SOMALI DEMOCRATIC REPUBLIC
MOGAMBO IRRIGATION PROJECT

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Mogambo Rice Mill Feasibility Study Preliminary Report

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FEASIBILITY STUDY OF A RICE MILL AT MOGAMBO

INTERIM REPORT

1. INTRODUCTION

This Report summarizes the studies made to date to identify requirements and costs for the proposed rice mill at Mogambo. It covers:

- the present and projected production of rice in southern Somalia;
- the present levels of imports of rice into Somalia;
- an assessment of the existing rice milling facilities;
- an assessment of the required capacity of a mill at Mogambo at completion on Phase II;
- an assessment of the required capacity of storage, drying and ancilliary equipment
- and an assessment of plant costs.

A two week visit was made to the major rice growing areas in the Middle and Lower Shabelle and Middle and Lower Juba Regions. Data was collected from agencies in Mogadishu including the Agricultural Development Corporation (ADC), Ministry of Agriculture: Crash Programme, Settlement Development Agency (SDA), the Ministry of National planning, the National Foreign Trading Agency (ENC) and Commercial Bank of Somalia. Basic economic data was also collected on import duties, port handling charges, transport costs and current levels of wage rates for skilled, semi-skilled and unskilled labour.

Plant requirements and costs were concurrently assessed by staff working in the United Kingdom.

2. PRESENT AND PROJECTED PRODUCTION OF RICE

Table 1 summarizes the 1981 and 1982 areas of rice cultivated and gives an assessment of the expected rice area by 1990. It also gives an estimate of the quantity of rice produced during 1981. The data for the 1982 der season and 1990 are target areas, obtained either from the scheme managers, the agency responsible, or in the case of some of the 1990 estimates, the appropriate planning report. Of the schemes listed, the Barro Uen and Fanoole State Farms and the settlement schemes at Kurtumware and Sablale, will almost

TABLE 1. Present and Projected Areas of Rice Cultivation in Southern Somalia

Scheme	1981 gu (ha)	1981 der (ha)	1981 Production unmilled rice (tonnes)	1982 gu (ha)	1982 der (ha)	1990 (ha)
1. Jowhar Crash Programme	80	-	160	4	-	300
2. Jowhar: Barro Uen State Farm	48	200	1,240	108	200	1,000
3. LIBSOMA: Afgoi Mordile	-	-	-	-	-	1,500
4. Qoryooley project	-	-	-	-	-	1,600
5. Kurtumware Settlement	171	112	321	309	550	1,200
6. Sablale Settlement	110	170	358	176	-	1,200
7. Awai Crash Programme	500 (1)	500 (1)	2,000 (2)	-	1,000	3,500
8. Awai Custodial Corp.	small area		-	small area		NA
9. Brava Military Marines	10 (3)	10 (3)	40 (3)	15		NA
10. Fanoole State Farm	64	64	665	100	100	7,500
11. Mogambo	-	-	-	-	-	3,078
TOTAL	983	1,056	4,784	714	1,850	20,878

Source: Consultants visits to schemes and agencies responsible for schemes.

Notes : (1) Crash Programme Director's estimate

(2) Yield estimate is not consistent with milling returns (see Table 2)

(3) Consultants estimate.

TABLE 2. Milling Returns from Crash Programme Mill at Shalambod (1978-82)

Scheme	1978	1981	1980	1981	1982 (1)
			(Quintals of milled rice)		
Jowhar Crash Programme	319	387	237	-	30
LIBSOMA (Afgoi)	2,052	107	901	-	-
Shalambod Crash Programme	41	52	-	-	-
Genale Crash Programme	-	134	26	-	-
Genale Farm	752	-	-	-	-
Kurtumware Settlement	358	1,120	1,644	613.5	127
Sablale Settlement	1,438	1,815	2,067	226	-
Awai Crash Programme	3,253	1,958	2,051	846	77
Awai Custodial Corps.	-	-	-	-	46
Brava Military Marines	58	194	295	315	265
Jelib Crash Programme	224	94	-	-	-
Fanoole Project	1,233	1,652	-	-	-
Kismayo Municipal	103	-	-	-	-
Private Grower	-	-	11	-	-
ADC Shalambod (2)	-	-	-	1,032	387
TOTAL	9,831	7,513	7,232	3,032	932

Source: Crash Programme Mill Shalambod.

Notes : (1) Quantity purchased in July 1982

(2) ADC mill unable to handle this amount.

TABLE 3. ADC Purchases of Milled Rice (1) 1978-81 (tonnes)

Area	Year			
	1978	1979	1980	1981
		(quintals)		
Jowhar	2,084	3,106	378	1,368
Afgoi	518	-	-	-
Shalambod	7,825	6,517	5,612	2,645
Baroawe	-	-	-	1,247
Jelib	-	-	285	3,070
Kismayo	-	581	-	-
	10,427	10,204	6,275	8,330

Source: ADC Headquarters, Mogadishu.

Notes : (1) Paddy and Upland combined.

certainly be increasing the area of rice cultivated annually. There is little doubt, however, that the area planted to rice and the country's production of rice has declined over the past five years. The LIBSOMA farm which planted about 324 ha of rice in the 1975 der season, and a number of other significant rice producing areas (Jamame, Jelib, Genale, and Shalambad Crash Programmes) are no longer planting the crop. This recent decline in production is confirmed by the milling returns over the last five years from the rice mill operated by the Crash Programme at Shalambad (Table 2) and from the ADC purchases of milled rice (Table 3)

The reasons given for the fall off in production are numerous and include bird damage, weeds, lack of agri-chemicals and machinery. Despite this there is considerable evidence at Fanoole and Barro Uen that rice can be grown successively and high yields obtained where there is strong and determined management. It is quite likely that decline has probably been arrested and that from 1982 onwards there will be steady progress towards the 1990 target area.

3. IMPORTS OF RICE

For the last decade Somalia has been a major importer of rice - importing on average about 25 000 tonnes between 1972 and 1977. Since then imports have risen markedly exceeding 100 000 tonnes in 1980. Compared with the other cereals, rice imports generally exceed imports of sorghum, are of a similar order to wheat imports but are slightly less than maize. Prior to 1980 the majority of imports were handled by the National Foreign Trading Agency (ENC). Since then private imports handled through the Commercial Bank of Somalia have become more important. Table 4 summarizes imports of rice from 1978.

TABLE 4. Rice Imports 1978-82 (metric tonnes)

	Year				
	1978	1979	1980	1981	1982 (1)
National Foreign Trading Agency	33 154	76 269	62 324	42 468	NA (2)
Private			41 620	24 777	13 870
TOTAL	33 154	76 269	103 944	67 245	13 870

Source: National Foreign Trading Agency (ENC) and Commercial Bank of Somalia: International Division

Notes: (1) Data available at July 1982

(2) Very little rice imported by ENC in 1982

4. EXISTING RICE MILLING FACILITIES

There are four rice mills currently operating in southern Somalia. One is of Chinese manufacture and is installed at the Barro Uen State Farm. The other three are exactly similar in design and potential milling capacity, and are manufactured by Columbine of Italy. Two of these mills, one operated by the Crash Programme and another by ADC, are located in Shalambad, whilst the third is located at Jelib and is operated by ONAT. The mills are described briefly in the following paragraphs.

(a) The Chinese Mill at Barro Uen

The mill was built in 1980 and has a capacity of one tonne of milled rice per hour or around 2 400 tonnes per year assuming a 300 day working year and an 8 hour working day. So far the mill has only had to work for six months in the year and for 5 hours per day to cope with the farm's current crop. The mill would be prepared to mill rice for outside growers at a charge of around 10/= per quintal to cover the incremental costs of power and labour. The milled rice is sold to ADC and the bran is given to the military. Before milling the rice is sun-dried on a concrete slab and stored in three warehouses each with a 500 tonne storage capacity. Overall the mill appears to be well-organised, well-maintained and its operations do not appear to be impeded by the lack of spare parts.

(b) Crash Programme Mill at Shalambod

This mill was built in 1976 and is probably the most efficiently operated of the three Italian mills. It has a mixiмum capacity of 8-10 quintals of milled rice per hour or around 2 000 tonnes per year. Lack of spare parts and delays in making repairs have meant that its current effective capacity is well below this and probably in the order of 4 quintals per hour. The mill's throughput has dropped (see Table 2) from almost 1 000 tonnes in 1978 to just over 300 in 1981. The mill has provided a service for growers from as far north as Jowhar to Brava in the south. It comprises a sequence of intake pit, cleaner, dehusker, separator, two polishers, a grader and a bagging hopper.

All rice milled is sold to ADC. Milling charges have been raised this year to 60/= per quintal from 30/= in 1981. The milling out percentage

is 70 of which 15 percent is broken grains. Bran amounts about 4 percent and is sold for 40/= per quintal.

Good milling records are readily available.

(c) ADC Mill at Shalambod

There is some doubt as to when this mill started operating. Records of operations were only available from March 1981. It is exactly the same type and design as the Crash Programme mill and should have the same maximum capacity of 8-10 quintals of milled rice per hour. However, for mechanical reasons, it has only been able to produce between 3 and 3.5 quintals of milled rice per hour. Breakdowns are frequent and there is great difficulty in obtaining spare parts. Since March 1981 the mill has produced about 160 tonnes of whole milled rice and 22 tonnes of broken grains. In 1981 it was unable to mill some 103 tonnes (see Table 2) which were sent to the Crash Programme mill.

(d) ONAT Mill at Jelib

This mill is the same type and maximum capacity as the two at Shalambod. It was built in 1977 but did not commence milling until 1979. It is currently operating well below capacity producing around 6 quintals of milled rice per hour. It suffers from the same major problems as the mills at Shalambod, namely great difficulty in obtaining spare parts and long delays in effecting repairs. Records of throughput could not be made available for the operations from 1979 to September 1981. From September 1981, however, the mill has produced 110 tonnes of milled rice. Current charges for milling are 30/= per quintal. This charge is unchanged from last year. Prior to that 24/= per quintal was charged.

The combined maximum capacity of the four mills is just under 4 tonnes of milled rice per hour, or about 8 000 tonnes per year. Of the three, however, only the Barro Uen Mill is capable of working to capacity. Taking account of the reduced working capacities of the others and the prolonged down time due to lack of spares, the effective milling capacity is probably in the order of 4 000 tonnes of milled rice per annum, enough to cope with the estimated production in 1981. If

production increases (i.e., expanding areas in Barro Uen, Afgoi, Kurtumware, Sablale, Fanoole and Mogambo) as expected over the next three or four years, it is extremely unlikely that the existing mills operating at their present levels of efficiency could cope. Furthermore, there is no reason to believe that the efficiency of the three mills south of Mogadishu will improve dramatically in the future.

5. POSSIBLE NEW MILLING FACILITIES

Apart from the feasibility study carried out in 1979 for a new mill at Afgoi (2 tonnes of unmilled rice per hour), the only other possible new mill which we have been advised of, is a mill at the Fanoole State Farm. The capacity of this mill for which construction may commence next year, is not yet decided, although we were advised by the Farm Manager (Chinese) that it would have a little extra capacityfor milling non-Fanoole Farm rice. If this is the case, it is unlikely that Mogambo could rely solely on the new Fanoole mill as Mogambo's production will ultimately be around half of that anticipated at Fanoole at full development.

6. A RICE MILL AT MOGAMBO

From the foregoing it is inevitable that a rice mill will ultimately be required at Mogambo. The questionswhich remain to be resolved are the timing, capacity and economic feasibility of establishing a mill. The timing of construction will depend upon the build up in production of rice at Mogambo and upon spare capacity which can be relied upon at Jelib. There is unlikely to be any spare capacity in the Shalambad mills and in any case they are probably too far away to make milling there a viable option. The major question therefore is will a new mill be built at Fanoole, if so what will be it's capacity and when will it be built? Plans for the Fanoole mill are not advanced enough to provide this information.

In this section, therefore, the capacity of mill required for Mogambo is assessed together with the requirement for drying and storage facilities. The timing or phasing of installation of milling capacity will influence the economic viability of the mill and the main alternatives will be considered in the economic analysis.

6.1. Build-up in Rice Production

The scheme at Mogambo is currently being developed in line with Development Alternative A from the Additional Study, March 1980[1]. This envisages the establishment of 2 052 ha of surface irrigated land together with 163 ha of sprinkler irrigation as a first Phase. The fully developed area is expected to be 6 430 ha as outlined in the Supplementary Study of 1979[2], consisting of approximately 3 330 ha of surface irrigation and 3 100 ha of sprinklers. In addition, an area of 1 000 ha of sprinkler irrigated upland is planned for upland rice production.

Two crop rotations are being considered, as given in Section 3.1 of the Additional Study. These are reproduced below:

Crop Rotation 1.

Surface irrigation:	100% paddy rice (gu season)
	70% maize (der season)
Sprinkler irrigation:	100% cotton (der season)

Crop Rotation 2.

Surface irrigation:	75% paddy rice (gu season)
	75% paddy rice (der season)
Sprinkler irrigation:	100% cotton (der season)

[1] Additional Study for an Alternative Development, Sir M. MacDonald & Partners Ltd., March 1980.

[2] Supplementary Feasibility Study, Sir M. MacDonald & Partners Ltd., August, 1979.

The cropped areas for the various alternatives being considered are, therefore, as follows:

Crop Rotation 1		Crop Rotation 2
Phase I		
Surface	2052 ha. paddy rice (gu season)	1539 ha. paddy rice (gu season)
" "	1458 ha. maize (der season)	1538 ha. paddy rice (der season)
Sprinkler	163 ha. cotton (der season)	163 ha. cotton (der season)
Phase II without upland development		
Surface	3321 ha. paddy rice (gu season)	2491 ha. paddy rice (gu season)
" "	2325 ha. maize (der season)	2491 ha. paddy rice (der season)
Sprinkler	3100 ha. cotton (der season)	3100 ha. cotton (der season)
Phase II with upland development		
Surface	3321 ha. paddy rice (gu season)	2491 ha. paddy rice (gu season)
" "	2325 ha. maize (der season)	2491 ha. paddy rice (der season)
Sprinkler	2000 ha. maize (der season)	3100 ha. cotton (der season)
" "	1100 ha. cotton (der season)	
" "	998 ha. upland rice (gu season)	998 ha. upland rice (gu season)

Expected yields have been taken from the Supplementary Feasibility Study Table 4.1 as follows:

Season	Crop	Yield. tonne/ha.
Gu	Paddy Rice	4.0
	Upland Rice	3.0
Der	Paddy rice	4.0
	Maize	4.0
	Cotton - hand picked	2.5
	Cotton - machine picked	2.0

For the build-up in paddy rice production and milled equivalent, two rates of build up in yield have been considered:

- a conservative rate similar to that used in the Additional Study which assumes that each years' incremental area will require four

years to reach a maximum yield of 4 tonnes per ha.

- an optimistic rate which maximum yields are reached within 4 years of starting to grow rice.

Tables 5 and 6 summarise the build up in unmilled and milled rice production for Phase I options above respectively. Milled production has been calculated on a milling-out percentage of 70% at this stage of the Study.

Finally, production at full development of the scheme, ie, completion of Phase II is estimated. If Phase II is developed and cropping pattern 1 is adopted, the area of paddy rice will be increased to 3321 ha and for the interim period between completion of Phase II and commissioning of the Bardheere dam an additional 998 ha of upland rice will be grown with sprinklers. The annual maximum rice production for the Phase II alternatives, for unmilled and milled rice, is summarised as follows:

Phase II maximum rice production - tonnes/year.

	Crop Rotation 1		Crop Rotation 2	
	Unmilled	Milled	Unmilled	Milled
Without Upland	13 250	9 300	19 920	13 940
With Upland	16 800	11 750	23 410	16 390

6.2 Milling Capacity

Table 7 indicates the milling capacities required for the various production alternatives discussed above. These capacities are based on a 10 hour working day for 25 days per month.

Since the Phase I project is committed to attempting to implement rotation 2, the choice of capacity lies between 3.0 and 4.0 tonnes of milled rice per hour. For the former to be adequate, additional unmilled rice storage space of about 1000 tonnes would be required. This would allow milling of the gu season crop to continue whilst the der season crop was being harvested. It is proposed, therefore, to investigate the relative economies of installing the higher milling capacity or building storage for an additional 1 000 tonnes of crop. It is pointed out, however, that the operating regime for the smaller mill is

TABLE 5. Build up in Unmilled Rice Production Mogambo Phase I

	Year					
	1984	1985	1986	1987	1988	1989
	(tonnes of unmilled rice)					
Rotation 1						
conservative	1147	3807	6075	7101	7898	8208
optimistic	1147	4293	7182	8208	8208	8208
Rotation 2 (1)						
conservative	1795	6008	9598	11030	12000	12312
optimistic	1917	7065	11542	12312	12312	12312

Source: Consultants' estimate.

Notes : (1) Rice planted in the der season will be harvested and milled in the following year.

TABLE 6. Build up in Milled Rice Production (1) Mogambo Phase I

	Year					
	1984	1985	1986	1987	1988	1989
	(tonnes of milled rice)					
Rotation 1						
conservative	803	2665	4252	4970	5529	5745
optimistic	803	3005	5027	5745	5745	5745
Rotation 2						
conservative	1256	4205	6718	8141	8400	8618
optimistic	1342	4945	8079	8618	8618	8618

Source: Consultants' estimate.

Notes : (1) Assumes a milling out percentage of 70%.

3 000 hours per year and will be much more demanding than that for the 4.0 tonne per hour mill which will be 2625 hours per year.

Table 6 suggests that it would not be necessary to have the mill operational in Year 3. Construction should be completed during Year 3 and the mill should be ready to commence operations in Year 4. Given the rapid build up in production, staging of installation of milling capacity would have little advantage.

The siting, layout and design of the mill should allow for its eventual expansion to a capacity of 6.0 tonnes of milled rice per hour which may be required when Phase II is completed, assuming 150% rice cropping can be achieved.

TABLE 7. Estimated Milling Capacities for Various Production Alternatives

		Precise Estimate (Tonnes of milled rice per hour)	Rounded Estimate
1.	Phase I Rotation 1	1.92	2.0
2.	Phase I Rotation 2(1)	2.87	3.0
3.	Phase I Rotation 2(2)	3.83	4.0
4.	Phases I & II Rotation 1 with upland	3.92	4.0
5.	Phases I & II Rotation 1 without upland	3.1	4.0
6.	Phases I & II Rotation 2 with upland	5.46	6.0
7.	Phases I & II Rotation 2 without upland	4.65	5.0

Notes+ (1) Assumes that storage is available for up to 7 000 tonnes of unmilled rice.

(2) Assumes that storage is available for 6 000 tonnes of milled rice and that the "gu" season crop of 6156 tonnes would have to be milled within a 4.5 month period from mid-August until the end of December. This would allow a 4-6 week close-down time for the mil

6.3. Storage

Enough storage space to hold 6 000 tonnes of unmilled rice will be required for the Phase I crop. An additional 1 000 tonnes, however, would mean that a 3 tonne per hour milled rice milling capacity would be adequate.

Storage for up to 100 tonnes (milled or unmilled) rice will be required within the mill buildings.

6.4. Cleaning and Drying

Whilst sun-drying of rice is currently the norm throughout southern Somalia, it is recommended that artificial drying either in ventilated silos or in a continual flow drier be considered. The principal reason is, that with up to 180 tonnes per day of rice coming in from the field, the task of sun-drying would probably be unmanageable. Also controlled drying will probably reduce the incidence of hair cracking and lead to a higher outturn of whole grains. To economise on drying costs cleaning should logically precede drying. A cleaning and drying capacity of 9 tonnes per hour (assuming 20 hours worked per day during harvest) would be required.

However, it is also recommended that the drying facilities be capable of handling maize if it should prove inadvisable for any reason to maintain the 150 per cent cropping intensity for rice.

6.5. Maize Production

From the cropped areas given in section 6.1, the expected maize production (tonnes) in the "der" season is as follows:

Crop Rotation 1	Crop Rotation 2
Phase I 5832	-
Phase II without upland development 9300	-
Phase II with upland development 9300 + 8000 = 17 300	-

7. TECHNICAL SPECIFICATIONS

The rice mill will be designed to mill rice for local consumption, i.e. import substitution. It is assumed that the incoming paddy will have a moisture content of not more than 20 per cent and that it will be dried in two passes which, in combination with tempering bins and cooling, will give a total

extraction of approximately 6 per cent so that the storage moisture content will be approximately 14 per cent. This is based on a drying air temperature of 50°C with a medium head yield.

For maize, the drier will be designed on the basis that incoming maize will have a moisture content of 19 per cent and that it will be dried and cooled in a single pass to give a final moisture content of about 14 per cent. This is based on a drying air temperature of 82°C.

If the above base levels of moisture content are exceeded by more than 1½% m.c. it will be necessary to increase the number of driers and handling bins or accept a very considerable reduction in capacity handled.

The plant will have a simple flow and will be only suited for intakes of grain of similar variety, grades of quality and moisture content. If any of the above, apart from "foreign matter", vary considerably from the standard at any one harvest, then additional equipment will be required to maintain capacity. The provision of separate maize and paddy operations at the der season will allow for some flexibility at the gu season if the paddy grown rice requires separation from that from upland fields.

Milling will be based on milling throughout the year except for an annual close down for major maintenance during the gu season. Ample provision will be made for extensions to provide mill feed bins to cover the "der" season when plant will be intaking grain as well as allowing for milling. Mill capacity will be approximately 4 tonne (milled rice)/hour minimum.

Provision for expansion will be allowed for in storage-milling and drying together with sufficient alternative runs and extra equipment provided to allow for cover of a large percentage of the failures that can occur.

It is also assumed that bulk handling in small-medium non-tipping trucks will be used.

As the maize storage is temporary and for a limited quantity and time as well as only occurring at the der season it is feasible to use part of the rice (paddy) store rather than a separate under-utilized store for maize alone.

During the der it will be necessary to work day and night, while in the gu the work at night is eliminated by the limited amount of daily overtime during the peak period. Night work has been planned for maize as the simplest of operations.

A seed processing plant will also be included but design has not commenced yet.

The use of bran to fire boilers or as animal feed (after processing) will also be considered, but preliminary indications are that the plant is too small for special equipment to be installed.

Power generation equipment has been allowed for with alternatives of a single power generation section or splitting loads by providing separate motors for single large loads such as aeration fans. Peak loads will occur in the der season due to milling at the same time as intake and drying. Allowing for drying during the night time at this period will reduce the peak load as well as minimizing the extra equipment required.

Staff lists, together with their qualifications and training needed to operate the plant are given. These assume the following:

- incorporation within a central structure that will provide the major services of purchasing and selling grain.
- transport will be part of the central services.

It is assumed that central services will assist in heavy workshop and major maintenance operations.

8. COST ESTIMATES

At this stage costs may only be estimated very roughly and such estimates must be treated with caution since even a simple economic analysis may show that it is preferable to omit certain components. Nontheless cost estimates are included in this section since work on the mechanical and electrical plant is relatively advanced, on the other hand structural designs are only just commencing.

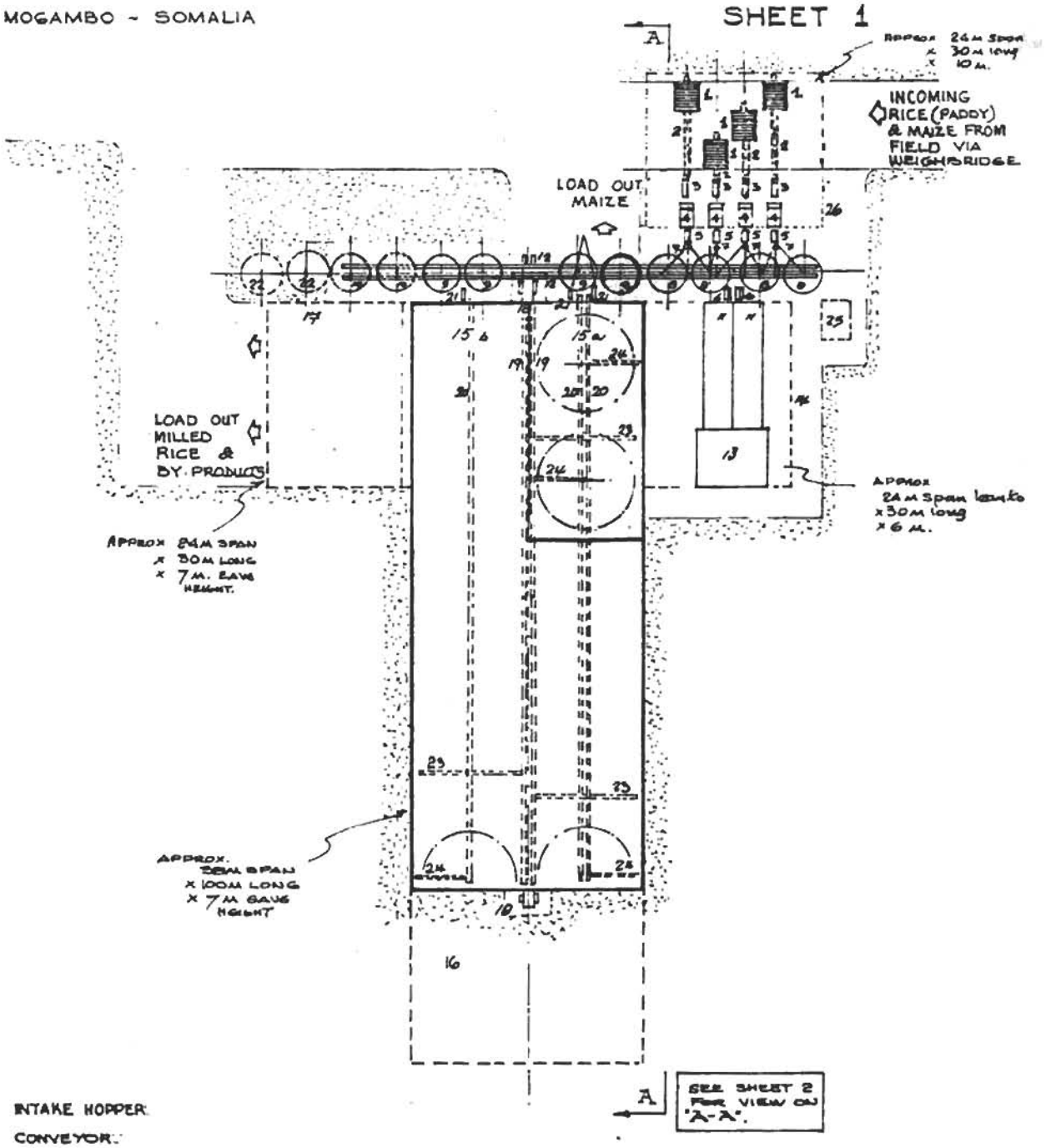
	£
Cost of Mechanical and Electrical Plant	1 500 000
Allow for seed treatment plant	50 000
Cost of Structural and Building Work	1 600 000
Cost of six staff houses, including services	300 000
	3 450 000
Allow further contingencies 10%	345 000
£	3 795 000

Engineering costs have been included elsewhere.

F I G U R E S

MOGAMBO ~ SOMALIA

SHEET 1



1 INTAKE HOPPER
2 CONVEYOR
3 INTAKE ELEVATOR
4 CLEANER / ASPIRATOR
5 CLEAN GRAIN ELEVATOR
6 DRYER FEED & DISCHARGE ELEVATOR
7 DISTRIBUTOR & SPOUTING
8 DAMP GRAIN (PRE-DRYER) SILO
9 TEMPERING SILO
10 MILL FEED SILO (2nd STAGE)
11 DRYER
12 UPPER & LOWER CONVEYOR
13 DUST HOUSE
14 COVERED AREA FOR DRYERS
15. BULK GRAIN STORE WITH AERATION DUCTS
15(a) RICE (PADDY)
15(b) MAIZE OR PADDY
16 RICE MILL OR ALTERNATIVE FUTURE EXTENSION OF BULK GRAIN STORE
17 ALTERNATIVE POSITION FOR RICE MILL
18 MAIN AERATION FAN FOR BULK STORE
19 UPPER CONVEYOR IN BULK STORE
20 LOWER CONVEYOR IN BULK STORE
21 BULK STORE UNLOADING ELEVATOR
22 FUTURE EXTENSION OF SILOS
23 BULK STORE DISTRIBUTING CONVEYOR
24 BULK STORE RECLAIMING CONVEYOR
25 INCOMING CABLE & TRANSFORMER / SWITCH GEAR - ALTERNATIVE :- POWER GENERATION STATION.
26 COVERED AREA OVER INTAKE AND CLEANERS

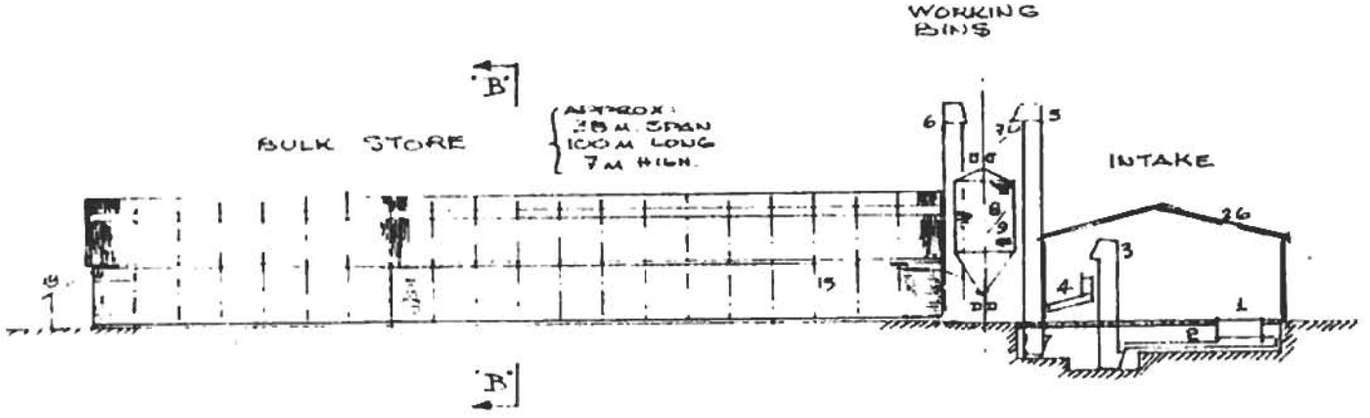
0 5 10 15 20 25 METRE.

APPROX. SCALE:

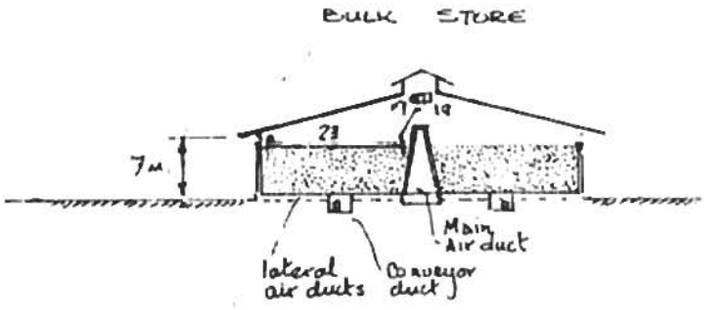
1st Aug. 1982.

GRAIN DRYING, STORAGE & PROCESSING PLANT - SHEET 2

MOGAMBO - SOMALIA



VIEW ON "A-A" (See Sheet 1)



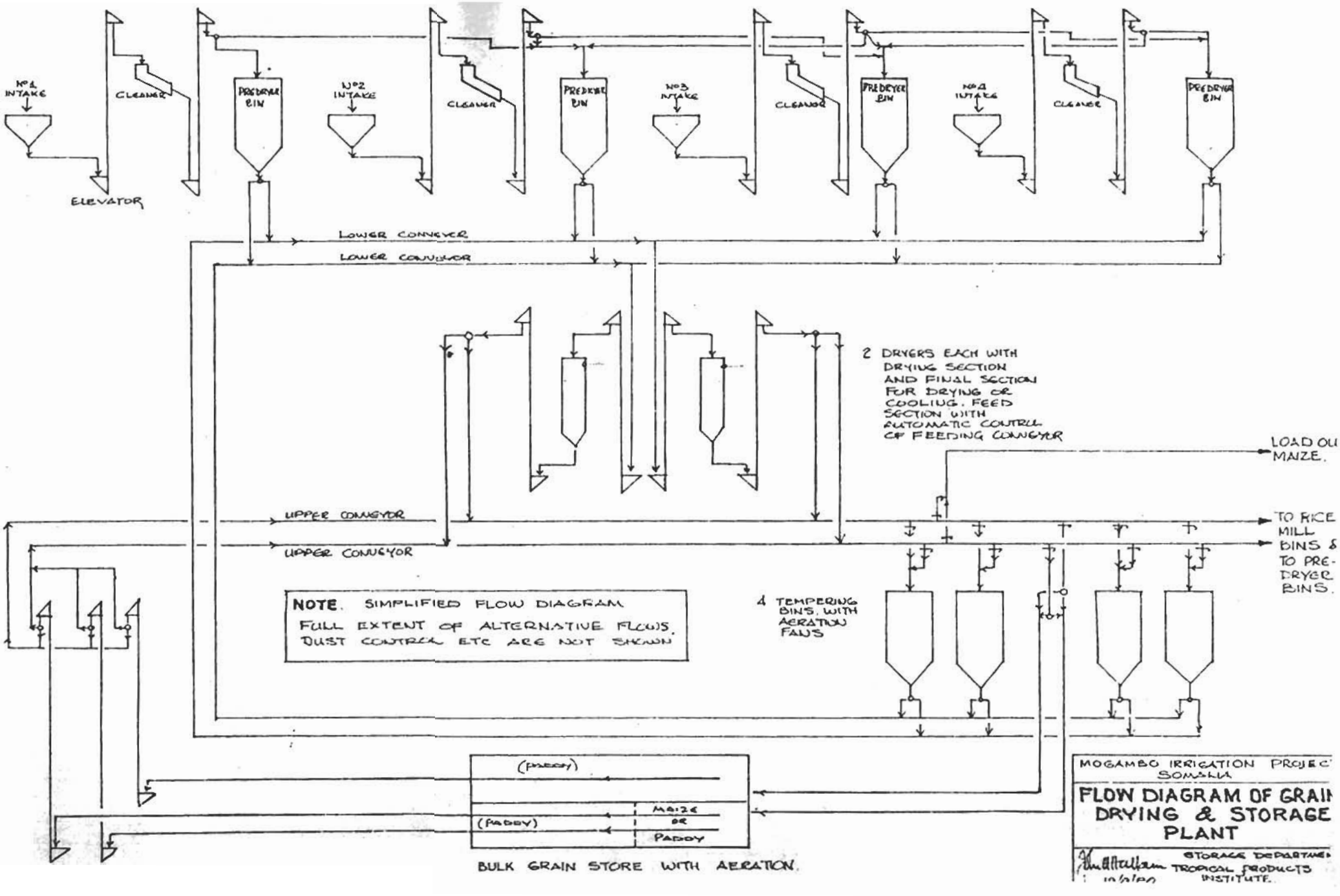
SECTION "B-B"

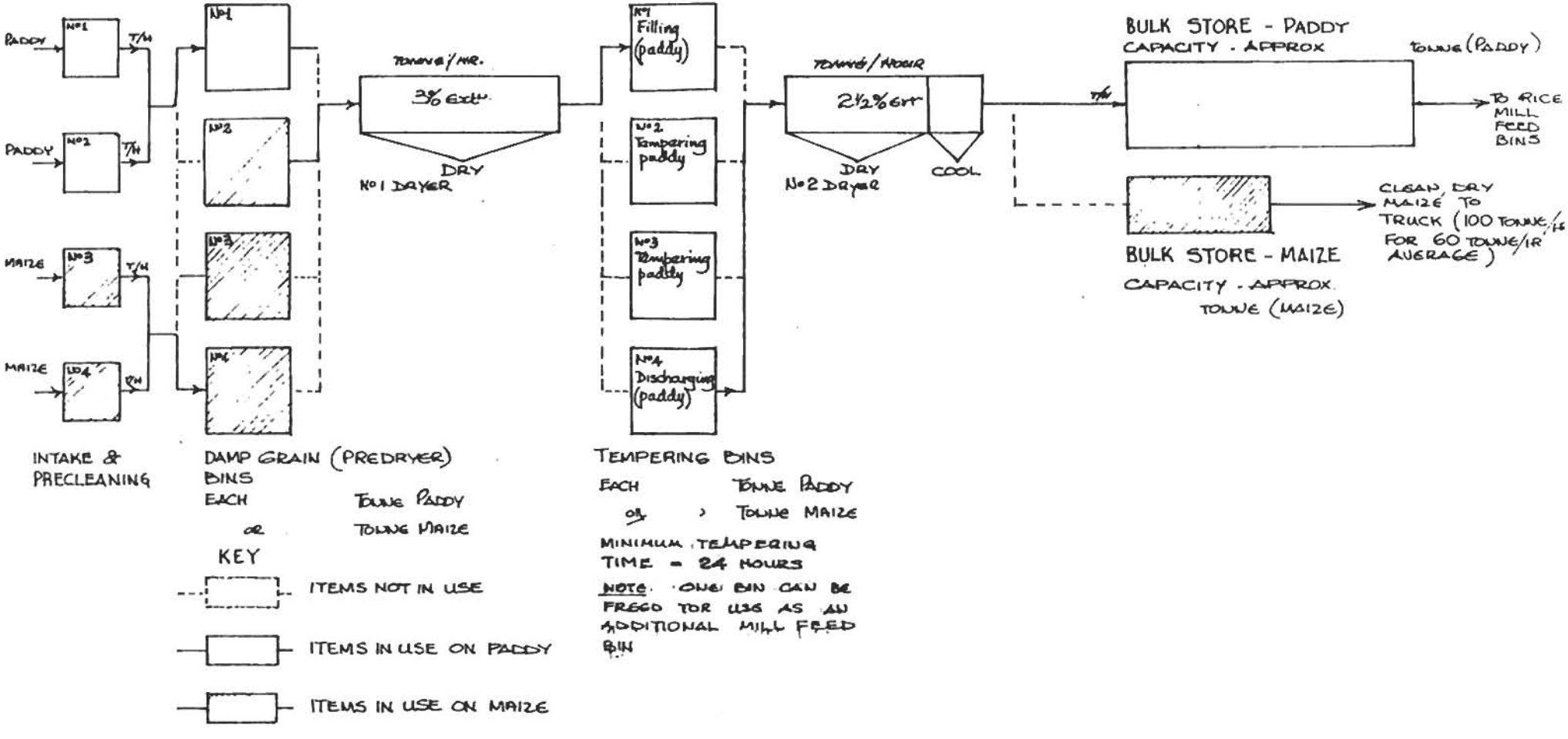
SEE SHEET 1 FOR KEY TO ITEM NUMBERS.

0 5 10 15 20 25 METRE

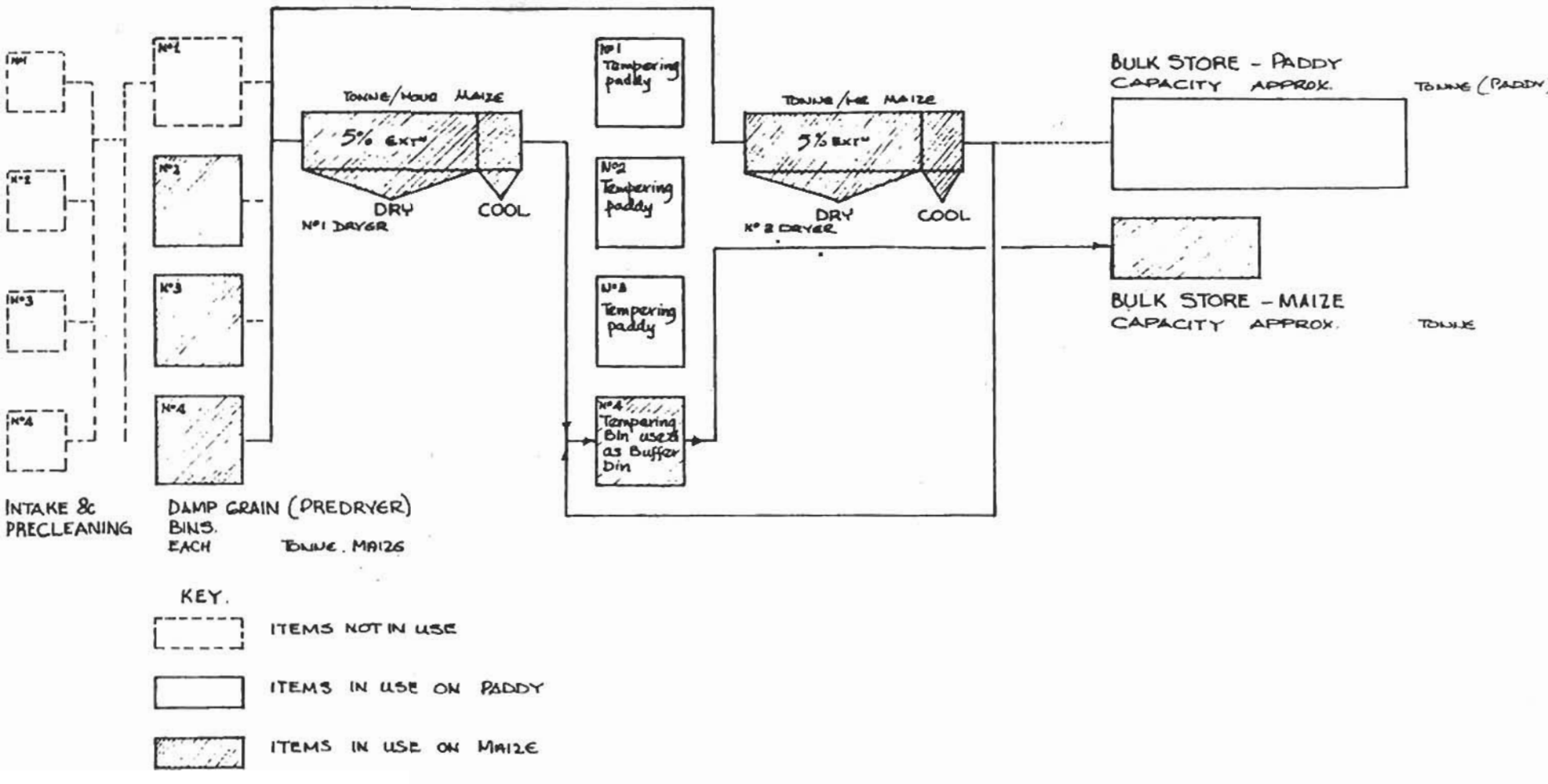
APPROX. SCALE.

Edward Halfen
16 Aug 1982
TPI Slough

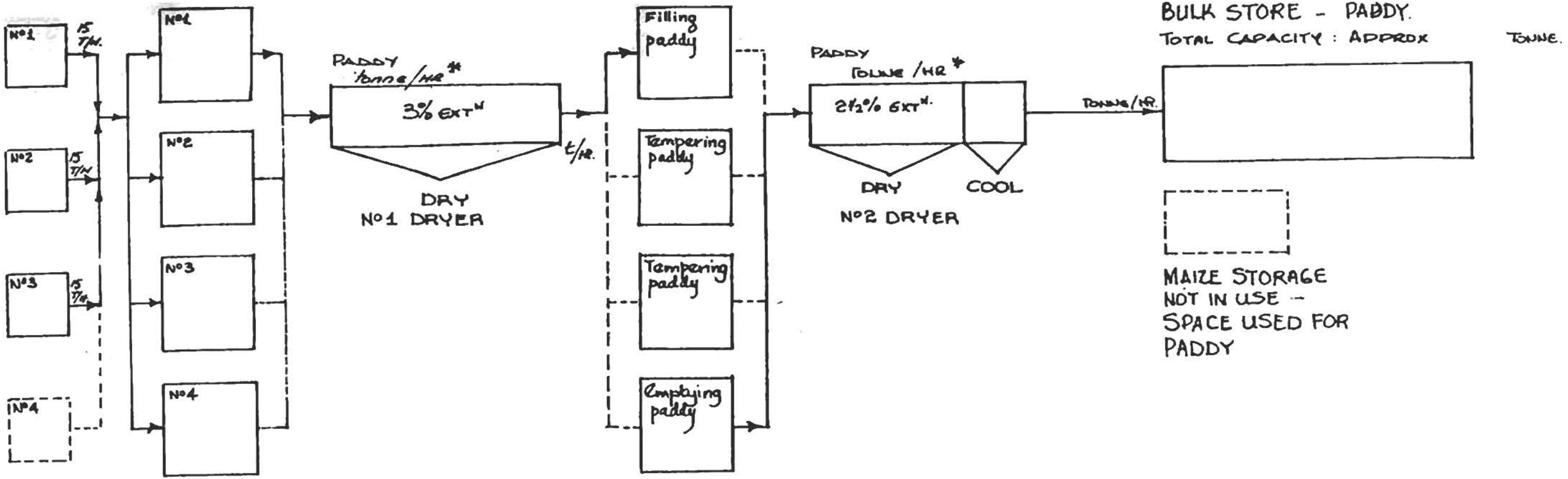

No1 INTAKE
CLEANER
PREDRYER BIN
No2 INTAKE
CLEANER
PREDRYER BIN
No3 INTAKE
CLEANER
PREDRYER BIN
No4 INTAKE
CLEANER
PREDRYER BIN
ELEVATOR
LOWER CONVEYOR
LOWER CONVEYOR
2 DRYERS EACH WITH DRYING SECTION AND FINAL SECTION FOR DRYING OR COOLING. FEED SECTION WITH AUTOMATIC CONTROL OF FEEDING CONVEYER
LOAD OU MAIZE.
UPPER CONVEYOR
UPPER CONVEYOR
TO RICE MILL BINS & TO PRE-DRYER BINS.
NOTE. SIMPLIFIED FLOW DIAGRAM
FULL EXTENT OF ALTERNATIVE FLOWS, DUST CONTROL ETC ARE NOT SHOWN
4 TEMPERING BINS, WITH AERATION FANS
(PADDY)
MAIZE OR PADDY
(PADDY)
BULK GRAIN STORE WITH AERATION.
MOGAMBO IRRIGATION PROJECT SOMALIA
FLOW DIAGRAM OF GRAIN DRYING & STORAGE PLANT
STORAGE DEPARTMENT TROPICAL PRODUCTS INSTITUTE.
10/3/60



DAY OPERATIONS FOR "DER" SEASON



NIGHT OPERATIONS FOR "DER" SEASON



INTAKE & PRECLEANING

DAMP GRAIN (PREDRYER) BINS.
EACH TONNE. PADDY

TEMPERING BINS
EACH TONNES PADDY
MINIMUM TEMPERING TIME = 24 HOUR.

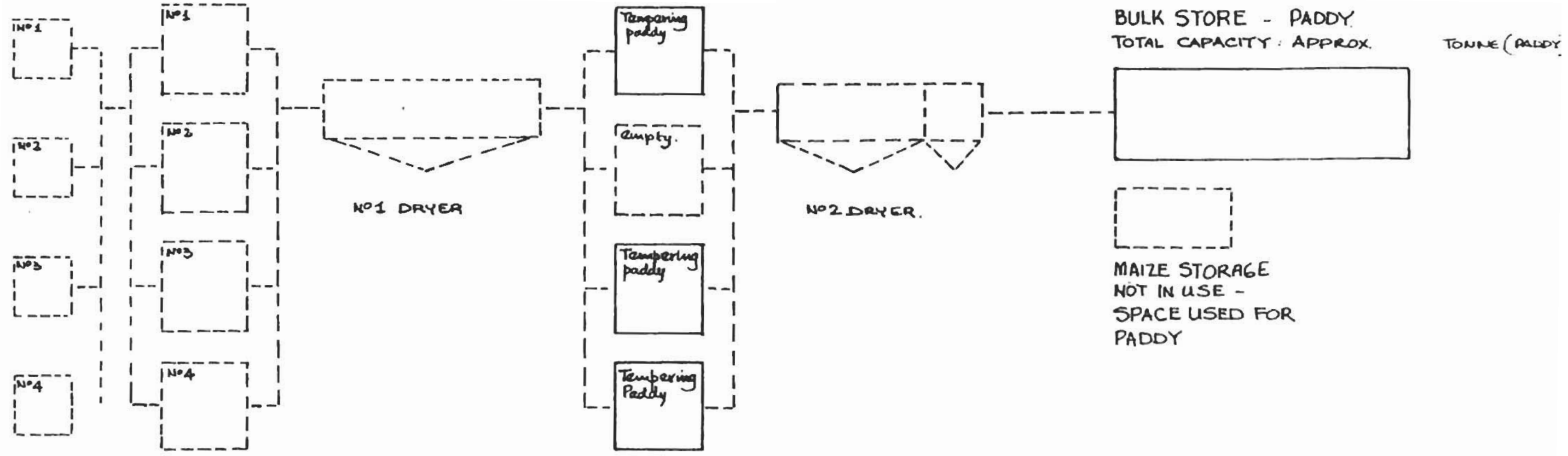
KEY.

ITEMS NOT IN USE

ITEMS IN USE ON PADDY.

* CAPACITY OF DRYERS IS DETERMINED BY THE "DER" SEASON OPERATIONS.

DAY OPERATIONS FOR "GU" SEASON.



NIGHT OPERATIONS FOR "GU" SEASON

A P P E N D I X I

PRELIMINARY COST ESTIMATES FOR MECHANICAL AND ELECTRICAL PLANT

PRELIMINARY ESTIMATES FOR M & E PLANT

ITEM Nº	DESCRIPTION	NO OF ITEMS	POWER REQ'D	ESTIMATED COST	
				ITEM	TOTAL
1	INTAKE HOPPER	4	–	INCLUDED IN CIVIL WORKS	–
2	INTAKE CONVEYOR C/W MEASURING IN-FEED & CUT-OFF VALVE, TEFC MOTOR, VEE-ROPE DRIVE & GEAR BOX CHAIN CONVEYOR 12" (300 MM) NOM. WIDTH. LENGTH 13 M. (AVERAGE) CAPACITY: MAIZE 40 TONNE/HOUR PADDY 15-20 —"—	4	4 x 3 HP = 12 HP or 9 KW	£ 3000	£ 12,000
3	INTAKE ELEVATOR (BELT & BUCKET) C/W TEFC MOTOR, BACKSTOP, VEE BELT DRIVE & GEAR BOX BUCKETS 12" WIDE DEEP PATTERN. BELT SPEED 250 FT/MIN (1,25 M/S) CAPACITY: MAIZE 40 TONNE/HOUR PADDY 15-20 —"— HEIGHT OVERALL 14 M.	4	4 x 3HP = 12 HP or 9 KW	4500	18,000
4	PRE-CLEANER. RECIPROCATING SCREEN TYPE C/W HEAD END ASPIRATOR, FAN, CYCLONE DUST COLLECTOR & AIR SEAL, TEFC MOTOR(S) & VEE ROPE DRIVES MINIMUM SCREEN SIZE: ONE SCALPER PLUS ONE SEED SCREEN EACH 50 SQ. FT. (M²) MINIMUM. CAPACITY: MAIZE 40 TONNE/HOUR PADDY 15-20 —"—	4	4 x 1 HP 4 x 3 HP 4 x 1/2 HP = 18 HP or 13,5 KW	6000	24.000
5	WEATHER PROOF, TOTALLY ENCLOSED EXTERNAL TYPE BELT & BUCKET ELEVATOR C/W TEFC MOTOR, BACK STOP, VEE ROPE DRIVE & GEAR BOX ACCESS LADDER AND PLATFORM BUCKETS 12" WIDE DEEP PATTERN BELT SPEED 250 FT/MIN. (1·25 M/S) CAPACITY: MAIZE 40 TONNE/HOUR PADDY 25 —"— HEIGHT OVERALL 29 M.	4	4 x 12½ HP = 50 HP or 37·5 KW	6200	24,800
6	WEATHER PROOF, TOTALLY ENCLOSED EXTERNAL TYPE BELT & BUCKET ELEVATOR C/W TEFC MOTOR, BACK STOP, VEE BELT DRIVE AND GEAR BOX, ACCESS LADDER & PLATFORM BUCKETS 12" WIDE DEEP PATTERN BELT SPEED 375/250 FT/MIN (1,25 M/S) CAPACITY: MAIZE 60 TONNE/HOUR PADDY 30 —"— HEIGHT OVERALL 29 M.	4	4 x 12½ HP 50 HP or 37·5 KW	6200	24,800
7	MULTIWAY GRAIN DISTRIBUTOR AND GRAIN SPOUTING	4	–	1000	4,000
8	PRE-DRYER SILO: WEATHERPROOF EXTERNAL TYPE, GALVANISED CORRUGATED STEEL SILO SUITABLE FOR DAMP PADDY AND MAIZE. APPROX. DIAMETER 7·3 M. (24 FT.) APPROX. OVERALL HEIGHT 12·50 M C/W ROOF, ACCESS AND INSPECTION OPENINGS, 50° CONICAL HOPPER TO CENTRAL DELIVERY 14" Ø WITH CONTROL SLIDE, SUPPORTING STEELWORK INTERNAL & EXTERNAL LADDER, HAND RAILS & PLATFORM CAPACITY: MAIZE 250 TONNE PADDY 190 —"—	4	– (106.5 KW)	6325	25,300 (32.900)

9	TEMPERING SILO. WEATHERPROOF EXTERNAL TYPE GALVANISED CORR-UGATED STEEL SILO SUITABLE FOR PADDY AND MAIZE. APPROX DIAMETER 7.3 M (24 FT) APPROX. OVERALL HEIGHT 12.50M. C/W ROOF, ACCESS & INSPECTION OPENINGS, ROOF VENT, AERATION DUCTS AND FAN UNIT C/W TEFC MOTOR FOR TEMPERING - "DRYRATION" & COOLING PURPOSES. 50° CONICAL HOPPER TO CENTRAL DISCHARGE OPENING 14" Ø C/W CONTROL SLIDE, SUPPORTING STEEL-WORK, INTERNAL & EXTERNAL ACCESS LADDERS, HANDRAILS & PLATFORM. CAPACITY: PADDY 190 TONNE MAIZE 250 "	4	4 x 1½ HP = 4.5 KW	£150	£8,600
10	MILL FEED SILO. WEATHERPROOF EXTERNAL TYPE GALVANISED CORR-UGATED STEEL SILO SUITABLE FOR DRY PADDY. APPROX. DIAMETER 7.3 M (24 FT) APPROX. OVERALL HEIGHT 12.25 M C/W ROOF, ACCESS & INSPECTION OPENINGS, 45° CONICAL HOPPER TO CENTRAL DISCHARGE OPENING 8" Ø C/W DISCHARGE CONTROL SLIDE, SUPPORTING STEELWORK INTERNAL AND EXTERNAL LADDERS PLATFORM AND HANDRAILS CAPACITY. PADDY 190 TONNE	2.	—	(5500) FUTURE EQUIPMENT	NOT INCLUDED.
11	DRYER WEATHER PROOF EXTERNAL TYPE GRAIN DRYER SUITABLE FOR MAIZE AND PADDY. MIXED FLOW COLUMN PATTERN WITH LATERAL HOT AIR AND EXHAUST DUCTS. COMPLETE WITH COOLING SECTION WITH PROVISION FOR COOLING OR ADDITIONAL DRYING. FUEL: DIESEL OIL & DIRECT HEATED AIR CAPACITY:- MAIZE. 30 TONNE/HOUR AT 5% M.C. EXTRACTION (19% to 16%) WITH HOT AIR TEMPERATURE 82°C MAX. - GRAIN TEMPERATURE 55°C MAX COOLING SECTION TO WITHIN 10°C OF AMBIANT CONDITION OR PADDY 25 TONNE/HOUR AT 3% MAX. EXTRACTION (20% - 17%) USING DRYING SECTION AND COOLING SECTION FOR DRYING. HOT AIR TEMPERATURE 50°C MAX. OR PADDY 25 TONNE/HOUR AT 2½% M.C. EXTRACTION (16½% - 14%) USING. DRYING SECTION ONLY WITH HOT AIR TEMPERATURE 43°C MAXIMUM COOLING SECTION TO COOL WITHIN 5°C OF AMBIANT	2	2 x 55 HP = 110 HP or 83 kw	59,000	118,000

12	UPPER & LOWER CONVEYOR TOTALLY ENCLOSED, WEATHER PROOF, EXTERNAL TYPE CHAIN CONVEYORS 2 WAY AND/OR REVERSABLE C/W TEFC MOTOR, VEE-ROPE DRIVE AND GEAR BOX, OUTLETS WITH OR WITHOUT CONTROL SLIDES & BRUSHES TO SUIT INSTALLATION. CHAIN WIDTH : NOMINAL 8" CAPACITY : MAIZE: 60 TONNE/HOUR PADDY 30 TONNE/HOUR LENGTH 65 M.	4	4 x 12½ = 50HP OR 37.5KW	£ 6150	£24,600
13	DUST HOUSE	1	*	EQUIPMENT COST INCLUDED IN DRYERS CLEANERS ETC. BUILDING IN CIVIL WORKS	—
14	COVERED AREA FOR DRYER	1	—	BUILDING IN CIVIL WORKS	—
15	BULK GRAIN STORE	1	*	EQUIPMENT DETAILED SEPERATELY BUILDING IN CIVIL WORKS	—
16 & 17	RICE MILL.	1	* 150 KW.	EQUIPMENT DETAILED SEPERATELY BUILDING IN CIVIL WORKS	285,700
18	MAIN AERATION FAN FOR BULK STORE. DOUBLE INLET CENTRIFUGAL FAN C/W TEFC ELECTRIC MOTOR & (ALTERNATIVE: DIESEL MOTOR & CLUTCH) VEE ROPE DRIVE AIRFLOW 25,000 CFM (M^3/S) AGAINST A TOTAL PRESSURE OF 5" (125 mm) OF WATER	2	2 x 40 HP = 80 HP OR 60 KW ALTERNATIVE DIESEL MOTOR	BUILDING IN CIVIL WORKS £1825 (ELECTRIC MOTOR) ALT: £4800 (DIESEL ENGINE DRIVE)	3650 (9600)
19	UPPER CONVEYOR IN BULK STORE TOTALLY ENCLOSED, WEATHER PROOF EXTERNAL TYPE SINGLE WAY CHAIN CONVEYOR C/W TEFC ELECTRIC MOTOR, VEE ROPE DRIVE & GEAR BOX. OUTLETS WITH CONTROL SLIDES TO SUIT LAYOUT CHAIN WIDTH : NOMINAL 8" CAPACITY : MAIZE - 40 TONNE/HOUR PADDY - 30 TONNE/HOUR LENGTH 110 M.	2	2 x 2 x 12.5HP = 50HP OR 37.5 KW	11,000	22,000
20	LOWER CONVEYOR IN BULK STORE. TOTALLY ENCLOSED, WEATHER PROOF EXTERNAL TYPE, SINGLE WAY BOTTOM CHAIN CONVEYING WITH TOP CHAIN IN MEASURING SYSTEM C/W. TEFC ELECTRIC MOTOR, VEE-ROPE DRIVE & GEAR BOX CHAIN WIDTH : NOMINAL 8" CAPACITY. MAIZE - 40 TONNE/HOUR PADDY - 30 TONNE/HOUR. LENGTH 105 M.	3	3 x 2 x 12½HP = 75 HP OR 56 KW	11,000	33,000

21	BULK STORE UNLOADING BUCKET ELEVATOR . BELT & BUCKET TYPE TOTALLY ENCLOSED , WEATHERPROOF, EXTERNAL PATTERN C/W TEFC ELECTRIC MOTOR , BACK STOP , VEE-ROPE DRIVE & GEAR BOX , ACCESS LADDER & PLATFORM. BUCKETS 12" WIDE DEEP PATTERN BELT SPEED 250 FT/MIN (1.25 M/S) HEIGHT OVERALL 22 M	3	3 x 10 = 30HP or 23 KW	5400	16,200
22	FUTURE EXTENSION	—	—	—	—
23	BULK STORE DISTRIBUTING CONVEYOR OPEN BOTTOM , TRAVELLING CONVEYOR, CHAIN PATTERN C/W TEFC ELECTRIC MOTOR , VEE-ROPE DRIVE & GEARBOX CHAIN WIDTH : NOMINAL 8" CAPACITY : MAIZE 40 TONNE/HOUR PADDY 30 TONNE/HOUR LENGTH 18 M	3	3 x 3HP = 9HP or 7 KW	3000	9000
24	BULK STORE RECLAIMING CONVEYOR OPEN CAGE ENCLOSED, PORTABLE CONVEYOR ("SWEEP AUGER") C/W TEFC ELECTRIC MOTOR AND VEE . ROPE DRIVE CAPACITY: MAIZE: 40 TONNE/HOUR PADDY: 30 TONNE/HOUR LENGTH 8,5 M.	4	4 x 3HP = 12HP = 9 KW	1500	6,000
25	INCOMING CABLE , TRANSFORMER & MAIN SWITCH .			(SEE SEPERATE SHEET.) BUILDING IN CIVIL WORKS	NOT USED SEE ITEM 31.
26	COVERED AREA OVER INTAKE & CLEANERS	—	—	BUILDING IN CIVIL WORKS	—
27	BULK STORE TEMPERATURE MONITORING SYSTEM	100	Nominal	5000	5000
28	SUBTOTAL ITEMS 1-27 INCLUSIVE				684,650
29	MISCELLANEOUS ITEMS - SPOUTING, DUCTING - MINOR SUPPORTS, CENTRAL DUST CONTROL & COLLECTION , MINOR ERECTION MATERIALS (EXCLUSIONS - ELECTRICAL/MECHANICAL POWER GENERATION PLANT - ELECTRICAL INSTALLATION	1		10 % of COST OF MECHANICAL EQUIPMENT (ITEM 28).	68,465
30	ELECTRICAL SWITCH GEAR , CABLING & FITTINGS FROM 440/415 V. 3 PH. OUTGOING SIDE OF MAIN DISTRIBUTION & SWITH BOARD(S) IN TRANSFORMER AND/OR POWER GENERATION UNITS EXCLUSIONS: 1. ELECTRIC MOTORS (INCLUDED WITH EQUIPMENT) 2. ELECTRIC LIGHTING (INCLUDE IN CIVIL WORKS) 3. MAIN INCOMING CABLE , TRANSFORMER(S), POWER GENERATION EQUIPMENT , MAIN DISTRIBUTION & SWITCH BOARDS	1	INTERNAL MOTORS LIGHTING 150 HP + 450 KW APPROX. SAY APPROX 500 KW INITIAL INSTALLATION.	10 % of COST OF MECHANICAL EQUIPMENT ITEMS 28 + 29.	75,312

31	POWER GENERATION PLANT(S) INCLUDING MAIN ISOLATOR _ DISTRIBUTION BOARD FOR 440/415V 3PH AND MAIN ISOLATOR FOR 1 PH.	2	2 x 250KVA	18,000	36,000
32	COST EX.WORKS UNPACKED FOR ITEMS 1-31 INCLUSIVE SUBTOTAL. (ITEMS 28, 29, 30 & 31)				864,427
33	COST OF PACKAGING (SEAWORTHY & TROPICAL CONDITIONS) PLUS DELIVERY CIF MOGADISHU (SOMALIA)			28 % OF COST EX.WORKS UNPACKED (ITEM 32)	242,040
34	COST OF DELIVERY FROM VESSEL SIDE TO SITE INCLUDING ALL FEES, & STORAGE CHARGES. (EXCLUSIONS - CUSTOMS DUTIES).			1,5 % OF COST CIF (ITEMS 32 + 33)	20,227
35	ERECTION ON PREPARED BASES OF EQUIPMENT ITEMS 1-31 INCLUSIVE, BASED ON SUPPLY OF SERVICES OF SKILLED & EXPERIENCED SUPERVISORS AND KEY ARTISANS ONLY & LOCAL SUPPLY OF SEMI-SKILLED ARTISANS AND LABOURERS. EXCLUSIONS - COSTS OF LOCAL SUPPLY OF SEMI-SKILLED ARTISANS & ARTISANS.			10 % OF COST OF PLANT DELIVERED TO SITE.	112,667
36	COST OF PLANT INSTALLED. EXCLUSIONS: INSPECTION/SUPERVISION COMMISSIONING TRAINING DESIGN/CONSULTANCY FEES SPARE PARTS CONTINGENCIES ESCALATION FACTOR See item "K" for cost in running order			ITEMS 32 + 33 + 34 + 35.	1,238 763

A	INSPECTION & SUPERVISION OF THE MECHANICAL & ELECTRICAL WORKS ASSOCIATED WITH THE CLEANING - DRYING - STORING & PROCESSING PLANT	1	—	1.5 % OF THE INSTALLED PLANT COST ITEM N° 36 & USING PART TIME SERVICES OF CIVIL WORKS INSPECTION - SUPERVISION CONTRACTOR	-
B	COMMISSIONING OF THE CLEANING - DRYING - STORING AND PROCESSING PLANTS INCLUDING ELECTRICAL & MECHANICAL POWER PLANT. (1 MONTH)	1	—	2 % OF THE INSTALLED PLANT COST ITEM N° 36	-
C	TRAINING OF OPERATORS OF THE RECEIVING - CLEANING - DRYING - STORING AND PROCESSING PLANTS INCLUDING LABORATORY SERVICES AND GRAIN INSPECTION / QUALITY CONTROL. (1 MONTH DURING COMMISSIONING PERIOD)	1	—	2 % OF THE INSTALLED PLANT COST ITEM N° 36	—
D	DESIGN & CONSULTANCY FEES FOR PLANT LAYOUT INCLUDING ELECTRICAL SYSTEMS FOR THE RECEIVING - CLEANING - DRYING - STORING & PROCESSING PLANTS (EXCLUSIONS : CIVIL & STRUCTURAL ENGINEERING, ELECTRICAL LIGHTING AND ELECTRICAL POWER SYSTEM FROM OUTGOING 400/415 V. 3 PH. SUPPLY TO PLANT BACK TO INCOMING MAIN CABLE. — ITEMS INCLUDED IN CIVIL WORKS)	1	—	2 % OF THE INSTALLED PLANT COST ITEM N° 36	—
E	SPARE PARTS : MECHANICAL & ELECTRICAL COMPONENTS OF THE RECEIVING - CLEANING - DRYING - STORING & PROCESSING PLANTS (EXCLUSIONS : ITEMS UNDER "CIVIL WORKS")	1	—	5 % OF THE INSTALLED PLANT COST ITEM N° 36	—
F	SUBTOTAL ITEMS A - E INCLUSIVE	1	—	12.5% OF THE INSTALLED PLANT COST ITEM N° 36	154,845
G	TOTAL ITEMS 'F' & 36	—	—	—	1,393,608
H	CONTINGENCIES	-	-	7.5 % OF ITEM 'G'	104,520
I	TOTAL AT AUGUST 1982 COST ESTIMATES (ITEMS 'H' + 'G')	—	—	—	£1,498,128
J	ESCALATION FACTOR FROM AUG. 1982 ESTIMATES TO PROJECTED ORDER DATE OF	—	—		
K	TOTAL COST IN RUNNING ORDER. EXCLUSIONS : CIVIL WORKS LOCAL LABOUR				

A P P E N D I X II

ELECTRICAL POWER REQUIREMENTS

MOGAMBO - SOMALIA
RICE MILL & STORAGE PLANT

ELECTRICAL POWER REQUIREMENTS

1. ALL ELECTRIC - INCOMING CABLE ETC:
   APPROX REQUIREMENT 650 KVA.

2. POWER GENERATION ON SITE.
   A) RICE MILL PLUS OCCASIONAL USE OF STORE EQUIPMENT
   MILL - APPROX 150 KW INSTALLED + LIGHTING
   STORAGE PLANT :- OUTLOADING ONLY:
   APPROX LOAD 25.5 HP (INSTALLED CAPACITY)
   + LIGHTING + MISC
   SAY 30 HP (INSTALLED CAPACITY)
   ~ 20 - 23 KW LOAD
   TOTAL (MILL + STORE) APPROX 175 KW
   SAY 150 - 180 KVA

   AERATION FANS 2 x 40 HP ELECTRIC MOTORS = 60 KW
   (POWER ABSORBED ≈ 2 x 28 HP AT RATED LOAD

   TOTAL LOAD APPROX 210 - 240 KW:
   (MILL + STORE + AERATION)..

3. INTAKE & DRYING SEASON.

DAY OPERATIONS: (EXCLUSIVE OF RICE MILL ETC)	INTAKE	- APPROX.	148.5 KW	INSTALLED
	DRYERS	--	83 --	--
	BULK STORE	---	31 --	--
	TOTAL		262.5 KW	

NIGHT OPERATIONS: TOTAL LESS THAN 250 KVA.

RECOMMENDED INSTALLATION: ALLOW FOR 250 KVA GENERATORS
2 x 250 KVA UNITS WILL COVER ALL OPERATIONS - ONE UNIT WILL ONLY OPERATE FOR APPROX 3 MONTH PER YEAR.
RICEMILL & AERATION CAN BE STOPPED FOR PERIODS OF A FEW DAYS AT HARVEST TIMES GIVING SOME ADDITIONAL STAND-BY CAPACITY

INITIAL INSTALLATION: 2 x 250 KVA UNITS.
FINAL INSTALLATION: 3 x 250 KVA UNITS.

Outline Specification

MOGAMBO IRRIGATION PROJECT: RICE MILL

Scale: 6T/hr paddy (4T/hr rice)

Item	Capacity	kW	NP	Total kW
Intake hopper for paddy with magnetic separator	6-12 T.	nominal	1	-
Elevator	6T/hr	0.75	1	0.75
Paddy cleaner with aspirator and destoner	6T/hr	3.0	1	3.0
Grain weighing scale (continuous) ...	6T/hr	nominal	1	-
Elevator	6T/hr	0.75	1	0.75
Holding bin for cleaned paddy	6-12 T.	-	1	-
Paddy sheller with aspirator	2T/hr	5.5	4	22.0
Paddy separator	3T/hr	1.5	2	3.0
Elevator	6T/hr	0.75	1	0.75
Holding bin for brown rice	6-12 T	-	1	-
(Return) sheller with aspirator	1T/hr	3	1	3
Elevator for return products	1T/hr	0.75	1	0.75
Husk fan and ducting	(1.5T/hr max)	1.5	1	1.5
"Husk House" (holding bin) 5 hrs make	6T ($60m^3$)	-	1	-
Brown rice whiteners	2.5T/hr	15	6	90
Milled rice gyro sifter	2T/hr	0.75	2	1.5
Elevator	2T/hr	0.75	2	1.5
Bran conveyor to bagging point	400 kg/hr	0.75	1	0.75
Bran bagger unit and hand-stitcher ..	400 kg/hr	0.125	1	0.125
Weigh scales	0-100 kg	-		-
Milled rice grader (sifter)	2T/hr	0.75	2	1.5
Holding bin for whole rice	20T	-	1	-
Holding bin for broken rice	5T	-	1	-
Milled rice aspirator		0.75	1	0.75
Bagging off point: weigh scales	0-200 kg	-	1	-
Bag stitcher		0.25	1	0.25
				131.875
			Allow	150 kW
			including lights	

NB. Steel platforms, steps, handrails;
accessories, hand-tools, adjusters;
cone-dressing materials;
ducting, cyclones, chutes.

A P P E N D I X III

STAFFING REQUIREMENTS

GRAIN DRYING, STORAGE & PROCESSING PLANT
MOGAMBO - SOMALIA.

STAFFING REQUIREMENTS

ITEM	DESCRIPTION	NO. DAY	NIGHT	QUALIFICATION/TRAINING/EXPERIENCE & REMARKS
1	OVERALL MANAGEMENT AND OFFICE			
1A	MANAGER	1	–	BSc OR EQUIVALENT IN SCIENCE OR ENGINEERING PLUS TRAINING IN STORAGE, MILLING AND QUALITY CONTROL & EXPERIENCE IN MANAGEMENT. SOME KNOWLEDGE OF A MAJOR EUROPEAN LANGUAGE (ENGLISH, GERMAN OR ITALIAN PREFERED)
1B	FINANCIAL CONTROLLER	1	–	SECONDARY EDUCATION AND RELEVANT COMMERCIAL QUALIFICATION AND/OR EXPERIENCE
1B	CLERK/TYPIST	1		SECONDARY EDUCATION PLUS COMMERCIAL TRAINING - EXPERIENCE
1C	MESSENGER	1		—
1D	GATE KEEPER - SECURITY	1	1	—
1E	WEIGHBRIDGE CLERK	1	–	PRIMARY EDUCATION + EXPERIENCE AND TRAINING
2	INTAKE			
2A	STORAGE SUPERVISOR	1	–	SECONDARY EDUCATION + EXPERIENCE OF SUPERVISION + TRAINING
2B	GRAIN INSPECTOR	1	–	SECONDARY EDUCATION + TRAINING IN QUALITY CONTROL - ALSO COVERS MILLED PRODUCTS ETC.
2C	ASSISTANT INSPECTORS	2	–	PRIMARY EDUCATION + TRAINING. ALSO COVERS MILLED PRODUCTS ONE FULL TIME - ONE PART-TIME SEASONAL
2D	CLEANER/INTAKE OPERATIVE	1	–	PRIMARY EDUCATION + TRAINING. PART-TIME SEASONAL - ONLY REQUIRED AT HARVEST PERIODS.
2E	ASSISTANT OPERATIVES	2	–	TRAINING - PART-TIME SEASONAL. ONLY REQUIRED AT HARVEST PERIODS
2F	INTAKE TALLY CLERK	1	–	PRIMARY EDUCATION + EXPERIENCE + TRAINING (ALSO COVERS MILL PRODUCTS)
2G	CASUAL LABOUR	~8	–	ONLY REQUIRED AT INTAKE PERIODS
3	DRYERS			
3A	DRYER OPERATIVE	1	1	PRIMARY EDUCATION + TRAINING (ONLY REQUIRED AT INTAKE PERIODS)
3B	ASSISTANT OPERATIVE	2	1	- TRAINING (ONLY REQUIRED AT INTAKE PERIODS)
4	BULK STORE			
4A	SENIOR OPERATIVE	1	–	PRIMARY EDUCATION – TRAINING (CAN USE 3A)
4B	ASSISTANT OPERATIVE (NIGHT)	–	1	(CAN USE 3A).
4C	ASSISTANT OPERATIVE	1	–	PRIMARY EDUCATION + TRAINING PART-TIME. SEASONAL. ONLY REQUIRED AT HARVEST PERIODS
4D	CASUAL LABOUR	4 to 8	–	8 NEEDED AT "DER" INTAKE OUTSIDE INTAKE PERIODS CAN USE 2G.

5	POWER PLANT: MACHINE MINDER	1	1	PRIMARY EDUCATION + TRADE CERT-IFICATE (DIESEL ENGINE MECHANIC) + EXPERIENCE + TRAINING NIGHT OPERATOR ONLY REQUIRED DURING INTAKE PERIODS BOTH OPERATIVES ASSIST WITH MAINTENANCE
6	RICE MILL			
6A	MILL FOREMAN	1	–	SECONDARY EDUCATION + TRAINING (CAN ALSO ACT AS 2A IN INITIAL STAGE OF PROJECT)
6B	MACHINE MINDERS	2	–	PRIMARY EDUCATION + TRAINING (CAN ALSO ACT AS 2D & 4C IN INITIAL STAGE OF PROJ
6C	LABOURER/PACKER	4	–	(CAN ALSO ACT AS {2G+4D / 2E+7E} IN INITIAL STAGE OF PROJ
6D	CASUAL LABOUR	? 8	–	CASUAL LABOURER'S - NUMBER REQUIRED DEPENDS ON WAREHOUSE OPERATIONS - CAN USE 2G AND 4D.
7	MAINTENANCE			
7A	MECHANIC	1	–	PRIMARY EDUCATION + TRADE CERTIFICATES (FITTING + WELDING) - EXPERIENCE + TRAINING
7B	MECHANICS MATE	1	–	—
7C	ELECTRICIAN	1	–	PRIMARY EDUCATION + TRADE CERTIFICATE IN 3 PHASE & 1 PHASE WORK + MOTOR MAINTENANCE - EXPERIENCE + TRAINING
7D	ELECTRICIAN'S MATE	1		—
7E	CASUAL LABOUR	AS NECESS-ARY		—

TOTAL	PEAK PERIODS & AT TOTAL CAPACITY OF PLANT 29 FULL TIME 5 PART TIME (SEASONAL) 8–16 CASUAL LABOUR	INITIAL STAGE OF PROJECT WHEN THROUGHPUT WILL BE LOWER AND MILL CAN BE STOPPED AT 'GU" AND 'DER" SEASONS. 27 FULL TIME 4-8 CASUAL LABOUR.