

(A) Materials to be procured locally

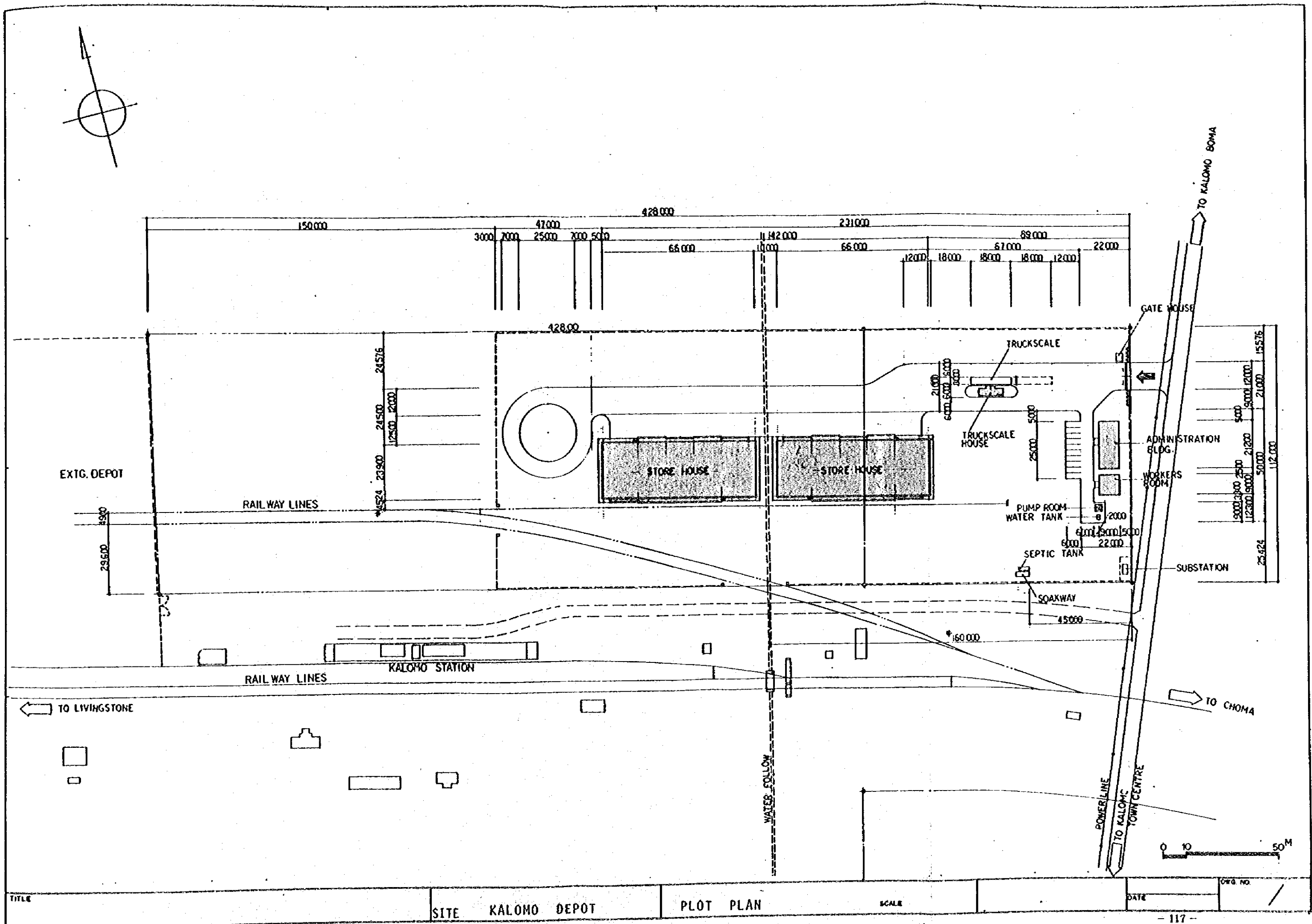
- (a) Materials likely to threaten the progress of the schedule:
Reinforcements, steel frames, cement, sand, gravel and others.
- (b) Materials which have low value-added and involve high
transportation costs: Cement, sand, gravel, bricks, asbestos
cement sheets, lumber and others.

(B) Materials to be procured in Japan

Steel fittings. All electric/plumbing/sanitary equipment.

4-3-6 Basic Design Drawings

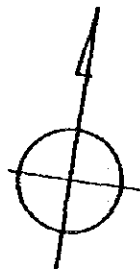
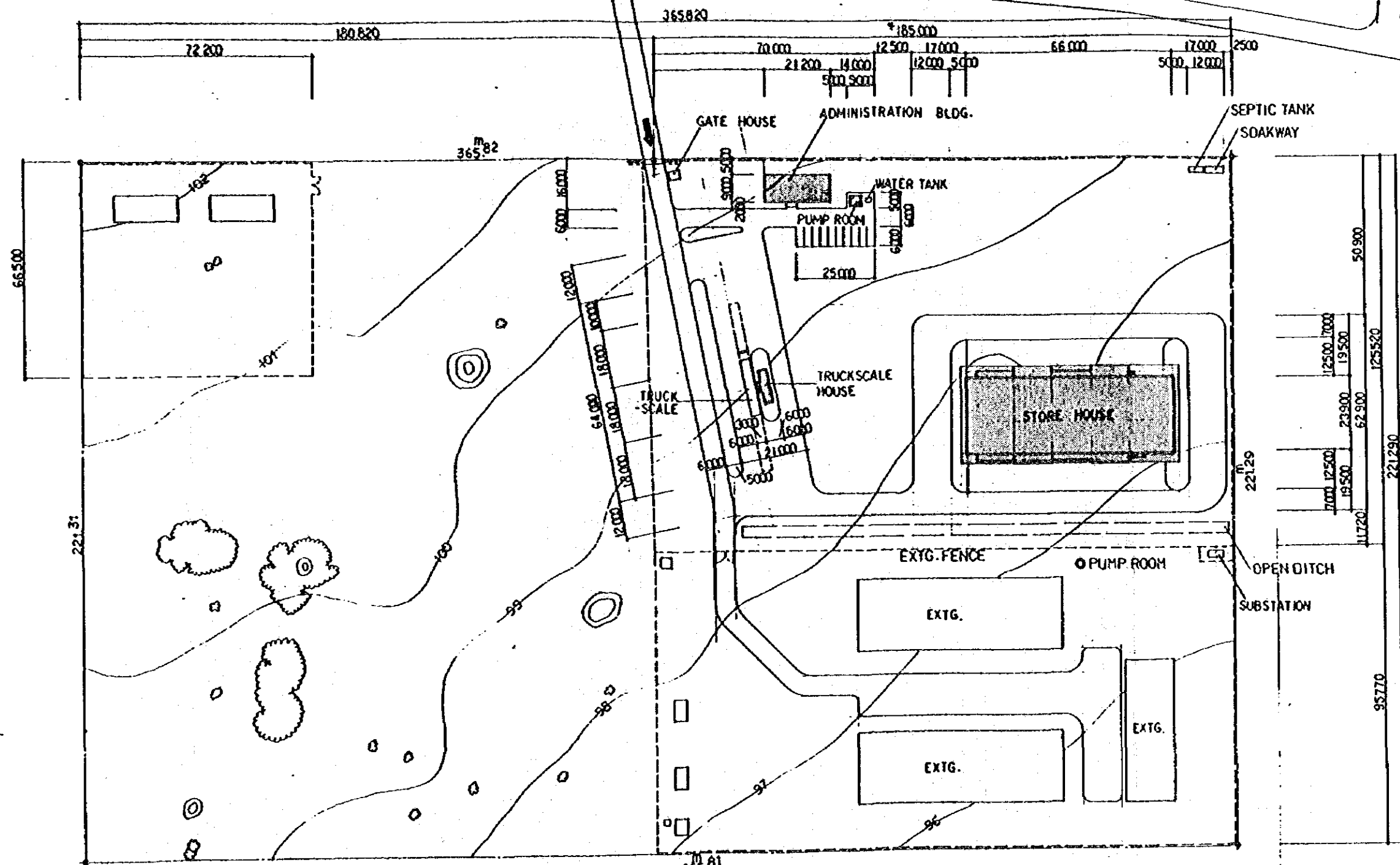
- (1) Plot Plan
 - 1) Kalomo
 - 2) Mumbwa
 - 3) Kaoma
 - 4) Kapiri-Mposhi
 - 5) Masansa
 - 6) Katete
- (2) Storehouse Floor Plan
- (3) Storehouse Roof Plan
- (4) Storehouse Elevation
- (5) Storehouse Elevation/Section
- (6) Office Building-(A) (Kalomo, Mumbwa, Kaoma, Kapiri-Mposhi)
- (7) Office Building-(B) (Masansa)
- (8) Office Building-(C) (Katete)
- (9) Shower Room Building (Kalomo, Kaoma, Kapiri-Mposhi)
- (10) Scale Room (Kalomo, Mumbwa, Kaoma, Kapiri-Mposhi, Katete)
- (11) Gate House (Kalomo, Mumbwa, Kaoma, Kapiri-Mposhi)



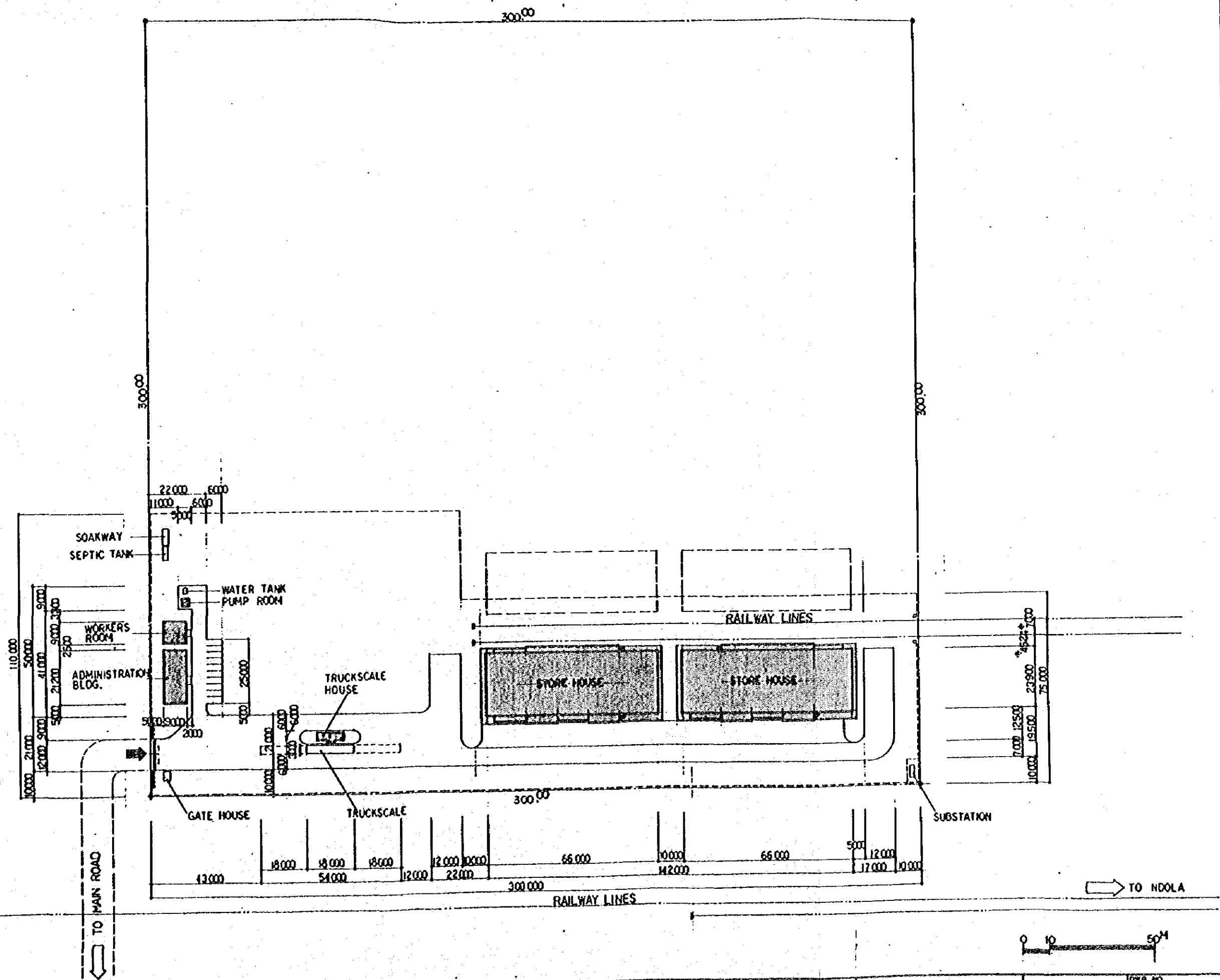
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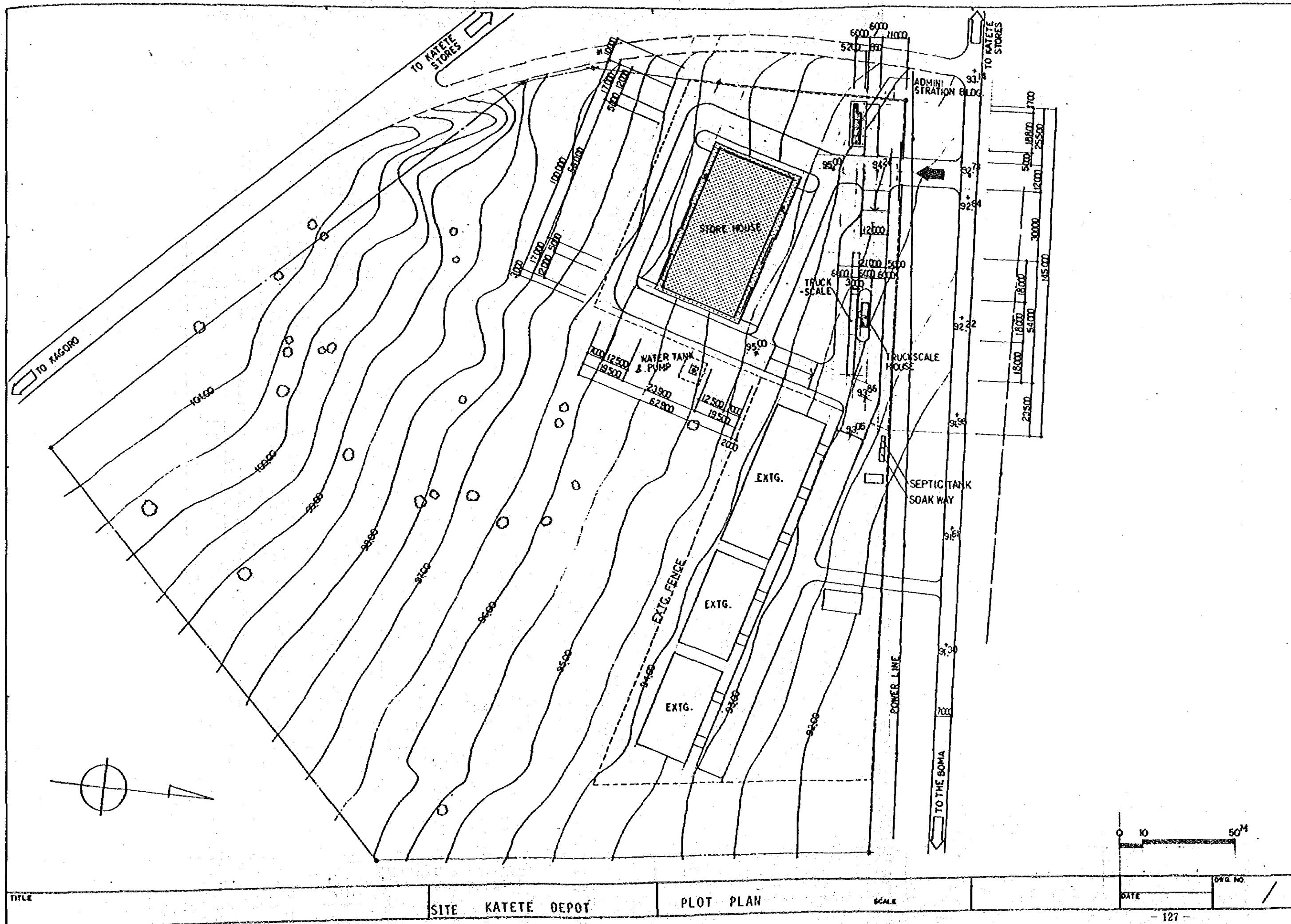
TO MUMBA

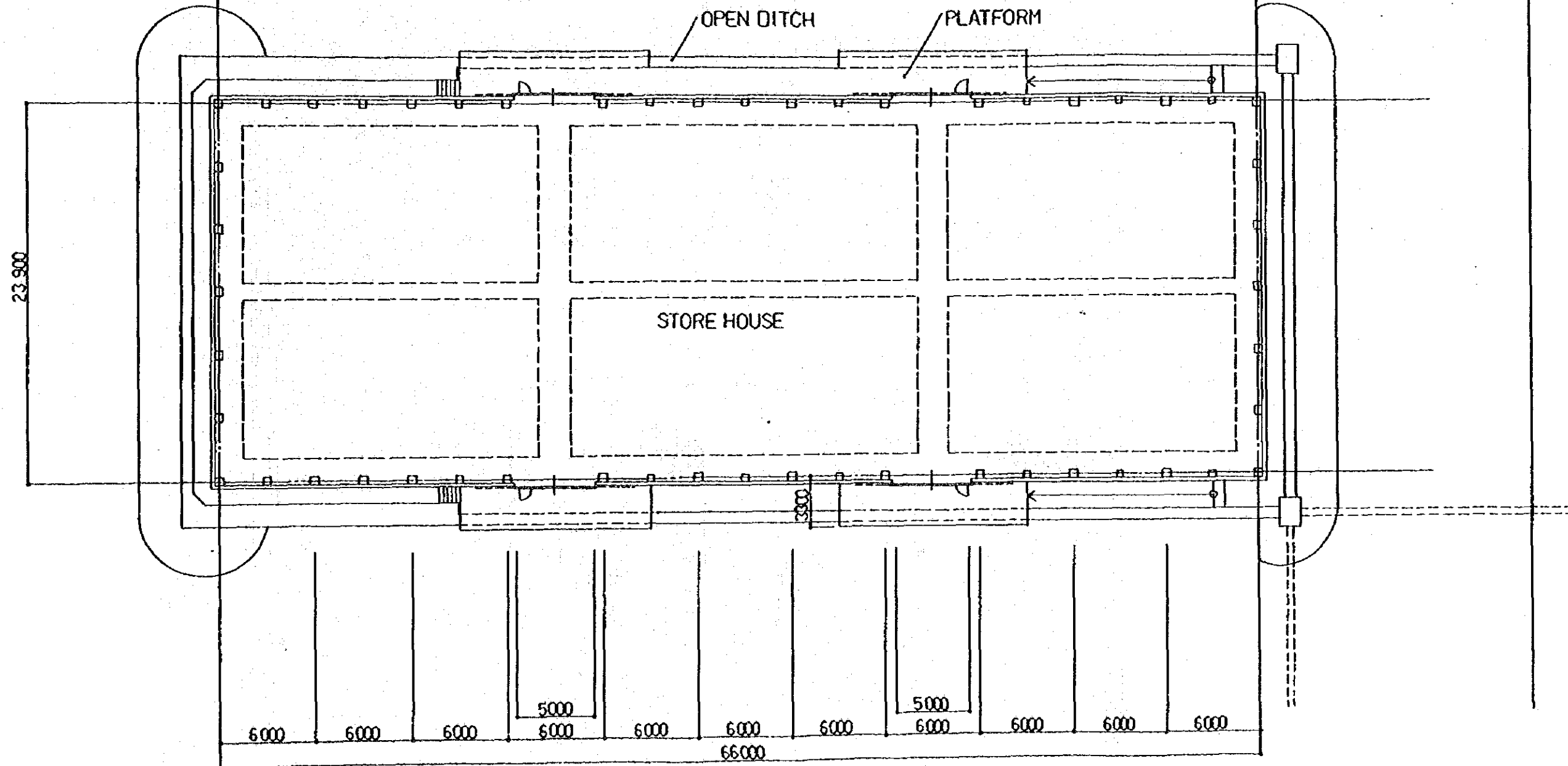
TO LUSAKA



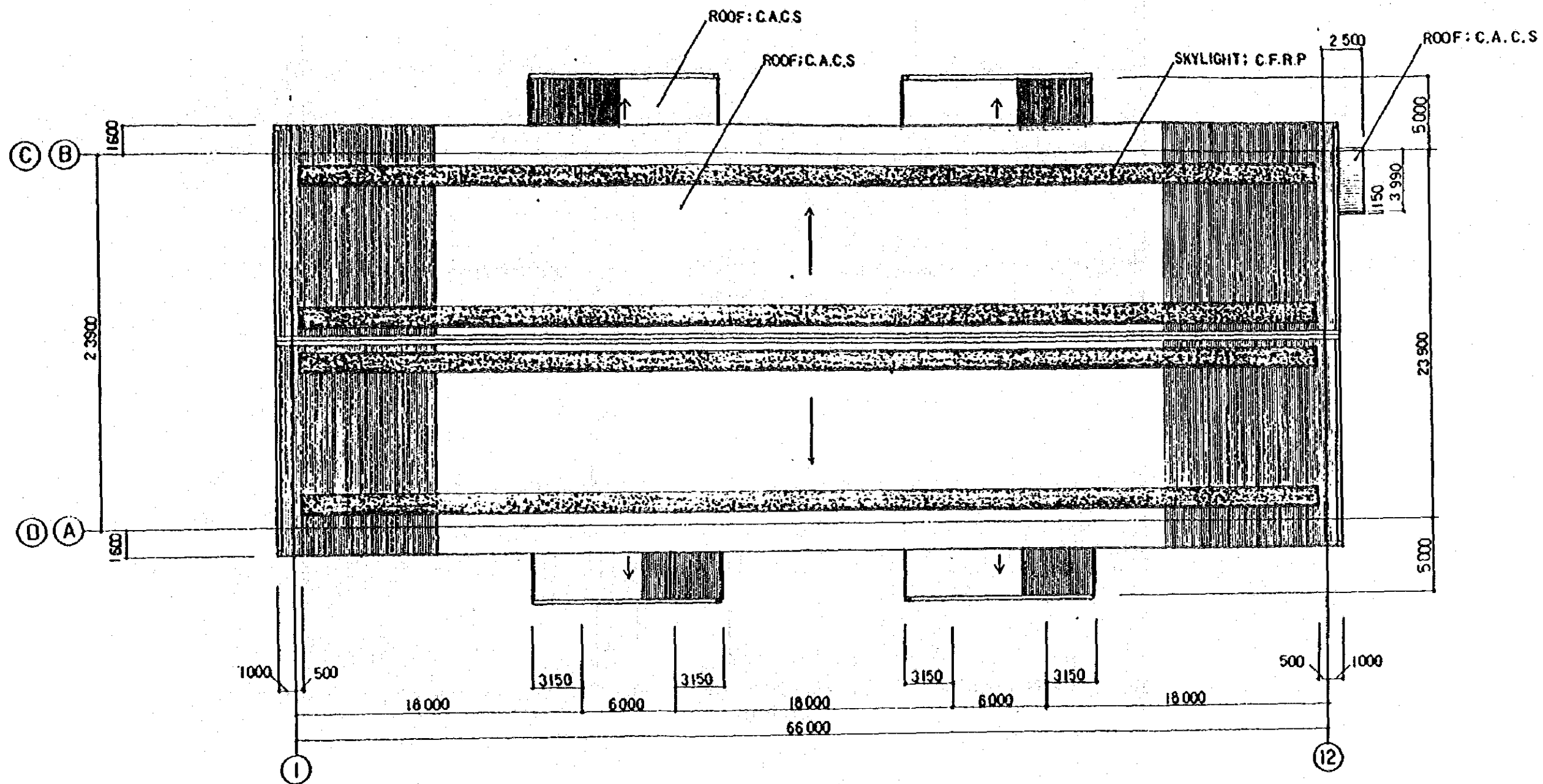
TITLE	SITE MUMBWA DEPOT	PLOT PLAN	SCALE	DATE	OWA NO.
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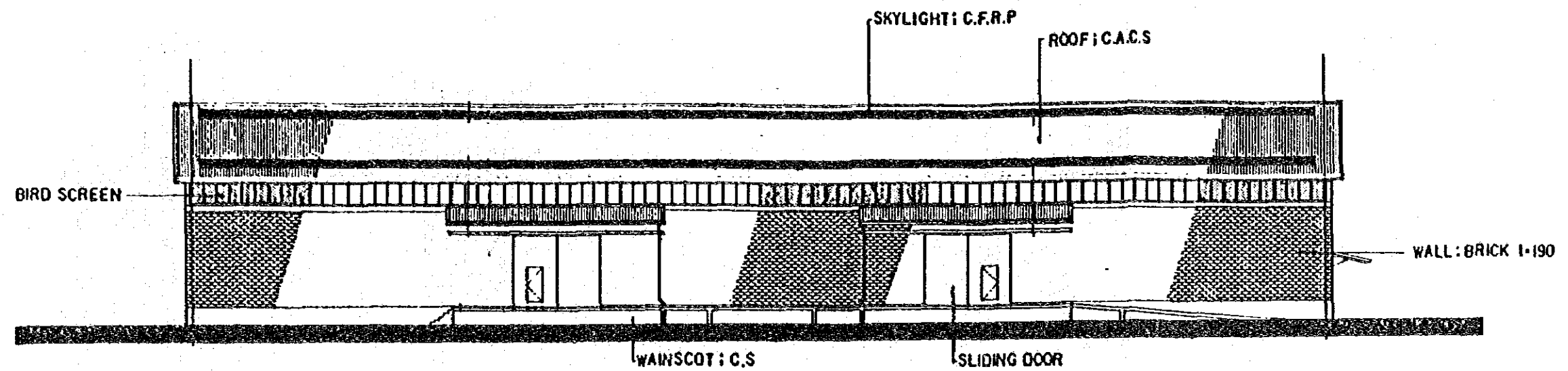


SITE	KALOMO, MUMBWA, KATETE, KAOMA, KAPIRI-MPOSHI, MASANSA DEPOT	STOREHOUSE FLOOR PLAN	SCALE	DATE	DWG. NO.
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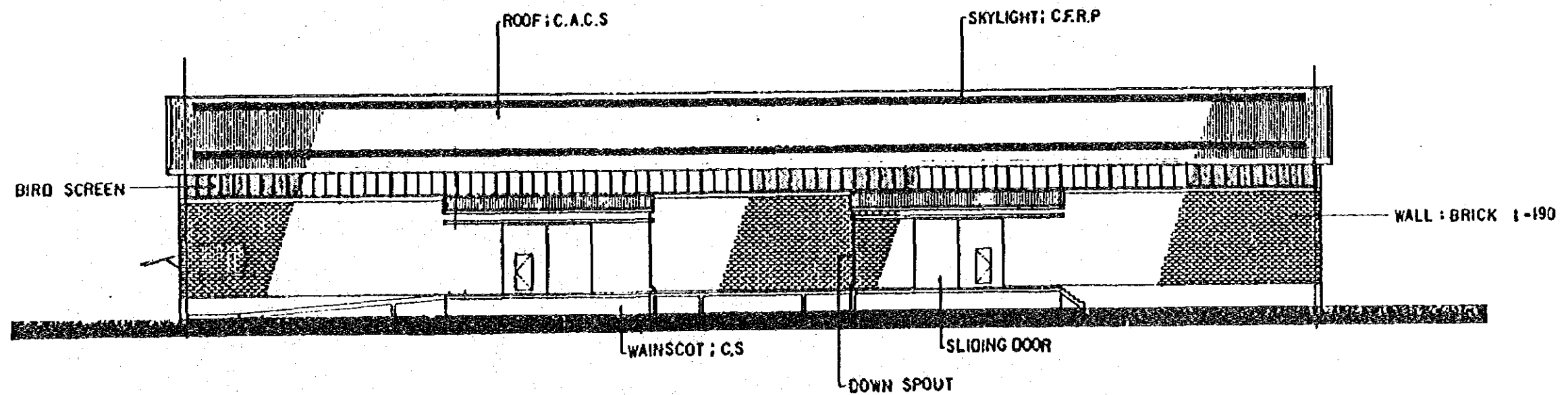


SITE
KALONO, MUMBWA, KATETE, KAOMA,
KAPIRI-MPOSHI, MASANSA DEPOT

STOREHOUSE
ROOF PLAN



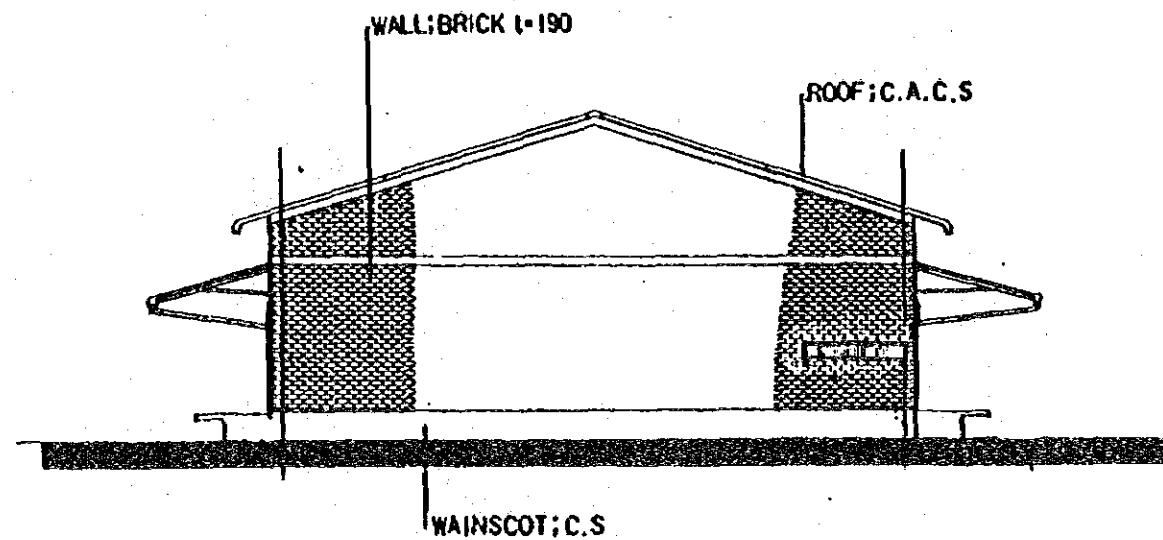
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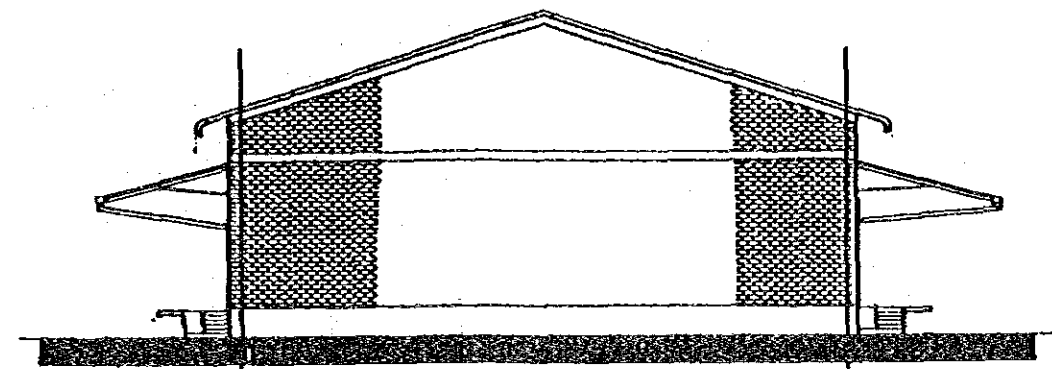
ELEVATION - 2

SITE
KALOMO, MUMBWA, KATETE, KAOMA,
KAPIRI-MPOSHI, MASANSA DEPOT

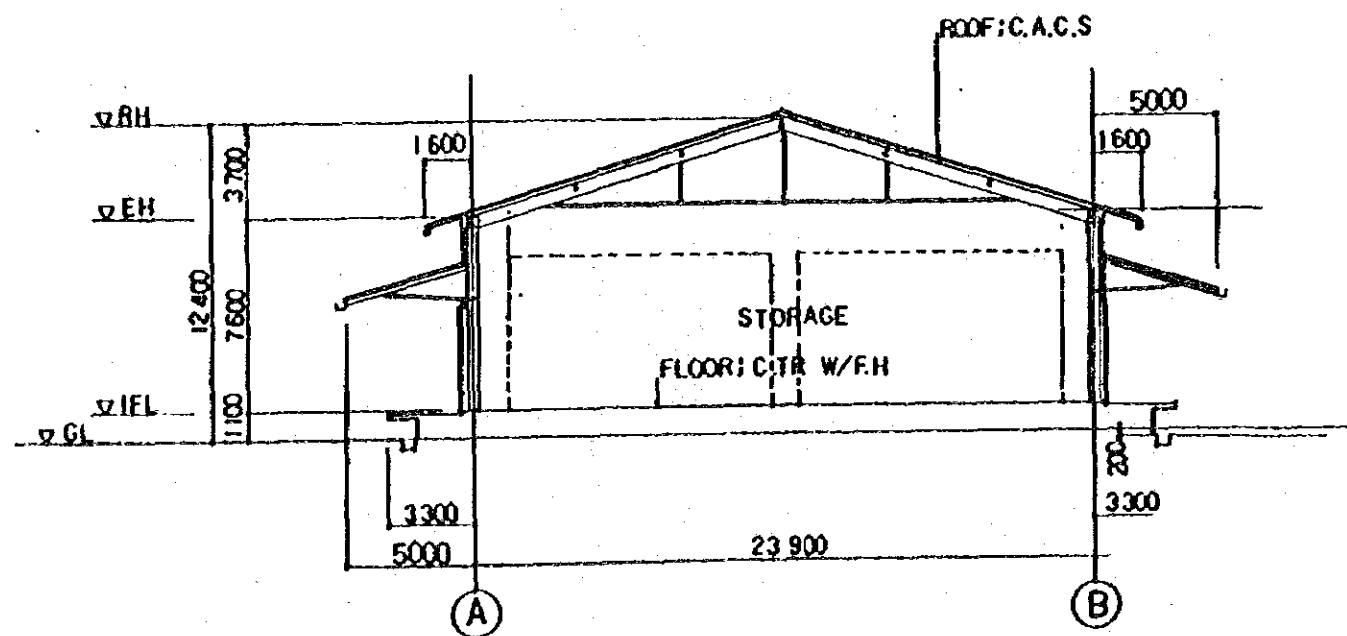
STOREHOUSE
ELEVATION



ELEVATION-3



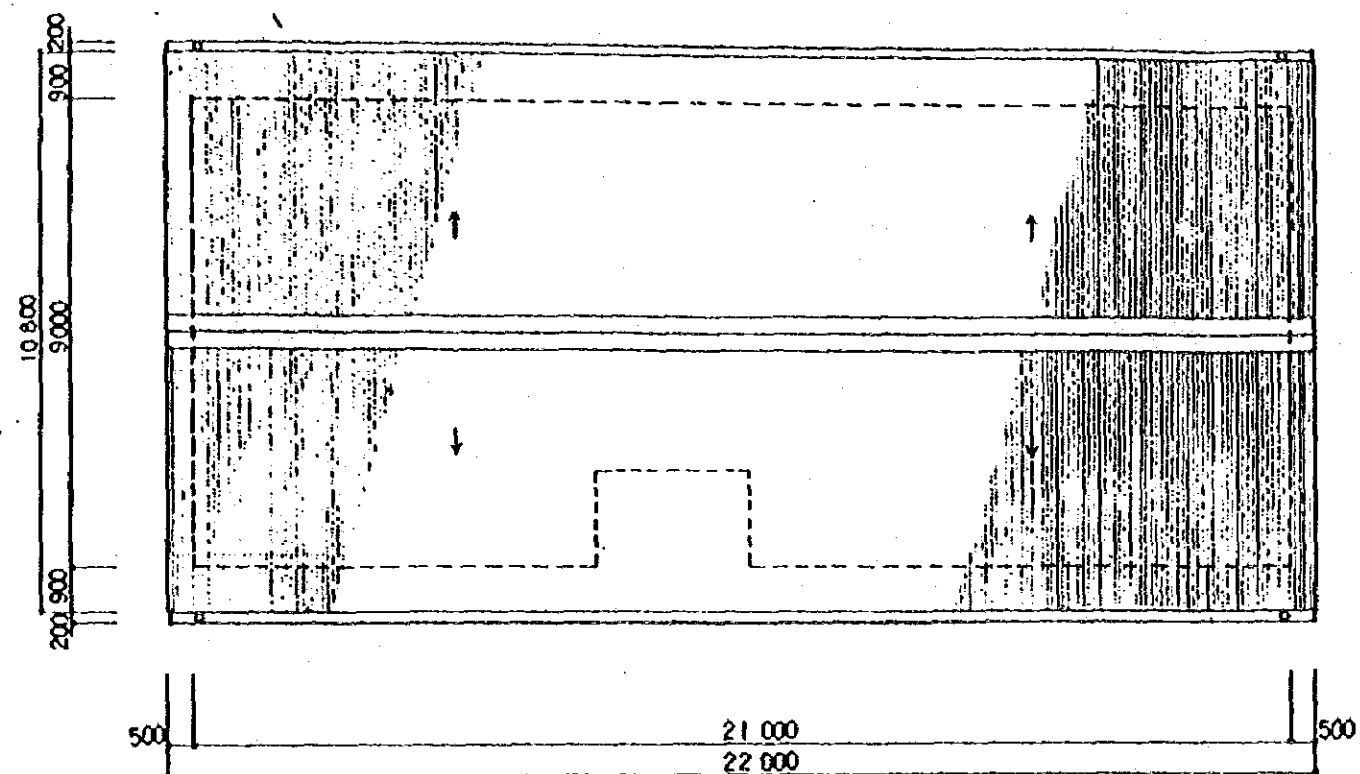
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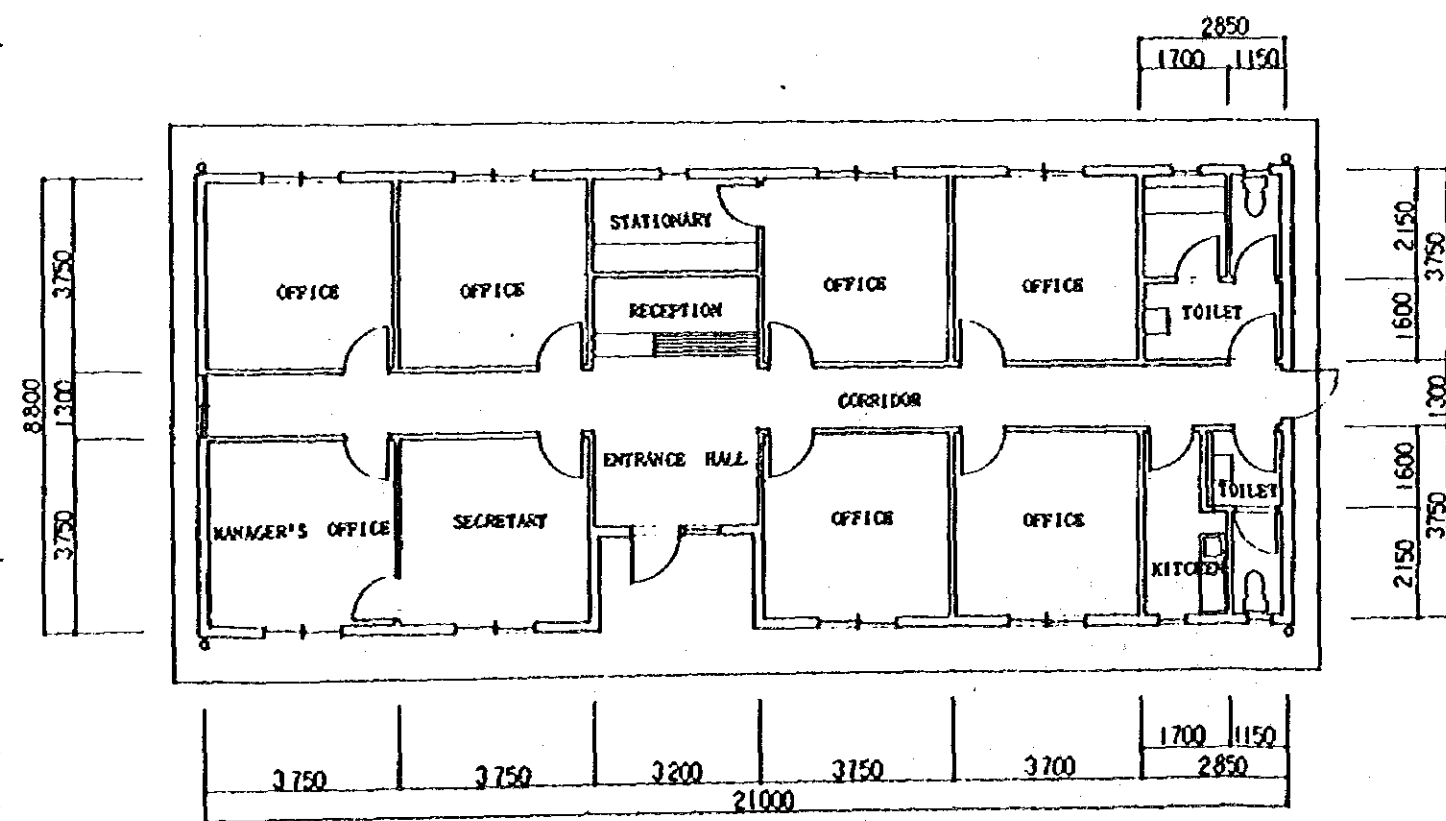
SECTION

SITE KALOMO, MUMBWA, KATETE, KAOMA,
KAPIRI-MPOSHI, MASANSA DEPOT

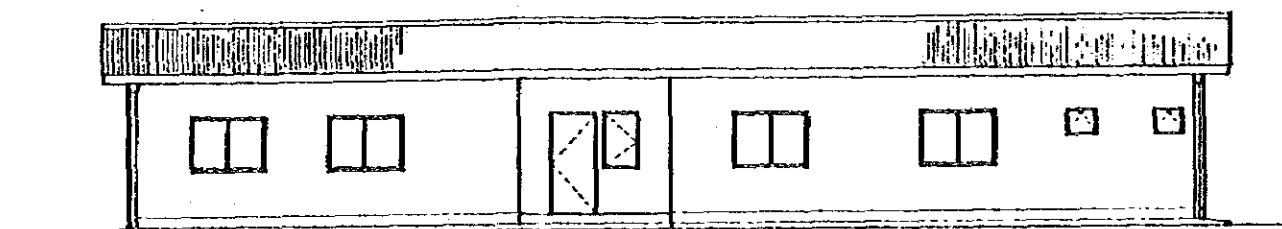
STOREHOUSE
ELEVATION/SECTION



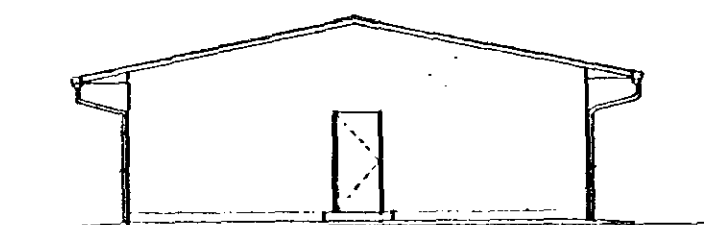
ROOF PLAN



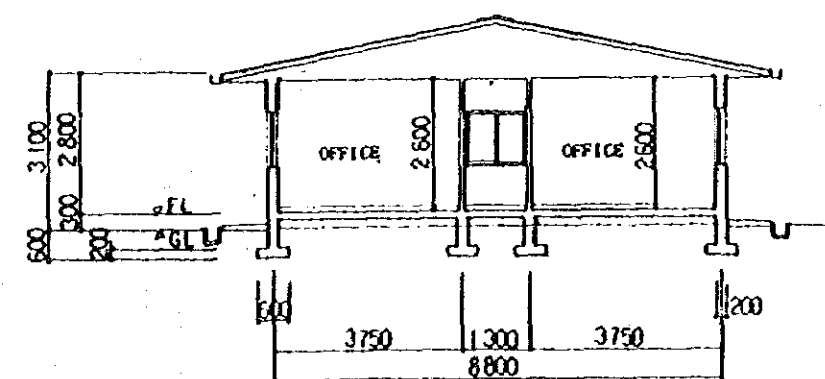
FLOOR PLAN



ELEVATION - 1



ELEVATION - 2



SECTION



TITLE

KALOMO, MUMBWA, KAOMA,
SITE KAPIRI-MPOSHI DEPOT

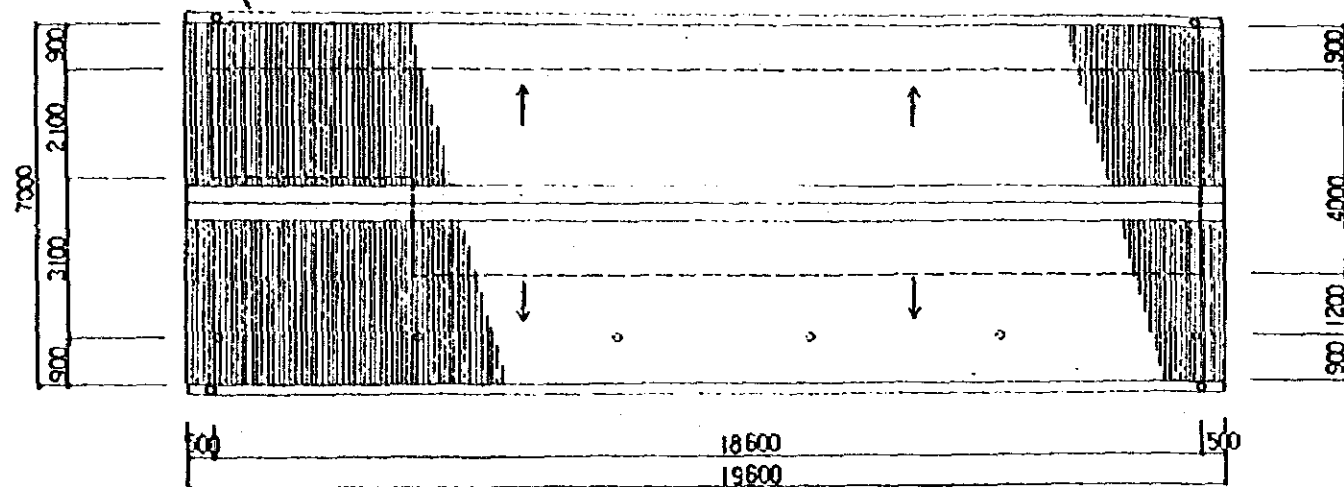
OFFICE BUILDING-(A)
PLAN/ELEVATION/SECTION

SCALE

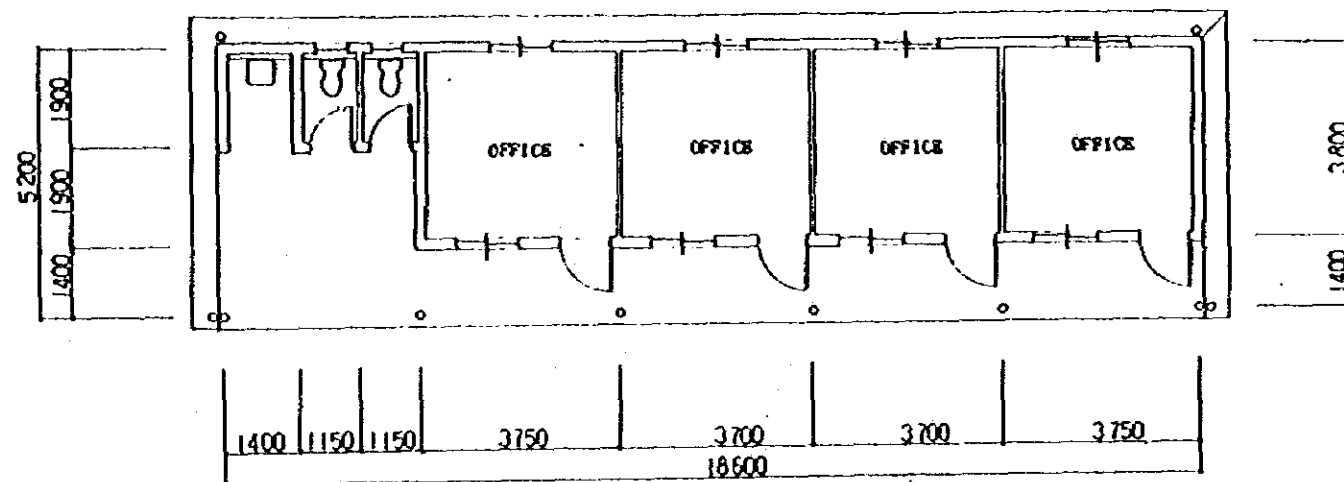
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DWG. NO.

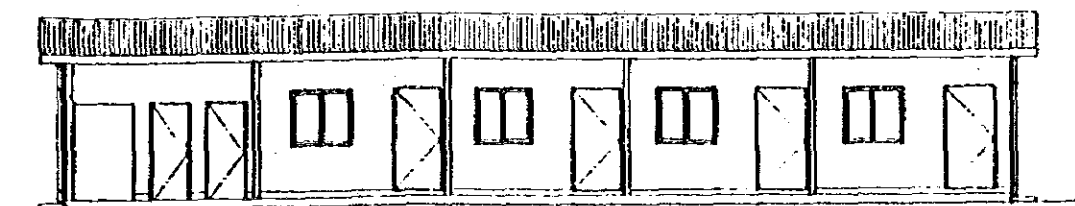
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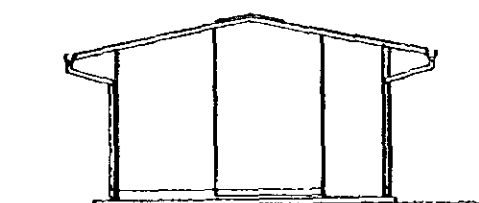
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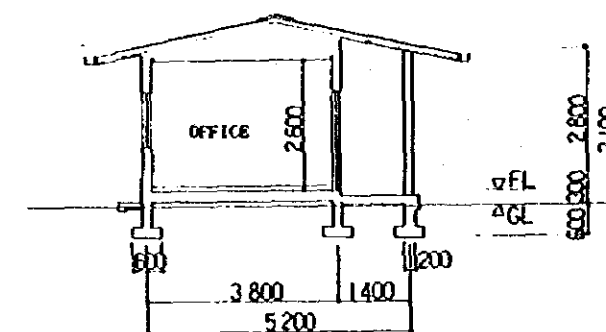
FLOOR PLAN



ELEVATION - 1

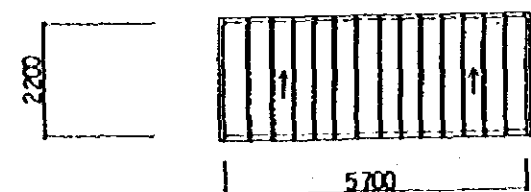


ELEVATION - 2

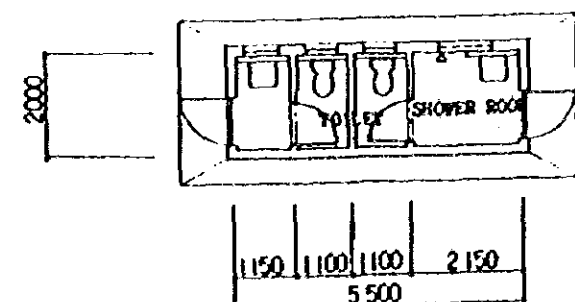


SECTION

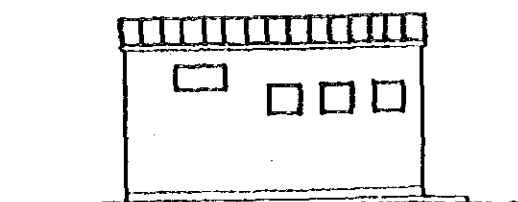
SHOWER ROOM



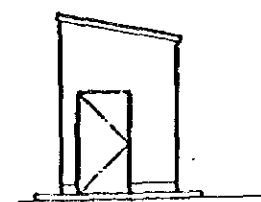
ROOF PLAN



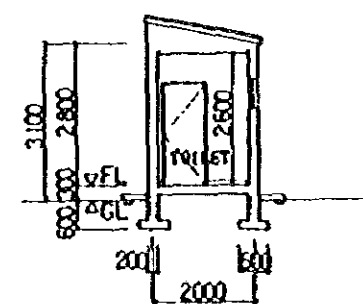
FLOOR PLAN



NORTH ELEVATION



EAST ELEVATION



SECTION



TITLE

SITE

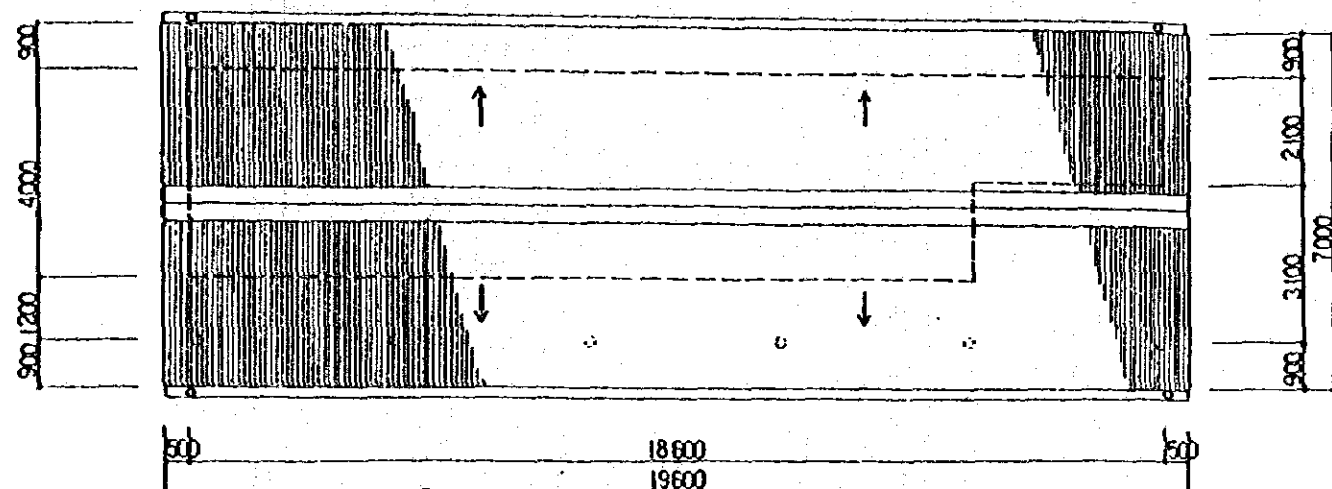
MASANSA DEPOT

OFFICE BUILDING - (B)
PLAN/ELEVATION/SECTION

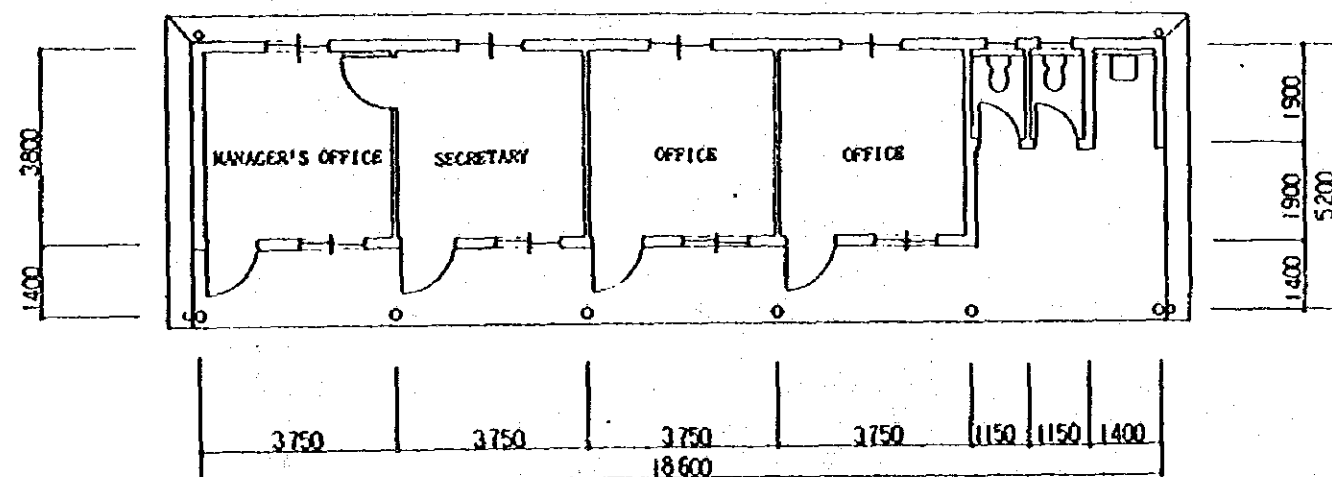
SCALE

DATE

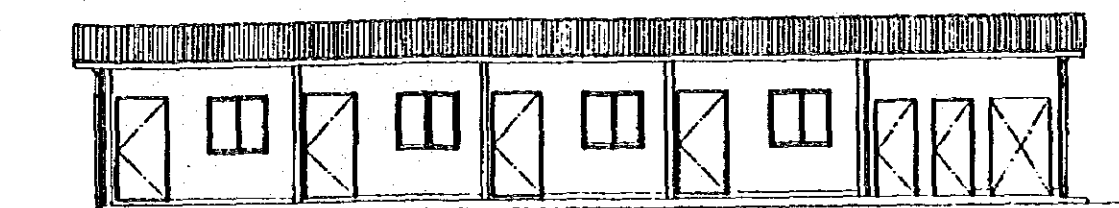
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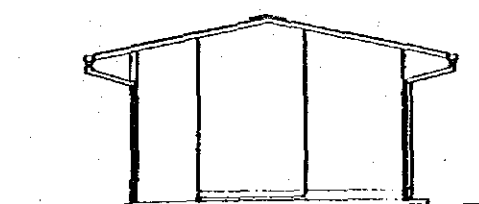
ROOF PLAN



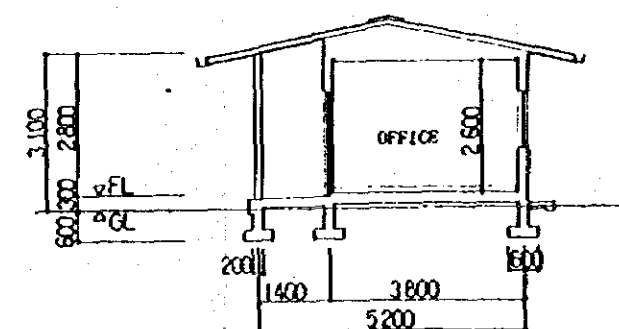
FLOOR PLAN



ELEVATION - 1



ELEVATION - 2



SECTION



TITLE

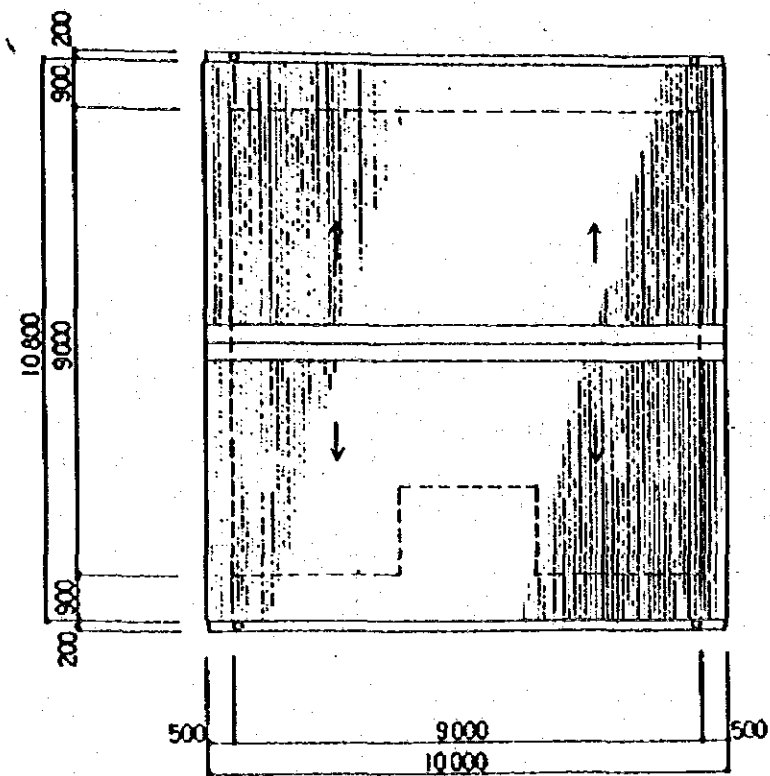
SITE KATETE DEPOT

OFFICE BUILDING-(C)
PLAN/ELEVATION/SECTION

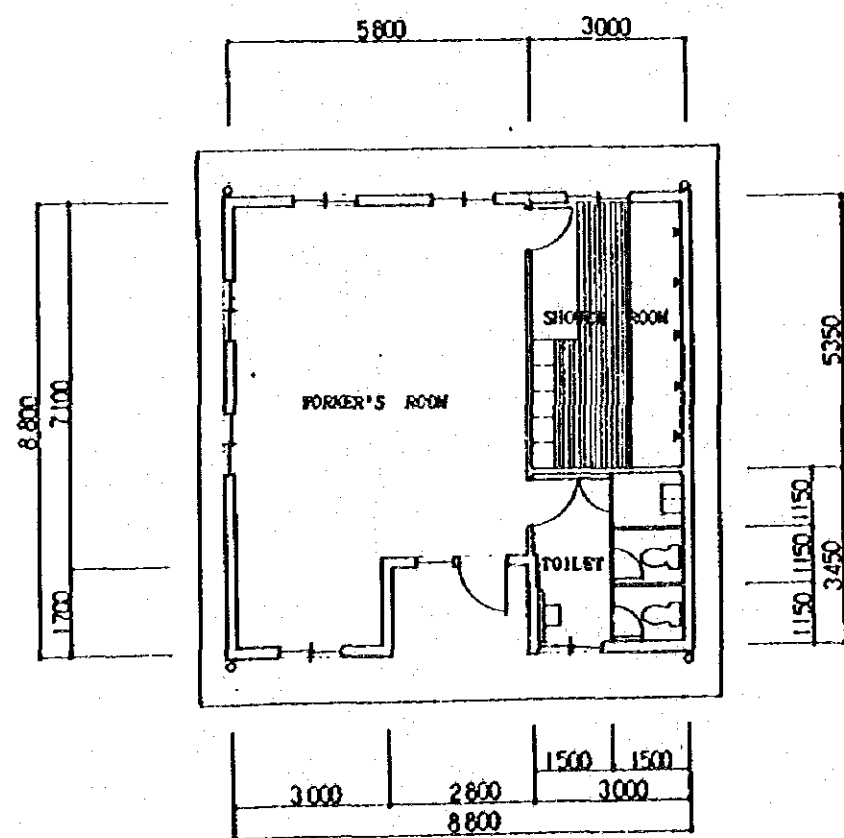
SCALE

DATE

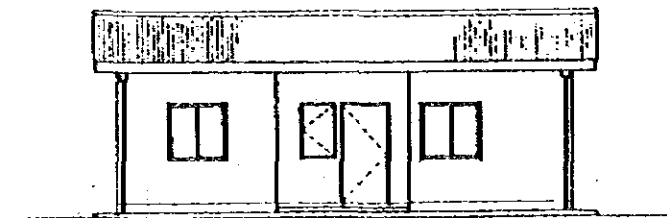
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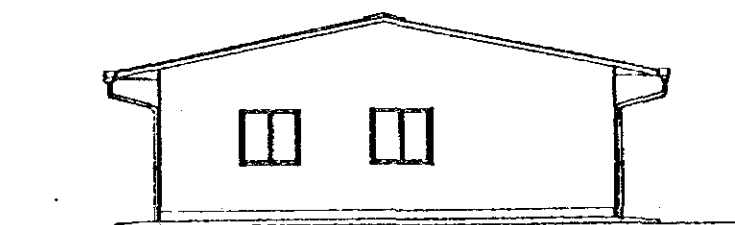
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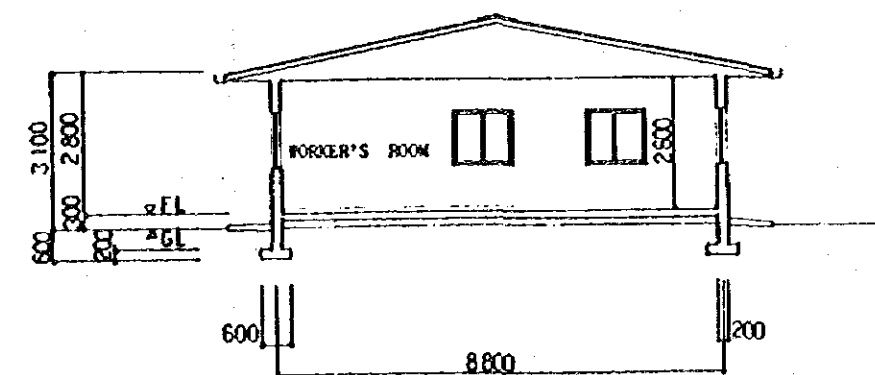
FLOOR PLAN



ELEVATION - 1



ELEVATION - 2



SECTION



TITLE

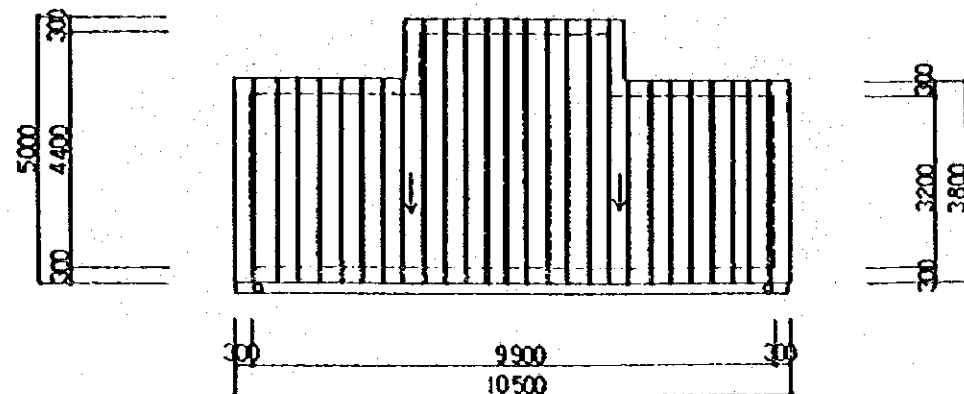
KALOMO, KAOMA,
SITE KAPIRI-MPOSHI DEPOT

SHOWER ROOM BUILDING
PLAN/ELEVATION/SECTION

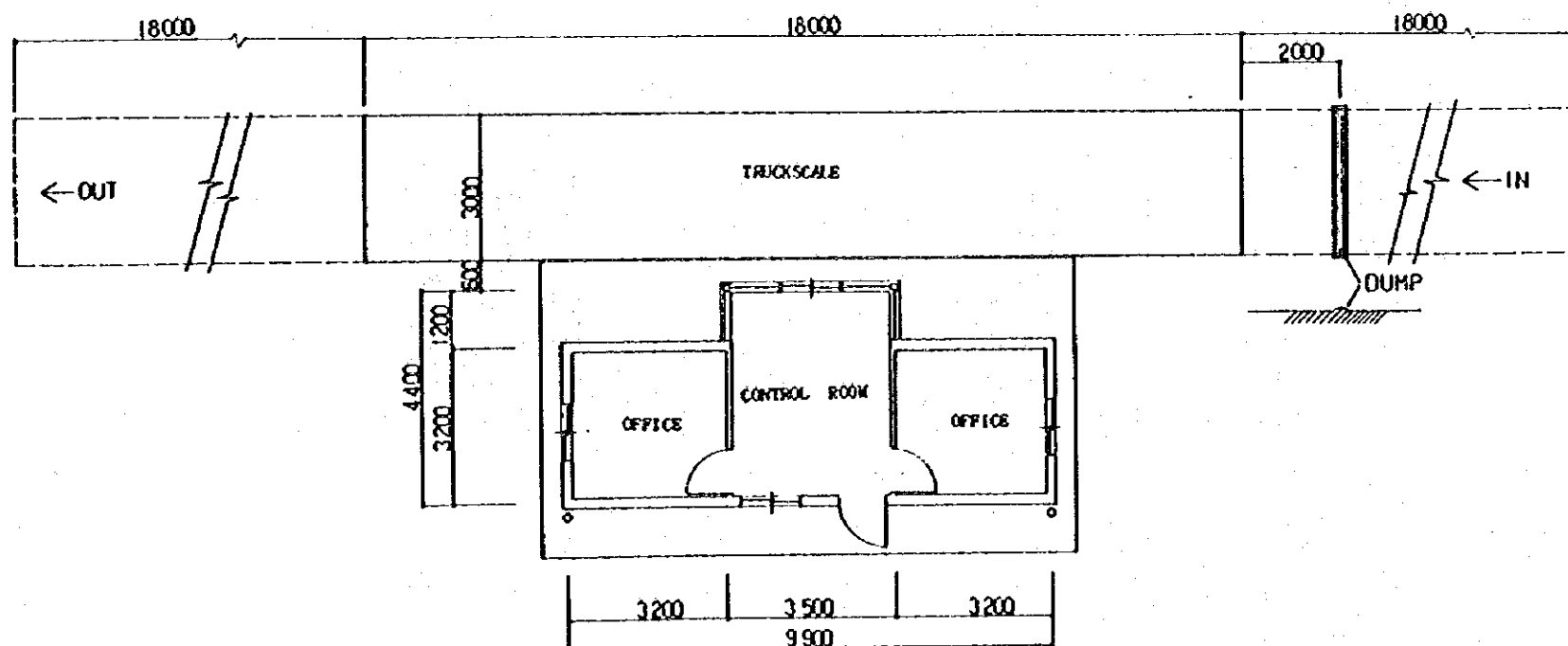
SCALE

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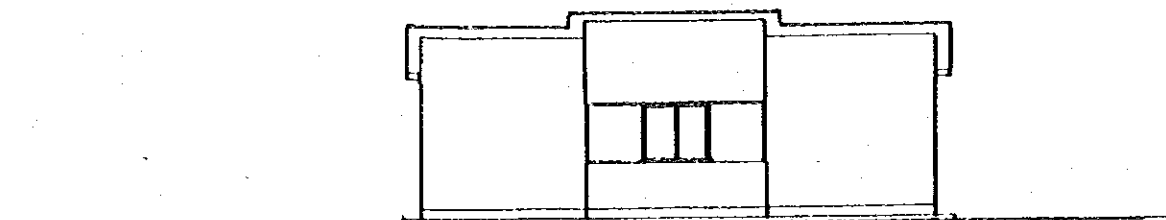
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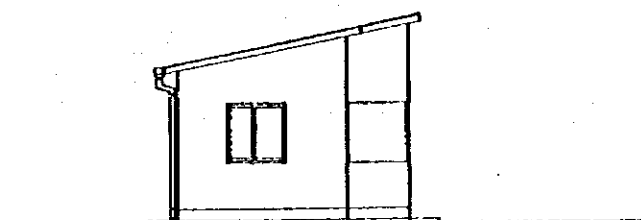
ROOF PLAN



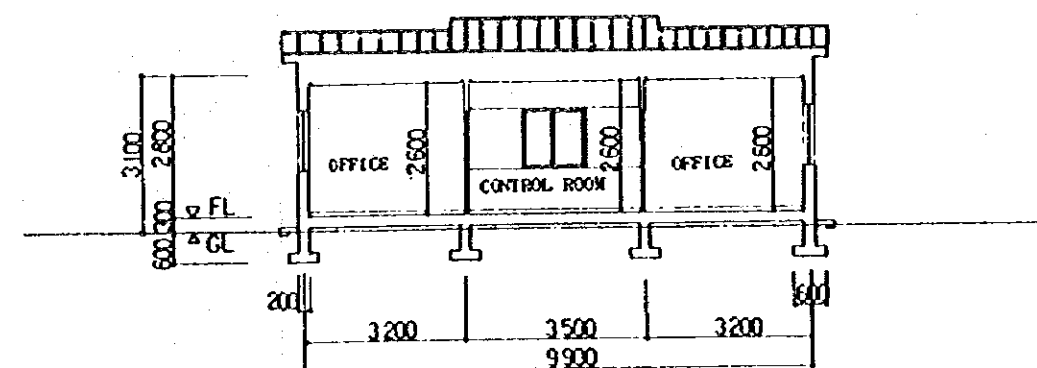
FLOOR PLAN



ELEVATION - 1



ELEVATION - 2



SECTION



TITLE

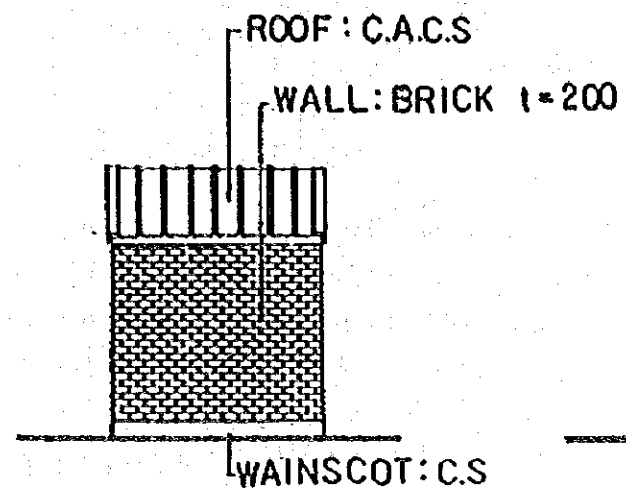
KALOMO, MUMBWA, KAOMA,
SITE KAPIRI-MPOSHI, KATETE DEPOT

SCALE ROOM
PLAN/ELEVATION/SECTION

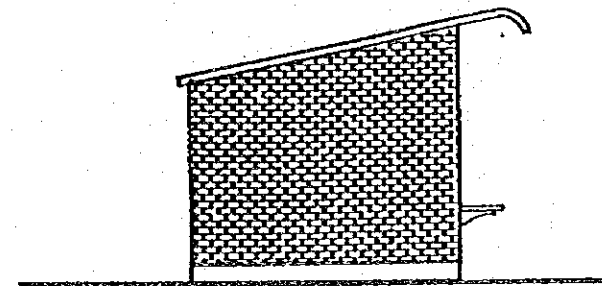
SCALE

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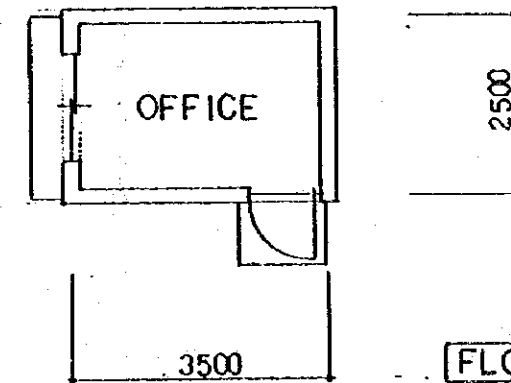
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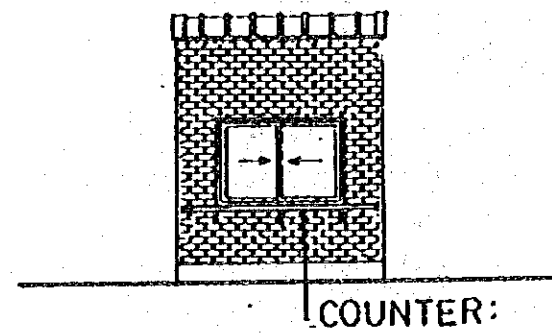
ELEVATION - 1



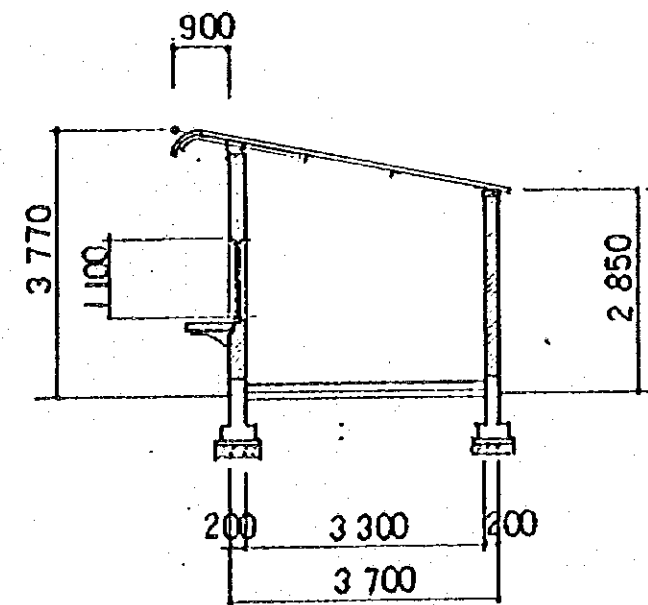
ELEVATION - 2



FLOOR PLAN



ELEVATION - 3



SECTION



KALOMO, MUMBWA, KAOMA,
KAPIRI-MPOSHI DEPOT

SITE

GATE HOUSE
PLAN/ELEVATION/SECTION

DATE

DWG. NO.

4.4 BASIC PLAN OF EQUIPMENT

4-4-1 Equipment Plan

The equipment plan and the selection of equipment basically remain the same as before. This time, however, hygrothermometers were added to obtain a guideline for quality control in the storehouse. Reasons necessitating the supply of equipment are as follows:

(1) Cargo handling equipment

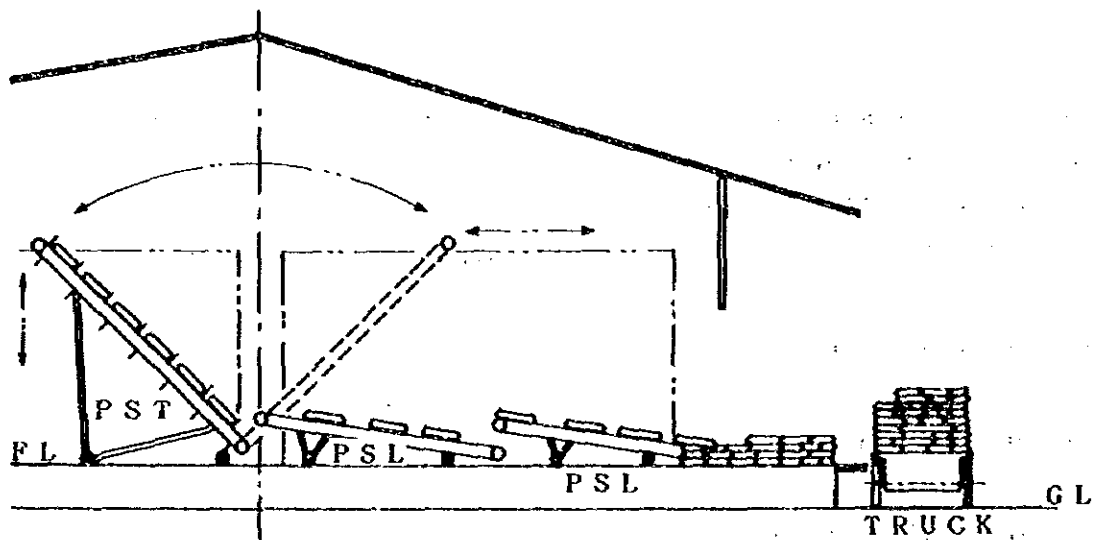
1) Stacker conveyor

The following methods of storing in and out food grain in the storehouse from its door to stacking are conceivable:

- ① Use of manual labor (shouldering)
- ② Use of conveyor
- ③ Use of forklift to handle palletized grain bags

As conveyors are used at present in each depot in Zambia to handle grain, a set of conveyors will be furnished for each proposed storehouse with a capacity of 5,000t in consideration of the structure and scale of the storehouse and in order to store in and out maize by the conveyor system shown below.

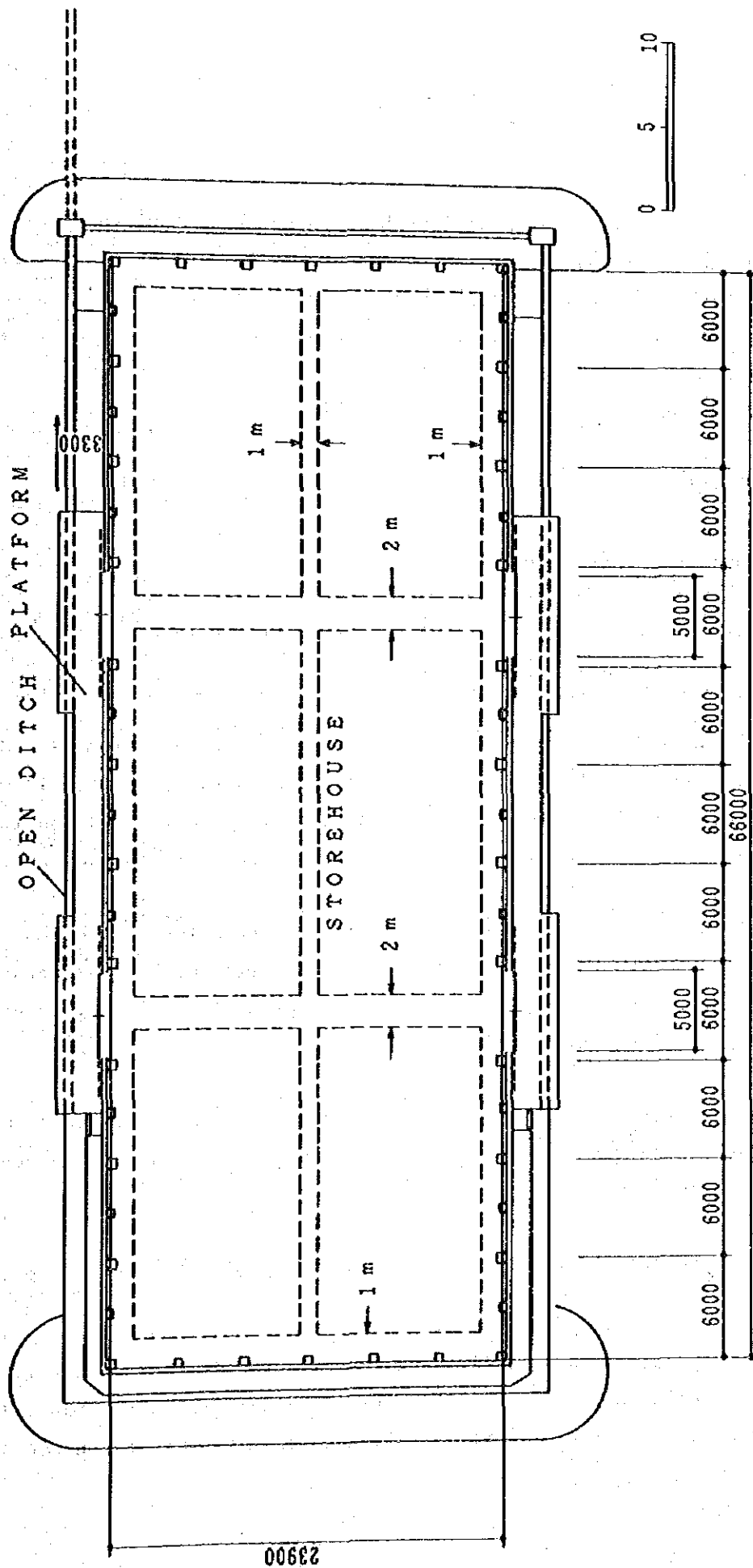
o Stacking by conveyor system



o Conveyors required by a unit of cargo handling.

1	Stacker conveyor (PST)	8m	2.2KW	1 unit
2	Slat conveyor (PSL)	7m	1.5KW	2 units
3	Slat conveyor (PSL)	6m	1.5KW	1 unit

Layout of Stacking in the Storehouse



2) Handcarts

Bags in the storehouse will be handled by the set of conveyors mentioned above. In the case of sampling for inspection, mending of broken bags, etc., the bag in question has to be carried separately from the conveyor line. In such a case a handcart is handy. It can also be used to carry small things. Therefore, each 5,000t storehouse will have 3 carts, 6 in all.

(2) Weighing equipment

1) Truck scales (road weigh-bridge)

Grain is distributed in Zambia almost entirely in bags and transactions are made by weight.

In a depot without a truck scale, each maize transaction is made by weighing a sample of roughly 10% of all bags to be shipped in or out to predict the total weight. Consequently, trouble is often invited over an excess or shortage in the transaction weight. To smoothen handling activities and improve measurement accuracy, a truck scale will be placed at each depot in which construction of storehouses are scheduled this time, where it is necessitated by consideration of the storehouse scale, site area and predicted delivery to and shipment from the storehouse.

When a storehouse was built for the Masansa depot in Phase I, no truck scale was installed. As it was not specifically requested this time, it was judged unnecessary.

2) Platform scales (to weigh 10-bag lots, capable of weighing up to 1,000kg)

In preparation for a failure of the truck scales to be installed due to trouble, etc. and to complement them, a scale capable of weighing 10 bags at a time will be installed in each 5,000t storehouse as requested.

- 3) Platform scales (to weigh individual bags, capable of weighing up to 150kg)

Platform scales will be installed to complement weight control when grain is shipped in or out and to weigh individual bags for sampling and inspection. Two scales will be installed at each 5,000t storehouse.

(3) Storehouse management equipment

1) Hand driven winnowers

As grain bags made of jute are all imported and are hard to get, they are used repeatedly. Therefore, bags are considerably worn and are torn very often during handling. A winnowing fan is used to efficiently remove impurities mixed in with maize spilled from broken bags. A hand driven winnower will be added to each 5,000t storehouse.

2) Sewing machines for bagging (electric)

A sewing machine to seal refilled bags will be given to each 5,000t storehouse.

3) Grain thermometers

As they are indispensable for identification of quality irregularities of maize during storage, three units will be placed in each 5,000t storehouse to measure the top, middle and bottom levels of the stacking in the center of the storehouse.

4) Hygrothermometers

Three units will be allocated to each depot to measure temperature and humidity levels in the storehouse.

(4) Inspection equipment

In Zambia, quality inspection of maize is made each time it is purchased by the Union from a producer, by NAMB from the Union and by flour mills from the Union or NAMB. Because of the shortage of inspection tools, quality is often determined intuitively by each inspector, resulting in quality fluctuations. A full line-up of inspection tools is necessary.

1) Moisture meter

This is used to measure moisture content in the grain during collection and storage in order to maintain a moisture level suited to grain storage. An electric resistance model powered by ordinary dry batteries and usable for maize, millet, sorghum, wheat, barley and rice will be chosen. Two units will be given to each depot.

2) Rough balance

This is used to weigh an inspection sample before analyzing it. Each depot will have one unit.

3) Sieve

This is used to sort grain mixed with impurities by size. One set of (5) different meshes will be placed in each depot for inspection purposes and another set in each 5,000t storehouse for operational purposes.

4) Sample pan (large and small)

50 (small) sample pans will be furnished as sampling containers for inspection and 3 (large) sample pans, to be used to return inspected samples to bags, will be allocated to each depot.

5) Grain probe

This is used to extract samples directly from grain bags for inspection. Three units that fit the bag quality and bag size and are suitable for maize will be selected and allocated to each depot.

(5) Generator

In the proposed site of Masansa, the supply of public electric power is unavailable. Therefore, two diesel generators will be allocated for each storehouse as the power source for conveyors.

4-4-2 List of Machines

Name of Machine	Kalomo	Kaoma	Mumbwa	Masansa	Kapiri-Mposhi	Katete	Total
(1) Cargo handling equipment							
1 Portable stacker conveyor (8m)	2	1	1	2	2	1	9
2 Portable slat conveyor (7m)	4	2	2	4	4	2	18
3 Portable slat conveyor (6m)	2	1	1	2	2	1	9
4 Handcart	6	3	3	6	6	3	27
(2) Weighing equipment							
1 Truck scale (60t)	1	1	1	0	1	1	5
2 Platform scale (1,000kg)	2	1	1	2	2	1	9
3 " (150kg)	4	2	2	4	4	2	18
(3) Storehouse management equipment							
1 Hand driven winnower	2	1	1	2	2	1	9
2 Sewing machine for bagging	2	1	1	2	2	1	9
3 Grain thermometer	6	3	3	6	6	3	27
4 Hygrothermometer	6	3	3	6	6	3	27
(4) Inspection equipment							
1 Moisture meter (electric resistance type)	2	2	2	2	2	2	12
2 Rough balance (200g/0.1g)	1	1	1	1	1	1	6
3 Sieves (for maize, 5 in a set)	3	2	2	3	3	2	15
4 Sample pan (large)	3	3	3	3	3	3	18
5 " (small, ϕ 180mm)	50	50	50	50	50	50	300
6 Grain probe (for maize)	3	3	3	3	3	3	18
(5) Generator							
1 Diesel generator	0	0	0	2	0	0	2

CHAPTER 5. PROJECT EXECUTION PLAN

CHAPTER 5. PROJECT EXECUTION PLAN

5-1 PROJECT EXECUTION ORGANIZATION

As all grain storehouses covered by this project will be built at NAMB depots, both the existing and the newly constructed storehouses will be operated by the NAMB staff. Though the control of NAMB switched from the Ministry of Agriculture and Water Development to the Ministry of Cooperatives in 1986, NAMB remains unchanged organizationally. In view of its rich experience in grain distribution, NAMB has the skill necessary to manage and control each of these grain depots. Therefore, Japan is not required to provide special personnel training sessions, but a short guidance period (of a week or so) is scheduled to explain how to handle the equipment and machines furnished, in particular how to inspect grain quality with the test apparatuses provided.

The personnel schedule for each grain depot presented by NAMB is as shown in 4-3-2 Building Plan.

5-2 SCOPE OF WORK

Work to be executed by the Japanese side and the Zambian side is classified as follows. The site clearance work (including removal of existing structures) and the lead-in work of electric power, water and telephone circuits have to be completed before the start of work assigned to the Japanese side.

(1) Work to be executed by the Japanese side

- 1) Construction of storehouses, offices, gate houses, scale rooms and pump rooms.
- 2) All electrical work at the sites after the transformer.
- 3) Plumbing and sanitary work at the sites;
- 4) Construction of in-site roads and access roads from the public road to the premises.

- 5) Gate and fence work.
- 6) Everything pertaining to equipment and machines furnished including cargo handling equipment, truck scales, grain inspection apparatuses, etc.

(2) Work to be executed by the Zambian side

- 1) Site clearance work (cutting and removal of trees, removal of existing buildings and obstacles, soil cutting, filling, etc.)
- 2) Removal of existing structures including high-voltage power cables, underground pipes, etc. that interfere with this project, before the start of construction work.
- 3) Leading-in of electric power, telephone circuits and water supply piping to the site borders.
- 4) Leading-in of temporary electric power, telephone circuits and water supply piping for the construction work.
- 5) Furniture, fixtures, curtains, carpets, etc.
- 6) Necessary legal procedures for the Project.

5-3 CONSTRUCTION PLAN

This grain storehouse construction work will be executed by a Japanese contractor specializing in construction, well-experienced in overseas work and selected by tender from several competitors who are sufficiently qualified to complete the project.

In Zambia, there are many construction firms that have acquired the appropriate engineering skills during the rule of the Great Britain. The Japanese construction firm acting as the general contractor is to select the fittest among them as the local subcontractor for this project.

As for the materials and engineering methods that will be used for the project, the same specifications as in Phase I and II will be used again as the quality of grain storehouses constructed during these past phases is rated highly. Locally-made materials will be used to the greatest

possible extent in view of the location of the construction sites and ease of maintenance after the start of storehouse operation, and also to ensure local procurement and engineering of materials as much as possible in the event of repairs, etc. As for engineering methods, those befitting the locality will also be employed to facilitate engineering by local subcontractors.

If large-scale steel frames or the main structural skeletons are fabricated in Japan, it will take more than 6 months for them to reach the construction sites, which the schedule cannot allow. As before, the main structural skeletons will be procured in Zambia. Recently, Zambia has been hard pressed by a shortage of foreign currency reserves and consequently import prices are going up. The same holds true for construction materials and they are hard to get. Therefore, the materials needed to complete the electrical, plumbing and sanitation will be procured in Japan and shipped to Zambia.

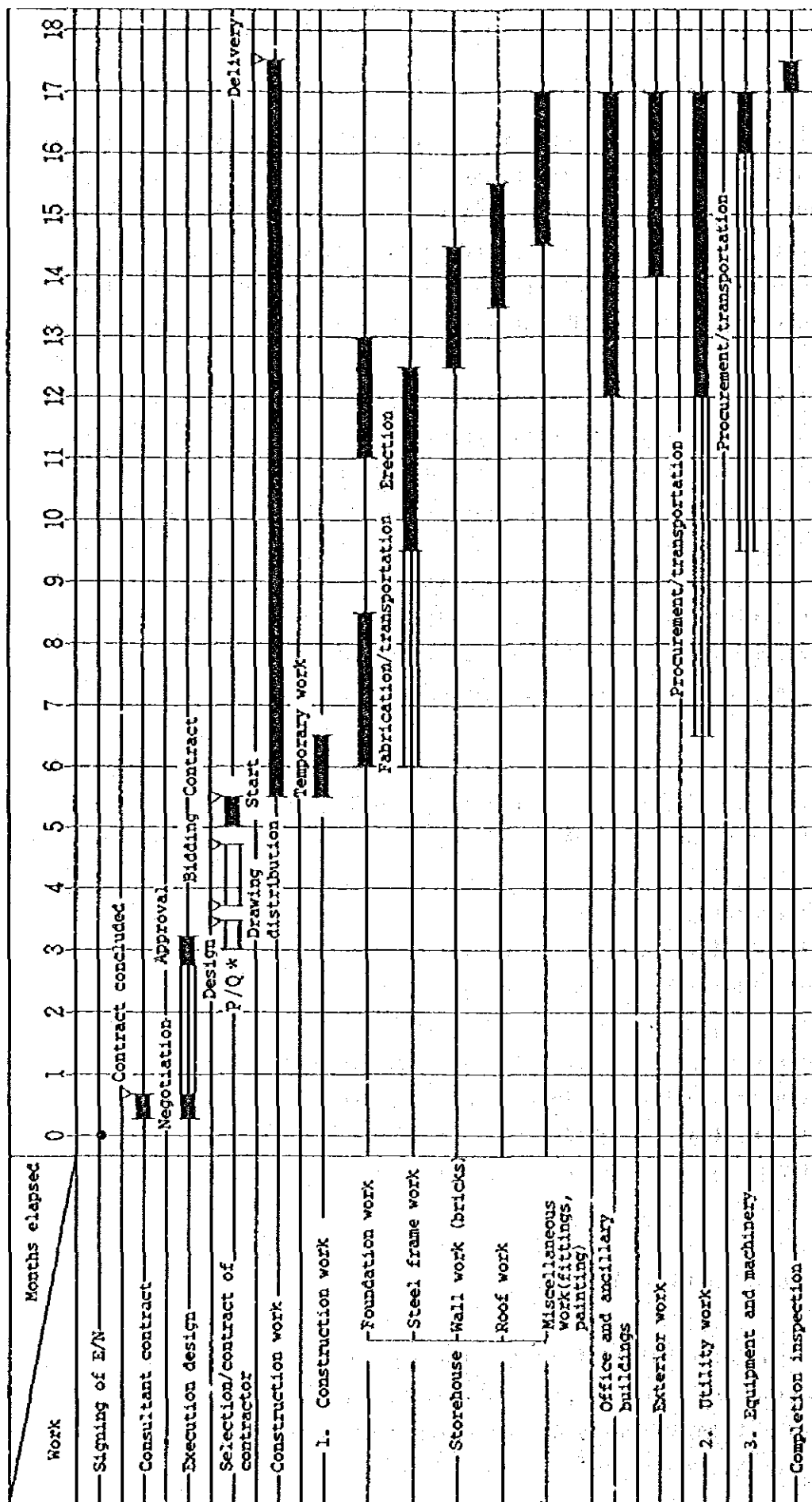
In Zambia, it rains greatly from December to March and this rainy season presents a major problem for outdoor work and the transportation of goods. The work schedule is therefore planned so that outdoor work and work that requires transportation of a huge amount of materials will not be done during this period. As the soil contains laterite, soil-related work including earth work, foundation work, etc. should be planned not to coincide with the rainy season.

Sources of domestic materials suitable for permanent structures in particular are limited in Zambia. Therefore, scheduling of domestic transportation of such domestic materials and the security of supply of skilled laborers are important considerations in execution.

5.4 EXECUTION SCHEDULE

Based on the results of study on six proposed construction sites (3-2-7 Selection of Proposed Sites), execution schedule is prepared for Kalomo and Mumbua which are considered to have a higher urgency.

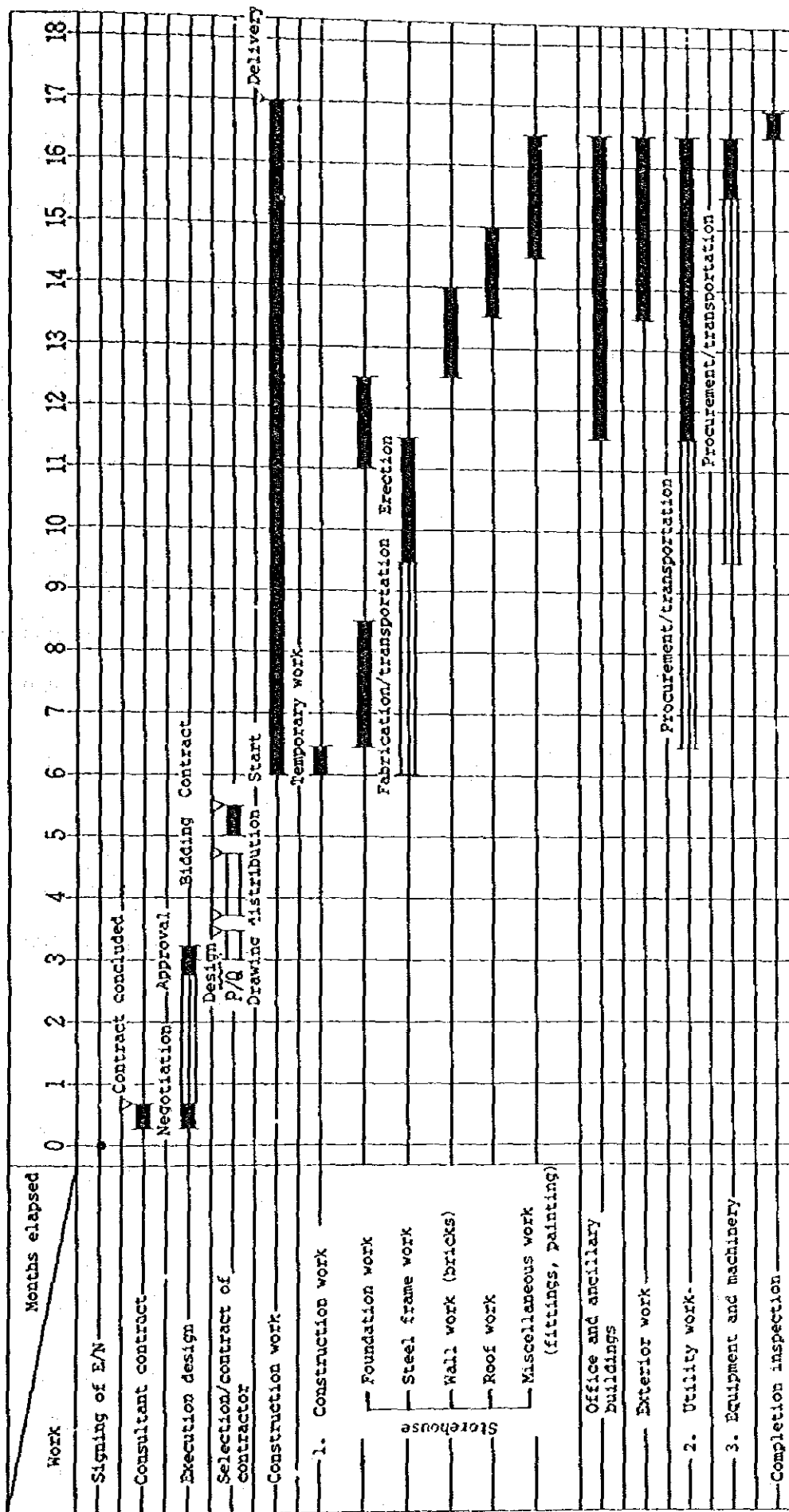
Progress Schedule (Kalomo)



* Prequalification of Tenderers

Note) Work in Japan
 Work at site

Progress Schedule (Mumbwa)



Note) Work in Japan
 Work at site

* Prequalification of Tenderers

5-5 ESTIMATED CONSTRUCTION COST

In this Project, a storehouse with a capacity of 10,000 tons and another of 5,000 tons will be constructed in Kalomo of Southern Province and in Mumbwa of Central Province, respectively.

The cost to be borne by the Government of Zambia is expected to be approximately 19,800,000 yen.

Breakdown

(Unit: Yen)

Item	Construction site	
	Kalomo	Mumbwa
1. Site preparation	8,200,000	6,400,000
2. Lead-in of electricity, water, telephone	1,000,000	700,000
3. Lead-in of electricity, water, and telephone lines for temporary facilities	2,000,000	1,500,000
Total	11,200,000	8,600,000
Grand total		19,800,000

(1,100,000 Kwacha)

5-6 OPERATION AND MANAGEMENT PLAN

The grain storehouses have been planned to be fully operable by the present staff. Therefore, it is judged that the staff will require no particular additional training.

The equipment and machines selected this time are generally uncomplicated. Thus, as long as standard operations are performed, there should be no operational and management problems. With regard to conveyors, truck scales, sewing machines for bags, and power generators, however, thorough training is required at the time of hand-over so that the staff will be capable of replacing at least consumables (prepared for two years' consumption) at each depot. The staff, mainly those who are in charge of equipment, will learn the correct daily handling of the equipment and how to carry out regular inspections. In addition, because of the characteristics of storehouses, the actual operation time of each piece of equipment during a year is very limited, requiring special precautions for equipment storage.

CHAPTER 6. EVALUATION OF PROJECT

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This project has been planned by the Government of Zambia to reduce, to the greatest extent possible, grain losses in the distribution stage in which grain has traditionally been stored outdoors. It is designed to construct full-scale maize storehouses in key production centers of the country as part of Zambia's grain storehouse construction program currently in progress. Food grain storehouses have been built in key distribution centers of the country with economic assistance from Japan and Canada and at present their total storage capacity reaches 304,000 t. In 1986, however, the volume of maize purchased by NAMB was 954,500 t and, in view also of the policy of the Government of Zambia which emphasizes agriculture and increased agricultural output, the storage capacity is not yet sufficient nor is it perfectly balanced among the provinces. Hence, the construction of full-scale storehouses in key production centers of the country and the development of new grain distribution centers is considered to make a great contribution to the improvement of grain distribution in the Republic of Zambia.

In this project, the storehouses to be constructed will have the same specifications as those which have already been constructed with the assistance of Japan. Since their function was thoroughly examined in the two previous studies and in the design stage, the storehouses, as well as the cargo handling equipment and test apparatuses granted as part of the project, should prove sufficient to store grain without deterioration and to supply consumers with high quality grain.

CHAPTER 7. CONCLUSION AND RECOMMENDATIONS

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The objectives of the present request to construct storehouses in key production areas include the collection of food grain after the harvest as speedily as possible, its storage without quality deterioration under optimum storage conditions, and improvements in the preparations for its shipment to consumer markets. Therefore, the conditions determining the selection of storehouse construction in production areas are affected by the volume of grain output, storage capacity, transportation problems, etc., in each area. The scale of such grain storehouses is further determined by factors related with the volume of grain delivered to and shipped from a given storehouse and, ideally, should be determined after a review of future plans and of the likely developments of these factors.

After a preliminary review of the state of grain distribution and construction in the ten candidate sites proposed by the Government of Zambia, the surveys of Thendere and Muyombe in Northern Province, Mansa in Luapula Province and Lundazi in Eastern Province were shelved. The construction of a storehouse in Kabwe-East in Kabwe District, Central Province, was also suspended because of its location and grain distribution conditions. Although a leading producer of maize in Zambia, Kabwe District in Central Province has a relatively low ratio of storehouse ownership. To cover Kabwe District, therefore, Kapiri-Mposhi was proposed in place of Kabwe-East.

Results of the review of the 6 candidate sites including Kapiri-Mposhi follow:

(1) Kalomo

Located along the Zambia Railways line connecting Lusaka and Livingstone, Kalomo is an important place for grain collection since it acts as a base for production and distribution in Southern Province, the major maize producing province. At present, there are no grain storehouses in Kalomo and all the harvested maize is

stored outdoors. Thus, construction of a maize storehouse is urgently required.

(2) Kaoma

The NAMB is eager to construct a new base here as a depot to collect grain in Kaoma District, one of the major producers of grain in Western Province, and as a receiving depot since it is a major transit point of traffic from Central and Eastern Provinces. Presently, the need for a storehouse is not large enough to justify the requested storage capacity of 10,000 tons, but if the construction scale is reduced to a capacity of 5,000 tons, then the construction of a storehouse can be evaluated highly.

(3) Mumbwa

Facing a major road connecting Lusaka and Western Province, Mumbwa is important as a base for production and distribution for Central Province, a major maize producer. There already exist storehouses with a capacity of 10,000 tons constructed with the financial assistance of the Government of Canada. However, the construction of a storehouse with a 5,000 ton capacity instead of the requested 10,000 tons is considered to be urgently necessary, in view of the grain distribution and location conditions.

(4) Masansa

A depot for production areas in Mukushi District of Central Province, Masansa is a major maize production area in Zambia. At this depot, there is a storehouse with a capacity of 5,000 tons constructed with grant aid from the Government of Japan. However, because of the volume of maize expected to be collected at this depot, construction of storehouses with a capacity of 10,000 tons is necessary. As the proposed site is located some distance from a trunk road and is close to the production areas, its need for a storehouse is below that of Kapiri-Mposhi in the same Central Province.

(5) Kapiri-Mposhi

Located at the junction of Zambia Railways and the Tanzam Railway, Kapiri-Mposhi is an important distribution base adjacent to a national highway connecting Lusaka and Copperbelt, both large consumption areas. At present, the site does not have a grain storehouse, and all the maize is stored outdoors. Maize storehouses are therefore urgently necessary.

(6) Katete

Eastern Province ships more than 95% of the grain handled by the NAMB to other provinces. Consequently, an ideal receiving/shipping model shows that the required storage capacity will be smaller than the volume handled. In consideration of the inventory level determined during the site survey, despite there being a 5,000 ton storehouse at this depot constructed with the financial assistance of the Government of Canada, construction of an additional 5,000 ton storehouse is deemed necessary.

From the above, the urgency and capacity of the proposed construction sites have been established as follows:

Urgency	Proposed construction site	Requested capacity	Decided capacity
1	Kalomo	10,000 t	10,000 t
2	Mumbwa	10,000	5,000
3	Kapiri-Mposhi	-	10,000
4	Kaoma	10,000	5,000
5	Masansa	10,000	10,000
6	Katete	5,000	5,000

From the above study results, two storehouses with a capacity of 5,000 tons each, total capacity of 10,000 tons, in Kalomo in Southern Province and a storehouse with a capacity of 5,000 tons in Mumbwa in Central Province will be constructed in this Project. The Study Team proposes that grain storehouses be constructed in order of the urgency of each proposed site as described above.

An understanding of the production and distribution conditions of the areas in which grain storehouse will be located is important for selecting the construction sites for grain storehouses and for determining their scale. Through such understanding, the distribution system can be predicted. However, at present the compilation of statistical data and information necessary to understand production and distribution conditions is not thoroughly done in Zambia.

The Study team proposes that, together with the construction of grain storehouses, a planned system of control over distribution including production, transportation, and consumption be established and that the statistical data and information necessary for such control be prepared.

Furthermore, for the construction of grain storehouses on a national scale, a plan that considers the future must be prepared and implemented effectively. In doing so, an overall future plan including data for production, imports, distribution, consumption, and stockpiling of food as well as consideration of population statistics, nutrition levels and transportation conditions must be thoroughly formulated. For the future, the Study Team proposes that sites for grain storehouses be determined through studies of and improvements in the entire grain distribution system, not by simply analyzing the actual distribution of maize or by creating storehouse construction plans.

In closing, it is hoped that this project will be executed successfully, the completed storage facilities will be fully utilized by the Government of Zambia, and the project will help Zambia promote its agricultural policy.

APPENDIX

- APPENDIX:**
- 1. Members of the Study Team**
 - 2. Schedule of Basic Design Study**
 - 3. List of Persons Interviewed**
 - 4. Minutes of Discussions**

APPENDIX-1

Members of the Study Team

Team leader	General	Hajime Ishii	Senior Officer for Storage Technique, Food Agency, the Ministry of Agriculture and Forestry
Team member	Planning and Supervising	Osamu Kosegawa	First Basic Design Study Division, Grant Aid Planning & Survey Department, The Japan International Cooperation Agency
Team member	Chief Engineer	Mikio Kasajima	DAIKEN Architects & Engineers, INC.
Team member	Architectural Planner	Toshio Kimura	DAIKEN Architects & Engineers, INC.
Team member	Food Grain Distribution Planner	Koji Fukuchi	Overseas Merchandise Inspection Co., Ltd.

APPENDIX-2

- Schedule of Basic Design Study -

Date	Representatives of Government		Members of Consultant	
	Time	Study details	Time	Study details
Sept. 16 (Wed.)			21:30	Depart from Tokyo JL 415.
Sept. 17 (Thur.)			10:00	Arrive in Rome.
			22:15	Depart from Rome QZ 005.
Sept. 18 (Fri.)			06:30	Arrive in Lusaka.
			11:00	Courtesy call to the Embassy of Japan.
			14:30	Visit NAMB Office, explain purpose and schedule of survey, and request for arrangement of site surveys.
			16:00	Courtesy call to JICA Office.
Sept. 19 (Sat.)				Preparation for survey.
				Collect information.
Sept. 20 (Sun.)			07:00	Depart from Lusaka.
			09:00	Arrive at Mumbwa Storehouse proposed site.
				Site survey.
			14:00	Depart from Mumbwa.
			16:00	Arrive in Itezhi Tezhi, stay overnight.
Sept. 21 (Mon.)			07:30	Depart from Itezhi Tezhi.
			11:30	Arrive at Kaoma Storehouse proposed site.

Date	Representatives of Government		Members of Consultant	
	Time	Study details	Time	Study details
Sept. 21 (Mon.) (Cont'd)				Site survey.
			14:30	Depart from Kaoma
			16:30	Arrive in Mongu, stay overnight.
Sept. 22 (Tue.)			08:00	Visit to the NAMB Mongu local office and meeting.
			09:00	Depart from Mongu.
			11:00	Arrive in and depart from Kaoma.
			15:00	Arrive in and depart from Mumbwa.
			17:00	Arrive in Lusaka.
Sept. 23 (Wed.)			09:30	Visit the Ministry of Construction. Request investigation of construction unit price.
			11:00	Collect data and information at the Government Printing Office, etc.
			14:00	Collect data and information for construction.
Sept. 24 (Thurs).			08:00	Depart from Lusaka.
			14:00	Arrive in Livingstone.
			15:00	Visit the NAMB Livingstone local office for a meeting.
Sept. 25 (Fri.)			07:00	Depart from Livingstone.
			09:00	Arrive at Karomo Storehouse proposed construction site. Site survey.
			12:30	Depart from Karomo.

Date	Representatives of Government		Members of Consultant	
	Time	Study details	Time	Study details
Sept. 25 (Fri.) (Cont'd)			14:30	Visit the NAMB Monze local office.
			16:00	Depart from Monze.
			18:00	Arrive in Lusaka.
Sept. 26 (Sat.)			09:00 to 14:00	Meeting at the NAMB Engineering Office.
Sept. 27 (Sun.)	11:45	Depart from Tokyo AF 269	10:00 to	Compile of data and information and prepare layout drawings (Draft) for Kaoma.
	18:20	Arrive in Paris	15:00	
Sept. 28 (Mon.)			07:00 to 08:30	Depart from Lusaka. Visit the NAMB Kabue local office for a meeting.
			10:00	Arrive at Kabue Storehouse proposed site.
				Site survey.
			14:00	Depart from Kabue.
			15:00	Arrive in Kapiri-Mposhi.
				Site survey.
			17:00	Depart from Kapiri-Mposhi.
	23:25	Depart from Paris U 745.	19:30	Arrive in Lusaka.
Sept. 29 (Tue.)	12:15	Arrive in Lusaka.	10:00 to	Meeting at NAMB Engineering Office.
	14:30	Courtesy call to the Embassy of Japan.	13:00	
			15:00 to 17:00	Meeting at NAMB Head Office.
Sept. 30 (Wed.)	09:00	Courtesy call to NAMB.	09:00 to 12:00	Meeting at NAMB Engineering Office.
	14:00	Courtesy call to JICA Office.	15:00 to 17:00	Meeting at NAMB Head Office.

Date	Representatives of Government		Members of Consultant	
	Time	Study details	Time	Study details
Oct. 1 (Thur.)	07:00	Depart from Lusaka	07:00	Same as left.
	13:00	Arrive at Katete Store-house proposed site. Site survey.	13:00	Same as left.
	15:00	Depart from Katete.	15:00	Same as left.
	16:00	Visit NAMB Chipata local office for a meeting.	16:00	Same as left.
	17:00	Depart from Chipata.	17:00	Same as left.
	19:00	Arrive in Petauke and stay overnight.	19:00	Same as left.
Oct. 2 (Fri.)	09:00	Depart from Petauke.	09:00	Same as left.
	10:00	Arrive in Mtirizi, visit a storehouse.	10:00	Same as left.
	11:00	Depart from Mtirizi.	11:00	Same as left.
	15:30	Arrive in Lusaka.	15:30	Same as left.
Oct. 3 (Sat.)			09:00 to 12:00	Meetings at the NAMB Engineering Office and
	14:00	Team meeting.	14:00	Same as left.
Oct. 4 (Sun.)	10:00	Prepare of Minutes of Discussions (Draft)	10:00	Compile data and information collected and prepare layout drawings (Draft) for Kapiri-Mposhi and Katete sites.

Date	Representatives of Government		Members of Consultant	
	Time	Study details	Time	Study details
Oct. 5 (Mon.)	09:00	Visit the NAMB and discuss the Minutes of Discussion.	10:00	Visit the Ministry of Construction. Collect data and information on construction unit prices.
	16:00	Visit the Embassy of Japan. Report the study results to Mr. Saito, the Ambassador.	11:00 to 13:00	Visit the NAMB Head Office for a meeting.
Oct. 6 (Tue.)	09:00	Visit NAMB and sign the Minutes of Discussion.	09:00	Attend the signing of the Minutes of Discussion.
	10:30	Report the results of study at JICA office.	10:30	Same as left.
	19:00	Attend dinner sponsored by JICA.	19:00	Same as left.
Oct. 7 (Wed.)	22:50	Depart from Lusaka QZ 7004.	22:50	Same as left.
Oct. 8 (Thur.)	07:30	Arrive in Frankfurt.	07:30	Same as left.
	09:30	Depart from Frankfurt.	09:30	Same as left.
	10:15	Arrive in Dusseldorf, stay overnight.	10:15	Same as left.
Oct. 9 (Fri.)	14:45	Depart from Dusseldorf JL 436	14:45	Same as left.
Oct. 10 (Sat.)	16:00	Arrive in Tokyo	16:00	Same as left.

APPENDIX-3

List of Officials Concerned

1. Officials of the Government of Zambia

. NAMB

Head Office in Lusaka

Major General, C.J. Nyirenda	Acting General Manager
Mr. M.A. Sichali	Grains Marketing Manager
Major B.C. Chibanda	Engineering Service Branch
Mr. Leman Mpokosa	Engineering Service Branch
Mr. K.C. Nsokolo	Engineering Assistant
Mr. J.M. Chirwa	Chief Grains Marketing Officer

Branch office

. Mongu

Mr. K.A. Kamuwahga	Branch Manager
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. Kaoma

Mr. M.M. Lsulo	Depot Manager
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. Livingstone

Mr. Exon S. Shema	Branch Manager
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. Monze

Mr. A.N. Tembo	Branch Manager
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. Kabwe

Mr. D.M. Manda	Branch Manager
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. Kapiri-Mposhi

Mr. Richard Sindwa Lisinba	Depot Manager
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. Chipata

Mr. J.J. Lungu	Branch Manager
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. Katete

. Mtirizi

. Cooperative Union

. Kaoma

Mr. N. Mufungulia

District Manager

. Kabwe

Mrs. T.M.M. Mvula

Acting Provincial Marketing
and Cooperative Officer

. Western Province Government

. Kaoma

Mr. H.L. Mushokabani

District Administrative
Secretary

2. Embassy of Japan

Mr. T. Saiki

Ambassador Extraordinary
and Plenipotentiary

Mr. Y. Imagawa

Counsellor

Mr. K. Ishida

First Secretary

Mr. Y. Kitamura

Second Secretary

3. JICA

Mr. K. Tomita

Resident Representative

Mr. R. Kojima

Assistant Resident
Representative

APPENDIX-4 Minutes of Discussions

MINUTES OF DISCUSSIONS

ON

THE CONSTRUCTION PROJECT OF FOOD GRAIN STOREHOUSES
IN THE REPUBLIC OF ZAMBIA

In response to the request made by the Government of the Republic of Zambia for assistance in constructing Food Grain Storehouses (hereinafter referred to as "the Project"), the Government of Japan has sent through the Japan International Cooperation Agency (JICA), a Study Team headed by Mr Hajime Ishii, Senior Officer for Storage Technique Food Agency, Ministry of Agriculture, Forestry and Fisheries, to conduct the Basic Design Study on the Project from September 18th to October 7th, 1987.

The team held a series of discussions and exchanged views with the relevant authorities of the Government of the Republic of Zambia. As a result of the study and discussions, both parties have agreed to recommend to their respective Governments to examine the result of the survey attached herewith, toward the realization of the Project.

October 6th 1987

Hajime Ishii

HAJIME ISHII
TEAM LEADER
JICA STUDY TEAM

for / [Signature]

MAJOR GENERAL C J NYIRENDA DFS(RTD)
GENERAL MANAGER
NAMBOARD

1. MAJOR POINTS OF UNDERSTANDING BY BOTH SIDES ARE AS FOLLOWS:

1. The objective of the Project is to provide Food Grain Storehouses with appropriate storage capacity and equipment for the National Agricultural Marketing Board (Namboard).
2. Out of the requested sites by the Government of the Republic of Zambia, the Japanese Study Team made a site survey of Mumbwa, Kaoma, Kalomo, Kabwe East and Katete, and the Team is convinced that the construction of storehouses at the mentioned-above sites except Kabwe East will bring about remarkable effects in improving grain distribution in the regions, and minimise post harvest losses.
3. In view of the maize distribution conditions in Kabwe East region and peripheral environments of the proposed site, it is of the Team's opinion that the justification of the construction of storehouses at Kabwe East is not convincing for the grant aid.
4. The Team is also convinced that the construction of storehouse at Masansa is necessary even though one shed has been already constructed by the Government of Japan.
5. The Japanese Study Team will convey the request of the Government of the Republic of Zambia to the Government of Japan, that the latter will extend Grant Aid for the construction of Food Grain Storehouses within the scope of the Japanese economic cooperation in Grant Form.
6. The Japanese Study Team is assured of the justification and of the effects to construct the storehouses at Mumbwa, Kaoma, Kalomo, Katete and Masansa as a result of the recent survey on the maize distribution condition, peripheral environments and others, within the scope of the Japanese economic cooperation in Grant Form.

7. The Optimum layout, scale and capacity, structure and order of priority of the sites will be formulated in Japan after analysing collected data and information, and it will be proposed in the Basic Design Study Report.
8. Equipment when deemed necessary for the operation of the storehouses will be taken up under the grant aid.
9. The Government of the Republic of Zambia will undertake the necessary measures (as described in II), on condition that the grant aid by the Government of Japan is extended to the Project.
10. Both sides have confirmed that the Japanese Study Team explained Japan's Grant Aid Programme, and that it was fully understood by the Zambian side.

II. Required arrangements to be undertaken by the Government of the Republic of Zambia.

1. To secure land necessary for the construction of the facilities and to clear, fill and level the site as needed before the start of construction.
2. To provide facilities for distribution of electricity, telephone, water supply and drainage and other incidental facilities outside the building.
3. To construct and prepare the access road to the Project site.
4. To ensure prompt unloading, tax exemption and customs clearance at ports of disembarkation in Zambia and proper internal transportation therein of construction materials and equipment purchased under the grant.
5. To exempt Japanese nationals engaged in the Project from custom duties, internal taxes and other fiscal levies which may be imposed in Zambia with respect to the supply of the products and services under the verified contracts.
6. To accord without delay to Japanese nationals whose services may be required in connection with the Project under the verified contracts such facilities as may be necessary for their entry into Zambia and they stay therein for the performance of their work.
7. To maintain and use properly and effectively the facilities constructed and equipment purchased under the grant aid.
8. To bear all the expenses, other than those to be borne by the grant, necessary for the construction of the facilities.
9. To undertake incidental civil works such as planting and fencing, if needed.

10. To provide the space necessary for such construction as temporary office, working areas, stock yards and others.
11. To ensure that temporary electric power and water supply are made available for the construction and incidental activities relative to the project.

JICA