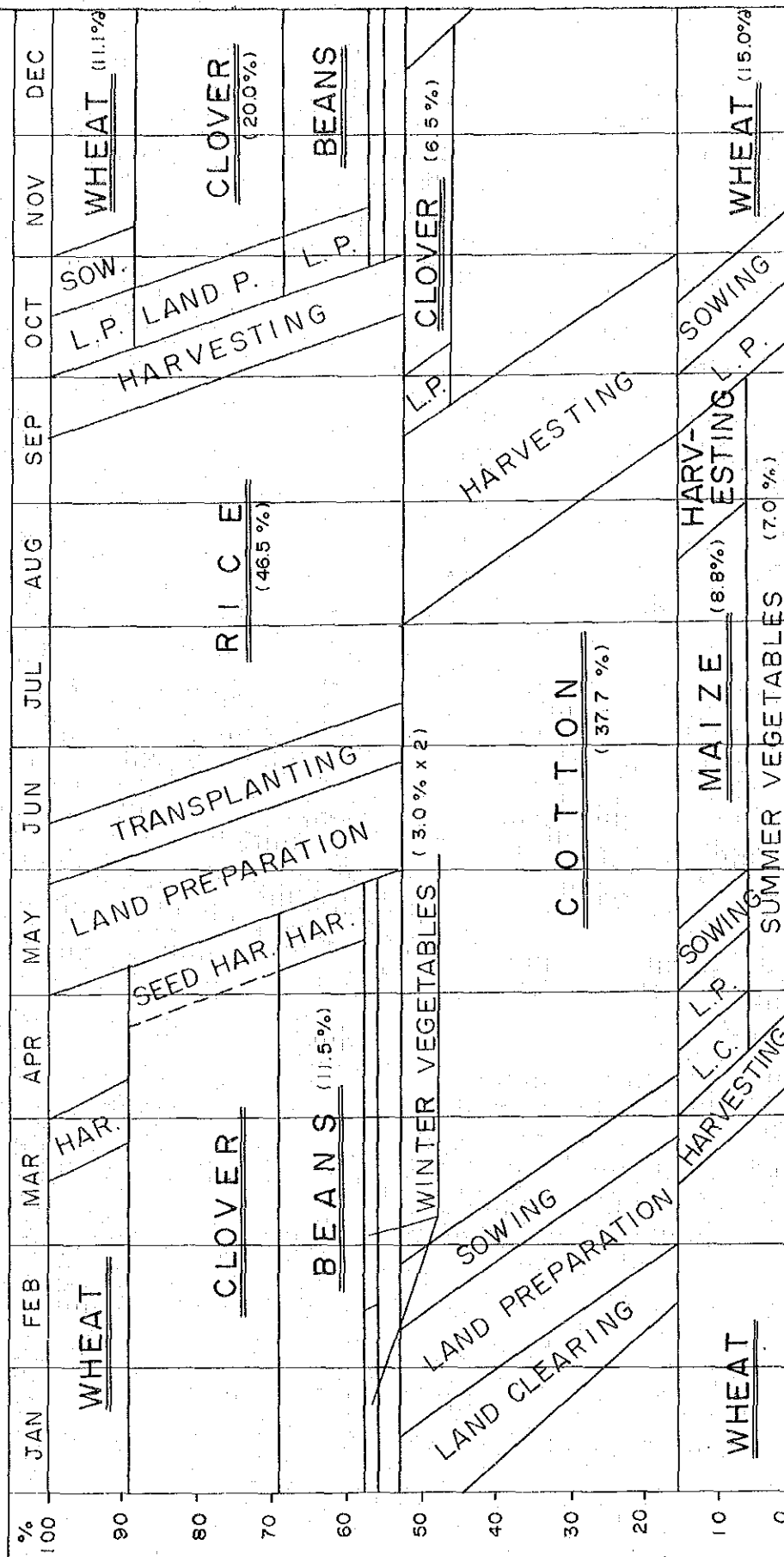
(8) Training equipment: 1 set

Equipment required for the training of staff and farmers such as an overhead projector, video cassette unit, etc.

Figure III-3

CROPPING PATTERN OF District El Sembellawain

District El Sembellawain



Cropping Intensity: 170.1 %

Total Area: 21,840 ha.