

AGENCY FOR INTERNATIONAL DEVELOPMENT
 WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

1. SUBJECT CLASSIFICATION	A. PRIMARY Agriculture
	B. SECONDARY Cereal Crops

2. TITLE AND SUBTITLE
 Consultation visit on Thailand seed project, a report

3. AUTHOR(S)
 Dougherty, G.M.

4. DOCUMENT DATE 1975	5. NUMBER OF PAGES 58 p.	6. ARC NUMBER ARC
--------------------------	-----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
 Seed Technology Laboratory, Mississippi State University,
 Mississippi State, Mississippi 39762

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)
 (In TA 75-20)

9. ABSTRACT

A report on the preparation of designs and equipment specifications for Thai seed facilities previously recommended by a project analysis team. Objectives of this assignment were to prepare: 1) facility layout plans and equipment specifications for corn shelling, seed drying, and seed storage facilities needed at Phitsanulok; 2) facility layout plans and equipment specifications for a seed facility to be established in Khon Kaen; and 3) information needed to design and to provide equipment specifications for seed facilities to be constructed in Chiang Mai and in Chai Nat.

10. CONTROL NUMBER PN-AAB-656	11. PRICE OF DOCUMENT
12. DESCRIPTORS Seed production Thailand	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/ta-C-1219 GTS
	15. TYPE OF DOCUMENT

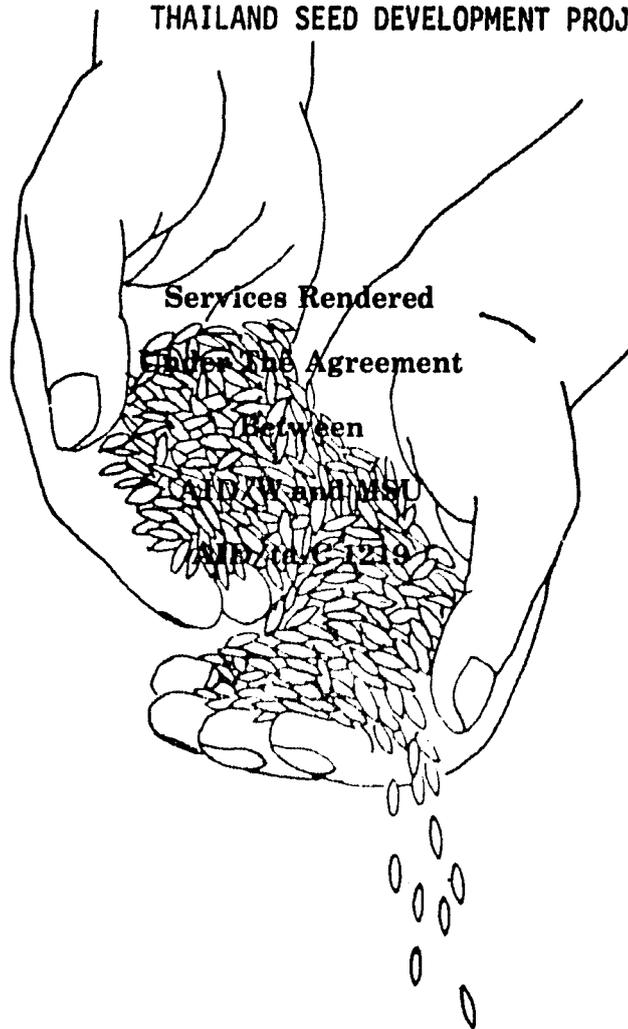
TH
631.521
D732

SOM/THAILAND

AID/ta-C-1219 G

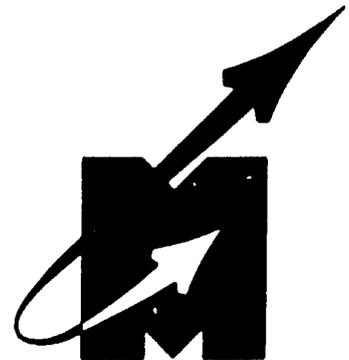
TA75-20

CONSULTATION VISIT
ON
THAILAND SEED DEVELOPMENT PROJECT



A.I.D.
Reference Center
Room 1656 NS

SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI



REPORT TO USOM/THAILAND
AND AID/W
ON
THAILAND SEED DEVELOPMENT PROJECT

Services Rendered
Under the Agreement
Between
AID/W and MSU
AID/CM/ta-C-1219

SEED TECHNOLOGY LABORATORY
MISSISSIPPI STATE UNIVERSITY
MISSISSIPPI STATE, MISSISSIPPI

January, 1976

REPORT SUMMARY

TITLE: Consultation visit on Thailand Seed Project
CONTRACT NO.: Mississippi State University - AID/CM/ta-C-1219
CONSULTANT: George M. Dougherty
PERIOD OF TRAVEL: 13 November - 18 December, 1975

SUMMARY

1. Assignment was performed in conjunction with an AID/Thailand Seed Development Project.
2. Royal Government of Thailand (RTG) requested services of a Mississippi State University seed specialist to design and prepare equipment specifications for seed facilities to be constructed under the Seed Development Project at Phitsanulok, and Khon Kaen.
3. Plans and specifications provided for the Khon Kaen seed facility can be used at Chai Nat.
4. Seed facility plans and specifications were based on recommendations formulated by a project analysis team of seed specialists that visited Thailand in April-May, 1975.

ACKNOWLEDGEMENTS

The author greatly appreciates the help and cooperation of Mr. D. Lundberg, USOM/Thailand; Mr. C. Taweesak, Deputy Director General, Department of Agricultural Extension; Mr. W. Petcharat and others with the Crop Promotion Division of the Department of Agricultural Extension during the consultation visit.

TABLE OF CONTENTS

	<u>Page</u>
REPORT SUMMARY.	ii
ACKNOWLEDGEMENTS.	iii
FORWARD	1
TERMS OF REFERENCE.	1
SEED FACILITIES	2
I. Phitsanulok.	2
II. Khon Kaen.	3
III. Chiang Mai	5
IV. Chai Nat	5
APPENDICES	
1. Equipment Summary - Phitsanulok.	7
2. Equipment Specifications for Phitsanulok Seed Facility	8
3. Phitsanulok - Equipment Electrical Specifications.	12
4. Equipment Summary - Khon Kaen.	13
5. Equipment Specifications for Khon Kaen Seed Facility	16
6. Khon Kaen - Equipment Electrical Specifications.	32
7. Trade Name Index	33
8. Itinerary and Contacts	35
9. Seed Facility Drawings - Phitsanulok	37
10. Seed Facility Drawings - Khon Kaen	41

CONSULTATION VISIT
ON
THAILAND SEED DEVELOPMENT PROJECT

16 November - 17 December, 1975

Forward

The assignment was arranged in conjunction with a U.S. AID/Royal Thailand Government (RTG) Seed Development Loan Project. Purpose of the project is to stimulate the use of improved seed on Thai farms with the expected result being an increase in the productivity and income of Thai farmers. Project objectives, in terms of the seed operation's component, is to provide certain inputs involved in the production, processing and marketing of 8,650 MT seed of improved varieties of Thailand's six basic crops by 1980.

Recommendations identifying inputs to be provided under the project were formulated by a project analysis team of Mississippi State University (MSU) seed specialists that visited Thailand in April-May, 1975 (Report TA 75-07).

In October, the RTG requested services of a seed specialist, under contract AID/CM/ta-C-1219 between AID and Mississippi State University, to prepare designs and equipment specifications for the seed facilities recommended by the project analysis team. George M. Dougherty, Seed Technology Laboratory, MSU was nominated for the assignment and authorized by TAB/AGR to provide the service requested.

Terms of Reference

Assignment objectives were:

1. Preparation of facility layout designs and equipment specifications for corn shelling, seed drying and seed storage facilities needed at Phitsanulok.
2. Preparation of facility layout designs and equipment specifications for a seed facility to be established in Khon Kaen.
3. To obtain information needed to design and provide equipment specifications for seed facilities to be constructed in Chiang Mai and Chai Nat.

Seed Facilities

Preliminary designs and equipment specification lists for the Phitsanulok and Khon Kaen Seed Centers were prepared and discussed in detail with representatives of the RTG prior to departure from Thailand.

I. Phitsanulok: (Drawings 1,2,3)

Located 500km north of Bangkok construction of this facility was started in 1972 by the RTG. Technical assistance and equipment was provided by USOM to increase the capacity and operational efficiency of the processing facility in 1973 and 1974. Under the current Seed Development Project additional storage warehousing and facilities needed to dry and shell ear corn will be provided.

Layout plans and equipment specifications for a corn shelling and drying facility and two seed storage warehouses are provided in this report.

The ear corn shelling and drying facility (Drawing 1) consists of a sheller and two corrugated 18 ft. diameter bins mounted on a concrete slab. Each bin has a usable side-wall height of 10 feet and can be used to dry 25 MT ear corn at a depth of 10 feet or 25 MT shelled corn or other grain crops at a 5 ft. depth. Each bin, when not used for drying purposes, will provide temporary storage for 50 MT (grains) when filled to a depth of 10 feet.

Storage warehouse "A" occupies an area of 1128 M². Within the building are four conditioned storage rooms, each 113 M² in size (Drawings 2,3). It is recommended the building be a concrete block structure. A vapor barrier should be placed between the soil and the reinforced concrete floor. The concrete floor slab should have a compressive strength of 2750 pounds per square inch and be reinforced with No.6, 6-inch x 6-inch reinforcement wire. Special attention is required to assure that drainage away from the building is adequate. Capacity of the 600 M² "ventilated" storage area of the building is estimated at 820 MT, if pallets are used.

Each conditioned storage room in warehouse "A" has an estimated capacity of 135 MT seed. These rooms provide space for the storage of seed to be held longer than three months, principally soybeans, mungbeans and peanuts. Seed to be sold the next planting season should be stored in the "ventilated" storage area of the building.

Storage warehouse "B" occupies an area 406 M² (Drawing 3). Capacity of the warehouse is estimated at 450 MT, if pallets are used. Construction requirements are the same as for warehouse "A".

Funds have not been provided in the Seed Development Project to construct warehouse "B". The structure was designed at the request of the RTG. If constructed by the RTG, space will be available at Phitsanulok to store about 2300 MT seed if all seed is stored utilizing a palletized-forklift seed handling operation. Warehouse storage capacity will be nearly doubled if seed is hand stacked and aisle space minimized.

Equipment items recommended for purchase are summarized in Appendix 1. Specifications of equipment required appear in Appendix 2. A listing of potential U.S. equipment suppliers is presented in Appendix 7.

II. Khon Kaen: (Drawings 1 through 13)

Located 500km northeast of Bangkok; Khon Kaen is the center of the 16 Northeast Provinces. The Khon Kaen Seed Center will be the first complete facility constructed under the Seed Development Project. It is anticipated this Seed Center will be operational by September, 1977.

Layout plans are provided for two flat-storage warehouses, a workshop and implement storage shed, an office-seed testing laboratory building, a processing plant, a bin-type drying and corn shelling facility and a sack (bag) type seed dryer.

The flat-storage warehouse, designated storage warehouse "A", occupies an

area of 720 M² (Drawing 2). It is recommended that the building be a concrete block structure. A vapor barrier should be placed between the soil and the concrete floor. The concrete floor slab should have a compressive strength of 2750 pounds per square inch and be reinforced with No.6, 6-inch x 6-inch reinforcement wire. Special attention is required to assure that drainage away from the building is adequate. Capacity of the 624 M² "ventilated" storage area of the building is estimated at 800 MT, if pallets are used.

A 160 MT capacity conditioned storage room (Drawing 2) is located within storage warehouse "A". This room provides space for the storage of "carry-over" seed.

Storage warehouse "B" (Drawing 3) occupies an area 1000 M². Capacity of the warehouse is estimated at 1400 MT. Construction requirements are the same as those indicated for warehouse "A".

The workshop building (Drawing 3) occupies an area 58 M² in size. An all-weather shed for equipment storage (58 M²) is attached to one end of the shop building. Any economical type construction will suffice for the shop building and equipment shed.

The office - laboratory building (Drawings 4,5) measures 10.8 M x 11 M. It is a single story structure with 3.0 M height sidewalls. The building has no special construction requirements. The building contains three offices, a laboratory, a storage room and a seed testing laboratory.

The seed processing plant building (Drawings 4,5,6,7,8) measures 26M x 16M. Building height at eave (6M) and ridge line (9.3M) are critical (Drawing 8). The building has no special construction requirements. All equipment is supported from the concrete floor but it will, however, require bracing from the superstructure. The concrete floor slab should have a compressive strength

of 2750 pounds per square inch and be reinforced with No.6, 6-inch x 6-inch reinforcement wire.

The corn shelling and bin-type dryer facility (Drawings 4,5,12) consists of a sheller, an elevator and two corrugated 18 ft. diameter bins mounted on a 16M x 17M concrete slab. The bins are identical to those recommended for installation at Phitsanulok. The 38 ft. (11.4M) discharge-height elevator (Drawing 4) will require bracing from the seed processing plant building.

The sack (bag) dryer, including both loading sheds, occupies an area of 270 M² and can be used to dry 224, 70Kg sacks, at one time. The complete dryer, or sections of it, can be converted to a temporary bulk type dryer if conditions warrant. The complete dryer, less fan and heater, can be constructed of locally available materials.

Equipment items recommended for purchase are summarized in Appendix 4. Specifications of equipment required appear in Appendix 5. A listing of potential U.S. equipment suppliers is presented in Appendix 7.

III. Chieng Mai:

Located 780Kms. north of Bangkok and 400Kms. northwest of Phitsanulok. This Seed Center will be the second constructed under the project. Construction is not scheduled to start before early 1977.

Preparation of layout drawings and equipment specifications were not requested as an objective of the assignment. Information needed to provide facility designs at a future date, to be determined by USOM and the RTG, was obtained.

IV. Chai Nat:

Located 200Kms. north of Bangkok near the eastern edge of the Central Plain. This will be the last facility built under the Seed Development Project. Construction is not scheduled to start until the end of 1977.

The Chai Nat and Khon Kaen facilities will be identical. Drawings and equipment specifications prepared for the Khon Kaen Seed Facility can be used at Chai Nat.

EQUIPMENT SUMMARY
PHITSANULOK

ITEM NO.	DESCRIPTION	NO. REQ'D.	NOTES
(DRYING AREA)			
1	Drying bins, 18 ft. dia. complete	2	
2	Heater-fan units (bins)	2	
3	Auger (bin unloading) 12' x 4" (3.6M)	1	
4	Tubular belt conveyor, 25' (7.5M)	1	(4a,4b)
	a) Load bins		
	b) Convey shelled corn to wagon		
5	Ear corn conveyor, 25' (7.5M)	1	(5a)
	a) Convey ear corn to sheller		
6	Ear corn sorting belt (Thai built)	1	(6a)
	a) Obtain spec's from units at Praphuttabat Field Crop Exp't Station (Suraburi)		
7	Corn sheller (Triumph)	1	
12	Belt conveyor, 14 ft. (4.2M)	1	(12a)
	a) Used in conjunction with item 4		
(PROCESSING PLANT)			
8	Belt conveyor, 14 ft. (4.2M)	1	(8a)
	a) Convey from dryer bins (inside) to main elevator		
9	Elevator C2-175; 22 ft. d.h. (6.0M)	1	(9a)
	a) Treater elevator		
(SEED STORAGE)			
10	Dehumidifier, desiccant type	2	
11	Air conditioners	8	

EQUIPMENT SPECIFICATIONS
FOR
PHITSANULOK SEED FACILITY

ITEM NO.	DESCRIPTION	NO. REQ'D.
1	<p>Drying and storage bin, round type; made up of corrugated metal; 18 ft. diameter; 5 standard (32") rings and 2-16" rings. <u>Note:</u> bin side-wall eave height to be 14 ft. high; perforated drying floor to be installed 4 ft. above concrete foundation support ring. To be supplied complete with:</p> <ul style="list-style-type: none"> a) all assembling hardware & caulking compound b) center-fill roof ventilator c) four (4) roof manholes with covers d) roof ladder e) outside wall ladder f) walk-in door (in 2nd & 3rd full rings) g) Channelox drying floor with flashing & hardware h) tube-well bin unloading kit (less auger) i) inside ladder j) door boards for walk-in door k) assembling instructions l) fan transition inlet collar <p><u>NOTE:</u> designs call for bin to be assembled as follows: 16" base ring with fan transition; 32" ring; perf. floor; 4-32" rings; 16" (top) ring.</p> <p><u>Preferred Brand:</u> Read Steel Products Reed-Joseph Columbian</p> <p><u>Suppliers:</u> Read Steel Products Reed-Joseph Columbian</p>	2
2	<p>Heater-Blower unit, for drying seed or grain; heater to be diesel oil burner modified to deliver 300,000 BTU/hr.; fan to be centrifugal type capable of delivering 10,000 cfm's at 3.25 inches static pressure; standard controls and safety devices; stemmed thermometer; all necessary electrical starters and mechanical drive components; electric drive motor to be sized to meet specifications (CFM) probably 7½ h.p., operable on 380 volt, 50 Hz., 3 phase; spare parts as selected by supplier on basis of experience but not to exceed \$200/unit.</p> <p><u>Preferred Brand:</u> American Drying Systems Model No.810 (Modified)</p> <p><u>Suppliers:</u> American Drying Systems Read Steel Products Campbell</p>	2

ITEM NO.	DESCRIPTION	NO. REQ'D.
3	Portable, utility auger; 4-inch dia. x 12 ft. length; complete with drive, motor mount and motor required to convey 300 bushel (7 MT) per hour (horizontal). Motor to be operable on 220 volt, 50 Hz., 1 phase.	1
	<u>Preferred Brand:</u> (none) To meet specifications	
	<u>Suppliers:</u> Burrows Hutchinson McMaster-Carr Seedburo	
4	Tubular belt conveyor; 25 ft. length (7.5 M); all-weather housing with undercarriage, load hopper and discharge spout. Capable of conveying 40 MT (ear corn and grain) 1 hour up to 45° incline. Complete with drive and motor; operable on 380 volt, 50 Hz., 3 phase.	1
	<u>Preferred Brand:</u> Belt-Veyor	
	<u>Suppliers:</u> Burrows Seedburo	
5	Ear corn conveyor, portable with undercarriage (aluminum construction preferred); 25 ft. (7.5 M) length; capable of conveying 2 MT (ear corn) per hour up to 45° incline. Complete with drive and motor operable on 220 volt, 50 Hz., 1 phase.	1
	<u>Preferred Brand:</u> (none) To meet specifications	
	<u>Suppliers:</u> Burrows Seedburo	
6	Ear corn sorting belt (Thai built) <u>Note:</u> DOAE to obtain spec's from units at Praphuttabat Field Crop Exp't Sta. (Suraburi)	1
7	Corn sheller; sheller to be suitable for seed corn; 7 MT shelling per hour; as determined from inlet end of sheller, grain discharge to be <u>right hand</u> . Complete with aspirator and cob-blower; 20 ft. cob-blower pipe; drive, motor and starting switch; replacement parts selected by supplier not to exceed \$200. Motor operable on 380 volt, 50 Hz., 3 Phase.	1
	<u>Preferred Brand:</u> Triumph Model 3-C Western Model 2½	
	<u>Suppliers:</u> Ehram Company Union Iron Works	

ITEM NO.	DESCRIPTION	NO. REQ'D.
8	Belt-conveyor; (portable) 14 ft. (4.2 M) length; flat belt, without flights; capable of conveying 3 MT grain per hour (horizontally). Complete with drive, motor, starting switch. Motor operable on 220 volt, 50 Hz., 1 phase. <u>Preferred Brand:</u> (none) To meet specifications <u>Suppliers:</u> Burrows Seedburo	1
9	Elevator, belt-bucket type; 22 ft. (6.6 M) discharge height; 175 bushels (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing; all metal construction; complete with required belting, buckets, splicers, assembling hardware and: a) dump hopper b) C.I. adjustable elbow, 6-inch c) two-way valve, 6-inch (transition & adapter incl.) d) 10 ft. section 6-inch rigid spouting (12 guage) flanged both ends e) two (2) clamp rings f) start-stop push button control station g) drive and motor operable on 220 volt, 50 Hz., 1 phase h) replacement parts not to exceed \$50 <u>Preferred Brand:</u> Universal Industries Model C2-175 "Easy Dump" <u>Suppliers:</u> Universal Industries Ferrell-Ross Burrows Mercator Corporation	1
10	Dehumidifier, desiccant type; continuous duty; dual tower, solid adsorption dehumidifier; with capability of removing 100 pounds of water per 24 hours at inlet air temperatures of 26.7° C (80°F) and 75% inlet humidity. Complete with humidistat and spare parts not to exceed \$200. Operational on 220 volt, 50 Hz., 1 phase. <u>Preferred Brand:</u> Dryomatic Model 150 <u>Suppliers:</u> Air Flow Company Burrows Seedburo	4
11	Air conditioners; 18,000 BTU's; through-the-wall type; with high dehumidification capacity; operable on 220 volt, 50 Hz., 1 phase.	8

ITEM NO.	DESCRIPTION	NO. REQ'D.
	<p><u>Preferred Brand:</u> (none) To meet specifications</p> <p><u>Suppliers:</u> Local Purchase</p>	
12	<p>Belt conveyor; (portable) 14 ft. (4.2M) length; flat belt with flights, capable of conveying 3 MT grain per hour up to 40° angle. Complete with drive, motor, starting switch. Motor operable on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> (none) To meet specifications</p> <p><u>Suppliers:</u> Burrows Seedburo</p> <p><u>NOTE:</u> Motors of 3/4 horsepower and less have been specified to be operable on 220 volt, 50 Hz., 1 phase; all larger motors have been specified to be operable on 380 volts, 50 Hz., 3 phase.</p>	1

**PHITSANULOK
EQUIPMENT ELECTRICAL SPECIFICATIONS**

ITEM NO.	DESCRIPTION	H.P.	MOTORS Voltage	Phase
2	Heater-fan units (2)	7½ ea.	380	3
3	Auger (bin unloading)	¾	220	1
4	Tubular belt conveyor	7½	380	3
5	Ear corn conveyor	½	220	1
6	Ear corn sorting belt	---	---	---
7	Corn sheller	15	380	3
8	Belt conveyor	¾	220	1
9	Elevator	1/3	220	1
10	Dehumidifier (4)	-- ea.	220	1
11	Air conditioners (8)	-- ea.	220	1

EQUIPMENT SUMMARY
KHON KAEN

ITEM NO.	DESCRIPTION	NO. REQ'D.	NOTES
	(Drying Area)		
1	Drying Bins, 18 ft. dia. complete	2	
2	Heater-fan units (bins)	2	
3	Heater-fan unit (sack dryer)	1	
4	Auger (bin unloading) 14' x 4" (4.4M)	1	
5	Tubular belt conveyor, 25' (7.5M) a) load bins b) will reach from bins to proc. plant	1	(5a,5b)
6	Ear corn conveyor, 16 ft. (4.8M) a) conveys ear corn to sheller	1	(6a)
7	Ear corn sorting belt (Thai built) a) obtain spec's from units at Praphuttabat Field Crop Exp't Station (Suraburi)	1	(7a)
8	Corn sheller (Triumph)	1	
9	Elevator, C2-350; 38'd.h.(11.4M) complete a) loads bins b) unloads bins to proc. plant	1	(9a,9b)
	(Processing Plant)		
10	Elevator C2-175; 29'd.h. (8.8M) complete a) Main receiving elevator	1	(10a)
11	Holding bin	1	
12	Cleaner surge bin	1	
13	Air screen cleaner	1	
14	Clean seed elevator C2-175; 25'd.h. (7.5M)	1	
15	Vibrating conveyor, 26' length (7.8M)	1	
16	Cylinder separator, No.3 (complete)	1	
17	Elevator C2-175; 25'd.h. (7.5M) a) Elevator for cyl. separator	1	(17a)

ITEM NO.	DESCRIPTION	NO. REQ'D.	NOTES
18	Precision grader, No.2 (complete)	1	
19	Elevator C2-175; 25'd.h. (7.5M) a) elevator for grader	1	(19a)
20	Gravity table, No.80	1	
21	Elevator C2-175; 26'd.h. (7.8M) a) elevator for gravity table	1	(21a)
22	Seed treater, Gustafson Model "B"	1	
23	Elevator C2-175; 22'd.h. (6.7M) a) elevator for treater	1	(23a)
24	Bagger-weigher, Unipak	1	
25	Surge bin (cylinder)	1	
26	Surge bin (grader)	1	
27	Surge bin (gravity)	1	
28	Surge bin (treater)	1	
29	Surge bin (bagger)	1	
30	Cyclones (cleaner)	2	
31	Platform scales	2	
32	Vacuum cleaner	1	
33	Blower (hand)	2	
34	Bag holders	6	
(Seed Storage)			
35	Bag conveyor, 17' length (5.1M)	1	
36	Bag trucks, 4-wheel	4	
37	Bag trucks, 2-wheel	4	
38	Warehouse platform scales	1	
39	Dehumidifier, desiccant type	1	

ITEM NO.	DESCRIPTION (Seed Storage Cont'd.)	NO. REQ'D.	NOTES
40	Air conditioners	2	
41	Hygrothermographs	2	
42	Moisture tester	1	
43	Oven, heated air	1	
44	Seed Divider, electric	1	
45	Torsion Balance w/weights	1	
46	Gram Scales	3	
47	Fluorescent lamp	2	
48	Weight tester (hand held)	1	
49	Germinator (heat only)	1	
50	Seed triers	3	
51	Seed triers	3	
52	Hand test screens	1 set	
53	Forceps	12	
54	Forceps	12	
55	Grain pans	6	
56	Grain pans	6	
57	Thermometers	12	
58	Petri dishes	50	
59	Filter paper	10 pkgs.	
60	Sling psychrometer	2	
61	Purity Board	1	
62	Counting boards	3	

EQUIPMENT SPECIFICATIONS
FOR
KHON KAEN SEED FACILITY

ITEM NO.	DESCRIPTION	NO. REQ'D.
1	<p>Drying and storage bin; round type; made up of corrugated metal; 18 ft. diameter; 5 standard (32") rings and 2-16" rings. <u>Note</u>: bin side-wall eave height to be 14' high; perf. drying floor to be installed 4' above concrete foundation support ring. To be supplied complete with:</p> <ul style="list-style-type: none"> a) all assembling hardware & caulking compound b) center-fill roof ventilator c) four (4) roof manholes w/covers d) roof ladder e) outside wall ladder f) walk-in door (in 2nd & 3rd full rings) g) Channelox drying floor with flashing & hardware h) Tube-well bin unloading kit (less auger) i) inside ladder j) door boards for walk-in door k) assembling instructions l) fan transition inlet collar <p><u>Note</u>: designs call for bin to be assembled as follows: 16" base ring w/fan transition; 32" ring; perf. floor; 4-32" rings; 16" (top) ring.</p> <p><u>Preferred Brand</u>: Read Steel Products; Reed-Joseph;Columbian</p> <p><u>Suppliers</u>: Read Steel Products Reed-Joseph Columbian</p>	2
2	<p>Heater-Blower unit, for drying seed or grain; heater to be diesel oil burner modified to deliver 300,000 BTU/hr; fan to be centrifugal type capable of delivering 10,000 cfm's at 3.25 inches static pressure; standard controls and safety devices; stemmed thermometer; all necessary electrical starters and mechanical drive components; electric drive motor to be sized to meet specifications (CFM) probably 7½ h.p., operable on 380 volt, 50 hz., 3 phase; spare parts as selected by supplier on basis of experience but not to exceed \$200/unit.</p> <p><u>Preferred Brand</u>: American Drying Systems Model No. 810 (Modified)</p> <p><u>Suppliers</u>: American Drying Systems Read Steel Products Campbell</p>	2

ITEM NO.	DESCRIPTION	NO. REQ'D.
3	<p>Heater-Blower unit, for drying seed or grain; heater to be diesel oil burner modified to deliver 300,000 BTU/hr; fan to be centrifugal type capable of delivering 10,000 cfm's at 0.5 inches static pressure; standard controls and safety devices; stemmed thermometer; all necessary electrical starters and mechanical drive components; electric drive motor to be sized to meet specifications (CFM) probably 5 h.p.; operable on 380 volt, 50 Hz., 3 phase; spare parts as selected by supplier on basis of experience but not to exceed \$200.</p> <p><u>Preferred Brand:</u> American Drying Systems Model 810 (Modified)</p> <p><u>Suppliers:</u> American Drying Systems Read Steel Products Campbell</p>	1
4	<p>Portable, utility auger; 4-inch dia. x 14 ft. length; complete with drive, motor mount and motor required to convey 300 bushel (7 MT) per hour (horizontal). Motor operable on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> (none) To meet specifications</p> <p><u>Suppliers:</u> Burrows Hutchinson McMaster-Carr Seedburo</p>	1
5	<p>Tubular belt conveyor; 25 ft. length (7.5 M); all weather housing with undercarriage, load hopper and discharge spout. Capable of conveying 40 MT (ear corn and grain)/hr. up to 45° incline. Complete with drive and motor operable on 380 volt, 50 Hz., 3 phase.</p> <p><u>Preferred Brand:</u> Belt-Veyor</p> <p><u>Suppliers:</u> Burrows Seedburo</p>	1
6	<p>Ear corn conveyor, portable with undercarriage (aluminum construction preferred); 16 ft. (4.8 M) length; capable of conveying 2 MT (ear corn) per hour up to 45° incline. Complete with drive and motor operable on 220 volt, 50 Hz., 1 phase.</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D.
	<p><u>Preferred Brand:</u> (none) To meet specifications</p> <p><u>Suppliers:</u> Burrows Seedburo</p>	
7	<p>Ear corn sorting belt. (Thai built)</p> <p>Note: DOAE to obtain spec's from units at Praphuttabat Field Crop Exp't. Sta. (Suraburi)</p>	1
8	<p>Corn sheller; sheller to be suitable for seed corn; 7 MT shelling per hour; as determined from inlet end of sheller, grain discharge to be <u>right hand</u>. Complete with aspirator and cob-blower; 20 ft. cob-blower pipe; drive, motor and starting switch; replacement parts selected by supplier not to exceed \$200. Motor operable on 380 volt, 50 Hz., 3 phase.</p> <p><u>Preferred Brand:</u> Triumph Model 3C Western Model 2½</p> <p><u>Suppliers:</u> Ehram Company Union Iron Works</p>	1
9	<p>Elevator, belt-bucket type: 38 ft. (11.4 M) discharge height; 350 bushels (8MT) per hour capacity at belt speed of 335 ft. per minute and 8½ inch bucket spacing; all metal construction; complete with required belting, buckets, splices, assembling hardware and:</p> <ul style="list-style-type: none"> a) two (2) dump hoppers b) bottom boot cleanout with 4-inch legs c) three-way valve, 6-inch with adapter and transitions d) three (3) C.I. adjustable elbows, 6 inches e) service ladder f) safety cage g) weather and dust sealing h) ten (10) cartridges of mastic i) ten (10) 10 ft. sections 6-inch rigid spouting (12 gauge) flanged both ends j) five (5) 6-inch loose flanges k) ten (10) 6-inch clamp rings l) service platform m) drive and motor operable on 380 volt, 50 Hz. 3 phase n) replacement parts to be selected by manufacturer (drive belts, belting, extra buckets, hardware) but not to exceed \$200 <p><u>Note:</u> Elevator to be installed out-of-door</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D.
	o) stop-start push button control station	
	<u>Preferred Brand:</u> Universal Industries Model C-350	
	<u>Suppliers:</u> Universal Industries Ferrell-Ross Burrows Mercator Corporation	
10	<p>Elevator, belt-bucket type: 29 ft. (8.8 M) discharge height; 175 bushels (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4¼-inch bucket spacing; all metal construction; complete with required belting, buckets, splicers, assembling hardware and:</p> <ul style="list-style-type: none"> a) dump hopper b) two-way valve, 6-inch with adaptor and transition c) two (2) C.I. adjustable elbow, 6-inch d) three (3) 10 ft. sections 6-inch rigid spouting (12 guage) flanged both ends e) two (2) 6-inch loose flanges f) three(3) 6-inch clamp rings g) start-stop push button control station h) drive and motor operable on 220 volt, 50 Hz., 1 phase i) replacement parts to be selected by manufacturer not to exceed \$50 	1
	<u>Preferred Brand:</u> Universal Industries Model C2-175 "Easy Dump"	
	<u>Suppliers:</u> Universal Industries Ferrell-Ross Burrows Mercator Corporation	
11	Holding bin (see dwg's) local fabrication	1
12	Cleaner surge bin (see dwg's) local fabrication	1
13	<p>Seed cleaner, air and screen type; cleaner to have four screens with adjustable shoe shake and screen pitch; two independent adjustable air systems (upper and bottom air); screen frame size 42 inch x 60 inch with synchronized brush type screen wipers. Overall cleaner dimensions (extremes): 152½ in. long; 76 in. wide; 98½ in. height. Average capacity of 60-100 bushels (1.6 - 2.3 MT) per hour of clean</p>	1

ITEM
NO.

DESCRIPTION

NO.
REQ'D.

seed. Complete with:

- a) roll-feed hopper
- b) adjustable speed feed roll
- c) fans mounted 45° angle to rear
- d) square to round adaptors on fan outlets
- e) screen tappers on all screen positions
- f) vibrating spout to discharge clean seed on left side of cleaner
- g) waste product holders on right side of cleaner
- h) safety guards as required
- i) screens as follows:
 - Round hole: 6,7,9,11,12,14,16,18,20,22,24
 - Slotted: 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 1/12 x 1/2, 7 x 3/4, 8 x 3/4, 9 x 3/4
- j) start-stop push button control station
- k) drives and motor of required horsepower, operable on 380 volt, 50 Hz., 3 phase
- l) replacement parts to be selected by manufacturer not to exceed \$200

Preferred Brand: Crippen Manufacturing Company
Model H-442

Suppliers: Crippen
Ferrell-Ross
Mercator Corporation

14,19,
21 & 23

Elevator, belt-bucket type: 26 ft. (7.8 M) discharge height; 175 bushels (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4½-inch bucket spacing; all metal construction; complete with required belting, buckets, splicers, assembling hardware and:

- a) dump hopper
- b) two-way valve, 6-inch with adapter and transition
- c) C.I. adjustable elbow, 6-inch
- d) one (1) 10 ft. section 6-inch rigid spouting (12 gauge) flanged both ends
- e) two (2) 6-inch loose flanges
- f) three (3) 6-inch clamp rings
- g) start-stop push button control station
- h) drive and motor operable on 220 volt, 50 Hz., 1 phase
- i) replacement parts to be selected by manufacturer not to exceed \$25

4

ITEM
NO.

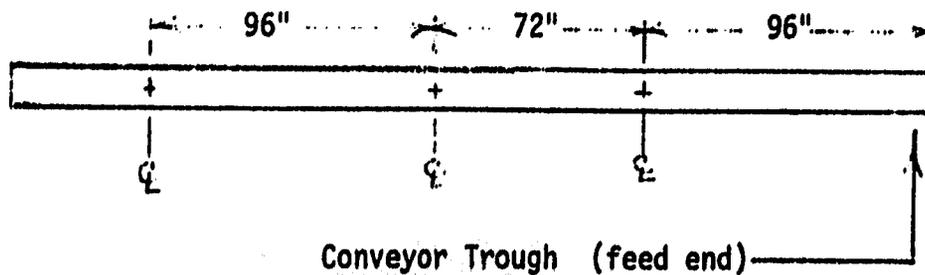
DESCRIPTION

NO.
REQ'D.

Preferred Brand: Universal Industries
Model C2-175 "Easy Dump"

Suppliers: Universal Industries
Ferrell-Ross
Burrows
Mercator Corporation

- 15 Conveyor, balanced oscillating type. Conveyor trough (pan) to be 8-inch (wide) x 6-inch (deep) x 26 feet (length); 3 MT per hour capacity. Installed weight to be 2,000 pounds (maximum); overall height not to exceed 30 inches. Complete with: drive; V-belts; sheaves; belt-guards; motor of required horsepower (Approx. 3 Hp.) operable on 380 volts, 50 Hz., 3 phase; start-stop push-button control station; spare parts not to exceed \$200. Conveyor to be supplied with intermediate positioned drive assembly and three intermediate discharge outlets 6-inches x 6-inches (including slide-gates) as indicated in drawing.



Preferred Brand: Overstrom, Model RLB-8 Natural
Frequency Vibrating Conveyor

Suppliers: Triple/S Dynamics

ITEM NO.	DESCRIPTION	NO REQ'D.
16	<p>Indented Cylinder Seed Separator. Average capacity ratings as follows: (Sm. grains) 2% - 5% liftings = 1 MT per hour. Overall dimensions (extreme) 101 3/4 inch (length); 26 7/8 inch (width); 30 inch height. Complete with:</p> <ul style="list-style-type: none"> a) roll feeder b) discharge spouts c) cylinders sized as follows: 13,16 d) drive and motor operable on 220 volt, 50 Hz., 1 phase e) replacement parts selected by manufacturer not to exceed \$50 f) start-stop push button control station <p><u>Preferred Brand:</u> CEA - Carter Day Model No. 3</p> <p><u>Suppliers:</u> Carter-Day Americas (sole supplier)</p>	1
17	<p>Elevator, belt bucket type: 25 ft. (7.5 M) discharge height; 175 bushel (3.5 MT) per hour capacity at belt speed of 110-125 ft. per minute and 4 1/4-inch bucket spacing; all metal construction; complete with required belting, buckets, splicers, assembling hardware and:</p> <ul style="list-style-type: none"> a) dump hopper b) two-way valve, 6-inch with adapter and transition c) C.I. adjustable elbow, 6-inch d) three(3) 10 ft. section 6-inch rigid spouting (12 guage) flanged both ends e) two (2) 6-inch clamp rings f) start-stop push button control station g) drive and motor operable on 220 volt, 50 Hz., 1 phase h) replacement parts to be selected by manufacturer not to exceed \$25 <p><u>Preferred Brand:</u> Universal Industries Model C2-175 "Easy Dump"</p> <p><u>Suppliers:</u> Universal Industries Ferrell-Ross Burrows Mercator Corporation</p>	1
18	<p>Cylindrical Screen Seed Width and Thickness Separator (Precision Grader). Average capacity 3 MT per hour. Dimensions (extreme) 80 inch (length); 33 inch (width); 58 inch</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D
	<p>(height). Complete with:</p> <ul style="list-style-type: none"> a) square to round transitions on discharge outlets b) vibrating conveyor (complete with drive and motor) for return of "thrus" product to feed-end c) two (2) shells sized 7½ R (for rice) d) two (2) shells sized 13S (for corn) e) two (2) shells sized 11S (for corn) f) two (2) shells sized 18 R complete with lifting bar assembly (for corn) g) drives and motors of required horsepower operable on 220 volt, 50 Hz., 1 phase h) replacement parts selected by manufacturer not to exceed \$50 <p><u>Preferred Brand:</u> CEA Carter-Day Model No. 2</p> <p><u>Suppliers:</u> Carter-Day Americas (sole supplier)</p>	
20	<p>Gravity separator, for seed; rectangular deck, 36 in. x 72 in.; multiple fans located under deck, separately adjustable; equipped with "A" type deck for use with large seed (covered with wire mesh) and deck (wire mesh) for small seed (sorghum & mungbeans). Dimensions 79 in. length x 45 in. width x 54 in. height (variable). Separator to have <u>left hand</u> discharge. Complete with drive and motor of required horsepower operable on 380 volt, 50 Hz., 3 phase; two-way discharge end spout; start-stop push button control station; replacement parts not to exceed \$50.</p> <p><u>Preferred Brand:</u> Oliver Manufacturing Company Model Hi-Cap. No. 80</p> <p><u>Suppliers:</u> Oliver Manufacturing Company Mercator Corporation</p>	1
22	<p>Seed Treater, metered slurry type; for application of both liquid and wettable powder formulated products. Treater to have 4.5 MT (150 BPH) capacity. Complete with 2-way bagging spout; drive and motor operable on 220 volt, 50 Hz., 1 phase; start-stop push-button control station; replacement parts not to exceed \$50.</p> <p><u>Preferred Brand:</u> Gustafson Manufacturing Company Model B</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D.
	<p>Suppliers: Gustafson Manufacturing Company Mercator Corporation Burrows</p>	
24	<p>Bagging-Weighing-Sewing System; consisting of:</p> <ol style="list-style-type: none"> 1) Automatic gross bagger with capacity of 25 to 140 lbs. in open mouth bags; cam grip bag holder with easy release holder bar; accuracy of ± 2 oz.; capacity of seven 50 lb. bags/minute (paper, textile, plastic or burlap); bagger scale with pedestal (height adjustable). 2) Sewing head (bag closer); sewing head for all paper and textile bags; heavy duty; self-lubricating; sealed in bearings and moving parts; two to four stitches per inch; Federal type 401; two thread stitch; $\frac{1}{2}$ h.p. sewing head motor with enclosed motor starter and take-up wheel; automatic thread cutter. 3) Sewing head pedestal; adjustable height-20" to 48"; horizontal movement to permit centering of needle over variable width bags; initiator for automatic start of sewing head when impulsed by moving bag. 4) Flat belt-bag sewing conveyor, oil resistant, 12" wide and approx. 88 in. long rubber coated belt; self cleaning "cage" type drive and tail pulley; speed reducer; chain drive to drive pulley; with bag guide vertically and horizontally adjustable, back mounted; with bag stop limit switch and conveyor restart switch activated by foot pedal which also activates sewing head. 5) Entire system unitized and connected for one man operation. Operable on 220 volt, 50 Hz., 1 phase. Complete with manufacturers 1 yr. operations replacement parts kit. <p><u>Preferred Brand:</u> Howe-Richardson Model "Unipak"</p> <p>Suppliers: Howe-Richardson Burrows Mercator Corporation</p>	1
25	Cylinder surge bin (see dwg's) local fabrication	1
26	Grader surge bin (see dwg's) local fabrication	1
27	Gravity surge bin (see dwg's) local fabrication	1

ITEM NO.	DESCRIPTION	NO. REQ'D
28	Treater surge bin (see dwg's) local fabrication	1
29	Bagger surge bin (see dwg's) local fabrication	1
30	Cleaner cyclones (see dwg's) local fabrication	2
31	Platform scale, portable, double beam type; 100 x ½ lb.; 1,000 lbs. capacity with counter poise weights (provided); open-type lever system; metal construction; corrosion resistant finish; with casters. <u>Preferred Brand:</u> Fairbanks-Morse No. 1180 Suppliers: Burrows Seedburo Mercator Corporation	2
32	Vacuum cleaner, heavy duty industrial type; cleaner with external filter and by-pass motor for dry or wet pickup; interchangeable and removable motor unit; complete with: a) carrier base b) 10 ft. of 2" hose with swivel sleeve c) 10 ft. of 2" extension hose d) nipple to connect extension to swivel hose e) curved handle for 2" hose f) 22" floor tool g) 15" flat crevice tool h) hand nozzle i) motor operable on 220 volt, 50 Hz., 1 phase <u>Preferred Brand:</u> Tornado Model 420 Suppliers: Burrows Seedburo	1
33	Blower, hand held. Complete with blower nozzle and 25 ft. extension cord. Operable on 220 volt, 50 Hz., 1 phase. <u>Preferred Brand:</u> Tornado Model 86C Suppliers: Burrows Seedburo	2
34	Bag holders. Adjustable to any height or width bag. Complete with six (6) replacement springs. <u>Preferred Brand:</u> Universal Bag Holder	6

ITEM NO.	DESCRIPTION	NO REQ'D.
35	<p>Bag conveyor, belt type, (17 ft. length) with capacity of 300 lbs. distributed load, 150 lb. unit load. Box type frame; 3 ply, grip belting 12" wide; belt speed approx. 50 ft. per minute; switch control (both ends) to start, stop and reverse belt direction; easily accessible pulley adjustments. Complete with undercarriage, drive and motor operable on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> Burrows "R" Series</p> <p>Suppliers: Burrows Seedburo</p>	1
36	<p>Platform bag truck; 4-wheels, rubber tires, two 10" x 3" wheels and two 8 x 2½" casters; steel frame with hardwood deck; heavy steel armored pockets, locked and bolted both ways; removable push handle (metal); load capacity of 3,500 pounds.</p> <p><u>Preferred Brand:</u> (none) To meet specifications</p> <p>Suppliers: Burrows Seedburo</p>	4
37	<p>Bag truck; 2-wheels, 9" diameter rubber tires; hardwood frame and handles; heavy weight iron nose with steel straps up handles; 10" nose length.</p> <p><u>Preferred Brand:</u> Minneapolis Type</p> <p>Suppliers: Burrows Seedburo</p>	4
38	<p>Warehouse platform scales; all steel welded construction-heavy duty structural steel frames and weigh-bridge; scale graduations by 100 lbs. on upper bar and to 100 lbs. by 1 lb. increments on lower bar; complete with weights to provide weighing capacity of 4400 lbs. (2 MT); platform size to be approx. 4 ft. x 4 ft. Complete with assembling directions and instructions for installing in shallow pit.</p> <p><u>Preferred Brand:</u> Winslow</p> <p>Suppliers: Burrows Seedburo</p>	1
39	<p>Dehumidifier, desiccant type; continuous duty, dual tower, solid adsorption dehumidifier; with capability of removing</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D.
	<p>100 lbs. water per 24 hours at inlet air temperature of 26.7°C (80°F) and 75% inlet humidity. Complete with humidistat and spare parts not to exceed \$200. Operational on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> Dryomatic Model 150</p> <p><u>Suppliers:</u> Air Flow Company Burrows Seedburo</p>	
40	<p>Air conditioners; 18,000 BTU's; through-the wall type; with high dehumidification capacity; operable on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> (none) To meet specifications</p> <p><u>Suppliers:</u> Local Purchase</p>	2
41	<p>Hygrothermograph; drum type, with 7 day clock. Approximate response time: Relative humidity - 2 min.; Temperature - 3 min. Complete with 500 weekly recording charts and special recording ink.</p> <p><u>Preferred Brand:</u> Bendix Model 594</p> <p><u>Suppliers:</u> Burrows Seedburo</p>	2
42	<p>Seed moisture tester; applicable to testing moisture content of: peanuts, corn, sorghum, rice, soybean and mungbean. Complete with charts for named crops. Operable on 220 volt, 50 Hz., 1 phase.</p> <p><u>Preferred Brand:</u> Steinlite Model 400-G Motomco Model 919</p> <p><u>Suppliers:</u> Seedburo Motomco</p>	1
43	<p>Heated air oven; temperature range to 218°C (425°F); minimum two inches of high density fiberglass insulation surrounding inner chamber (including door); air intake valves at both sides of chamber; metal damper on top of oven for control of air circulation; provision for mounting of thermometers to measure inside temperatures; all aluminum-clad steel interior (not painted); heavy gauge steel exterior; 3 shelves, 2 adjustable. Complete with replacement parts (at suppliers discretion) not to exceed \$50. Operable on 220 volt, 50 Hz., 1 phase.</p>	1

ITEM NO.	DESCRIPTION	NO. REQ'D.
	<u>Preferred Brand:</u> Cenco Stainless Steel Oven No. 262 Suppliers: Burrows Seedburo	
44	Seed Divider; all electric; height 20½", width 14"; wearing parts of heavy brass or copper, chrome plated throughout. Operable on 220 volt, 50 Hz., 1 phase.	1
	<u>Preferred Brand:</u> Gamet Precision Divider Suppliers: Burrows Seedburo	
45	Torsion balance scale; capacity 120g.; dial 1.0g. x .01g. graduations; readability 2 mg.; accuracy 5 mg. with polished steel scope, positive acting arrest, silicone fluid dash pots and metal case. Complete with weight set (50g. to 1 g.) in hinged box with forceps.	1
	<u>Preferred Brand:</u> Torsion Balance Scale Model DLM2-1 with Class "P" weight set Suppliers: Burrows Seedburo	
46	Gram scales; weigh beams calibrated as follows: (front) 10 x 0.1g.; (rear) 100 x 10g.; (center) 5,000 x 100g. Complete with scoop.	2
	<u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	
47	Dazor lamp; desk type, with two (2) 15 w. fluorescent tubes; reflector and adjustable multiposition arm. Complete with twelve (12) extra fluorescent tubes; operable on 220 volt, 50 Hz., 1 phase.	2
	<u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	
48	Seed test weight apparatus; hand held type, with beam call	1

ITEM NO.	DESCRIPTION	NO. REQ'D
	brations in Kg. 1 Hl; capacity 1 liter; complete with strike-off stick.	
	<u>Preferred Brand:</u> Burrows Model 328	
	Suppliers: Burrows Seedburo	
49	Germinator; approx. dimensions: 19" width x 12" depth x 20" height. Fully automatic with moisture pan and fresh air chamber; insulated rust proof cabinet and thermopane plexiglass door. Containing: four (4) Dur-Aluminum trays, dial thermometer, strip heaters. Operable on 220 volt, 50 Hz., 1 phase.	1
	<u>Preferred Brand:</u> Burrows Model 1880	
	Suppliers: Burrows Seedburo	
50	Bag trier; 39" length x 7/8" outside diameter, double tube with six openings.	3
	<u>Preferred Brand:</u> (none) To meet specifications	
	Suppliers: Burrows Seedburo	
51	Bag trier; 30" length x 1/2" outside diameter, double tube with nine openings.	3
	<u>Preferred Brand:</u> (none) To meet specifications	
	Suppliers: Burrows Seedburo	
52	Hand test screens; set of twenty-four (24) hand screens (9 x 9 inch) complete with screen rack. Screens to be sized as follows: Round Hole: 1/12, 6,7,8,9,11,12,14,16,18,20,22,24,30 Slotted: 1/20 x 1/2, 1/15 x 1/2, 1/14 x 1/2, 1/13 x 1/2, 1/12 x 1/2, 7 x 3/4, 8 x 3/4, 9 x 3/4, 10 x 3/4, 11 x 3/4	1
	<u>Preferred Brand:</u> (none) To meet specifications	
	Suppliers: Burrows Ferrell-Ross Seedburo	

ITEM NO.	DESCRIPTION	NO. REQ'D.
53	Forceps, nickel plated, 5½" long, medium serrated point. <u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	12
54	Forceps, nickel plated, 5" long, fine smooth point. <u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	12
55	Sample (grain) pan, triangular, heavy tin, dark blue enamel 10" x 10" x 2½". <u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	6
56	Sample (grain) pan, round tinfoil metal, 2 qt. capacity, 8 ¾" x 2 ¾". <u>Preferred Brand:</u> (none) To meet specifications Suppliers: Burrows Seedburo	6
57	Thermometers; general laboratory type; range -20 to 110°C.; length 305mm; subdivisions 1°C. <u>Preferred Brand:</u> (none) To meet specifications Suppliers: Sargent-Welch Scientific Products	12
58	Petri dishes, plastic, 6" diameter x 1" deep; with covers. <u>Preferred Brand:</u> (none) To meet specifications. Suppliers: Tri-State Plastics	50
59	Filter paper, 15.0cm. diameter; 100 sheets per pkg. <u>Preferred Brand:</u> Whatman No.1, Size "G" Suppliers: Sargent-Welch Scientific Products	10 pkgs.

ITEM NO.	DESCRIPTION	NO. REQ'D.
60	Sling psychrometer, complete with six (6) replacement thermometers and package of extra wicks. <u>Preferred Brand:</u> (none) <u>Suppliers:</u> Burrows Seedburo The Harry Alter Company	2
61	Seed Analyst Purity Workboard; 22" (length) x 11" (width) x 4" (height) with center drawer (1 qt. capacity). Operable on 220 volt, 50 Hz., 1 phase. <u>Preferred Brand:</u> Burrows No. 1838 <u>Suppliers:</u> Burrows Seedburo	1
62	Counting boards for large seed, 9-3/8" x 15"; for use with corn and soybeans. (100 seed) <u>Preferred Brand:</u> E.L. Erickson <u>Suppliers:</u> Erickson Burrows Seedburo	3

NOTE:-----Motors of 3/4 horsepower and less have been specified to be operable on 220 volt, 50 Hz., 1 phase current; motors of 1 horsepower and larger have been specified to be operable on 380 volts, 50 Hz., 3 phase current.

KHON KAEN
EQUIPMENT ELECTRICAL SPECIFICATION

ITEM NO.	DESCRIPTION	h.p.	MOTORS Voltage	Phase
2	heater-fan units (2)	7½ ea.	380	3
3	heater-fan unit	7½	380	3
4	auger (bin unloading)	¾	220	1
5	Tubular belt conveyor	7½	380	3
6	ear corn conveyor	½	220	1
7	ear corn sorting belt	---	---	---
8	corn sheller	15	380	3
9	elevator	¾	380	3
10	elevator	½	220	1
13	air screen cleaner	10	380	3
14	elevator	1/3	220	1
15	vibrating conveyor	3	380	3
16	cylinder separator	¾	220	1
17	elevator	1/3	220	1
18	precision grader (1)	½	220	1
	precision grader (1)	1/3	220	1
19	elevator	1/3	220	1
20	gravity table	10	380	3
21	elevator	1/3	220	1
22	seed treater	1/3	220	1
23	elevator	1/3	220	1
24	bagger-weigher (1)	½	220	1
	bagger-weigher (1)	¾	220	1
32	vacuum cleaner	1½	220	1
33	blower	¾	220	1
35	bag conveyor	¾	220	1
39	dehumidifiers	---	220	1
40	air conditioners (2)	-- ea.	220	1
----	miscellaneous	*(total)	30*	1

TRADE NAME INDEX

Companies listed are potential suppliers of the items shown in the "Equipment Specification List". Referenced items may be available from sources in addition to those listed.

Air Flow Company
Dryomatic Division
Montgomery County Airpark
Gaithersburg, Maryland 20760

Burrows Equipment Company
1316 Sherman Avenue
Evanston, Illinois 60204 U.S.A.

CEA - Carter Americas
500 Seventy-Third Avenue
N.E. Minneapolis, Minnesota 55432

E.L. Erickson Products
Brookings, S. Dakota 57006

Ehrsam Company
300 N. Cedar
Abilene, Kansas 67410

Ferrell-Ross
1621 Wheeler Street
Saginaw, Michigan 48601

Howe-Richardson Scale Company
680 Van Houten Avenue
Clifton, New Jersey 07000

Mercator Corporation
P.O. Box 142
Reading, Pennsylvania 19600

Oliver Mfg. Company
Rocky Ford, Colorado 81067

Reed Joseph Company
Highway One North
Greenville, Mississippi 38701

Sargent-Welch Scientific Company
5915 Peeler Street
Dallas, Texas 75235

American Drying Systems
1135 N.W. 159th Drive
Miami, Florida 33169 U.S.A.

Crippen Mfg. Company
Alma, Michigan 48801 U.S.A.

Hutchinson Division
Royal Industries
P.O. Box 33
Clay Center, Kansas 67432

Columbian Steel Tank Company
1509 West 12th Street
Kansas City, Missouri 64101

Campbell Industries
3121 Dean Avenue
Des Moines, Iowa 50317

Gustafson Mfg. Company
6600 S. County Road 18
Hopkins, Minnesota 55343

McMaster-Carr Supply Company
P.O. Box 4355
Chicago, Illinois 60680

Motomco, Inc.
89 Terminal Avenue
Clark, New Jersey 07066

Read Steel Products
906 North 40th Street
Birmingham, Alabama 35223

Seedburo Equipment Company
1022 West Jackson Boulevard
Chicago, Illinois 60607

Scientific Products
1210 Leon Place
Evanston, Illinois 60200

(Trade Name Index Continued)

The Harry Alter Company
2399 South Archer Avenue
Chicago, Illinois 60616 U.S.A.

Triple/S Dynamics
1033 South Haskell Avenue
Dallas, Texas 75223 U.S.A.

Tri-State Plastic Molding Company
P.O. Box 337
Henderson, Kentucky 42420 U.S.A.

Union Iron Works
600 East William Street
Decatur, Illinois 62525 U.S.A.

Universal Industries
516 Grand Boulevard
Cedar Falls, Iowa 50613 U.S.A.

ITINERARY & CONTACTS

13 November - 18 December, 1975

November 13 --	Leave State College, MS	0741 hrs.	So.332
	Arrive Memphis, TN	0815	
	Leave Memphis, TN	0915	UA 433
	Arrive Los Angeles, CA	1105	
	Leave Los Angeles, CA	1545	PA 3
November 14 --	Arrive Tokyo (Overnight Tokyo)	2205	
November 15 --	Leave Tokyo	1000	PA 3
	Arrive Hongkong	1335	
	Leave Hongkong	2330	PA 1
November 16 --	Arrive Bangkok	0210	
November 17 --	Bangkok - Meeting with Mr. D. Lundberg, Project Manager, USOM and Mr. W. Petcharat, Project Manager, DOAE to obtain background information and define assignment objectives.		
November 18 --	Bangkok - Meeting with Mr. Taweesak, Deputy Director General, DOAE and Mr. Petcharat to discuss assignment objectives and prepare itinerary.		
November 19 --	Bangkok - Meeting with Mr. Chaisap Sapsara, Chief, Crop Promotion Division -- DOAE to obtain additional background information		
November 20 --	Bangkok - Meeting with Ms. Margot Johnson, Ministry of Agriculture and Fisheries, New Lealand to discuss seed testing facilities to be constructed under the U.S. Seed Development Loan.		
November 21 --	Departed Bangkok 1130 hrs. arrived Khon Kaen 1900 hrs. Travel by RTG vehicle.		
November 22 --	Khon Kaen - Viewed proposed site location for Khon Kaen Seed Center; meeting with Mr. Nipan Prachantasen, Chief, Northeast (Khon Kaen) Seed Center; visited Kalasin Field Crop Experiment Station.		
November 23 --	Khon Kaen - Meeting with Dr. Kawee Jotikul, Dean of Agriculture, Khon Kaen University to discuss Seed Center land requirements; departed Khon Kaen 1230 hrs. arrived Bangkok 1830 hrs.		
November 24 --	Bangkok - Visited USOM; departed Bangkok 1400 hrs. arrived Phitsanulok 2030 hrs. Travel by RTG vehicle.		
November 25 --	Phitsanulok - Meeting with Mr. Tawee Pluemsab, Chief, Phitsanulok Seed Center; selected sites for new construction; prepared preliminary drawings of facilities to be constructed.		
November 26 --	Phitsanulok - departed 1400 hrs. arrived Chiang Mai 1930 hrs.		

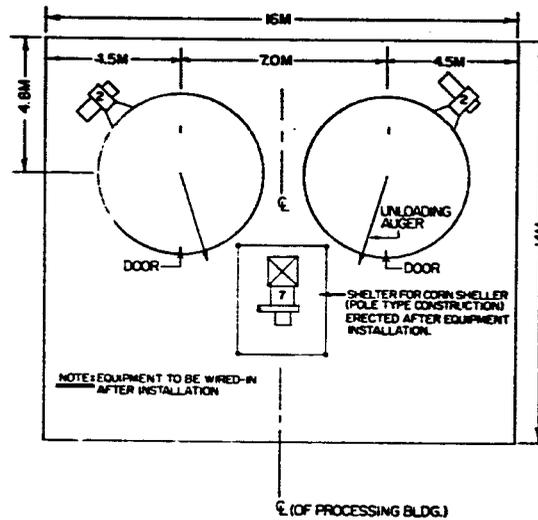
- November 27 -- Chiang Mai - Meeting with Mr. Boonyart Lumpaopong, Dean, Faculty of Agriculture, Chiang Mai University and Dr. M.D. Dawson, Project Consultant, Multiple Cropping Project, The Ford Foundation to discuss proposed Seed Center's activities and site location. Visited three locations under consideration as possible sites.
- November 28 -- Chiang Mai - departed Chiang Mai 0930 hrs. arrived Bangkok 2330 hrs. Travel by RTG Vehicle.
- November 29 -- Bangkok - preparation of designs for Phitsanulok Seed Facility.
- November 30 -- Bangkok - preparation of designs for Phitsanulok Seed Facility.
- December 1 -- Bangkok - preparation of designs for Phitsanulok Seed Facility; meeting with Mr. Chalong, Ministry Architect.
- December 2 -- Bangkok - visited Praphuttabat Field Crop Experiment Station (Suraburi) to observe corn drying-processing operation; preparation of Phitsanulok drawings.
- December 3 -- Bangkok - preparation of designs for Khon Kaen Seed Facility; meeting with Ministry architect.
- December 4 -- Bangkok - preparation of designs and equipment specifications for Phitsanulok and Khon Kaen Seed Facilities.
to
December 10
- December 11 -- Bangkok - visited USOM; meeting with Ministry architect; preparation of equipment specifications.
- December 12 -- Bangkok - preparation of equipment specifications.
- December 13 -- Bangkok - meeting with Mr. Panoo Satayavibul, DOAE to discuss facilities designed and equipment recommendations.
- December 14 -- Bangkok - preparation of Preliminary Report.
- December 15 -- Bangkok - meeting with Mr. D. Lundberg, Project Manager, USOM; preparations for departure.
- December 16 -- Bangkok - debriefing meetings with USOM and Ministry personnel.
- December 17 -- Leave Bangkok 0800 hrs. KE602
Arrive Hong Kong 1300
Leave Hong Kong 1830 PA830/008
Arrive Los Angeles 1500
- December 18 -- Leave Los Angeles 0900 hrs. AA250
Arrive Memphis 1500
Leave Memphis 1600 S0816
Arrive Miss. State 1800

APPENDIX 9

SEED FACILITY DRAWINGS

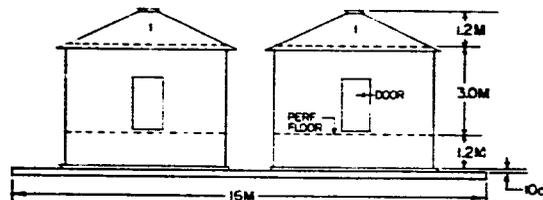
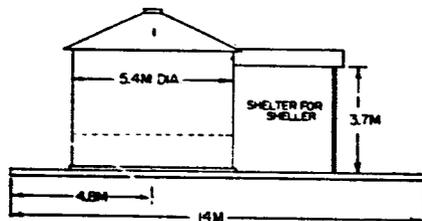
PHITSANULOK

BIN DRYING-CORN SHELLING FACILITY
SCALE = 1/80

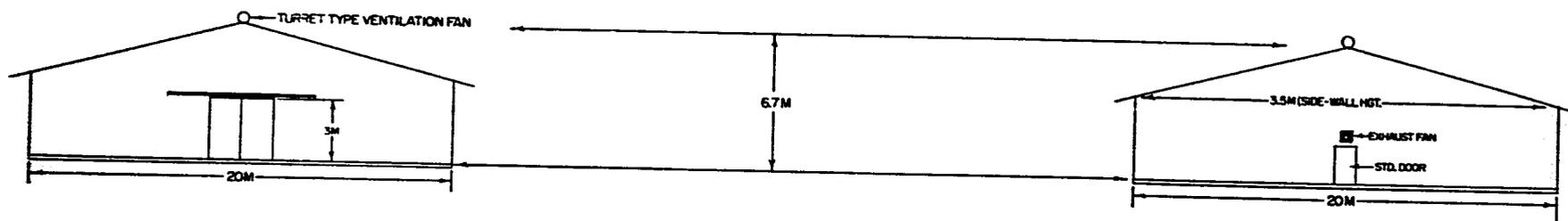
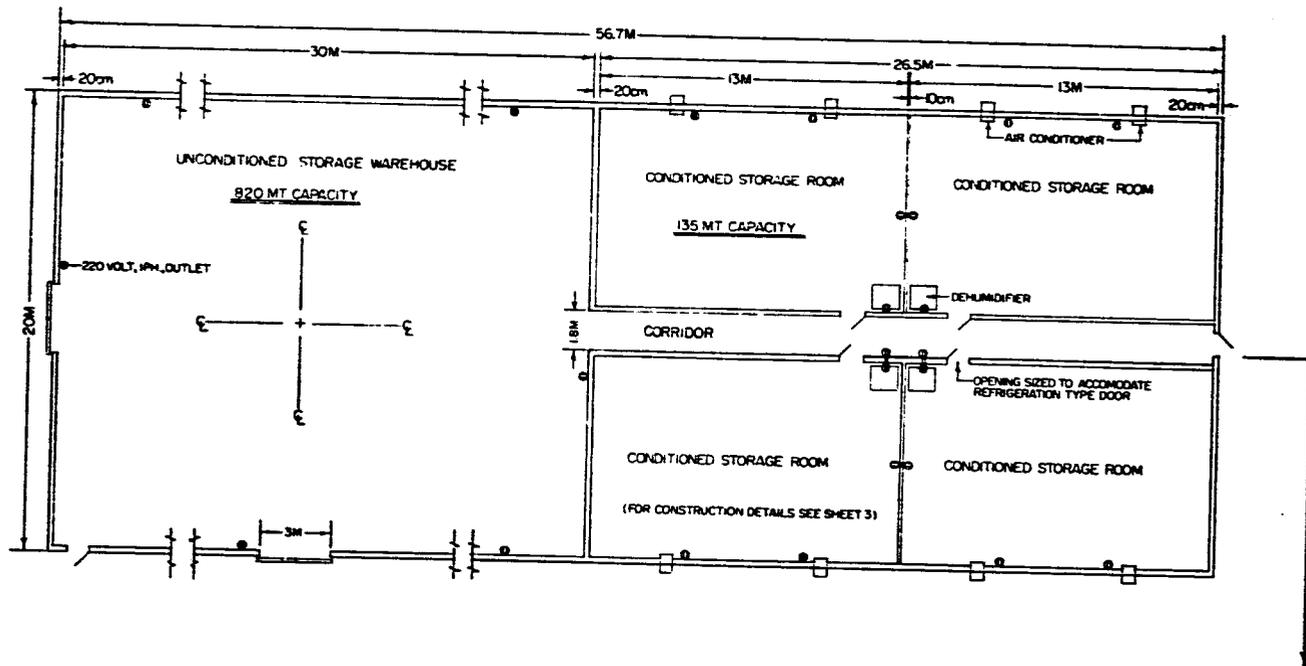


FOR LEGEND SEE "EQUIPMENT SPECIFICATIONS"
REPORT TA75-20

NOTE: FOR BIN FOUNDATION DETAILS SEE KHON KAEN
SEED CENTER DRAWINGS -- SHEET 12

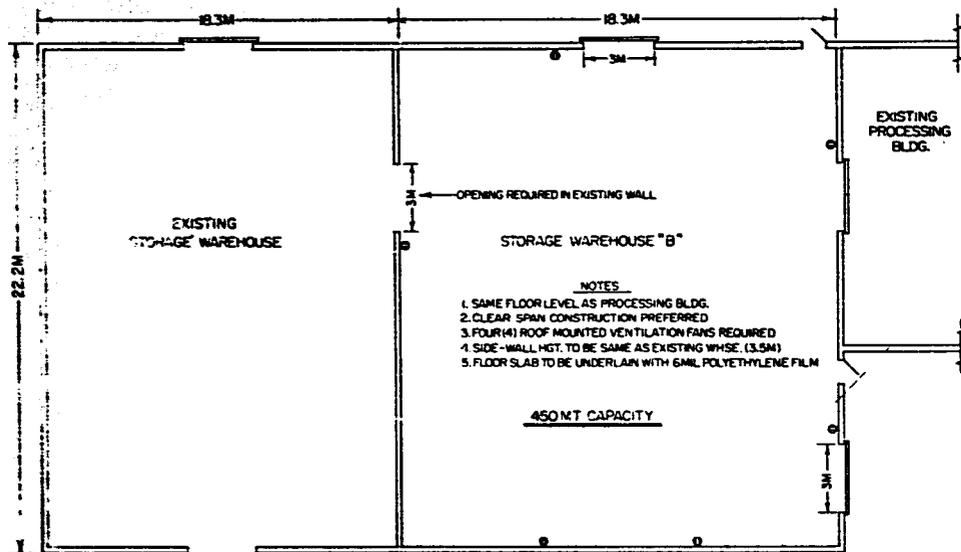


MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY <small>STATE COLLEGE, MISSISSIPPI</small>		
SEED FACILITY PHITSANULOK SEED CENTER PHITSANULOK, THAILAND		
DESIGNED BY: GMD	DATE: JANUARY, 1976	SHEET
DRAWN BY: GMD	FILE NO. TA 75-20	1 of 3
APPROVED BY: JCD		



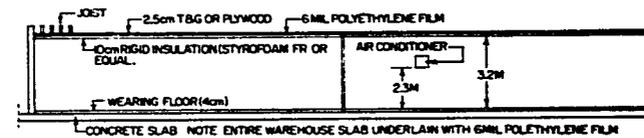
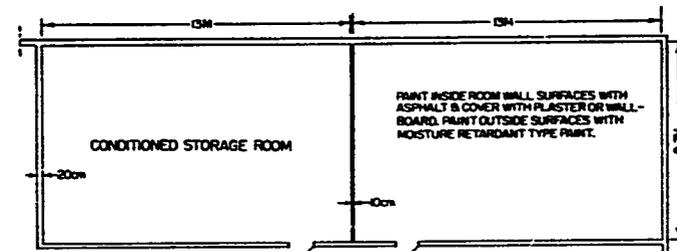
STORAGE WAREHOUSE "A"
SCALE = 1:100

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY PHITSANULOK SEED CENTER PHITSANULOK, THAILAND		
DESIGNED BY: GMD	DATE: JANUARY, 1976	SHEET 2 of 3
DRAWN BY: GMD	FILE NO. TA 75-20	
APPROVED BY: JCD		



STORAGE WAREHOUSE "B"
SCALE = 1:100

(DOAE CONSTRUCTION-NON-PROJECT)



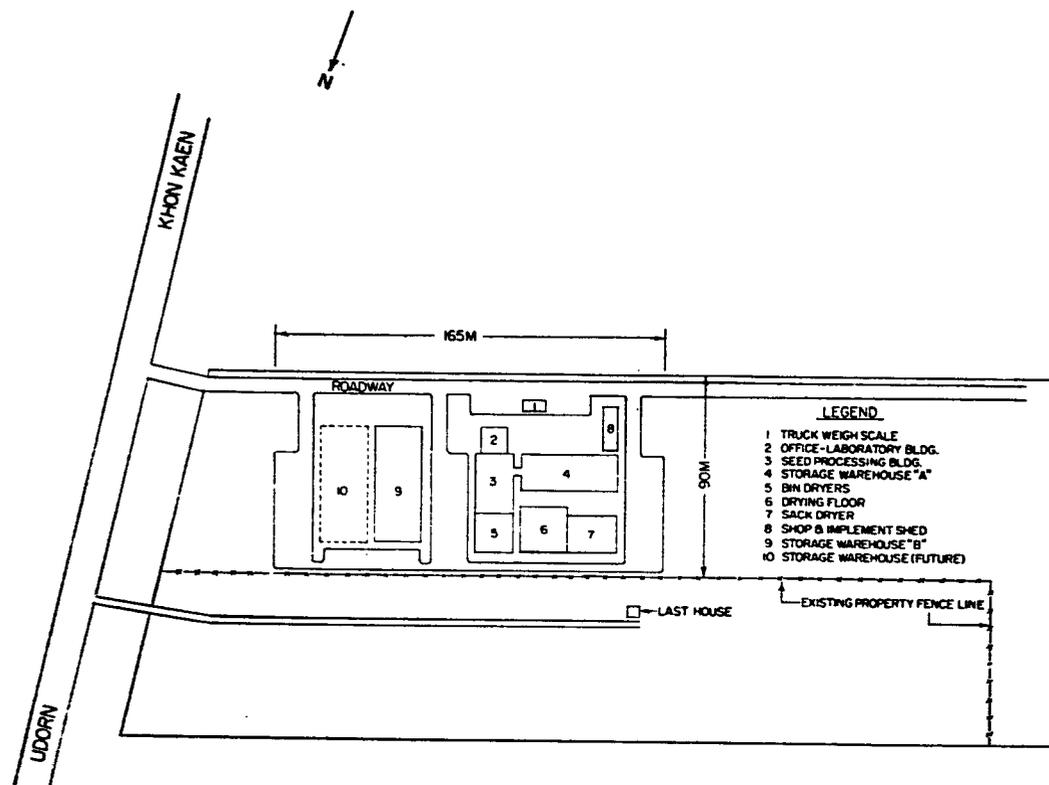
DETAILS--CONDITIONED STORAGE ROOMS (WHSE. "A")
NO SCALE

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY OSAGE COLLEGE, MISSISSIPPI		
SEED FACILITY PHITSANULOK SEED CENTER PHITSANULOK, THAILAND		
DESIGNED BY: GMD	DATE: JANUARY, 1976	SHEET
DRAWN BY: GMD	FILE NO. TA 75-20	3 of 3
APPROVED BY: JCD		

APPENDIX 10

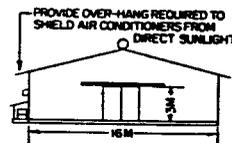
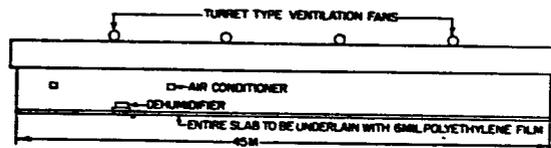
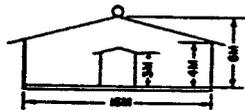
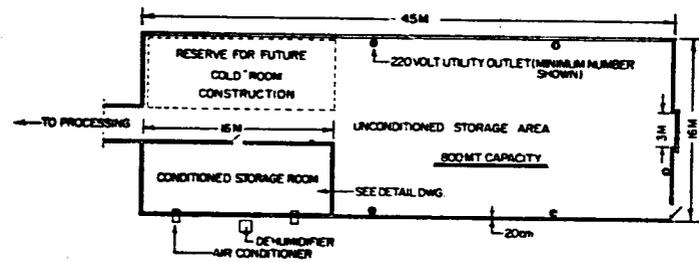
SEED FACILITY DRAWINGS

KHON KAEN



SCALE = 1:1000

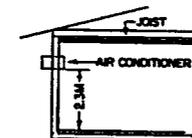
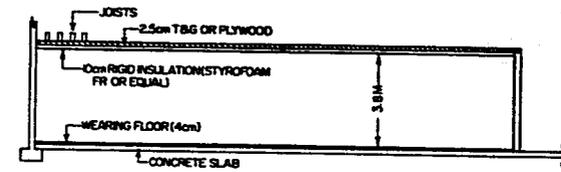
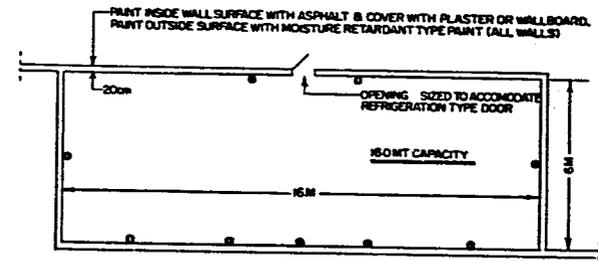
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY <small>STATE COLLEGE, MISSISSIPPI</small>		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA75-20	1 of 3
APPROVED BY: JCD		



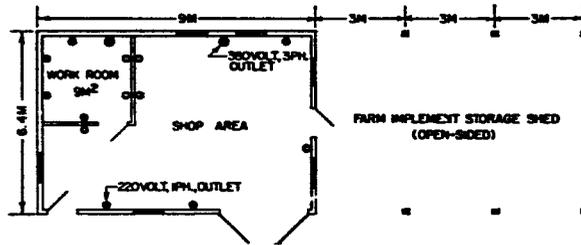
STORAGE WAREHOUSE "A"
SCALE = 1:200

DETAILS—CONDITIONED STORAGE ROOMS

(NO SCALE)

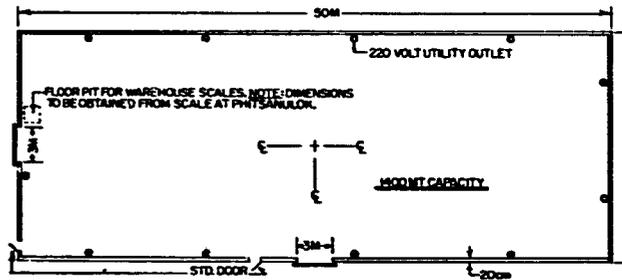
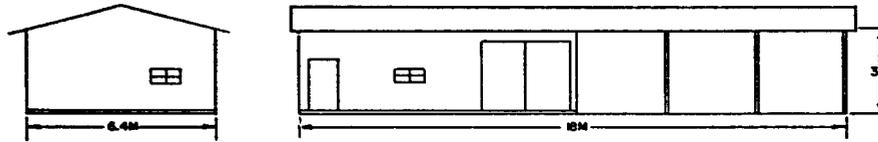


MISSISSIPPI STATE UNIVERSITY		
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION		
SEED TECHNOLOGY LABORATORY		
STATE COLLEGE, MISSISSIPPI		
SEED FACILITY		
KHON KAEN SEED CENTER		
KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	DRAWN BY: JCD
DESIGNED BY: GMD	FILE NO. TA 75-2	2 of 13
APPROVED BY: JCD		



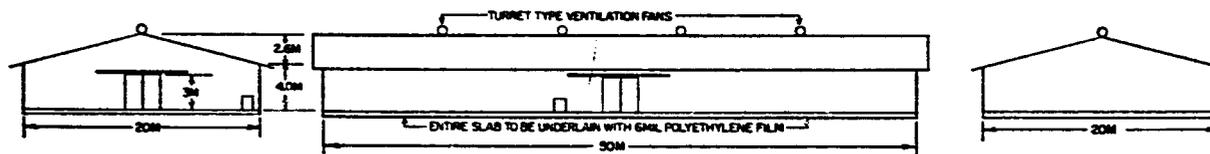
WORKSHOP & IMPLEMENT STORAGE SHED

SCALE = 1:80



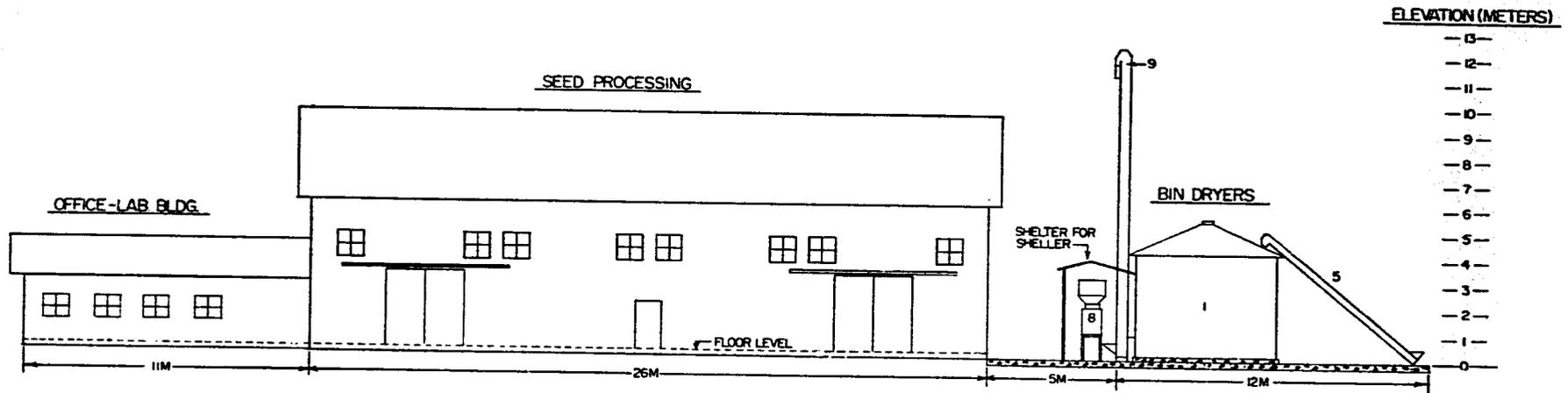
STORAGE WAREHOUSE "B"

SCALE = 1:200



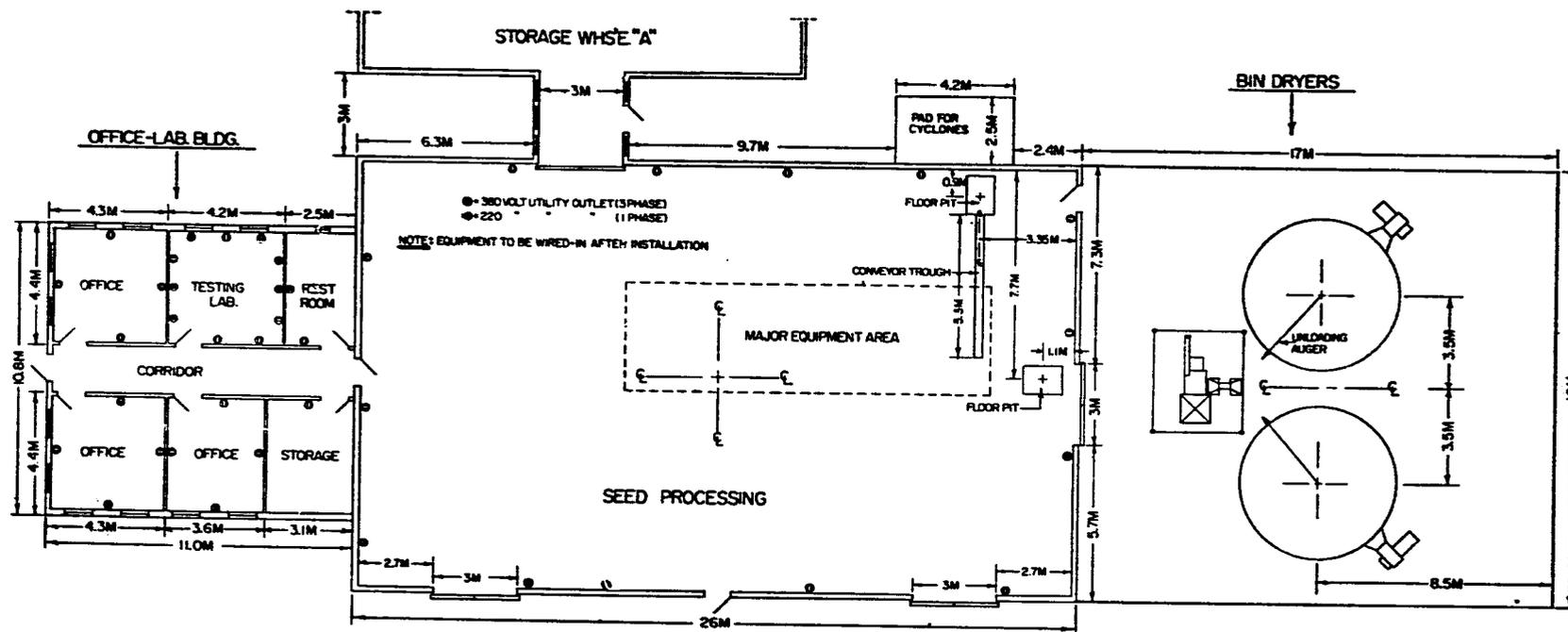
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY VERNER COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	DRAWN BY: GMD
APPROVED BY: JCD	FILE NO. TA75-20	SHEET 3 of 13

FOR LEGEND SEE "EQUIPMENT SPECIFICATIONS" REPORT TA75-20



SCALE = 1:80

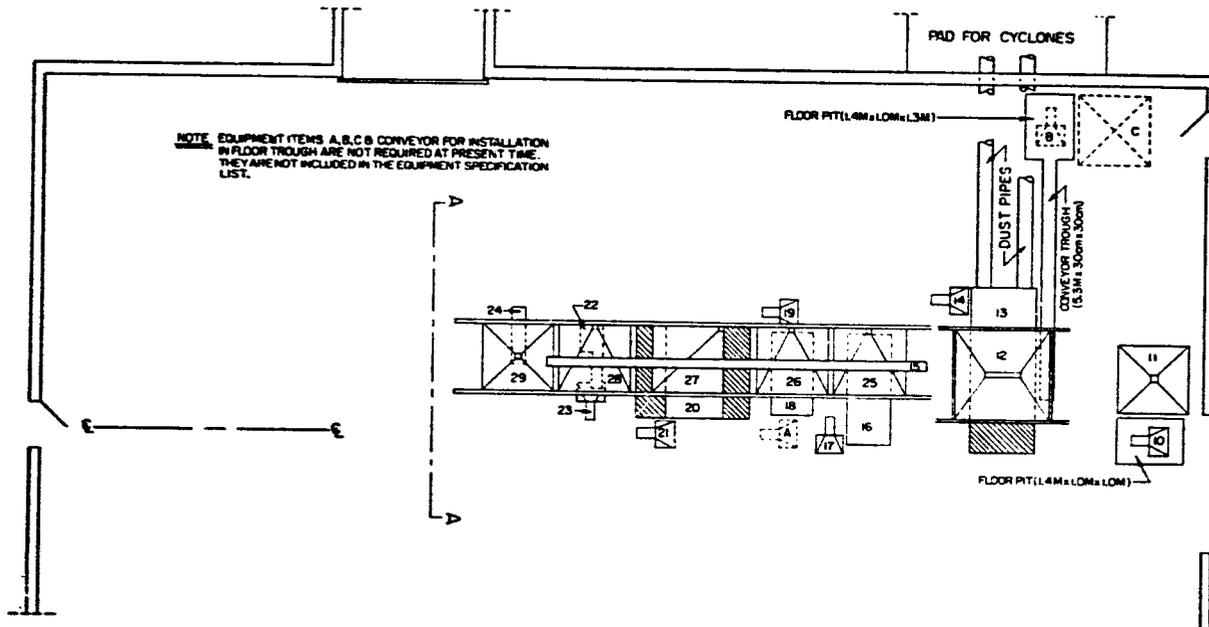
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA75-20	4 of 13
APPROVED BY: JCD		



SCALE = 1:80

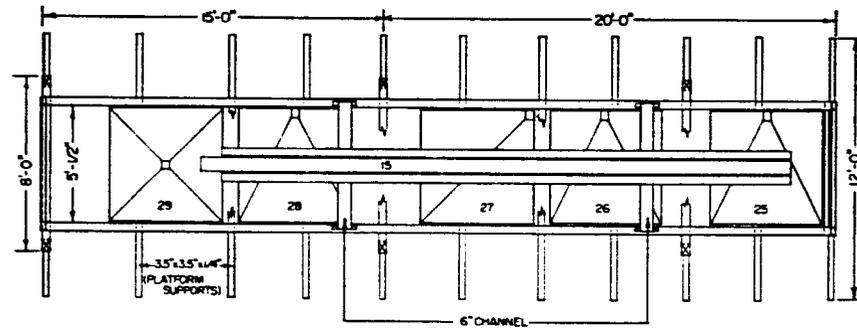
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	DRAWN BY: GMD
APPROVED BY: JCD	FILE NO. TA.75-20	SHEET 5 of 13

FOR LEGEND SEE "EQUIPMENT SPECIFICATIONS"
 REPORT TA75-20



SEED PROCESSING - EQUIPMENT LAYOUT
 SCALE = 1:50

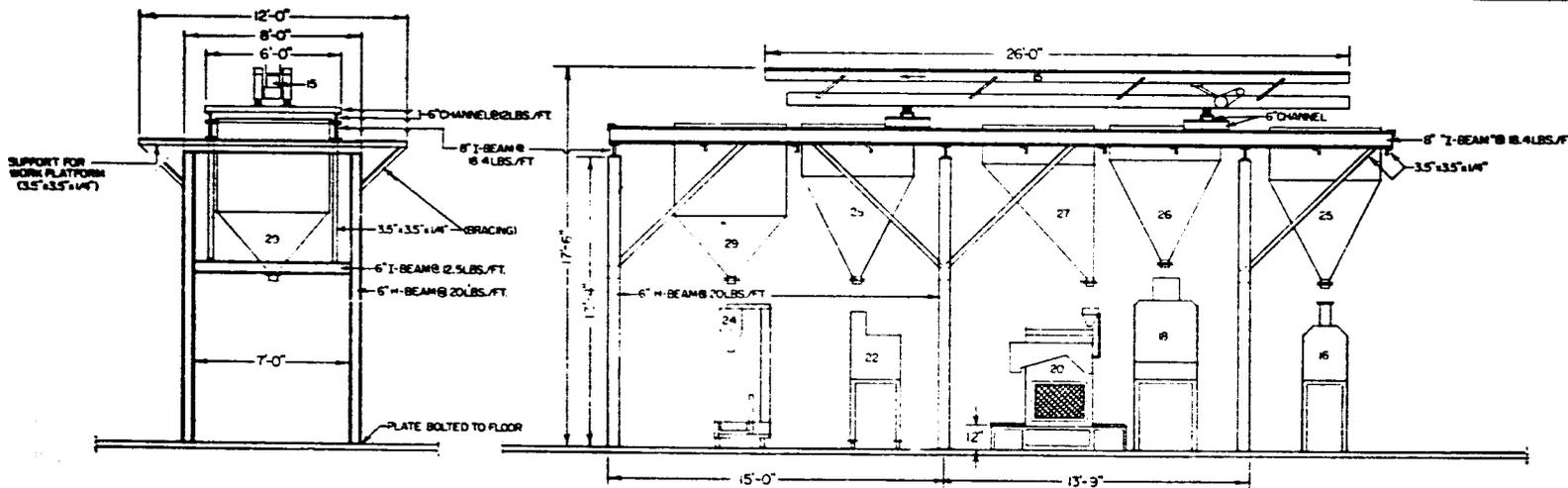
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA75-20	6 of 13
APPROVED BY: JCD		



PLAN

SUPPORT FRAMING FOR CONVEYOR (15) AND
SURGE BINS (25, 26, 27, 28, 29)

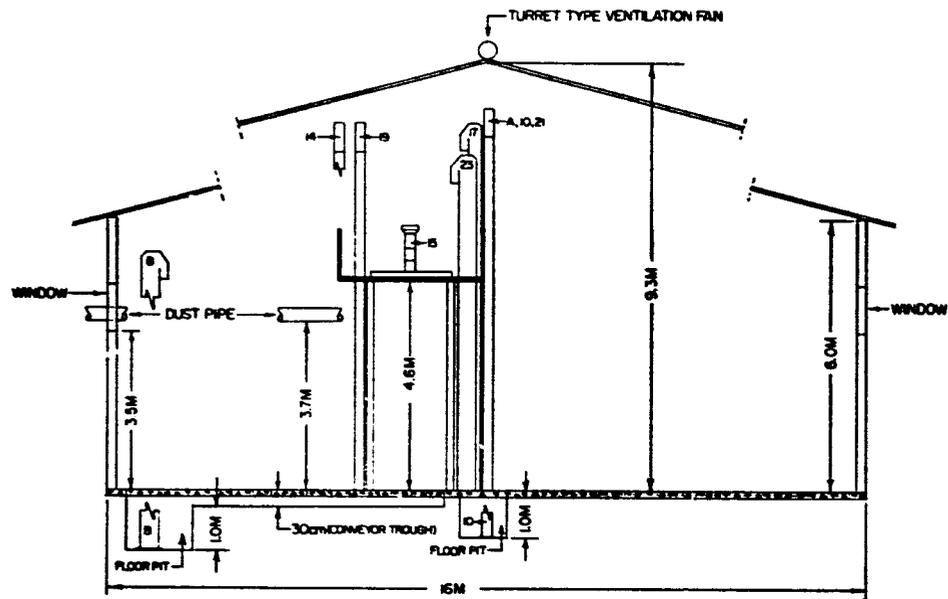
SCALE: 3/8" = 1'-0"



ELEVATION

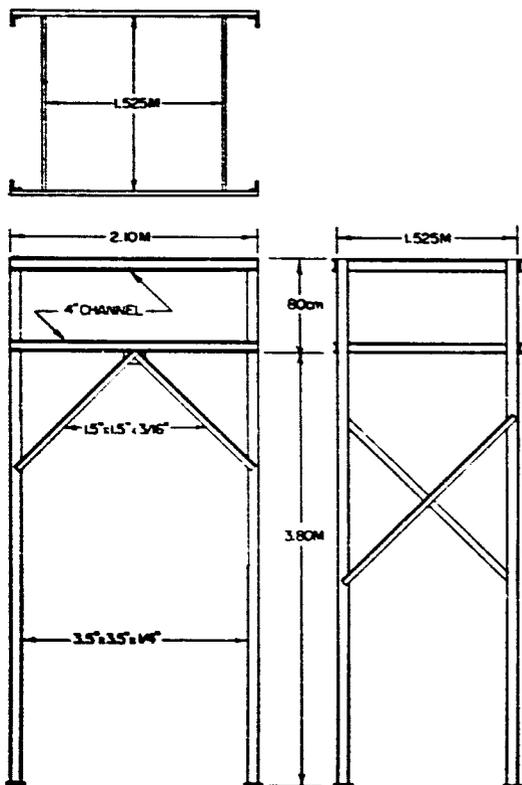
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD, GBW	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA 75-20	7 of 13
APPROVED BY: JCD		

FOR LEGEND SEE "EQUIPMENT SPECIFICATIONS" REPORT TA75-20

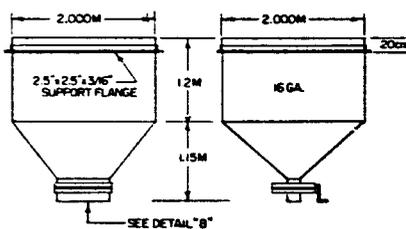
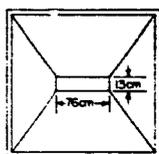


SECTION A-A
SCALE = 1/50

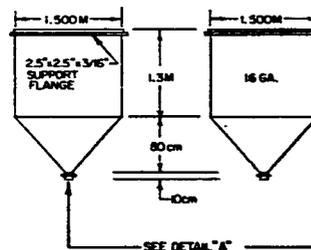
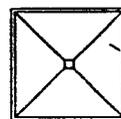
MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY <small>STATE COLLEGE, MISSISSIPPI</small>		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA 75-20	8 of 13
APPROVED BY: JCD		



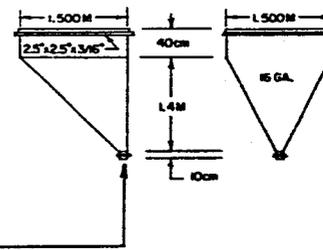
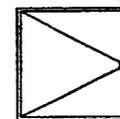
SUPPORT FRAME - BIN 11
SCALE = 1:20



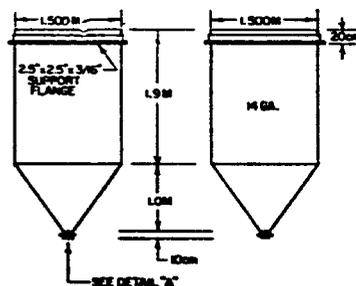
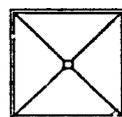
BIN 12



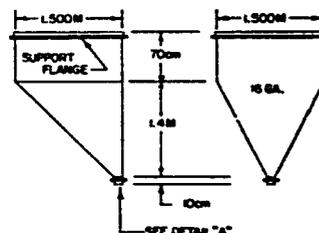
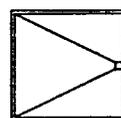
BIN 29



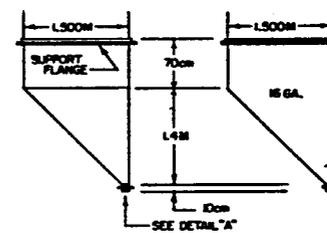
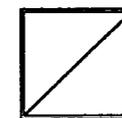
BIN 26



BIN 11



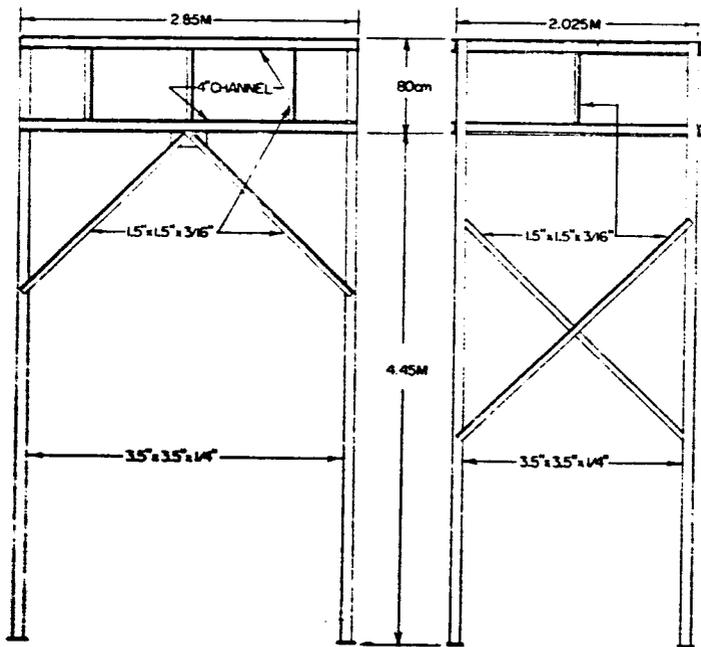
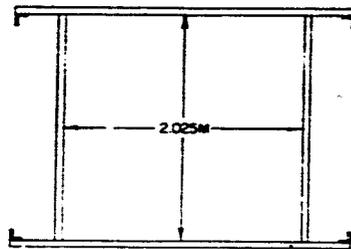
BIN 25 & 28



BIN 27

SURGE BINS
SCALE = 1: 33-1/3

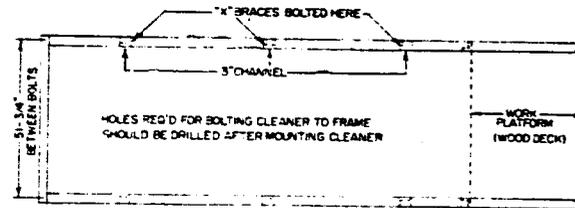
MISSISSIPPI STATE UNIVERSITY		
MISSISSIPPI AGRICULTURAL EXPERIMENT STATION		
SEED TECHNOLOGY LABORATORY		
STATE COLLEGE, MISSISSIPPI		
SEED FACILITY		
KHON KAEN SEED CENTER		
KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET 9 of 13
DRAWN BY: GMD	FILE NO. TA 75-20	
APPROVED BY: JCD		



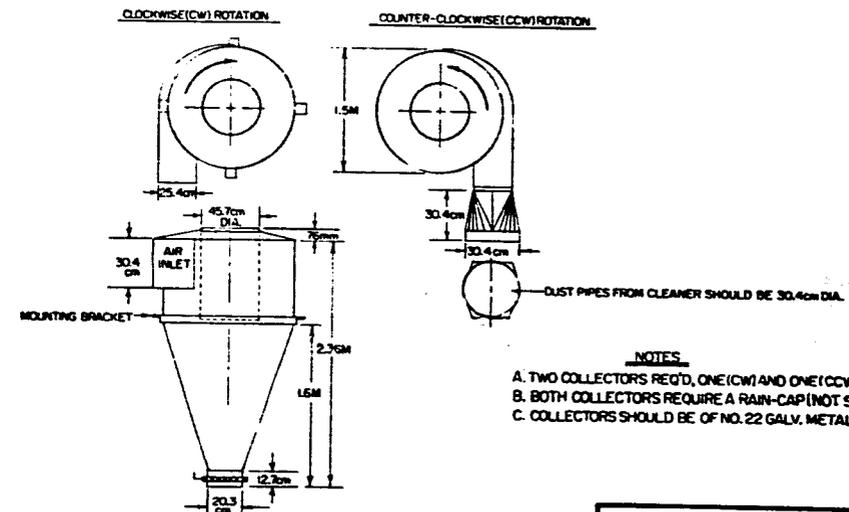
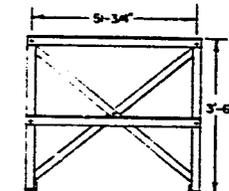
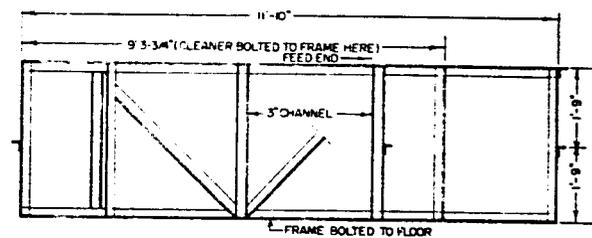
SUPPORT FRAME - BIN 12
SCALE = 1:20

FRAMING FOR H442 CLEANER

SCALE 3/4" = 1'-0"



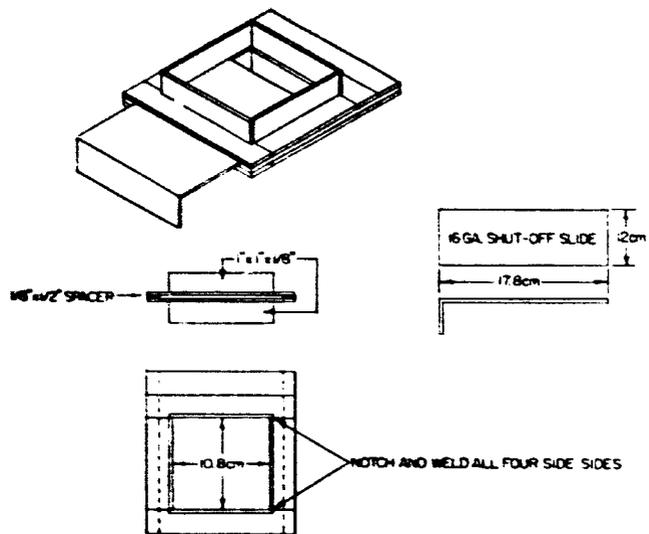
NOTE: FRAMING CONSTRUCTED OF 2.5\"/>



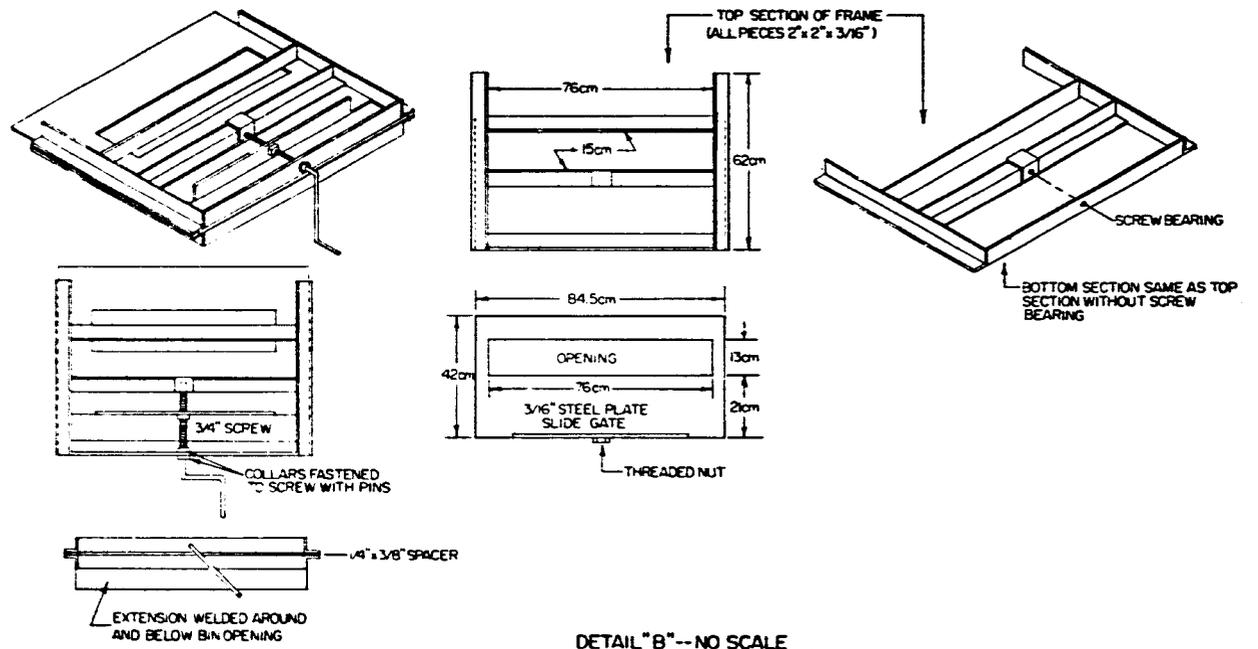
- NOTES**
- A. TWO COLLECTORS REQ'D, ONE (CW) AND ONE (CCW)
 - B. BOTH COLLECTORS REQUIRE A RAIN-CAP (NOT SHOWN)
 - C. COLLECTORS SHOULD BE OF NO. 22 GALV. METAL

DUST COLLECTOR (CYCLONE) FOR H442 CLEANER
NO SCALE

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY <small>STATE COLLEGE, MISSISSIPPI</small>		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD		10 of 13
APPROVED BY: JCD	FILE NO. TA 75-20	

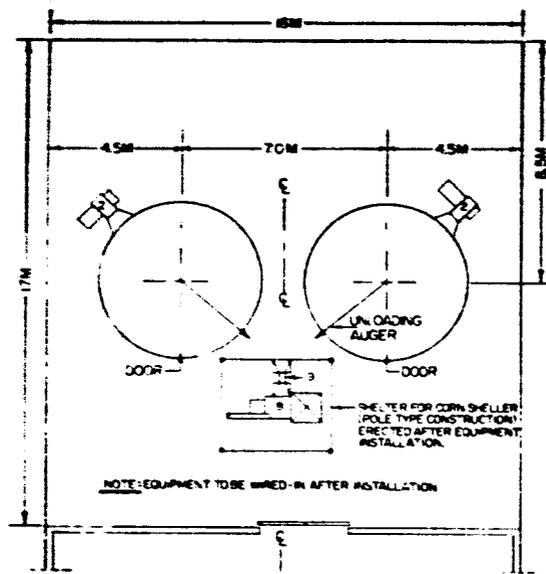


DETAIL "A"-- NO SCALE



DETAIL "B"-- NO SCALE

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD	FILE NO. TA 75-20	11 of 13
APPROVED BY: JCD		

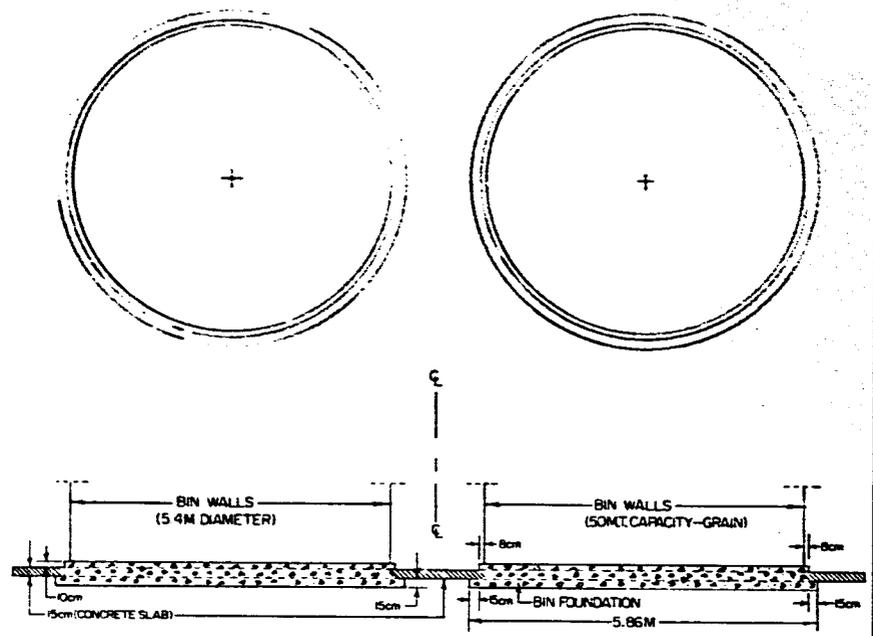


SEED PROCESSING

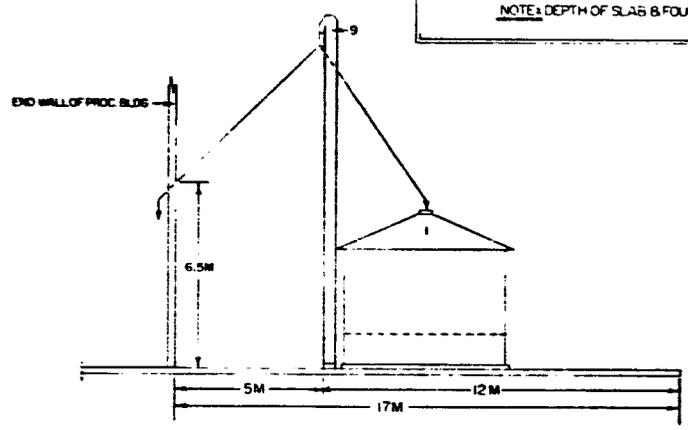
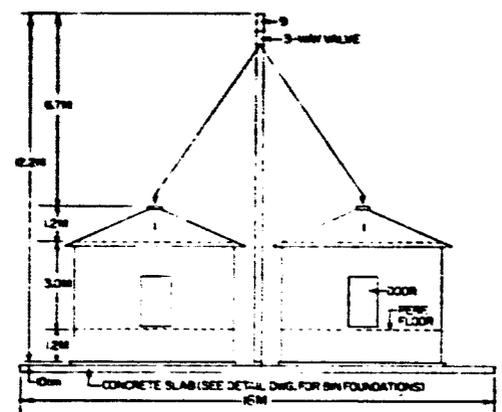
BIN DRYING-CORN SHELLING FACILITY
SCALE = 1:80

FOR LEGEND SEE "EQUIPMENT SPECIFICATIONS"
REPORT TA75-20

BIN FOUNDATIONS --- DETAILS
SCALE = 1:40

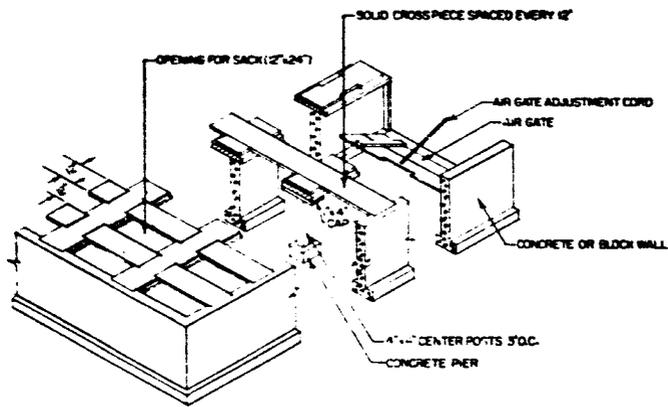


NOTE: DEPTH OF SLAB & FOUNDATIONS WILL DEPEND ON SOIL CHARACTERISTICS

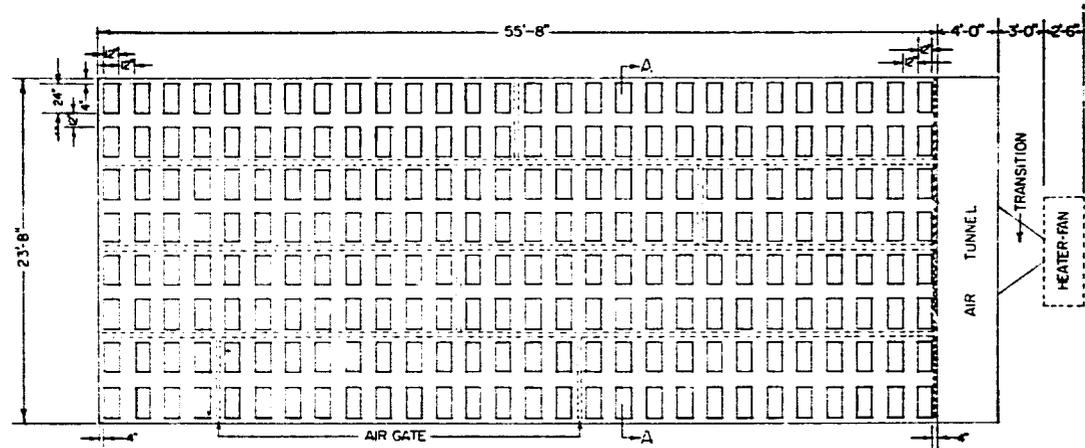


MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET
DRAWN BY: GMD		12 of 13
APPROVED BY: JCD	FILE NO. TA75-20	

NOTE: HEATER-FAN END OF DRYER SHOULD FACE TOWARD THE DRYING FLOOR--DWG. 1

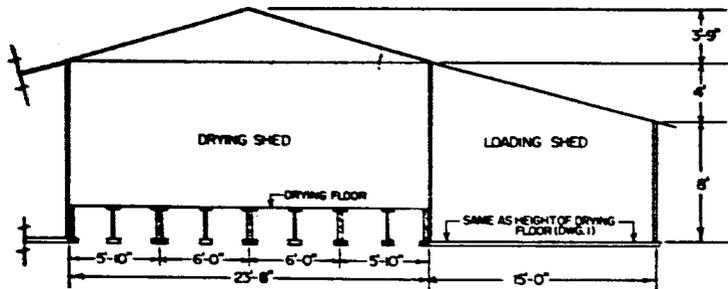


CONSTRUCTION DETAILS
NO SCALE

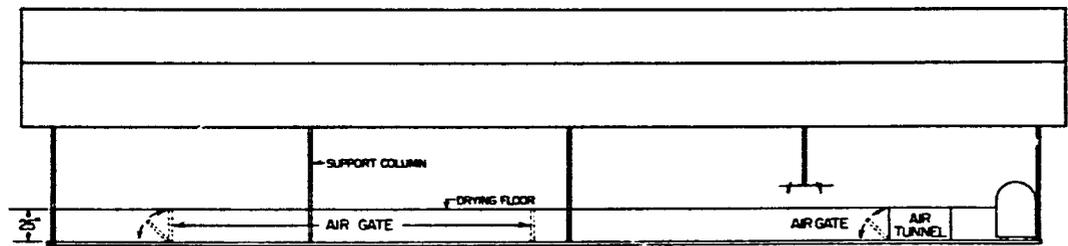


PLAN
SCALE 1/4" = 1'-0"

TUNNEL-TYPE (SACK) SEED DRYER
224 BAGS



SECTION A-A



SIDE ELEVATION

MISSISSIPPI STATE UNIVERSITY MISSISSIPPI AGRICULTURAL EXPERIMENT STATION SEED TECHNOLOGY LABORATORY STATE COLLEGE, MISSISSIPPI		
SEED FACILITY KHON KAEN SEED CENTER KHON KAEN, THAILAND		
DESIGNED BY: GMD	DATE: DECEMBER, 1975	SHEET 13 of 13
DRAWN BY: GMD	FILE NO. TA 75-20	
APPROVED BY: JCD		