

TITLE : Organization of Kenya Soil Survey Project
- documents, plan of operation, etc.
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YEAR : 1970

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AGREEMENT BETWEEN THE GOVERNMENT OF THE KINGDOM OF
THE NETHERLANDS AND THE GOVERNMENT OF THE REPUBLIC
OF KENYA ON COOPERATION IN A SOIL SURVEY & LAND USE
PLANNING PROGRAMME IN KENYA

HAVE AGREED AS FOLLOWS:

- suitable port of arrival in Kenya;
- e. special research to be carried out in the Netherlands to an amount not exceeding D.Fl. 150.000,--;
 - f. aerial photography to an amount not exceeding D.Fl. 200.000,--;
2. The Government of Kenya undertakes to facilitate the Netherlands activities under the Project in general and shall contribute to it:
- a. by making available land and buildings, including adequate laboratories, offices and storage space.
 - b. by supplying Kenyan counterparts to the Netherlands experts as well as supporting staff including administrative personnel;
 - c. by assuming responsibility for all charges to be made for the clearing, inland-transportation, storage, insurance etc. of the equipment and the vehicles provided by the Netherlands Government in connection with the Project;
 - d. by bearing the recurrent costs of the Project in general and in particular:
 - the exploitation of the Soil Survey Institute, including labour, stationary, laboratory and office supplies, maintenance, repair and replacement of equipment, air photo's and mosaics, printing of maps and reports, air reconnaissance flights;
 - the cost of running and maintenance of the vehicles provided by the Netherlands;
 - the cost of suitable housing for the Netherlands experts and their families;
 - 50% of the total expense for board and lodging in hotels for the Netherlands resident experts prior to their movement into permanent accommodation as well as for the visiting experts;
 - the cost of travelling within Kenya for all Netherlands Experts;
 - the analyses of a maximum of 3000 soil samples per year by the National Agricultural Laboratories with the assistance of two technical laboratory assistants of the Soil Survey Institute.

ARTICLE III

Kenyan facilities on behalf of the
Netherlands personnel

1. The Government of Kenya shall:
 - a. exempt each of the Netherlands experts under the terms of this Agreement from the payment of income and other direct taxes on salaries, allowances and emoluments received from the Netherlands Government;
 - b. exempt each of the Netherlands experts from paying import and customs duties on new or used household effects and personal belongings, as well as professional equipment, imported into Kenya within 3 months of his arrival or that of his dependants, provided such goods are re-exported from Kenya at the time of departure or within such period as may be agreed upon by the Government of Kenya;
 - c. make provision for duty-free importation or purchase from bond of ONE motor vehicle by each of the Netherlands experts within 3 months of first arrival in Kenya provided that such a vehicle if sold to a person not likewise privileged, shall be subject to payment of an appropriate import duty based on the estimated value of the vehicle at the time of it being sold.
 - d. make provision for the issue of entry-visas and work permits, free of charge, to the Netherlands experts, employed or to be employed by the Netherlands Government to serve the Project;
 - e. exempt the Netherlands experts or their dependants from national service obligations;
 - f. grant the Netherlands personnel as far as their Netherlands salaries, allowances and emoluments are concerned the privileges in respect of exchange facilities under the most favourable conditions, i.e. external accounts;
 - g. offer the Netherlands experts and their families in Kenya repatriation facilities in time of international crises.
2. a. The Government of Kenya shall hold harmless the Netherlands Government and the Netherlands experts and consultants against any civil liability arising from any act or omission on the part of one or more of the Netherlands experts or consultants during the operations

governed by or undertaken in virtue of this Agreement, which has caused the death or physical injury of a third party or damage to the property of a third party and shall abstain, for its part, from making any claim or instituting any action for extracontractual civil liability unless such liability derives from willful misconduct or from gross negligence on the part of one or more of the Netherlands experts or consultants.

- b. In the event the Government of Kenya holds harmless the Netherlands Government or one or more of the Netherlands experts or consultants against any claim or action for extracontractual civil liability in accordance with paragraph 2.a. of the present Article, the Government of Kenya shall be entitled to exercise all rights to which the Netherlands Government or one or more of the Netherlands experts or consultants is entitled.
- c. Should the Government of Kenya so request, the Netherlands Government shall provide the competent authorities of Kenya with the administrative or judicial assistance needed for a satisfactory settlement of such problems as may arise in connection with the application of paragraphs 2.a. and b. of the present Article.

ARTICLE IV

Kenyan facilities on behalf of the Netherlands equipment

The Government of Kenya shall exempt from all import- and export duties and other official charges the equipment and other supplies provided by the Netherlands Government in connection with the implementation of the Project.

ARTICLE V

Status of the Netherlands personnel

- 1. The Government of Kenya shall not request the Netherlands experts and consultants to take part in any activities other than those described in the present Agreement or in the Schedule of Operations referred to in Article VIII.

2. The Government of Kenya shall provide the Netherlands experts and consultants with any information that the latter consider necessary for the efficient execution of operations in the Project subject to the security regulations.
3. The Government of Kenya may request the Netherlands Government to recall one or more of the Netherlands experts and consultants if the professional or personal conduct of the person or the persons concerned justifies such a measure. However, the Government of Kenya shall not have recourse to such an expedient until it has consulted the Netherlands authorities.

ARTICLE VI

Status of the Netherlands equipment and supplies

All equipment and supplies contributed by the Netherlands Government to serve the purpose of the Project shall remain the property of the Netherlands Government for the duration of the Project. Shortly before its termination both Governments shall consult each other on the ultimate destination of the equipment and supplies after the termination of the Project.

ARTICLE VII

Competent and Executive Authorities

1. The responsibility for all activities in connection with the Netherlands contribution to the Project shall lie with the competent Netherlands Authority, which is the Netherlands Minister without Portfolio, ~~responsible for Development and COOPERATION.~~

The responsibility for all activities in connection with the Kenyan contribution to the Project shall be with the competent Kenyan Authority, which is the Minister for Agriculture of the Republic of Kenya.

2. The responsibility for the implementation of the Netherlands contribution is delegated by the Competent Netherlands authority to the International Technical Assistance Department of the Ministry of Foreign Affairs of the

Kingdom of the Netherlands, acting as the Netherlands Executive Authority. The responsibility for the implementation of the Kenyan contribution is delegated by the Competent Kenyan Authority to the Chief Research Officer of the Ministry of Agriculture acting as the Kenyan Executive Authority.

3. Each of the Executive Authorities is entitled to delegate under its own responsibility, partly or entirely, its duties in connection with the Project to other authorities or organizations. In doing so the Executive Authorities shall inform each other of such delegations and to what extent delegations are made.

ARTICLE VIII

Schedule of Operations

The Executive Authorities of both Governments shall establish in mutual understanding a "Schedule of Operations" giving all details of the implementation of the provisions of the present Agreement, including an organization chart, a time schedule and a budget.

The Schedule of Operations shall be reviewed and if necessary revised after two years from the start of the Project, especially with regard to the role of the Institute in the over-all development of soil research activities in the country.

ARTICLE IX

Duration

1. This Agreement will enter into force on the day on which both Governments have informed each other that the procedures required therefor in their countries have been complied with.
2. It shall remain valid until six months after one of the two Governments shall have notified the other in writing of its intention to terminate the Agreement or until six months after the two Governments have agreed in writing that in accordance with the provisions of Article I paragraph 5 the operations are terminated, whichever is earlier.

3. Notwithstanding the contents of paragraph 1 of this Article, this Agreement shall provisionally be applied as from the date of signature.

IN WITNESS WHEREOF the undersigned, duly authorized thereto, have signed the present Agreement.

DONE at Nairobi, on
in two originals.

For the Government of the Kingdom of the Netherlands:

For the Government of the Republic of Kenya:

SCHEDULE OF OPERATIONS

The Kenya Soil Survey Project

This Schedule of Operations has been drawn up in joint consultation between the Competent Authority of the Kingdom of the Netherlands and the Competent Authority of the Republic of Kenya under Article VIII of the "agreement concerning the Kenya Soil Survey Project signed at Nairobi on

1. Name of the project :Kenya Soil Survey Institute for Land Use Planning
2. Aim of the project :To establish and operate a soil survey institute which will produce information on soil and land resources required for accelerated agricultural development and systematic rural land use planning.
3. Location :The Soil Survey Institute will be located at Nairobi
4. Language :The official language will be English
5. Netherlands contribution :experts
visiting experts
fellowships
equipment
research
special air photography
6. Kenyan contribution :counterparts
clerical staff and drivers
land and buildings
centre running costs including the running and maintenance of vehicles
housing overseas staff
routine soil analysis
7. Duration of the project :five years
8. Competent Netherlands Authority :The Netherlands Minister without Portfolio ^{COOPERATION} ~~responsible~~ for Development Aid
9. Competent Kenyan Authority :The Minister of Agriculture of the Republic of Kenya
10. The Netherlands Organization in charge of the project :The International Technical Assistance Department of the Netherlands Ministry of Foreign Affairs, hereinafter referred to as the Executive Authority, shall act on behalf of the Competent Netherlands Authority, and shall be assisted by the following Institutions of the Ministry

:of Agriculture and Fisheries: The International Agricultural Centre and the Netherlands Soil Survey Institute (STIBOKA)

11. The Kenyan Organisation in charge of the project :The Chief Research Officer of the Ministry of Agriculture shall act as the Executive Kenyan Authority on behalf of the Competent Kenyan Authority. The Institute shall constitute a separate section within the Research Division of the Ministry of Agriculture. It will be headed by the leader of the Dutch team, to be known as Project Manager, who will be assisted by a Kenyan Project Co-Manager.

- 3 -
1. THE PROJECT

1.1. Aim of the Project

The Competent Netherlands and Kenyan Authorities shall co-operate in establishing a Soil Survey Institute designed to carry out soil surveys which will produce information about the soil and land resources of Kenya required for accelerated agricultural development and systematic rural land use planning. In order to staff the soil survey institute entirely by Kenyans by the end of the project period, the training of Kenyan citizens in soil science, soil survey and soil survey interpretation will have first priority.

1.2. Main features of the Project

A team of Netherlands experts shall participate in the establishment of the afore-mentioned Soil Survey Institute. The activities of this Institute shall consist of:

- a. Training of Kenyan counterparts in all aspects of soil survey and thus build up a cadre of trained soil surveyors, soil survey interpretation specialists, draughtsmen and laboratory staff.
- b. Training of Kenyan officers from other Kenyan Institutions in soil survey and soil survey interpretation, if and when such can fit-in with the main purpose of the Institute.
- c. Selecting, in consultation with the Chief Research Officer, suitable candidates for counterparts and other trainees for on the job training within the Soil Survey Institute.
- d. Assisting a National Land Use Committee in determining priority study areas.
- e. Conducting soil surveys and indicating their practical applications in areas selected in co-operation with the competent authorities of the Kenya Government. For the practical application co-operation and advice will be sought from crop specialists, fertility experts, etc. from other Kenyan institutions.
- f. Co-operating with the National Agricultural Laboratories (NAL) with respect to routine analyses of soil samples brought to the NAL. This may include special research as needed for the selection of suitable analytical methods and the evaluation of the results.
- g. Co-operating with the University of Nairobi, other research bodies, Statutory Boards, Planning Authorities and other interested organizations, including organizations of the East African Community, on matters of soil survey and its practical applications.
- h. Co-ordinating and correlating all soil surveys and their interpretations as an aid in the country wide planning of land use and accelerated agricultural development.
- i. Making available to the Extension Service and other relevant Government Departments, the results of soil surveys for dissemination to

posts: three soil surveyors, one soil survey land classification specialist and one soil management specialist. One of these officers shall be designated as Project Co-Manager.

- b. 6 assistant agricultural officers (Egerton level) for the following posts: three assistant soil surveyors, one assistant soil management specialist, one draughtsman and one assistant soil chemist-physicist.
- c. 17 technical assistants including twelve field assistants, two assistant draughtsman, and three laboratory assistants.

In addition to the counterparts Kenya shall supply clerical staff and drivers as follows:

- 1 Executive Officer (to be shared with other sections at N.A.L.)
- 1 clerk-typist
- 2 typists
- 8 drivers
- 2 subordinate staff

All Kenyan staff shall be made available as set out in the Time Schedule (see Annex III).

1.6. Fellowships

The Netherlands shall make available a number of fellowships amounting to 10 man-years for Kenyan counterpart staff to be especially trained in soil survey, soil survey interpretations, airphoto interpretation, cartography, etc. The decision of granting fellowships shall be taken by the Competent Netherlands Authority upon receiving a proposal from the Kenyan Government after recommendation by the Project Manager.

1.7. Equipment and Running costs

1.7.1 Netherlands contribution

The Netherlands shall provide scientific and educational equipment and vehicles as indicated in Annex I.

The items as indicated in Annex I must be considered as tentative and indicative and apt to revision. Variations in this list may be made by mutual consent of the Competent Authorities to suit the requirements of the project provided that the total costs mentioned in Annex I will not be exceeded.

The cost of transport, including insurance, of the equipment supplied by the Netherlands to Nairobi shall be borne by the Netherlands.

1.7.2. Kenyan contribution

All running costs of the soil survey institute shall be borne

practical applications of the soil surveys.

1.9. Research and soil analyses

1.9.1 Netherlands contribution

Where desirable, specific research and other special work which cannot be done in Kenya may be carried out in laboratories and institutes in the Netherlands. The work to be considered for this shall be decided upon by the Project Manager in consultation with the other experts. The costs of this research shall be met by the Netherlands Government and shall be limited by the overall budget fixed for the project.

In addition, where desirable, special air photography on the base of newly developed methods, i.e. false colour, multi spectral scanning, etc. or conventional air photography flown for special purposes may be carried out up to a maximum amount of Fl. 200,000,--.

1.9.2 ~~1.10~~ Kenyan contribution

- a. Routine soil analyses up to a maximum of 3000 samples per year will be carried out by the routine laboratory of the National Agricultural Laboratories. For this purpose two technical laboratory assistants of the Soil Survey Institute will be given on loan to the routine lab. of the N.A.L.
- b. The Ministry of Agriculture shall assist in making available to the project staff, the results of research carried out for the Government of Kenya, which can be of use for the soil survey.

1.10. ~~1.11~~ Project budget

A detailed budget, indicating the Netherlands and the Kenyan contribution to this project is presented in Annex I and II.

2. ORGANIZATION AND DUTIES

2.1. General

The Soil Survey Institute shall constitute a separate section within the Research Division of the Ministry of Agriculture. The Project Manager shall be responsible for all activities of the Soil Survey Institute directly to the Chief Research Officer of this Ministry. The responsibilities of the Soil Survey Institute are those mentioned under 1.2. The Soil Survey Institute shall be free to publish results under the general responsibility of the Project Manager.

The Project Manager shall be responsible to the Netherlands Executive Authority for all matters concerning the implementation of the Netherlands contribution to the project as described in this Schedule of Operations. He shall be free to delegate one or more of his duties to a deputy appointed by the Competent Netherlands Authority.

The Project Manager or his deputy shall submit a progress report every three months to the Competent Authorities of each country. A copy of each report shall be submitted to the Royal Netherlands Embassy at Nairobi.

The Netherlands organization in charge of the project will be the International Technical Assistance Department of the Netherlands Ministry of Foreign Affairs. This organization will be assisted by the following Institutions of the Ministry of Agriculture and Fisheries: The International Agricultural Centre and the Netherlands Soil Survey Institute (STIBOKA). Advice and assistance also will be requested from the Agricultural University (Msc-training soil science) at Wageningen and the International Training Centre at Delft (airphoto interpretation).

2.2. Dutch Experts

There will be six Dutch experts as follows:

- a. Three soil surveyors, one of whom will be the Project Manager, the other two will act as soil correlator - map co-ordinator,

while training and guiding the field parties that will consist entirely of Kenyan counterparts.

- b. One soil survey land classification expert who shall also supervise the soil surveying, but in addition will be in charge of setting up a land capability classification system
- c. One soil management expert in charge of soil management field research needed for a proper interpretation of the soil maps.

d. e. One soil chemist-physicist who should work in very close co-operation with the National Agricultural Laboratories to assess the value of various physical and chemical laboratory methods, to carry out non routine soil analyses, and to aid in the interpretation of the laboratory data in terms of practical management recommendations. In order to help the routine laboratory to analyse the increased number of soil samples which can be expected if the Soil Survey Institute is established, two technical laboratory assistants of the Soil Survey Institute will be given on loan to the routine lab. of the NAL.

The Netherlands experts shall perform their duties under the direction of the Project Manager, who shall bear general responsibility for their contribution to the project. The experts shall report to the Project Manager at regular intervals in accordance with the instructions issued to them by the Netherlands Executive Authority. The Netherlands experts attached to the Soil Survey Project shall be entitled to periodical leave in accordance with the regulations applicable to Netherlands civil servants. The Project Manager, in consultation with the responsible Kenyan authorities, shall recommend the dates of leave to be granted to the Netherlands experts.

2.3. Kenyan counterparts and supporting staff

X
1.5. (see para III)
submitted 4/2
in total
There will be a total of (46) Kenyan professional, technical and administrative staff in the project. Detailed breakdown of this staff is given in 1.5 above. All Dutch field experts will have a Kenyan counterpart of university graduate level and one or

two assistants(A.A.O) and technical staff. The laboratory expert (soil chemist - physicist) will have no counterpart at university graduate level, but one assistant soil chemist-physicist of assistant agriculture officer level, and three technical laboratory assistants, should work, however, in close co-operation with the heads of the soil chemistry, soil physics and soil mineralogy units of the National Agricultural Laboratories, all of whom are university graduates.

The Kenyan counterparts will be involved in bearing responsibilities at different levels for various aspects of the Soil Survey Institute from the beginning of the project. With time these responsibilities will gradually grow so that after five years all responsibilities are in the hands of Kenyan soil scientists.

The Kenyan counterparts shall work under the general direction of the Project Manager and report to him on technical matters. The Project Manager will also indicate to each counterpart who will be his immediate technical supervisor.

All administrative matters regarding the counterpart and supporting staff and the Kenyan Government's contributions in general will be the responsibility of the Project Co-Manager. The Co-Manager shall also liaise with the Ministry Head Office, Provincial Administration in the field and others, and will provide the link with other local agencies having connections with the Project.

In matters of general policy of the Institute in relation to other Kenyan Agencies or Organisations the Project Manager and the Co-Manager shall act together, in mutual agreement.

The clerical staff and drivers consist of one E.O., one clerk-typist, two typists two subordinate staff and eight drivers. All will work under the general direction of the Project Manager. The Executive Officer shall keep an accurate accounting system so that all money and equipment from the Kenyan and Dutch Governments can be carefully accounted for.

3. EXECUTION

3.1. Priorities

The aim of the project is to build up a Kenya Soil Survey Institute run effectively by well trained Kenyan soil scientists. Therefore the training of Kenyan counterparts will be a first priority. This training will be done mainly on the job. In the first years of the project the training will mainly concern staff members of the Soil Survey Institute. However, after two years and provided that this fits in with the main purpose of the Institute, other Kenyan officers of other relevant organisations should be trained, who after their training return to their parent organisations to assist in solving soil problems that may arise.

During the training programme various areas will be surveyed. The areas concerned will be decided on by a Committee to be created within the Ministry of Agriculture, of which the Project Manager and the Co-Manager will be members. In case requests for soil surveys are so many that they cannot be undertaken without adversely affecting the training programme, the training shall have first priority, and the Chief Research Officer in mutual agreement with the Project Manager may, in consultation with the Advisory Committee, reject those projects that do not fit in the training programmes. In such cases the Kenya Government may request additional technical assistance to make available the services of a consultant firm for some of the ad hoc soil surveys.

3.2. Time schedule

The stages of the operations and the steps to be taken by each Government are given in summary form in Annex III to this Schedule of Operations. The Competent Authorities of each country shall see that each stage of the operations, such as, the delivery of equipment and the availability of counterparts are accomplished at the proper time.

The project shall be for the duration of five years. The date of commencement of the project has been provisionally fixed at Dec. 1, 1971 (zero on time schedule).

In accordance with Article I, paragraph 5 of the Agreement signed at Nairobi on the date of termination of the operations referred to in the Schedule shall be fixed unless the Competent Authorities agree in writing to an earlier or later date of termination, it being understood that any such agreement shall be concluded six months prior to the new date of termination.

4. FINAL CLAUSE

Final report

On completion of the project, the Project Manager or his deputy shall draw up a final report giving a description of all aspects of the work done in connection with the project and containing recommendation on future policy. Copies of this report shall be submitted to the Competent Netherlands and Kenyan Authorities and to the Royal Netherlands Embassy at Nairobi

ANNEX I Schedule of Operations - Kenya Soil Survey Project
Estimated contribution of the Netherlands Government (in Dutch guilders)

Experts		year 1	year 2	year 3	year 4	year 5	Total
3 soil surveyors	F	210.000	240.000	240.000	240.000	160.000	1.090.000
1 soil survey land classification expert	F	65.000	80.000	80.000	80.000	80.000	335.000
1 soil management expert	F	65.000	80.000	80.000	80.000	-	305.000
1 soil chemist-physicist	F	65.000	80.000	80.000	80.000	80.000	385.000
<u>Visiting Experts</u>	F	60.000	60.000	60.000	60.000	60.000	300.000
<u>Fellowships</u>	F	15.000	45.000	45.000	30.000	15.000	150.000
<u>Equipment</u>							
air photo interpretation equipment	F	14.000	-	-	-	-	14.000
teaching equipment + special lectures	F	6.000	2.500	2.500	2.500	2.500	16.000
drawing and reproduction equipment	F	56.000	-	-	-	-	56.000
soil survey field equipment	F	30.000	10.000	10.000	20.000	10.000	80.000
camping equipment	F	40.000	-	-	40.000	-	80.000
laboratory equipment	F	80.000	5.000	5.000	5.000	5.000	100.000
office equipment	F	49.000	-	-	-	-	49.000
books and periodicals	F	5.000	2.000	2.000	2.000	2.000	13.000
5 long wheel base Landrovers	F	80.000	-	-	80.000	-	160.000
3 Toyota landcruisers	F	42.000	-	-	42.000	-	84.000
2 stationwagons Peugeot	F	21.000	-	-	21.000	-	42.000
3 trailers for Landrovers	F	6.000	-	-	-	-	6.000
3 watertrailers for Landrovers	F	6.000	-	-	-	-	6.000
1 Landrover 1 ton truck	F	17.000	-	-	-	-	17.000
1 caravan	F	10.000	-	-	-	-	10.000
1 mechanical auger + Landrover pick up	F	20.000	-	-	-	-	20.000
transport of equipment	F	62.000	5.200	5.200	8.400	5.200	86.000

ANNEX I Schedule of Operations - Kenya Soil Survey Project
Estimated contribution of the Netherlands Government (in Dutch guilders) (continued)

	year 1	year 2	year 3	year 4	year 5	Total
<u>Research in the Netherlands</u>	F 10.000	35.000	35.000	35.000	35.000	150.000
<u>Special Air Photography</u>						200.000
<u>Field Allowances Dutch experts</u> ¹⁾	F 15.000	17.500	17.500	17.000	10.000	77.000
<u>Air travel in Kenya</u>	F 1.800	1.800	1.800	1.800	1.800	9.000
<u>Miscellaneous</u>						534.000 560.000
					Total	4.424.000 4.420.000

¹⁾ This post is based on the assumption, that 4 of the Dutch experts, i.e. 2 soil surveyors, 1 soil survey-land classification expert and 1 soil management expert are working in the field outside Nairobi for a period of 180 days a year, the project leader for a period of 90 days a year and the soil chemist - physicist for a period of 50 days a year. In total 860 days per year. Field allowance per day F 20,-- (K.sh.40), when camping.

ANNEX II Schedule of Operations - Kenya Soil Survey Project
Estimated contribution Kenyan Government (in Kenyan pounds)

	year 1	year 2	year 3	year 4	year 5	Total
<u>Capital Costs</u>						
Building: labs, offices, drawing room, Lecture room, dark room (see design ² Appendix II) total 515 m ²)						
Store for equipment Total 60 m ²						
<u>Recurrent Costs</u>						
<u>Housing overseas staff</u>	K£ 7.750	9.000	9.000	9.000	6.000	40.750
<u>Running and maintenance of vehicles</u>	K£12.600	12.600	12.600	12.600	12.600	63.000
<u>Routine soil analyses ¹⁾</u> <u>not calculated</u>						

¹⁾ Two technical laboratory assistants of the soil survey institute will be given on loan to the routine lab of the NAL in order to help to analyze the soil samples brought in by the soil survey institute.

Time schedule personnel (time 0 is assumed to be Dec. 1, 1971)

								Months
0	3	6	9	12	24	36	48	60

[illegible][illegible]

REPORT OF A FACT FINDING MISSION TO KENYA CONCERNING THE ESTABLISHMENT
OF A KENYA SOIL SURVEY ORGANIZATION WITH DUTCH TECHNICAL AND FINANCE
ASSISTANCE November 30, 1970

	page
1. Members of the mission	1
2. Duration	1
3. Aim	1
4. Background information	2
4.1 The need for soil surveys	2
4.2 Present situation	3
5. Conclusions and recommendations	5
5.1 Dutch aid for Kenya Soil Survey Institute	5
5.2 Summary of project proposal	6
5.3 Name of the project	9
5.4 Organization and development of the Soil Survey Institute	9
5.5 Responsibilities of the Soil Survey Institute	11
5.6 Training Priority	12
5.7 Availability of counterparts	13
5.8 Selection of areas to be soil surveyed	14
5.9 Building for the Soil Survey Institute	14
5.10 Co-operation with other proposed projects	15

Appendix II Proposed design for a building

Acknowledgment

The members of the mission like to express their sincere gratitude to the persons and organizations in Kenya, which they visited. All of them showed great hospitality and contributed much to the success of the mission by giving valuable information and advice.

In particular we would like to thank the Ministry of Agriculture for the excellent way they guided the mission to become familiar in a very short period with the agricultural problems of Kenya. The mission is also very grateful to the Netherlands Embassy for all they did to make the Kenyan visit both pleasant and valuable.

Finally we would like to thank the FAO-mission for the excellent co-operation and the great amount of preparatory work they had already accomplished, which facilitated the task of this Dutch mission very much.

1. MEMBERS OF THE MISSION:

- | | | |
|------------------------|---|--|
| Prof.Dr.Ir. J.Bennema | - | Head Sub Department of Soils - International Institute for Aerial Survey and Earth Science (ITC), Delft |
| Dr.Ir. J.C.Dijkerman | - | Senior Research Officer at the Agricultural University, in charge of the soil survey specialization of the International Post Graduate Soil Science Course at Wageningen |
| Ir. R.P.H.P.v.d.Schans | - | Deputy Director of the Netherlands Soil Survey Institute (Stiboka) at Wageningen. |

2. DURATION OF THE VISIT TO KENYA

Bennema from October 1st till October 22nd, 1970

Dijkerman and van der Schans from October 1st till October 30th, 1970.

3. AIM

The aim of the mission was to look into the possibilities of and to do recommendations for Dutch technical and finance assistance with respect to the establishment of a soil survey organization in Kenya. Such assistance has been requested to the Dutch Government by the Kenya Ministry of Agriculture in December 1969.

4. BACKGROUND INFORMATION

4.1 The need for soil surveys

A great interest and urgent need for soil surveys was expressed by various organizations, which were visited by the Dutch mission. The organizations include the Research, Economic Planning, Farm Management and Training Divisions of the Ministry of Agriculture, the National Agricultural Laboratories at Nairobi, The National Agricultural Research Station at Kitale, the Department of Agriculture at the Coastal Province, the Town Planning Office at the Coastal Province, the University of Nairobi, Egerton College, the National Irrigation Board, the Forestry Department of the Ministry of Natural Resources, the Tea Research Institute at Kericho, the Plant Breeding Station at Njoro, the Pyrethrum Research Station at Molo, and the Dairy Research Station at Naivasha.

Two kinds of soil surveys will be needed in the future:

- a. ad hoc soil surveys for specific projects as irrigation schemes, settlement schemes, forest plantations, experimental stations, etc.;
- b. over-all soil survey of the high potential areas in order to obtain exact knowledge about the various kinds of soils and their location which is needed for a better land use planning. Especially such knowledge is urgently needed: (1) for a proper selection of suitable areas for various agricultural development schemes, especially in the coastal province, (2) for a better advice to farmers on soil fertility and soil management matters taking into account not only the kind of crop but also the kind of soil present on the farmer's land, because at present the application of data obtained from fertility, irrigation, variety and other trials from experimental stations to farmers field is seriously hampered by the absence of soil maps, (3) for teaching to students of the University of Nairobi, Egerton College, and Embu College, more specific knowledge about the soil resources of Kenya, their potentialities and their problems.

The size and the location of the areas which need urgently soil surveys have not yet been decided upon. It is understood that a committee will be established under the chairmanship of the Chief Research Officer of the Ministry of Agriculture to decide on soil survey priorities.

4.2 Present situation

Up till present only ad hoc soil surveys have been carried out over a very limited area. A compilation and assessment of the present soil survey data have been made by the FAO ¹⁾. The visit of the Dutch mission and the FAO-team partly overlapped so that an useful co-operation could take place.

Most of the soil surveys in the past have been carried out by expatriates, leaving only a map and report. Because training of Kenyan counterparts was not an essential part of these soil surveys, a transfer of soil knowledge to Kenyan soil scientists has been lacking.

The present soil survey unit, which is attached to the National Agricultural Laboratories, consists of only one Kenyan graduate (MSc. Reading). Temporarily he is being assisted by two Russian trained (MSc.) Kenyans, who will get a permanent post as soil surveyors (agricultural officers) if the Dutch assistance is being implemented. Also two members of the subordinate staff belong to the present soil survey unit. It is very clear, that the size of this unit is absolutely inadequate to meet in any way the demands for soil survey in Kenya. Not only the amount of soil survey work that can be carried out is inadequate, but also the soil fertility and soil management field research, which should accompany the soil surveys in order to make a valuable soil survey interpretation for various agricultural purposes.

The present soil survey unit is located in a small building with two offices about 3 by 4 meters. This accommodation is completely inadequate. It is however understood that the Kenya Government has allocated K.L. 60 000 for additional buildings at the National Agricultural Laboratories. It is the intention to erect these buildings within 6 months time.

Samples brought in by the soil survey unit and by other organizations are analyzed by the routine laboratory of the National Agricultural Laboratories. This laboratory has a capacity of about 15000 soil samples a year. Besides routine analyses also soil research is carried out in the National Agricultural Laboratories. In general these laboratories are reasonably well organized and equipped, but strongly understaffed. Some of the analytical methods in use may need revision, especially in the soil physics section. More research is also needed for a better interpretation of laboratory data in terms of soil management and soil fertility. In summary, the soil laboratories are certainly not

¹⁾ Ableiter, J.K. and Van Baren, H. Soil Survey data and methods. Report to the Government of Kenya - UNDP - Ken. 170/5 (in preparation).

adequately staffed, the more so if we take into account a greater demand related to the expansion of soil surveys and field research on soil fertility and soil management.

Independently from the soil survey unit of the National Agricultural Laboratories other soil survey work is carried out outside the Ministry of Agriculture by a soil surveyor attached to the Department of Geography of the University of Nairobi. Unfortunately no good co-operation exists between the Department of Geography and the Soil Survey Unit with respect to soil correlation and the use of a common system of soil classification, soil survey methods, soil survey interpretations and land evaluation.

The Faculty of Agriculture of the University of Nairobi also plans to establish a soils department, consisting of one Professor (Head of Department) and two Lecturers. The professor and one lecturer are requested for 1971, the other lecturer for 1972. The two posts for 1971 are now being advertized.

A good co-operation between the soils department of the University of Nairobi and the to be established soil survey organization is of course of great importance.

The great need for a better use of the natural resources of Kenya has resulted in a number of plans for technical and finance assistance which have been drawn up partly independently from each other. These plans are:

1. Soil Survey Organization - Dutch aid (this application) - Plan from Ministry of Agriculture
2. Soil Institute - FAO aid - Plan from Ministry of Agriculture
3. Land Use Planning Course - British aid - Plan from Ministry of Agriculture
4. National Resources Institute - Plan from University of Nairobi.

It is important for Kenya to make sure that no overlap occurs in these plans, and that, where desirable, full co-operation between them is established. It is emphasized that the Dutch aid project is by far the most advanced. All other plans are still in the first preliminary stage.

The Soil Institute (FAO-aid) is intended to be a large Institute in which should be concentrated and combined all major work done in Kenya on soil survey, classification, soil and land evaluation, soil and water management, soil fertility, soil - water and plant routine laboratories, soil conservation and soil extension. Such an Institute has been set up already by FAO in Iran. The Kenyan plan is modelled

according to this example, although of course it needs to be carefully adapted to Kenyan circumstances. This plan is still in a very preliminary stage and if implemented it will take at least a couple of years before the project will start.

The land use planning course (British aid) is intended to be an in service training to agricultural officers and assistant agricultural officers of various departments on all aspects of land use planning using airphoto interpretation and collected information about soils, vegetation, land forms, climate, agriculture, etc. The course will be given only once and will probably have a duration of 2 to 3 months. On November 17 preliminary talks were held in Nairobi, about the possibility of starting such a course in September 1971.

The Faculties of Arts and Sciences of the University of Nairobi propose to establish a Natural Resources Institute attached to the University of Nairobi to do integrated surveys by various specialists in certain areas of Kenya selected for development. It was not clear what the role of the Faculty of Agriculture will be in this Institute. The plan for this Institute is still in a very preliminary stage. No allocation of foreign aid has yet been obtained.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Dutch aid for Kenyan Soil Survey Institute

There is a great and urgent need for a well organized Kenyan Soil Survey Institute. In view of this and the extensive experience of Dutch soil scientists in soil survey, both in temperate and in tropical regions, it is recommended that the Netherlands Government reacts positively to the Kenyan application for technical and finance assistance for the establishment of such a soil survey organization. The project should have three aspects: (1) soil survey, (2) soil survey interpretation, especially with respect to land classification and soil management recommendations, (3) laboratory work, especially soil chemical and physical data to support the field data and aid in their interpretation.

5.2 Summary of project proposal

During their visit the members of the mission have discussed several times their ideas about the project with officials of the Research and Financial Divisions of the Ministry of Agriculture. They have indicated what probably would be requested as Kenyan contribution, especially stressing the demands for counterparts, running cost of vehicles and office and laboratory space. Agreement was reached on all major points. However, it was understood that these proposals still are subject to the approval of the Kenya Treasury and the Ministry of Economic Planning.

On basis of these discussions a preliminary draft schedule of operations for this project was drawn up.

The following is a short summary:

1. Name of the project: Kenya Soil Survey Institute for Land Use Planning;
2. Aim of the project: To establish and organize a soil survey organization which will produce information about the natural resources required for accelerated agricultural development and land use planning in Kenya. In order to staff the soil survey institute entirely by Kenyans by the end of the project period the training of Kenyan citizens in soil science, soil survey and soil survey interpretation will have first priority.
3. Location: The headquarters of the Soil Survey Institute will be located at Nairobi. Most of the staff, however, will be working outside Nairobi for prolonged periods at various soil survey projects throughout Kenya.
4. Language: The official language will be English
5. Netherlands contribution: Will amount to approximately four million guilders over a five year period.
It includes:
 - a. six experts: 3 soil surveyors one of whom shall be the project leader
1 soil survey-land classification expert
1 soil management expert
1 soil chemist-physicist

- b. visiting experts: a total of 30 men months will be made available for short visits of specialists who will advise on special problems or give special courses;
- c. fellowships: amounting to 10 men years for Kenyan counterpart staff to be especially trained abroad;
- d. equipment to a total of f 743 000 including vehicles, stereoscopes, field office, laboratory, drawing and reproduction equipment;
- e. research to a total amount of f 150 000 for specific research and other special work which cannot be done in Kenya, but which will be carried out in laboratories and institutes in the Netherlands;
- f. special air photography on the base of newly developed methods, i.e. false colour, multi spectral scanning, etc. or conventional air photography flown for special purposes may be carried out if desirable up to a maximum of f 200 000.

6. Kenyan contribution includes:

- a. counterparts: 5 agricultural officers, including 3 soil surveyors, 1 soil survey-land classification specialist and 1 soil management specialist
6 assistant agricultural officers, including 3 assistant soil surveyors, 1 assistant soil management specialist, 1 draughtsman¹⁾ and 1 assistant soil chemist-physicist
16 technical assistants, including 12 field assistants, 1 assistant draughtsman and 3 laboratory assistants
- b. clerical staff and drivers: 1 administrator
1 clerk-typist
1 typist
8 drivers
2 messenger boys

¹⁾ The draughtsman needs to follow the initial course in the training school for cartographers of the Survey of Kenya from July-Dec. 1971.

- c. land and buildings: including office, laboratory and storage space of not less than 515 m² and a separate store of 60 m²
- d. field allowances of Kenyan staff: up to an average of 200 field days per year
- e. centre running cost: up to K.L. 6100 for the first year, including casual labour, stationary, laboratory and office supplies, maintenance, repair and replacement of equipment, air photo's and mosaics, printing of maps and reports, air reconnaissance flights
- f. running and maintenance of vehicles: f + g will be provided
- g. housing overseas staff: in a lump sum which will amount to K.L. 20 100 for the first year
- h. routine soil analysis: up to a maximum of 3000 samples per year to be carried out by the routine laboratory of the National Agricultural Laboratories. For this purpose two technical laboratory assistants of the Soil Survey Institute will be given on loan to the routine lab of the NAL.

7. Duration of the project: 5 years.

8. Competent Netherlands Authority: The Netherlands Minister without Portfolio responsible for Development Aid.

9. The Netherlands Organization in charge of the project: The International Technical Assistance Department of the Netherlands Ministry of Foreign Affairs, hereinafter referred to as the Executive Authority, shall act on behalf of the Competent Netherlands Authority and shall be assisted by the following Institutions of the Netherlands Ministry of Agriculture and Fisheries: the International Agriculture Centre, and the Netherlands Soil Survey Institute (Stiboka).

10. Competent Kenyan Authority: The Minister of Agriculture of the Republic of Kenya.
11. The Kenyan Organization in charge of the project: The Soil Survey Institute shall be an independent official body of the Ministry of Agriculture. The project leader shall be responsible for all activities of the Soil Survey Institute directly to the Chief Research Officer of this Ministry, who shall act as the Executive Authority on behalf of the Competent Kenyan Authority.

5.3 Name of the project

It is proposed to call the project Kenya Soil Survey Institute for Land Use Planning. In this name the purpose for which soil surveys are carried out is clearly expressed, because in discussions with some organizations it was found that there exist definite misconceptions about this point. In our point of view the task of the soil survey organization is not only to make soil maps, but also to indicate clearly how these soil maps can be used for land use planning, including such points as selection of sites for villages and roads, choice of crops to be grown, recommended management practices for various soils, and if possible expected yields. It is for this reason that we like the term land use planning as part of the project name.

5.4 Organization and Development of the Soil Survey Institute

The staff of the to be established Institute is proposed to consist of 6 Dutch experts, 27 Kenyan counterparts, 3 men administrative personnel, 8 drivers and 2 messenger boys.

The 6 Dutch experts should include 3 soil surveyors, one of whom will be the project leader, the other two will act as soil correlator-map co-ordinator, while training and guiding the field parties that will consist entirely of Kenyan counterparts. Further proposed is a soil survey land classification expert, who should also supervise the soil surveying, but in addition should be in charge of setting up a land capability classification system for various crops under different management systems in order to facilitate the land use planning in Kenya. Also proposed is a soil management expert who will be in charge of soil management field research needed for a proper interpretation of the soil maps.

Finally it is proposed to include a soil chemist-physicist who should work in very close co-operation with the National Agriculture Laboratories to assess the value of various physical and chemical laboratory methods, to carry out non routine soil analyses, and to aid in the interpretation of the laboratory data in terms of practical management recommendations. In order to help the routine laboratory to analyse the increased number of soil samples, which can be expected if the Soil Survey Institute is established, two technical laboratory assistants of the Soil Survey Institute will be given on loan to the routine lab of the NAL.

It is proposed that all Dutch field experts will have a Kenyan counterpart of university graduate level and one or two assistants (A.A.O.) and technical staff. The laboratory expert (soil chemist-physicist) will have no counterpart of university graduate level but one assistant soil chemist-physicist of assistant agricultural officer level and three technical lab assistants. It is expected, however, that the soil chemist-physicist will work in close co-operation with the heads of the soil chemistry, soil physics and soil mineralogy sections of the National Agricultural Laboratories, all of whom are university graduates. One of the visiting experts should be a cartographic draughtsman who will be in charge of setting up a drawing room and who will give guidance to the Kenyan draughtsmen and assistant draughtsman.

It is advisable that the project manager shall be responsible for all activities of the Soil Survey Institute directly to the Chief Research Officer of the Ministry of Agriculture and that the Dutch experts and Kenyan counterparts shall be responsible directly to the Project Manager.

The duration of the project is proposed to be 5 years. The departure of the Dutch experts, however, should preferably be phased according to the requirements and with the intention to make the end of the project less abrupt with a gradual increase of responsibilities of the Kenyan counterpart staff. For instance it is proposed to let return two of the six Dutch experts already after four years. These two experts probably will be the soil management expert and one of the soil surveyors.

5.5 Responsibilities of the Soil Survey Institute

The mission believes that the responsibilities of the to be established Soil Survey Institute should include the following activities:

- a. training of Kenyan counterparts in all aspects of soil survey and thus build up a cadre of trained soil surveyors, soil survey interpretation specialists, draughtsmen and laboratory staff
- b. training of Kenyan officers from other Kenyan Institutions in soil survey and soil survey interpretation
- c. selecting, in consultation with the Chief Research Officer, suitable candidates for counterparts and other trainees for on the job training within the Soil Survey Institute
- d. advising the committee on priorities for soil surveys about the most suitable areas to be surveyed
- e. conducting soil surveys and indicating their practical applications in areas selected in co-operation with the competent authorities of the Kenya Government. For the practical application co-operation and advice should be sought from crop specialists, fertility experts, etc. from Kenyan Institutions
- f. co-operating with the National Agricultural Laboratories (NAL), with respect to the routine analyses of soil samples brought to the NAL by the Soil Survey Organization. Special attention is needed for the selection of suitable analytical methods and the evaluation of the results
- g. co-operation with the University of Kenya, other research bodies, Statutory Boards, Planning Authorities and other interested Organizations on matters of soil survey and its practical applications
- h. co-ordinating and correlating all soil surveys and their interpretations as an aid in the country wide planning of land use and accelerated agricultural development
- i. making available to the Extension Services and other relevant Government Departments, the results of soil surveys for dissemination to farmers and other land users in a manner that can be readily understood and utilized
- j. making available to the University of Kenya and Agricultural Education Institutes the results of soil surveys for use in the teaching programmes.

The mission likes to emphasize especially the importance of point h, which easily may be overlooked by non-soil scientists. This point indicates that all soil surveys within Kenya should be co-ordinated and

correlated by the Soil Survey Institute. Although it is not advisable, it sometimes happens that more than one organization carries out soil surveys in a country. This is a dangerous situation as it usually results in the use of different soil classifications and soil survey methods with the result that for instance one type of soil is given different names by two independent soil surveyors, while they may give the same name to totally different soils. This results in much confusion, especially for the users of the soil map. In order to avoid this kind of confusion it is absolutely necessary that the co-ordination and correlation of all soil surveys and their interpretation is the responsibility of one single agency, the Soil Survey Institute.

5.6 Training Priority

It is the aim that after 5 years when the project ends the Kenya Soil Survey Institute will be run entirely by Kenyan soil scientists. At present only one qualified Kenyan Soil Surveyor is available. Thus it is clear that training of Kenyan citizens in soil science, soil survey and soil survey interpretation should have first priority. The aim of the Dutch aid should be not just to produce soil maps and reports, but more important it should be to build up a Kenya Soil Survey Organization run effectively by well trained Kenyan soil scientists. The training will be done mainly on the job.

It is quite possible that in the first years when the cadre of Kenyan soil scientists is not yet to its full strength, a conflict may arise between the demands for soil survey and the training task. In case the requests for soil surveys are so many that they cannot be met unless the training program is seriously hampered it is recommended that the training will have first priority. In such a case if the surveys are required very urgently the Kenyan Government may consider to request the Dutch Government for additional aid by making available the services of a consultant firm for some of the ad hoc surveys.

Training should be done at three levels: Soil Surveyor (Agricultural Officer), Assistant Soil Surveyor (Assistant Agricultural Officer) and Technical Assistant. In the first years of the project the training will mainly concern staff members of the Soil Survey Institute. However, after two years, it may be wise to make this training also available to Kenyan staff of other organizations, which after their training return to their home organization to assist in

solving soil problems that may arise. The presence of these soil specialists in the various organizations is important for the Soil Survey Institute. They may help in the development of the suitability classification for special crops. They play an important role in the dissemination of soil knowledge gained in the Soil Survey Institute. During their visit the Dutch mission found a considerable interest for such an in service soil survey training by several organizations like the Forestry Department, the Tea Research Institute, the Plant Breeding Station at Njoro, the National Agricultural Research Station at Kitale, the Department of Agriculture of the Coastal Province and the National Irrigation Board.

5.7 Availability of counterparts

Because training in this program plays an important role the availability of counterparts at various levels is a crucial point. Counterparts that are university graduates are most scarce. However, fortunately one qualified Kenyan soil surveyor (M.Sc. Reading) is already in service, while two Russian trained (M.Sc.) Kenyans who are now on temporary basis working for the Soil Survey Unit will get a permanent post as soil surveyors when the project is implemented. This means from the 5 soil surveyors requested already 3 are available now.

With respect to the Assistant Agricultural Officers level Kenya is fortunate to have a good secondary agricultural school, Egerton College, which certainly will be able to supply the general agriculturists required as trainees for the assistant soil surveyors posts. Technical assistants may be obtained from another secondary agricultural school of somewhat lower standards, Embu College. The mission discussed the availability of counterparts with several officials of the research, financial and training divisions of the Ministry of Agriculture, which saw no major problem in supplying the required man-power counterparts as long as a reasonable phasing is present in the plan taking into account that Egerton graduates become available at the end of December and Embu graduates at the end of March.

A problem that certainly may arise is that many officers especially of university graduate and Egerton level, after a few years of service, quit their jobs with the Government for better paid jobs with private organizations or they obtain fellowships to continue their studies at a University. This may be especially a serious problem for a Soil Survey Institute as the job of soil surveyor is cer-

tainly not a white collar job which many people prefer. In the contrary it should be appreciated that a soil surveyor will have to stay in the field, often sleep in tents, under rather primitive circumstances for prolonged periods. It is strongly recommended that these people obtain a special field allowance or hardship allowance, which makes the special hardships inherent to the soil survey work acceptable to them. If this is not provided, keeping good soil survey personnel may well become a major problem. This problem is not specific for Kenya, but is found everywhere in the world where soil surveys impose hardships on the people who have to do the field work. Where camping is possible, it may be one solution to provide the field people with tents, food and a cook to prepare it, so that the field allowance they obtain is a real addition to their salaries.

5.8 Selection of areas to be soil surveyed

The establishment of a committee which advises on the priorities of areas to be surveyed is strongly supported. Such a committee could be an advisory committee to the Ministry of Agriculture under the chairmanship of the Chief Research Officer and with the project manager of the Soil Survey Institute as a member, preferably secretary. The committee should be kept as small as possible, but with all organizations interested in soil survey represented.

With respect to the selection of the areas to be surveyed it is strongly recommended not only to do ad hoc surveys, but also to make a start with the long term project of an over-all soil survey of the high potential areas.

5.9 Building for the Soil Survey Institute

The proposed soil survey organization will consist of 31 men technical and 3 men administrative personnel. Adequate office and laboratory space should be provided before the project can start. An estimated 515 m² is needed for offices, laboratory, drawing room, lecture room, dark room including corridor and toilets. In addition a 60 m² store will be needed for storing equipment. At the moment the existing space at the National Agricultural Laboratories is totally inadequate. The Chief Research Officer however, has indicated that K.L. 60 000 have been made available for additional buildings at the National Agricultural Laboratories. This, he indicated, should provide sufficient space for the Soil Survey Organization. The buildings are planned to be completed within 6 months. The mission was

requested to provide a drawing of the required building, which is presented in Appendix II.

In case the new building is not completed at the time the Soil Survey Institute starts its activities, the Kenya Government should provide free of charge a suitable temporary building with office and laboratory space of a size not less than 350 m², and a store not less than 50 m², until the new building is completed. Such a temporary building might be for instance the present accommodation of the Department of Geology and Mines. The mission was informed that this Department will be moved to a new building during the first half of 1971.

5.10 Co-operation with other proposed projects

a. Soil Institute (FAO-aid)

The plan for a large Soil Institute, including all aspects of soil research, is still in a very preliminary stage. If it is realized in the next few years, it will be necessary to carefully investigate how a close co-operation between the FAO-project and the Dutch project can be established. Such a co-operation may be of great benefit for the agricultural development of Kenya. To avoid any overlap the Dutch project should remain fully in charge of all soil survey, classification, interpretation and land evaluation matters.

b. Land use planning course (British aid)

It would be useful to look into the possibility of co-operation between this course and the soil survey project as they are rather closely related. Any overlap should be avoided and where possible co-operation should be established, so that both projects may benefit from each other's activities.

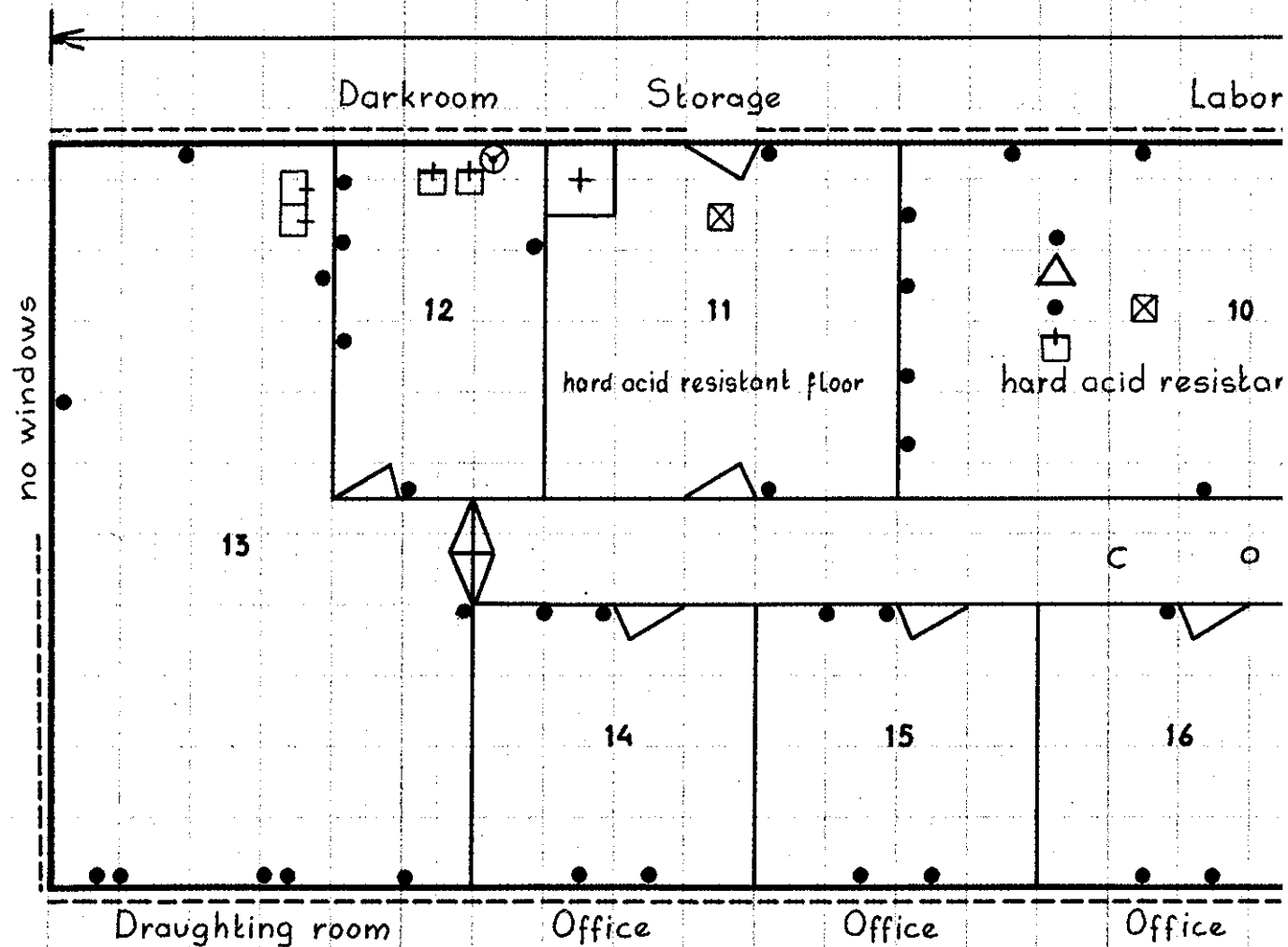
c. Natural Resources Institute (University of Nairobi)

The plan for this Institute is still in a very preliminary stage and no allocation of foreign aid has yet been obtained. A good co-operation between the proposed Natural Resources Institute and the Soil Survey Institute is essential. For the integrated surveys, which the proposed Natural Resources Institute plans to carry out, the Soil Survey Institute could co-operate by carrying out the soil survey and soil survey interpretations. It is not advisable that the Natural Resources Institute of the University of Nairobi itself carries out soil surveys, other than some small soil surveys for educational purposes, as this would be an unnecessary overlap of activities.

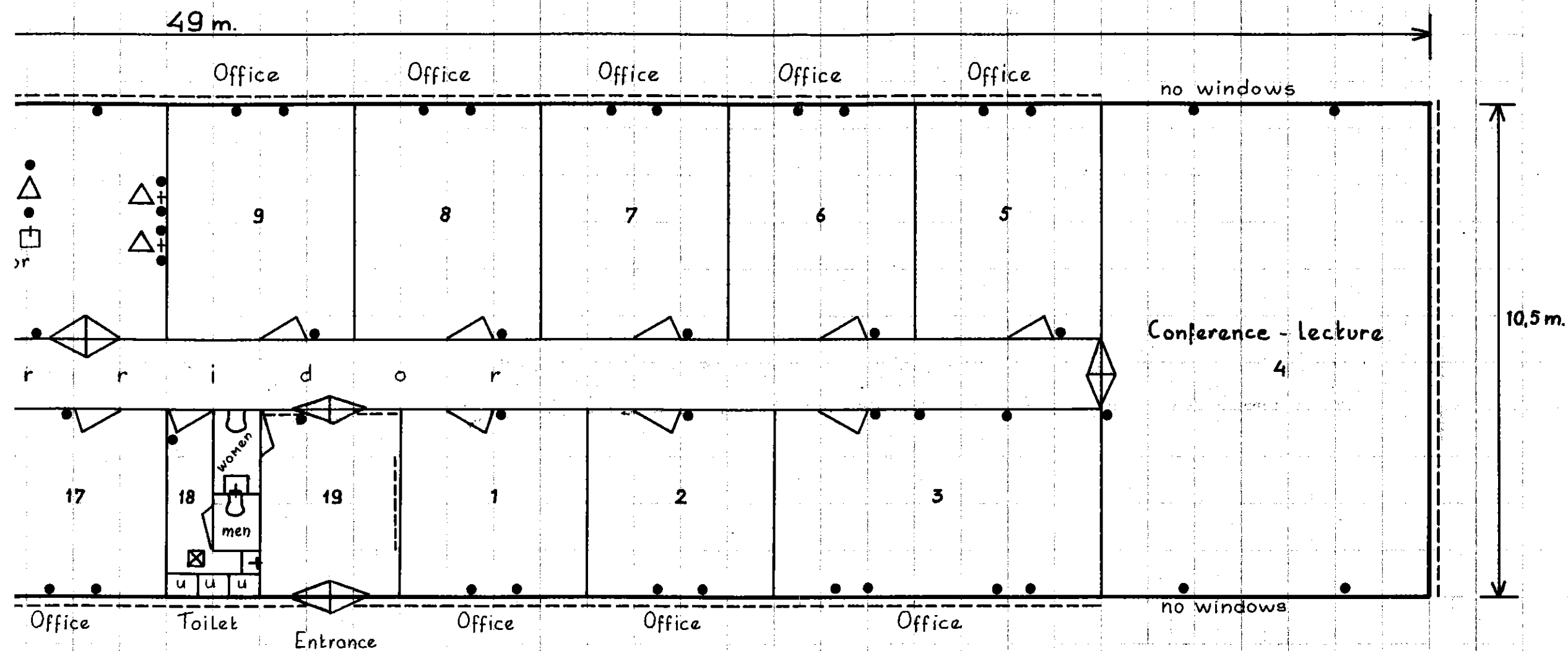
Appendix II

Nov. '70

Proposed design for a b



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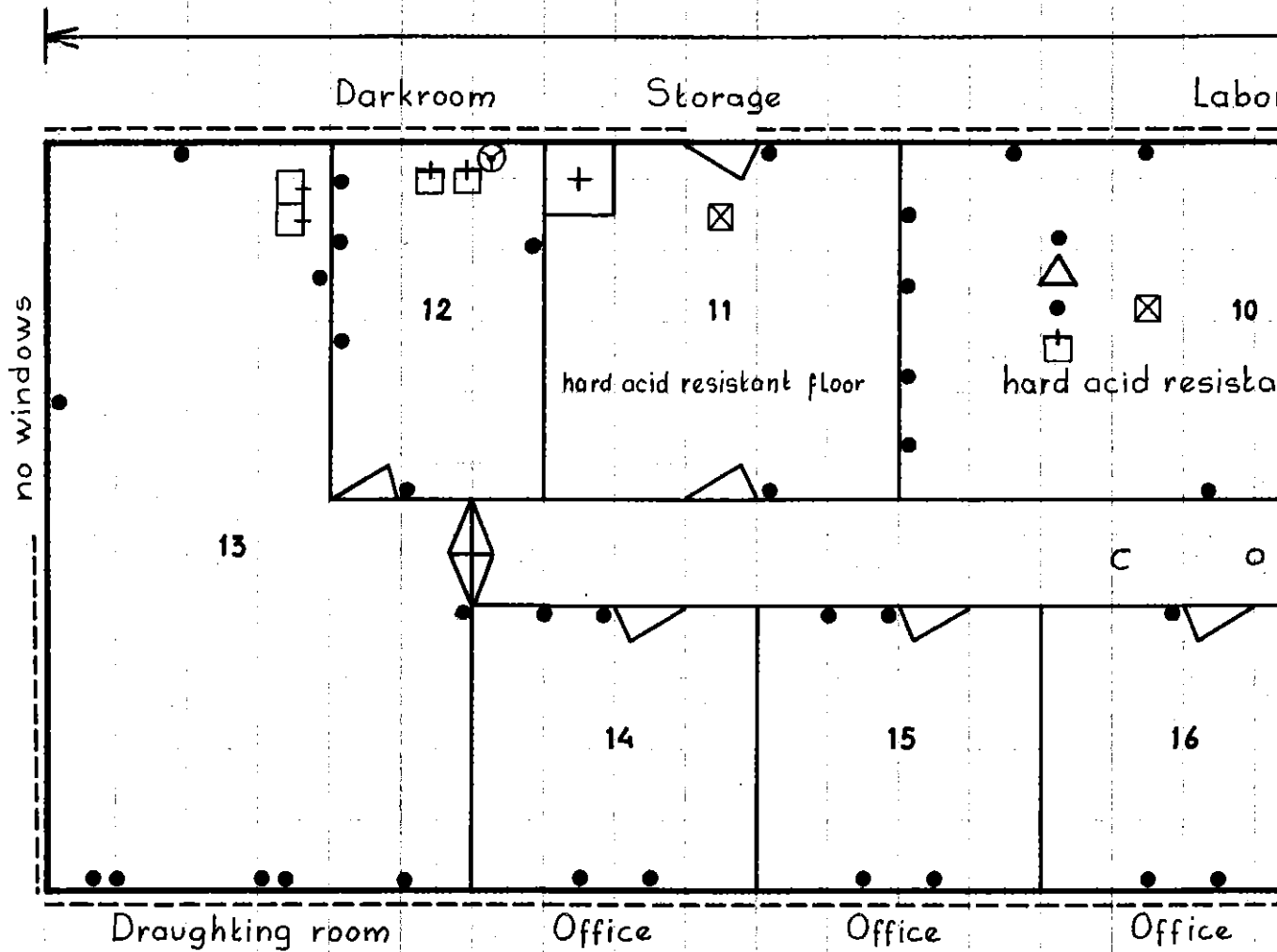


Scale 1:100

- windows
- plugs
- water
- △ gas
- ⊗ refuse water drain
- ⊙ ventilator

Appendix II
Nov. '70

Proposed design for a b



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