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REPORT TO

Public Affairs

TA 71-05(1)

MAY, 1971

USAID/PHILIPPINES AND GOVERNMENT OF PHILIPPINES
ON
REQUIREMENTS AND EQUIPMENT SPECIFICATIONS
FOR THE
DRYING AND CONVEYING EQUIPMENT
MALIGAYA SEED PROCESSING PLANT

Services Rendered

Under The Agreement

Between

AID/W and MSU

AID-W-607

**SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY
STATE COLLEGE, MISSISSIPPI**



REPORT SUMMARY

Title: Requirements and Equipment Specifications for the Drying and Conveying Equipment, Maligaya Seed Processing Plant in Nueva Ecija, Philippines

Author: James M. Beck, Engineer Technician

Period of Report: April - May, 1971

Contract Number: AID-W-607

Project Title: AID/W-MSU

Contractor: Mississippi State University

Principal Investigator: James M. Beck

SUMMARY

As a result of a tripartite agreement among Bureau of Plant Industry (BPI), United Nations Development Program (UNDP), and USAID, a seed processing and drying facility is being established at Maligaya, Nueva Ecija, Philippines. USAID/Philippines requested Mississippi State University to provide technical assistance in the preparation of layout drawings and on-the-site assistance in the installation of the seed processing equipment. These services were rendered under the MSU/AID-W-607 contract earlier this year.

The current request was for drawings and specifications for the construction of the drying facilities at the Maligaya Seed Plant and detailed specifications for drying equipment to be purchased for the Maligaya Project.

REQUIREMENTS AND EQUIPMENT SPECIFICATIONS
FOR THE
DRYING AND CONVEYING EQUIPMENT
MALIGAYA SEED PROCESSING PLANT
IN
NEUVA ECIJA, PHILIPPINES

Forward

Mississippi State University (MSU) has rendered technical assistance to the Maligaya Project through USAID/Philippines by supplying layout drawings and on-the-site assistance in the installation of the seed processing equipment that was purchased as a result of a tripartite agreement among Bureau of Plant Industry (BPI), United Nations Development Program (UNDP), and USAID to establish a pilot seed processing plant at Maligaya, Nueva Ecija, Philippines.

Current Report

I. General Requirements

The seed processing plant at the Maligaya Rice Research Station was designed and equipped primarily for the purpose of handling basic seeds of rice, corn, feed grains, vegetables and legumes. Because this facility will handle many types and kinds of seeds and because it will be utilized to train technicians, the drying system must be quite flexible and feature more than one method of drying.

Seeds that are received in bags may be either dried in bags or bulk in the bin drier or if they are "free-flowing", they can be dried in the tower drier either as a batch or as a continuous flow operation if the quantity is sufficiently large enough. Seeds that are received in bulk may be loaded directly into either the bulk drying bins or the tower drier.

There are two acceptable procedures used in the drying of rice. Personal preference usually dictates which of the two procedures is used. This facility is designed to permit usage of either procedure.

The procedure most frequently used in the U.S. is termed "stage-drying." Using this procedure, the rice is intermittently dried and sweated. The drying periods are timed so that only a small amount of moisture is removed during each period. Following each drying period (usually 4 to 5) the seed is aerated until moisture within the seed is once again moved toward the outside of the seed.

A less frequently employed procedure, although very satisfactory, is to dry the seed from incoming moisture content to safe storage moisture content in a single stage.

As previously stated, either procedure can be used. If "stage drying" is employed in the bulk drying bins, grain depths should not exceed 4 feet. If seed is to be completely dried in a

single stage, grain depth in the bulk bins should not exceed 8 ft.

When not needed for drying, the bulk drying bins can be utilized as holding bins for either cleaned or uncleaned seed. After installation of the reversible conveyor connecting the drying and processing sections of the plant, seeds can be moved in either direction (to or from drying) without having to go through the main receiving dump pit and elevator.

II. General Layout - Drying System

The drying section of the facility is adjacent to the processing section and is a part of the same building. The area approximately 11 meters by 16 meters, is a dock high concrete slab, open on two sides, with columns spaced 3 meters apart on the front and back sides supporting the roof structure. Within this area four (4) bulk drying bins will be constructed of concrete blocks and connected to an air distribution system that will supply heated air to both a tower drier and the bulk bins. Flat bottoms in these bins will permit uniform drying of all types of seed in bags or in bulk. A special type perforated flooring, AIRSWEEP, will be utilized so that "free-flowing" seed (in bulk) can be handled mechanically - without the use of shovels or brushes to clean out each lot of seed from the drying bins. After free flow ceases, air from the drying fan and air distribution system will completely clean out all residual seed from the drying bins.

The drying system will also include a small tower drier that can be used either as a batch or continuous flow drier. Special features of the tower drier include a trouble-free, mechanical unloader, latch-down exhaust doors on column drying section that permit drying of a partially filled column and a discharge air plenum to control the exhaust air.

An indirect oil fired, heater-fan drier unit with built-in air by-pass system will be utilized to supply only the air needed at any given time. Damper assemblies, hand operated by heavy-duty, gear box controls, will regulate the flow of air to the four (4) bulk bins and the tower drier from the air distribution tunnel. Exact air requirement for individual bins can be maintained by adjusting these damper assemblies to hold a given static pressure under each bin floor.

III. Equipment Specifications and Price Quotations

Specifications and price quotations are listed for items that are needed to complete the proposed drying facility, Maligaya Seed Processing Plant, Nueva Ecija, Philippines. Item numbers listed here correspond to the numbered items shown on the accompanying drawing. All prices are F.O.B. supplier.

Quantity	Description	Price
<u>Item 1</u> One	Seed Drier complete with U1000 Indirect Oil Fired Heater, arrangement No. 10 for 750,000 BTU/Hr. output with Model No. 1000 blower section. Fan to deliver 16,000 CFM of air at 4.5 to 5.0 inches external static pressure. Unit to be complete with heat exchanger with stainless steel combustion chamber and radiator, outdoor weather-proof casing and vestibule for controls, forced draft oil (#2) burner suitable for OFF-HIGH-LOW operation, electronic primary safety control, Fan/Limit switch, two stage plenum thermostat, blower section with twin 18 1/4 inch diameter backward inclined blade heavy duty blower, 20 H.P., 3 phase, 60 cycle, 230 volt drip-proof blower motor, drive and magnetic across-the-line starter, mounting legs, return and outside air mixing damper section with manual dampers, supply and return air section under heater, and hooded fresh air intake. Crated for export shipment.	\$7,560.00
	Suggested Supplier: Campbell Industries, Inc. 3121 Dean Avenue Des Moines, Iowa 50317	
<u>Item 2</u> One	Discharge Duct/Transition Assembly and Return Air Duct for U 1000 Heater. Sizes to be: Discharge, 38" x 80" to 24" x 140" x 48" long. Return, 24" x 80" to 24" x 80" x 48" long. Material to be light gauge, reinforced galvanized iron. Crated for export shipment.	313.00
	Suggested Supplier: Campbell Industries, Inc. 3121 Dean Avenue Des Moines, Iowa 50317	

Quantity	Description	Price
<u>Item 3</u>		
One	Tower Drier, Model NC-4 Drying Bin with a holding capacity of 160 bushels. Consisting of structural steel base, grain column sections (complete but unassembled) mechanical unloader, motor and electric timer, top and bottom hoppers, grain column divisions, exhaust air doors, section ladders, and discharge air plenum. Crated for export shipment.	\$3,650.00
	Suggested Supplier: Campbell Industries, Inc. 3121 Dean Avenue Des Moines, Iowa	
<u>Item 4</u>		
One	Inlet Duct Assembly for NC-4 Drying Bin, size to be 14" x 60" to 24" x 36". Material to be light gauge reinforced galvanized iron. Crated for export shipment.	363.00
	Suggested Supplier: Campbell Industries, Inc. 3121 Dean Avenue Des Moines, Iowa	
<u>Item 5</u>		
Five	Damper Assemblies, 24" high by 36" long, parallel blade blast type control dampers. Heavy gauge galvanized iron blades and frame (maximum leakage 7 CFM per square foot of damper area at 1/2 inch W.C. pressure.) Vertical mounting with heavy-duty gear box, hand operated, to be mounted 36 inches above damper. Crated for export shipment.	1,022.00
	Suggested Supplier: Campbell Industries, Inc. 3121 Dean Avenue Des Moines, Iowa	

Quantity	Description	Price
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Item 6

This unit is already on hand. The following extension sections and accessories are needed to utilize this conveyor for unloading the bulk drying bins.

One	Motor Mount Assembly for KS Conveyor (1 1/2 - 3 H.P.)	\$ 18.00
Two	10 ft. KS Conveyor Extension and Belt @ 185.00	370.00
One	3 ft. KS Conveyor Extension and Belt	59.00
One	2 H.P., 3 phase, 60 cycle, 230 volt, TEFC motor	137.00

Note: Prices quoted are F.O.B. Hudson, Iowa. Add 15% for export crating.

Suggested Supplier: Mercator Corporation
607 Washington Street
Reading, Pennsylvania 19603

Items 7-10

These items are already on hand. The following extensions and accessories are needed to utilize these elevators in the drying section of the plant.

Five	10 foot extensions for C2-175 Easy Dump Universal Elevator, Complete with double tube legs with couplings on each end, proper length of belting, buckets, pads, bolts, and belt bar splice @ 160.50.	802.50
Two	7 foot extensions (Same as above) @ 114.00.	228.00
Two	6 foot extensions (Same as above) @ 98.50	197.00

Quantity	Description	Price
Two	3 foot extensions (Same as above) @ 52.00	\$104.00
Two	Weather covers for C2-175 Easy Dump Universal Elevator @ 46.00	92.00
Three	2-Way 6 inch discharge valves with C2 adapters @ 42.00	126.00
Six	3 foot sections 6 inch flexible spouting, flanged both ends @ 18.50	111.00
Five	10 foot lengths 6 inch rigid spouting (14 ga. flanged both ends) @ 28.00	140.00
Six	6 inch loose flanges (6 in. I.D. round) @ 2.50	15.00

Note: Prices quoted are F.O.B.
Hudson, Iowa. Add 15% for
export crating.

Suggested Supplier: Mercator Corporation
607 Washington Street
Reading, Pennsylvania 19603

Item 11

This patented bin flooring is manufactured by Simplex of Cambridge. Export orders to the Philippines can be placed with Phil-Seeds, their distributor in the Philippines. Available lengths should be determined before placing the order. Exact quantity needed can then be determined from the drawing.

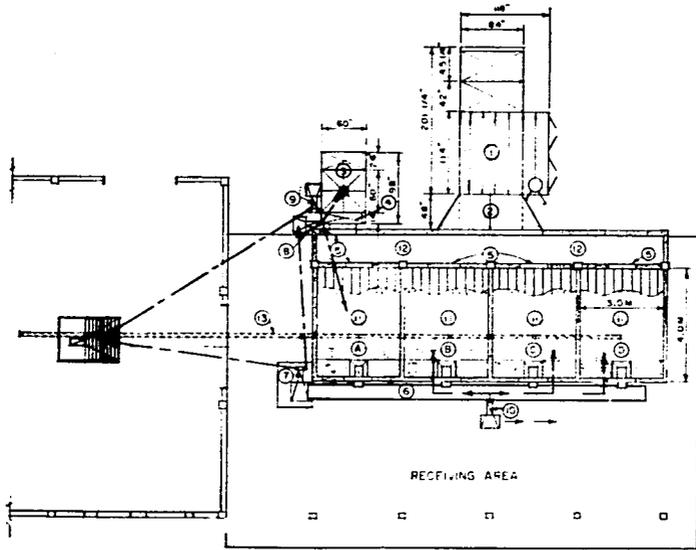
Quantity	Description	Price
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Item 12

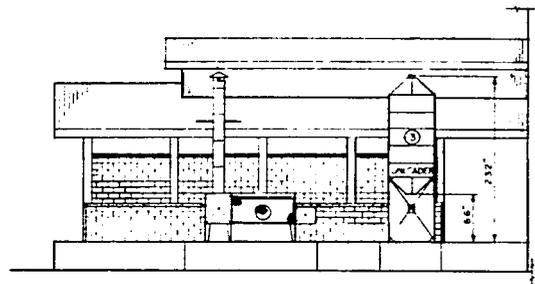
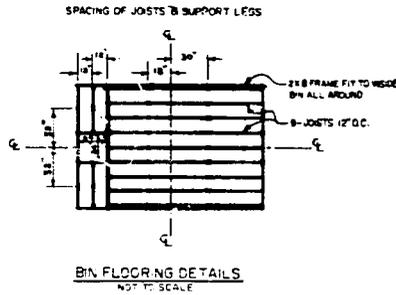
Air Distribution Tunnel to be of masonry construction.

Item 13

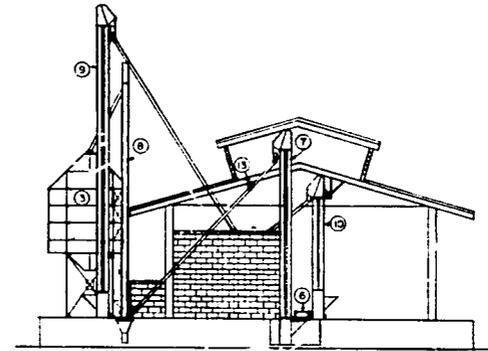
Installation of this reversible conveyor would eliminate the need to operate the main elevator in the processing plant when moving seed from the tower drier to the processing plant. It would also make it possible to utilize all of the bulk drying bins as tempering/holding bins in a continuous flow drying operation. Since the drying section of the plant can be made operational without this conveyor, it is being listed as an optional unit. Specifications and a price quotation will be sent just as soon as this information is available from a supplier.



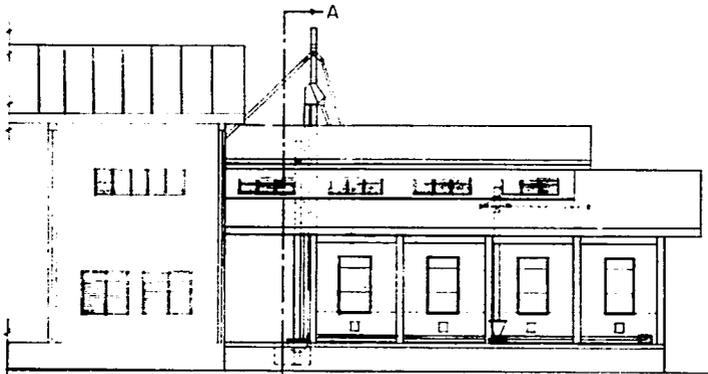
PLAN VIEW
SCALE: 1/80M



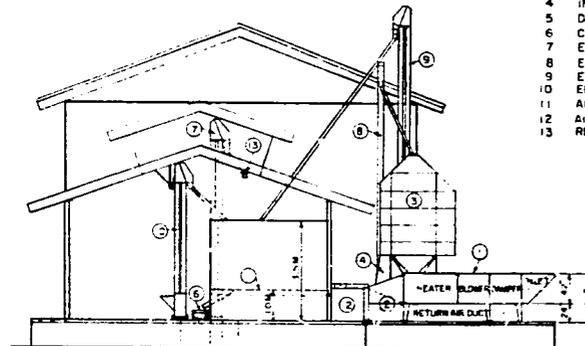
REAR ELEVATION
SCALE: 1/80M



SECTION A-A
SCALE: 1/80M



FRONT ELEVATION
SCALE: 1/80M



RIGHT SIDE ELEVATION
SCALE: 1/80M

LEGEND

- 1 SEED DRIER, OIL FIRED, CAMPBELL MODEL U-1000
- 2 DISCHARGE DUCT/TRANSITION ASSEMBLY, SEFT DRIER
- 3 TOWER DRIER, CAMPBELL MODEL NC-4
- 4 INLET DUCT ASSEMBLY, TOWER DRIER
- 5 DAMPER ASSEMBLY WITH GEARBOX CONTROL (5 FEED)
- 6 CONVEYOR, UNIVERSAL MODEL KS, 38 FEET LONG
- 7 ELEVATOR, UNIVERSAL MODEL C-2, 7.3 METER DISCHARGE HEIGHT
- 8 ELEVATOR, UNIVERSAL MODEL C-2, 9.2 METER DISCHARGE HEIGHT
- 9 ELEVATOR, UNIVERSAL MODEL C-2, 10.4 METER DISCHARGE HEIGHT
- 10 ELEVATOR, UNIVERSAL MODEL C-2, 4.8 METER DISCHARGE HEIGHT
- 11 AIRSWEEP 3/4 FLOORING
- 12 AIR DISTRIBUTION TUNNEL
- 13 REVERSIBLE CONVEYOR, SUFFER-FLO, 21.0 METER LONG (OPTIONAL)

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
PROPOSED DRYING FACILITIES SEED PROCESSING PLANT MALIGAYA, NUEVA ECUIJA		
DESIGNED BY: BECA, CAMERON	DATE: MAY, 1971	SHEET
DRAWN BY: JMB		OF
APPROVED BY: JCD	FILE NO.	